

BOILER
ROOM
SUPPLIES

M
A
T
T

M
A
R
S
H
A
L
L
&

C
O
M
P
A
N
Y

INDUSTRIAL
SUPPLIES

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS

MATT MARSHALL & COMPANY

BOILER & BURNER—SALES & SERVICE

Interstate Hwy. 85-S, Exit 120—Mail Route 7, Box 170

Phone (919) 292-8477

NC Toll Free 1-800-632-1274

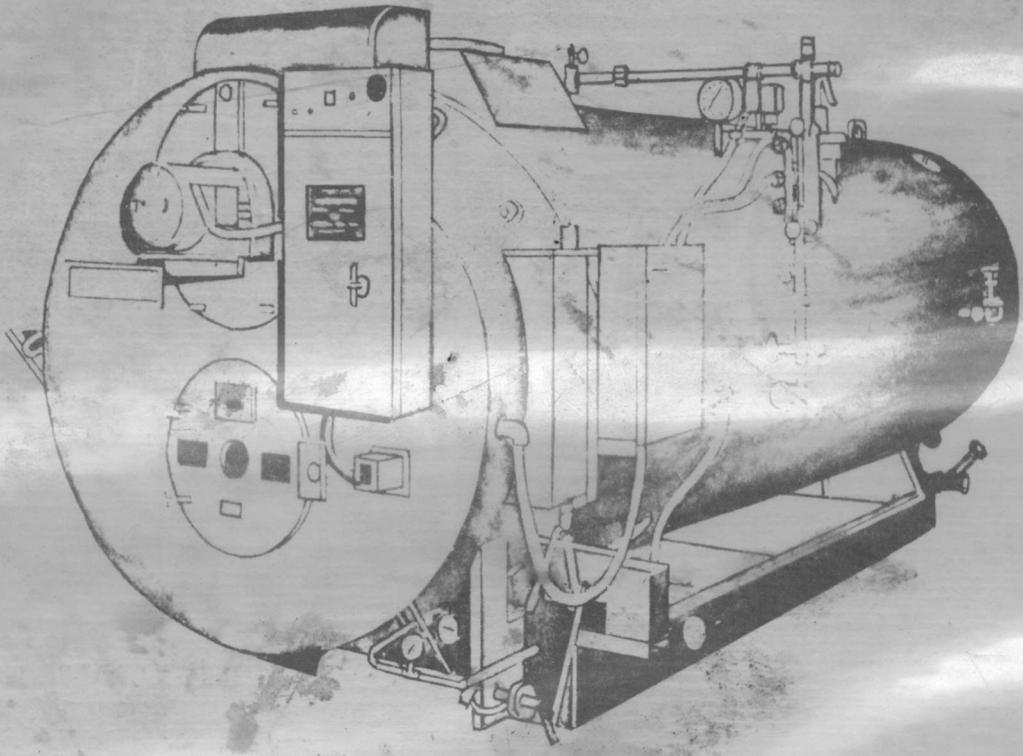
Outside NC Toll Free 1-800-845-6073

Greensboro, North Carolina 27407-9799



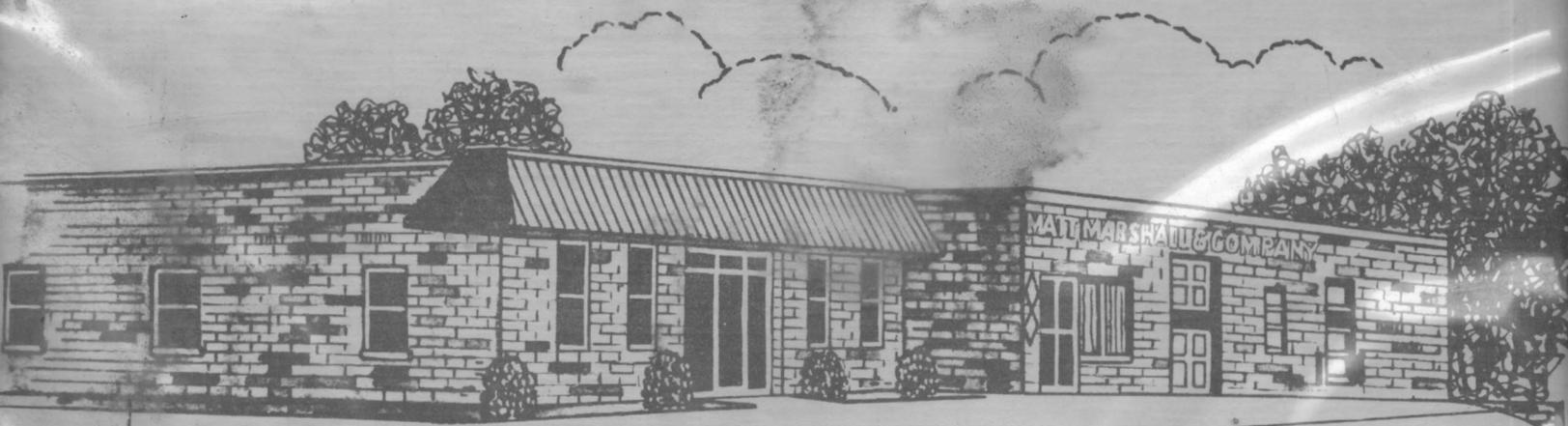
I
N
D
U
S
T
R
I
A
L

E
Q
U
I
P
M
E
N
T



S
U
P
P
L
I
E
S

P
A
R
T
S



— Serving Industry Since 1954 —

Steam Specialties

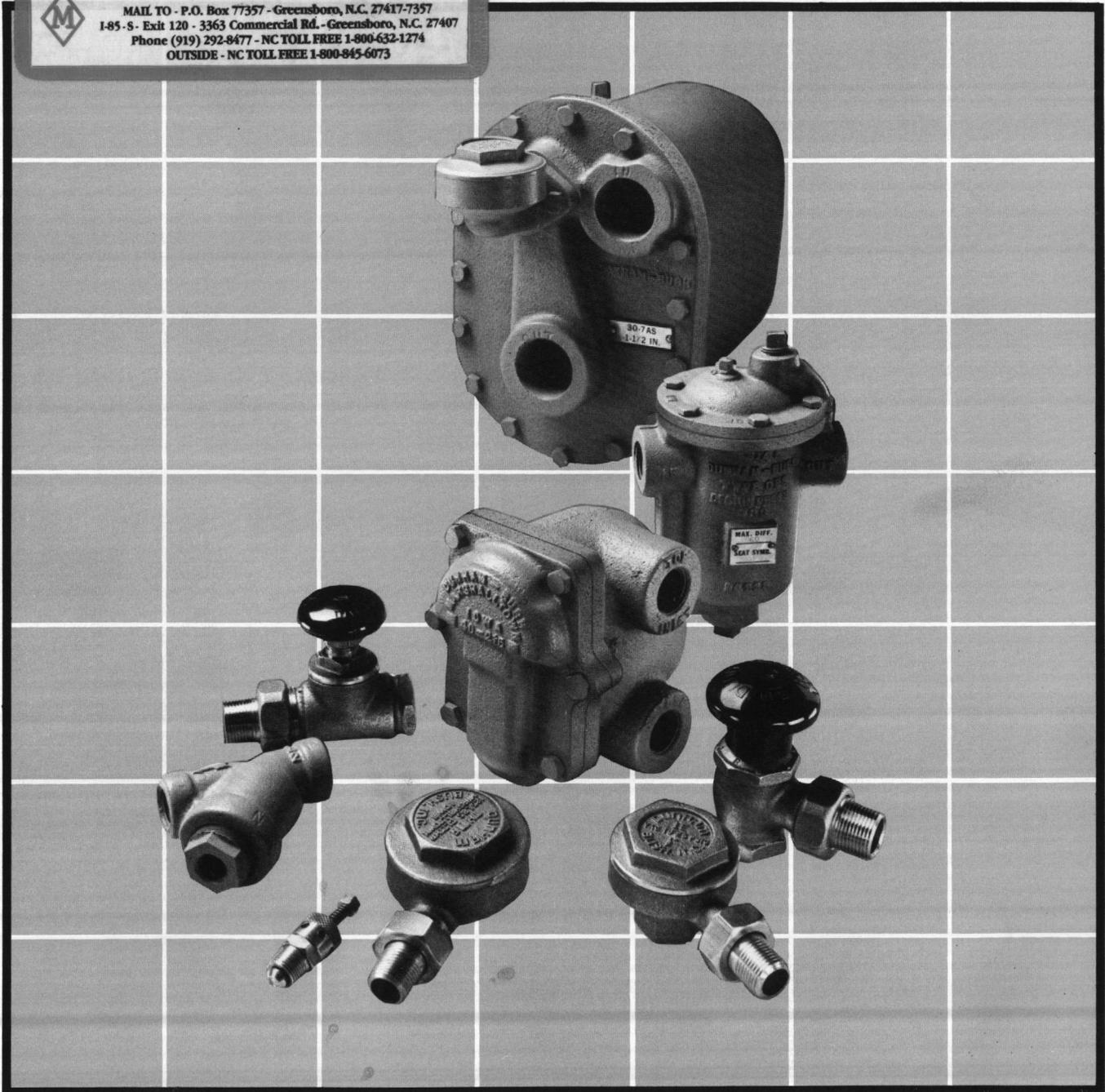
by Dunham-Bush

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



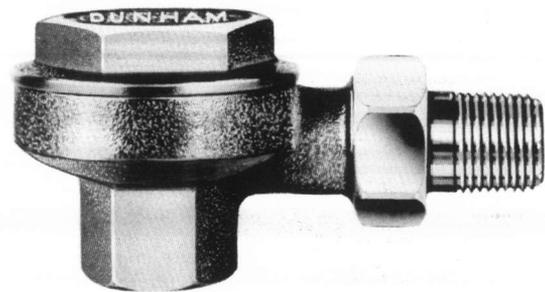
Radiator Traps · Float & Thermostatic Traps · Radiator Valves · Medium & High Pressure Traps · Strainers · Vacuum Breakers

DUNHAM-BUSH
DUNHAM DIVISION

Products That Perform...By People W/ho Care

RADIATOR TRAPS

Over 85 years ago, C. A. Dunham developed the first commercially successful fluid-filled thermostatic radiator trap. Since that time, Dunham-Bush, Inc. has manufactured well over 8 million traps. Today, in hundreds of thousands of installations from coast to coast, Dunham-Bush quality traps are delivering dependable, long-lasting, low maintenance service so essential to efficient heating systems. Dunham-Bush Traps efficiently drain condensate, vent air from steam equipment and prevent the flow of steam to return piping with a simple ruggedly constructed unit that requires minimum maintenance.



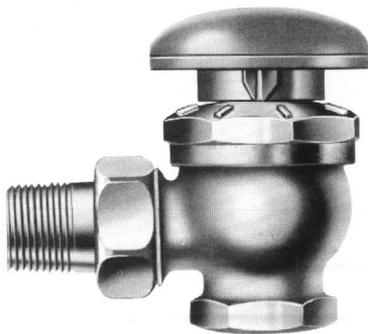
Low Pressure Thermostatic Traps

Low Pressure Thermostatic Traps are applicable for pressures from 25" Hg vacuum to 25 PSI, and capacities to 700 EDR. With a cast brass body and cover, non-corrosive working parts, and thermostatic discs that have been tested to over 10 million cycles, these traps set industry standards for

dependability. Our seats are guaranteed for 25 years, with large seat openings to prevent clogging. Stop shoulder construction of disc permits individual calibration for correct operation and field interchangeability without field adjustment. Volatile fluid in disc is sealed

under a high vacuum to provide uniform expansion over the entire operating range. Available in five patterns (AP, SW, LH, RH, VS): sizes 1/2", 3/4", and 1" with either integral or replaceable seats. **Refer to File No. 1505.**

RADIATOR VALVES



1240

The 1240 Packless Valve is applicable to both hot water and steam heating systems from 25" Hg vacuum to 125 PSI. It can also be applied to water systems up to 125 PSI. Our highest quality valve, the 1240 has a unique design utilizing primary and secondary levers of high tensile noncorrosive alloys to insure trouble free operation. The 1240 Packless Valve opens and closes in less than one turn and is equipped with an indicating dial. Available in two patterns (AP and ST): sizes 1/2" and 3/4".

Refer to File No. 1527.



740A

The 740A Radiator Valve is applicable to water systems as well as steam at operating pressures from 25" Hg to 150 PSI. This radiator valve has a one piece formed solid packing held in place by a heavy coil spring to assure a tight seal around the valve stem. Referred to in the industry as packless, the 740A opens and closes in less than one turn and is equipped with 'On' and 'Off' dial arrows and easy to use dial divisions for adjustment. Available in four patterns (AP, RH, LH, ST): sizes 1/2" through 1-1/2". **Refer to File No. 1522.**



600A

The 600A Radiator Valve is applicable for steam or water systems up to 125 PSI operating pressures. Proven in over 40 years of service, the 600A is your best buy for quality at an inexpensive price. A heavy packing nut and a one piece formed solid packing keeps a tight seal around the valve stem. The 600A opens and closes without binding allowing for exceptionally free drainage of water. Available in two patterns (AP & ST): sizes 1/2" through 2". **Refer to File No. 1526.**

INDUSTRIAL STEAM TRAPS



High Pressure Thermostatic Traps

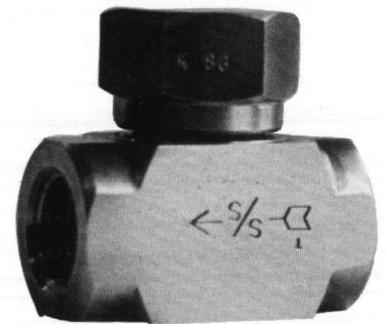
High Pressure Traps are similar in construction to the low pressure radiator trap. With swivel type stainless steel renewable seat, this trap is especially designed for high pressure service. Stop shoulder disc construction allows ease of field replacement if required. Operating pressures range from 5 to 125 PSI. Available in two patterns (AP & SW): sizes 1/2", 3/4" and 1".

Refer to File No. 1506.



Bucket Traps

Bucket Traps are applicable for pressures up to 200 pounds. With inlet and outlet connections at the same level, installation is simplified. These traps feature renewable and interchangeable valve and seats constructed of hardened corrosion-resisting steel, positive opening action, and easy to inspect working parts. Available in sizes 1/2" through 1-1/4". Trap construction for 250 PSI. **Refer to File No. 1508.**



Thermodynamic Disc Trap

The compact, self-draining Thermodynamic Disc Trap is designed for high pressure applications such as tracer lines, steam line drips, steam jacketed fittings and pumps, small press platens, laundry and dry cleaning presses and similar condensate load service. All stainless steel constructed traps are available in four sizes (3/8", 1/2", 3/4", and 1") with 3/4" and 1" sizes for light process loads.

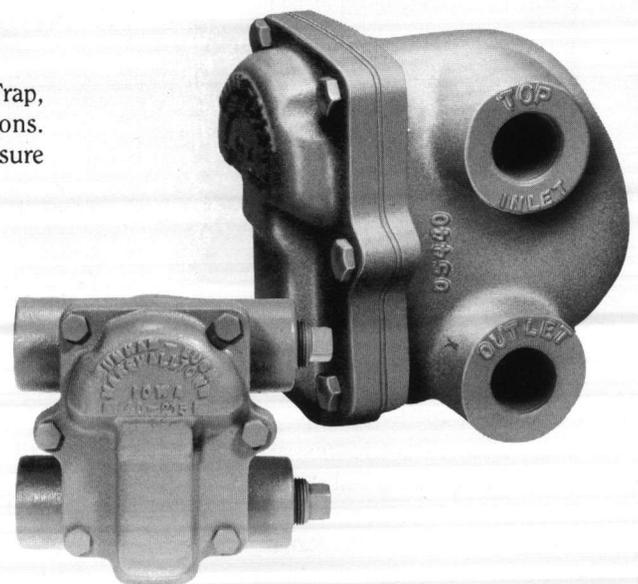
Refer to File No. 1519.

Float and Thermostatic Traps

Combining the advantages of the Float Trap and the Thermostatic Trap, these traps come in a wide range of pressures for numerous applications. Heavy duty construction and quality engineered valves and seats assure performance and trouble free operation.

Refer to File No. 1510, 1511, 1512 & 1513.

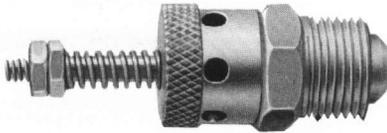
The Dunham-Bush Double Inlet/Double Outlet F & T Trap (Series 44) is applicable to all types of steam heating systems and steam process equipment where straight through piping is required. These traps can be piped in and out from either side depending on your particular needs. These traps operate efficiently with pressures up to 15 lbs. for low pressure applications and up to 125 PSI for higher pressure applications. Available in four sizes (3/4", 1", 1-1/4", and 1-1/2") for handling capacities of 340 to 4,075 lbs. of condensate per hour. **Refer to File No 1514.**



SPECIALTIES

Vacuum Breaker

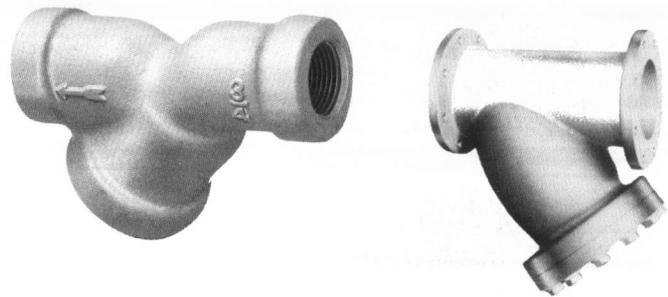
The Dunham-Bush Vacuum Breaker is a simple device which provides a positive means of relieving or "breaking" a vacuum at a predetermined setting. They are designed to prevent damage caused by a vacuum such as: freezing coils, collapse of steam jackets and damage caused by water hammer. The maximum operating pressure is 65 pounds. Set by the factory at 2" Hg of vacuum, the vacuum breakers may be field adjusted from 1" to 28" Hg of vacuum. **Refer to File No. 1529.**



Strainers

Strainers protect traps, valves, heating elements, and piping from dirt and scale. The Dunham-Bush Strainers feature a sieve formed from perforated brass, SST or monel which has been designed for ease of removal for cleaning. Operating in pressures up to 250 PSI (SSA strainer) and 125 PSI (flanged "Y" strainer). These strainers are available in sizes 1/2" through 2" with threaded connections and 2-1/2" through 8" in the flanged model.

Refer to File Nos. 1534 and 1535 (Flanged Type "Y" Strainer).



SPECIAL CUSTOMER NEEDS

In an effort to meet our customers' most special needs, the Manufacturer is well equipped with trained, experienced personnel to help with even the most special of design and application needs. Built-in design flexibility and personalized manufacturing attention to each product makes our complete line of steam heating equipment the perfect choice for your new or retrofit situation . . . whatever the circumstance.

Contact Dunham-Bush for more details and application assistance . . . today

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



DUNHAM DIVISION
Products That Perform...By People Who Care

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1581B © 1989, Copyright Dunham-Bush, Inc. (6/89)

Printed in U.S.A.

Heating Pumps

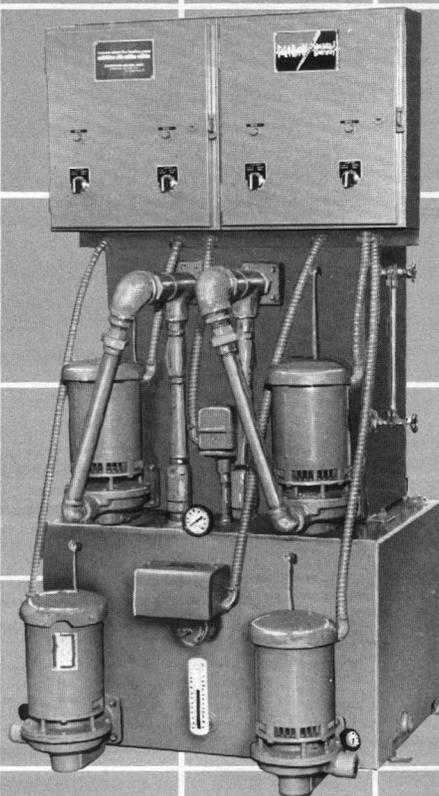
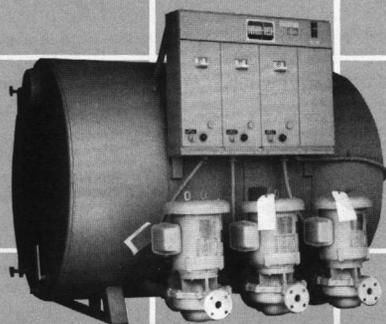
by Dunham-Bush

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

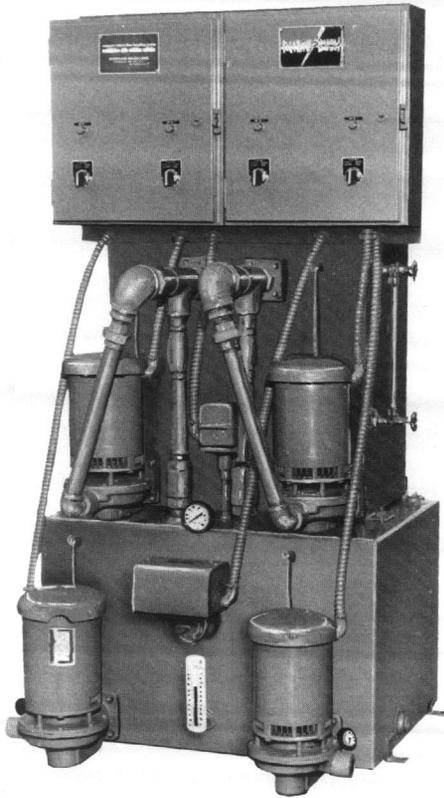


DUNHAM-BUSH
DUNHAM DIVISION

Products That Perform...By People Who Care

Condensate Pumps

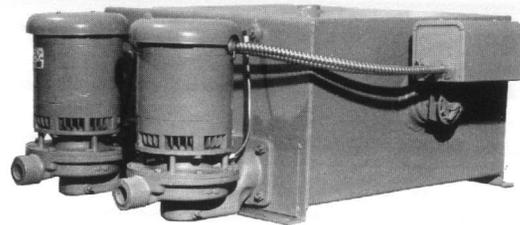
Controlled by the demands of a tank mounted float control device, Dunham-Bush Condensate Pumps are compact, complete assemblies for returning water from atmospheric heating systems, boiler feed systems, low pressure steam process equipment or from any combination. These pumps lift condensate from extremely low to high return lines. Use of these pumps can account for impressive fuel savings by returning hot condensate to the boiler or boiler feed pump instead of wasting it to the sewer, thus reducing the amount of make-up water required and minimizing difficulties from boiler encrustation.



Vacuum Pumps

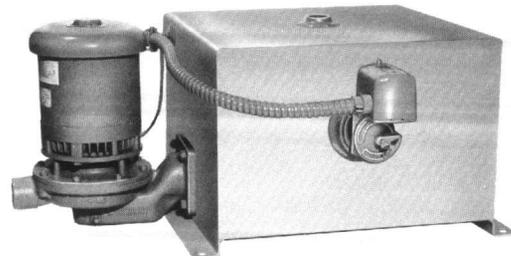
MODEL E2

The Dunham-Bush Model E2 Vacuum Pump is the heart of a steam heating system. For either new construction or retrofitting of older systems, the rapid removal of air from the system speeds warm-up times while reducing fuel consumption. Over 80 years of design background and production expertise, along with complete factory testing of each unit in all aspects including its ability to pull 25 inches of vacuum assures product quality and dependability. The pump features Dunham-Bush designed 3450 RPM centrifugal pumps, jet-type exhausters, heavy gauge copper bearing steel receivers with a ten year warranty, and comes complete with electrical controls and necessary accessories. The Model E Vacuum Pump is manufactured in single, duplex and semi-duplex configurations in capacities ranging from 5000 EDR (7.5 GPM) through 65000 EDR (97.5 GPM). Independence of condensate and hurling tanks offers great flexibility of design. CFM and GPM can be specifically suited to individual job requirements. Optional high temperature limiting equipment is available to meet even hostile operating conditions (160°+). **Refer to Form No. 1407.**



MODEL CRV

The Dunham-Bush Model CRV Condensate Pump is offered in single and duplex configurations in capacities ranging from 2000 EDR to 50000 EDR (3 GPM to 75 GPM) in pressures from 10 through 70 PSI at both 3450 and 1750 RPM. Standard tank sizes are 24, 33 and 44 gallons with 70 and 100 gallon optional sizes available. Standard thickness of tank is 10 gauge. Optional material thicknesses on available tanks are 3/16", 1/4" and 3/8". A wide variety of accessories from customized control panels to isolation valves are factory available with this model. The Model CRV is also offered as an AWCRV boiler feed model. **Refer to Form No. 1437.**



MODEL CHV

The Dunham-Bush Model CHV Condensate Pump is furnished in single and duplex configurations for capacities from 6000 EDR to 10000 EDR (9 GPM to 15 GPM) in pressures of 20 and 30 PSI at 3450 RPM. Tank sizes available are 10 and 16 gallons. Standard thickness of tanks is 10 gauge, with optional thicknesses of 1/4" and 3/8". This pump is factory stocked, and is especially designed to answer standardized needs. **Refer to Form No. 1426.**

Boiler Feed Pumps

Controlled by the demands of the Boiler Water Level Controller, the Dunham-Bush complete line of Boiler Feed Pumps are fully equipped units designed to efficiently return hot condensate and make-up water. They may be used on low and medium pressure atmospheric heating systems, steam process equipment, or combinations of both. Their use often permits increasing the usable heated space in a building by allowing the installation of radiation below the boiler water level. Performing many of the same functions of a condensate pump, these pumps additionally provide increased storage ability and automatic make-up response to meet boiler water demands. Dunham-Bush Boiler Feed Pumps are offered in an economy model (described at right) and a complete premium line in three configurations (described below).



MODEL AWCHVS

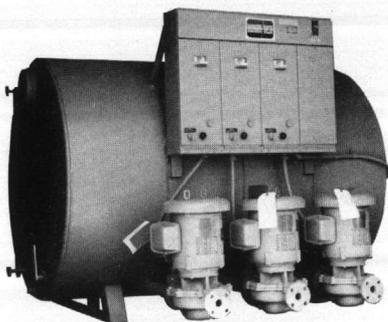
The Dunham-Bush Model AWCHVS is comprised of a receiver, water make-up circuit and close-coupled centrifugal pump. Offered in either single or duplex, four standard models cover 6000 EDR through 30000 EDR (9 GPM to 45 GPM) in 20 and 30 PSI. Standard tank sizes are 94, 150, 225 and 300 gallons. **Refer to Form No. 1428.**

Premium Boiler Feed Line

The Dunham-Bush line of premium Boiler Feed Pumps features models to meet all combinations of space and temperature requirements (as described below). As standard these pumps are fully equipped with water level and temperature gauges, isolation valve and suction strainers, low water cut-off protection and electrical panel for the control of all pump functions. Covering EDRs ranging from 10000 to 200000 (15 GPM to 200 GPM), in pressures from 10 to 75 PSI, these pumps are offered with 9 standard tank sizes from 94 to 1500 gallons and can be equipped with a wide variety of options to meet most any condition or application.

MODEL AWLCH

The Dunham-Bush Model AWLCH is the most popular of the boiler feed line. An elevated tank in an L configuration gives free discharge piping opportunities. This pump is especially applicable where temperature rather than space requirements is of concern. **Refer to Form No. 1410.**

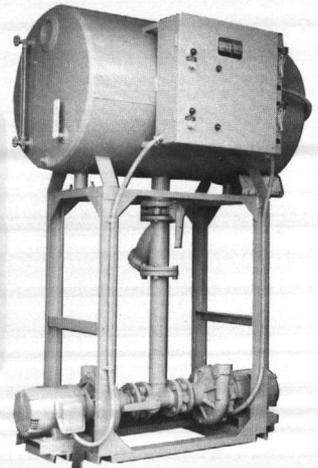


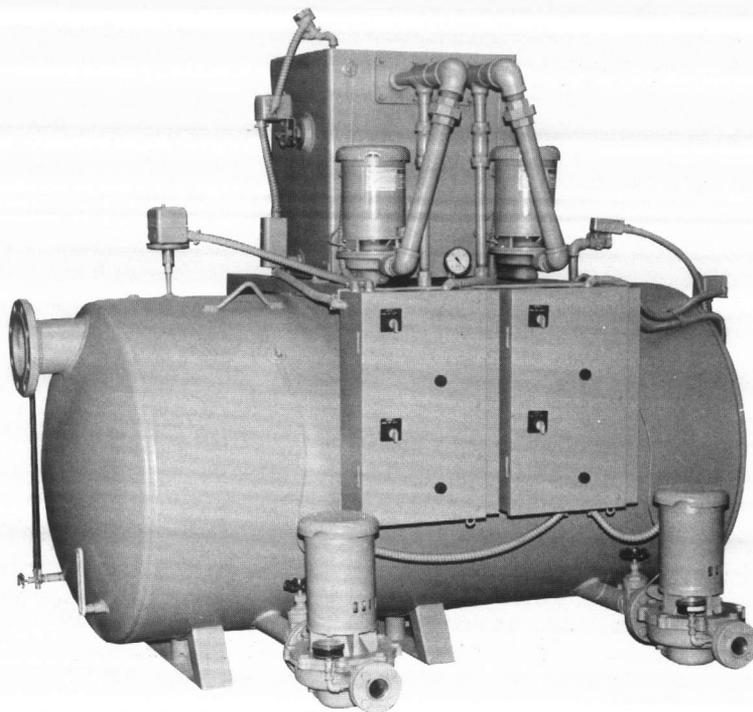
MODEL AWPCH

The Dunham-Bush Model AWPCH is especially designed for those applications where height is of concern. Its low profile configuration lends itself to space problem solutions. **Refer to Form No. 1412.**

MODEL AWICH

The Dunham-Bush Model AWICH is especially designed for applications where temperature and space are of concern. An elevated tank in an I configuration with the pumps tucked within the tank silhouette helps with the handling of high temperature condensate while saving boiler room floor space. **Refer to Form No. 1411.**





Boiler Feed/Vacuum Pumps

MODEL AWVR

The Dunham-Bush AWVR Boiler Feed/Vacuum Pump is a compact unit that functions both as a vacuum pump and as a boiler feed pump. Its design makes it an ideal choice for retrofit situations involving small capacity boilers while saving precious boiler room space. The pump features Dunham-Bush designed centrifugal pumps, heavy gauge copper bearing steel receivers, and is shipped complete with all necessary electrical controls and accessories including water level gauges, thermometers, isolation valves, high temperature limit switch and high water alarm contact. All standard AWVR are duplex (two air pumps - two condensate pumps). However, simplex, triplex and an unlimited variety of optional air and condensate pump configurations are available. Offered in standard capacities of 10000 EDR through 60000 EDR (5 GPM to 60 GPM) in pressures from 10 to 40 PSI, these pumps offer the design flexibility to be custom built for most special capacity applications and space requirement conditions. **Refer to Form No. 1413.**

Special Customer Needs

In an effort to meet our customers most special needs, the Marshalltown facility of Dunham-Bush, Inc. is well equipped with trained, experienced personnel to help with even the most special of design and application needs. Built-in design flexibility and personalized manufacturing attention to each unit makes our complete line of heating pumps the perfect choice for your new or retrofit situation . . . whatever the situation.

Contact Dunham-Bush for more details and application assistance . . . today



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1481B © Copyright, 1988 Dunham-Bush, Inc.

Printed in U.S.A.

Centrifugal Pumps

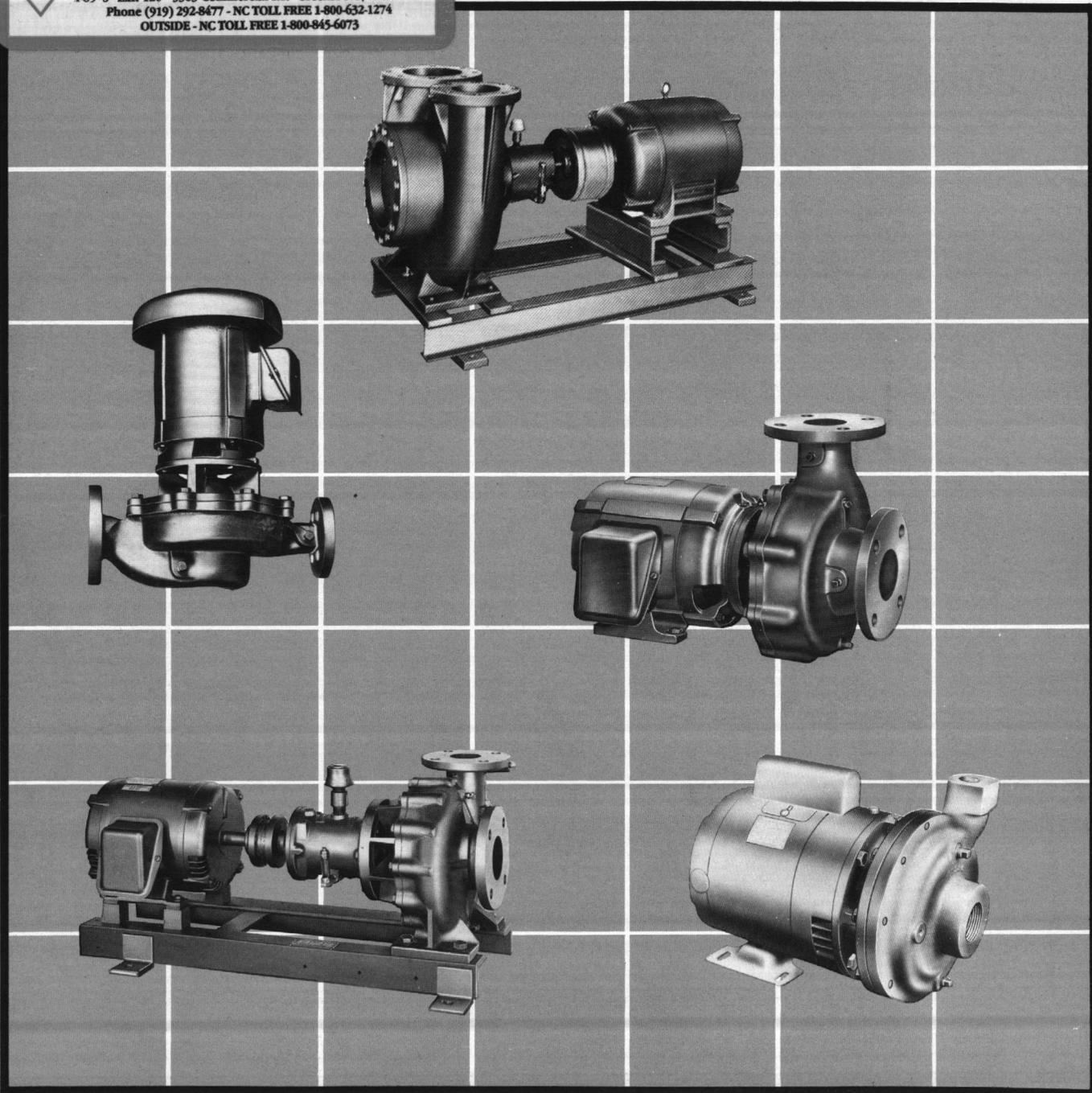
MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

by Dunham-Bush



 **DUNHAM-BUSH**
DUNHAM DIVISION

Products That Perform...By People Who Care

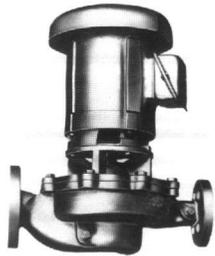
Dunham-Bush's Complete

Here's a line of centrifugal pumps designed to handle a wide range of applications. Used where water or other general purpose liquids are to be circulated, such as in cooling towers, chilled or hot water circulating systems, drainage and many other institutional, commercial and industrial applications. The table on the back page will supply you with the necessary information for locating data on a specific pump and its characteristics.

Close-Coupled & In-Line

Close-coupled and In-line pumps are used in supply system applications such as boiler feed, processing, drainage, washer service and booster service. These pumps are also used as circulators in evaporative condensers, cooling towers, hot water and chilled water systems.

For applications involving fluids other than water, consult factory for recommendations.



Model PM7

The Dunham-Bush Type PM7 pump is of the volute type and is for horizontal or vertical position. Fifty-four models are available in the PM7 pump with ranges from 1/4 HP to 25 HP and capacities to 480 GPM.

Refer to Form No. 1470.



Model C

The Dunham-Bush Type C is of the volute type for horizontal or vertical installation. Fifty models are available in the C pump with ranges from 1 HP to 60 HP and capacities to 1755 GPM.

Refer to Form No. 1493.



Model A7

The Dunham-Bush Type A7 pump is of the volute type for horizontal or vertical installation. Fifty-four models are available in the A7 pump with ranges from 1/4 HP to 25 HP and capacities to 480 GPM. Sizes over 2" with flanged case.

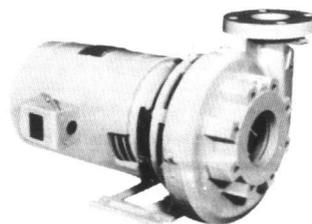
Refer to Form No. 1474.



Model V

The Dunham-Bush Type V is of the volute type and is for horizontal or vertical installations. Forty-five models are available in the V pump with ranges from 1 HP to 15 HP and capacities to 850 GPM.

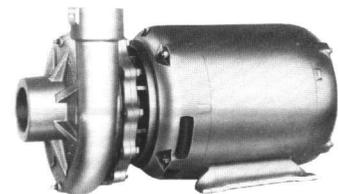
Refer to Form No. 1490.



Model C300

The Dunham-Bush Type C300 pump is of the volute type and is for horizontal or vertical installation. Forty-four models are available in the C300 pump with ranges from 1 HP to 20 HP and capacities to 1470 GPM.

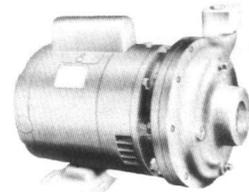
Refer to Form No. 1492.



Model A9

The Dunham-Bush Type A9 pump is of the volute type for horizontal or vertical installation. Forty-one models are available in the A9 pump with ranges from 1/2 HP to 20 HP and capacities to 350 GPM.

Refer to Form No. 1440.



Model A5

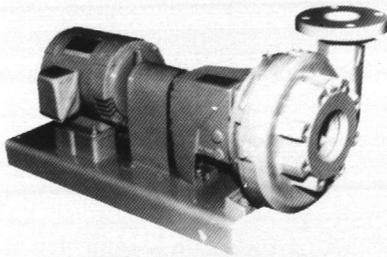
The Dunham-Bush Type A5 pump is of the volute type for horizontal or vertical installation. Sixteen models are available in the A5 pump with ranges from 1/4 HP to 2 HP and capacities to 150 GPM.

Refer to Form No. 1440.

Line of Centrifugal Pumps

Base Mounted

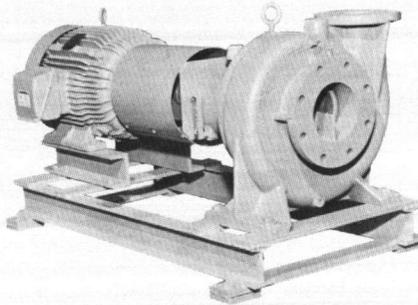
Base Mounted pumps are most commonly applied for water circulation to be used for heating or air conditioning. The particular quietness of these pumps makes them most suitable for handling hot and chilled water for hydronic systems. They are also very successfully applied for condenser water, domestic hot water and water supply systems.



Model F300

The Dunham-Bush Type F300 pump is of the volute type for horizontal mounting. Forty-five models are available in the F300 pump with ranges from 1 HP to 25 HP and capacities to 1470 GPM.

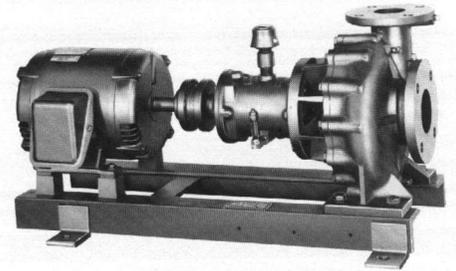
Refer to Form No. 1491



Model E

The Dunham-Bush Type E pump is of the double volute type for horizontal mounting. Thirty-two models are available in the E pump with ranges from 7-1/2 HP to 150 HP and capacities to 2600 GPM.

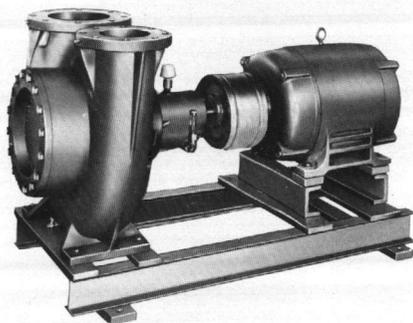
Refer to Form No. 1451.



Model B9

The Dunham-Bush Type B9 pump is of the volute type for horizontal mounting. Twenty-eight models are available in the B9 pump with ranges from 3/4 HP to 25 HP and capacities to 1,000 GPM.

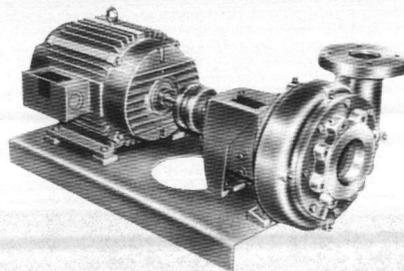
Refer to Form No. 1445.



Model F11

The Dunham-Bush Type F pump is of the double volute type for horizontal mounting. Particularly suited for applications where net positive suction head available may be limited. Ten models are available with ranges from 7-1/2 HP to 75 HP and capacities to 2600 GPM.

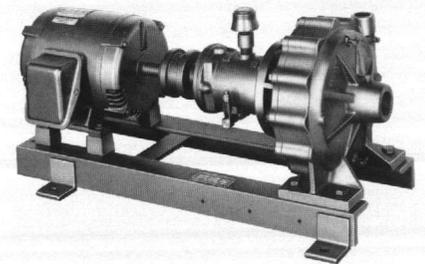
Refer to Form No. 1433.



Model F

The Dunham-Bush Type F pump is of the volute type for horizontal mounting. Ninety-two models are available in the F pump with ranges from 3/4 HP to 75 HP and capacities to 1755 GPM.

Refer to Form No. 1494.



Model AB9

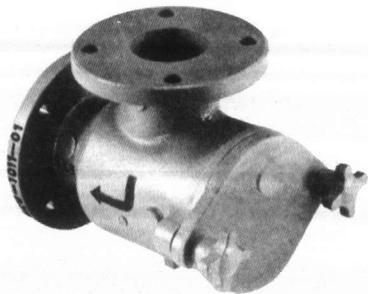
The Dunham-Bush Type AB9 pump is of the volute type for horizontal mounting. Twenty-five models are available in the AB9 pump with ranges from 1/2 HP to 10 HP and capacities to 450 GPM.

Refer to Form No. 1452.

Centrifugal Pump Specification Chart

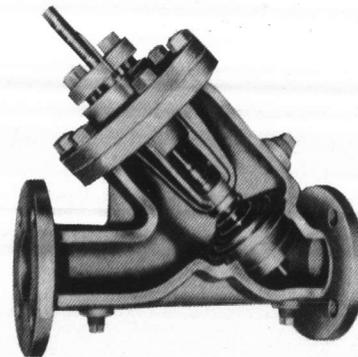
PUMP MODEL	TYPE	CAPACITIES	HEAD	WORKING PRESSURE	HP	REFERENCE CATALOG NO.
A5	Close-Coupled	To 150 GPM	115 Ft.	175 PSI	1/4 - 2 HP	1440
A9	Close-Coupled	To 350 GPM	170 Ft.	175 PSI	1/2 - 20 HP	1440
A7	Close-Coupled	To 480 GPM	240 Ft.	175 PSI	1/4 - 25 HP	1474
C300	Close-Coupled	To 1470 GPM	290 Ft.	175 PSI	1 - 20 HP	1492
C	Close-Coupled	To 1755 GPM	180 Ft.	175 PSI	1 - 20 HP	1493
AB9	Base Mounted	To 450 GPM	100 Ft.	175 PSI	1/2 - 10 HP	1452
B9	Base Mounted	To 1000 GPM	90 Ft.	175 PSI	3/4 - 25 HP	1445
F300	Base Mounted	To 1470 GPM	290 Ft.	175 PSI	1 - 25 HP	1491
F	Base Mounted	To 1755 GPM	180 Ft.	175 PSI	3/4 - 75 HP	1494
E	Base Mounted	To 2600 GPM	220 Ft.	175 PSI	7-1/2 - 150 HP	1451
F11	Base Mounted	To 2600 GPM	140 Ft.	175 PSI	7-1/2 - 75 HP	1433
PM7	In-Line	To 480 GPM	240 Ft.	175 PSI	1/4 - 25 HP	1470
V	In-Line	To 850 GPM	150 Ft.	175 PSI	1 - 15 HP	1490

Centrifugal Pump Accessories



Suction Diffuser

The Suction Diffuser, as offered by Dunham-Bush, furnishes ideal flow conditions to the centrifugal pump, has a built-in strainer and purge port, provides a method for pipe support and eliminates the use of reducing fittings. Available in twenty sizes from 2" x 1-1/4" to 12" x 12". Refer to Form No. 1480.



Pump Discharge Valve

The Pump Discharge Valve, as offered by Dunham-Bush, combines the functions of a gate valve, balancing valve and check valve in one body. This combination offers savings in space, hardware cost and labor. Available in sizes from 2" to 8" and in working pressures to 175#. Refer to Form No. 1483.

Contact Dunham-Bush for more details and application assistance . . . today



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
 Industrial Equipment & Supplies
 Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
 I-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
 Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
 OUTSIDE - NC TOLL FREE 1-800-845-6073

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1482A © 1988, Copyright Dunham-Bush, Inc.

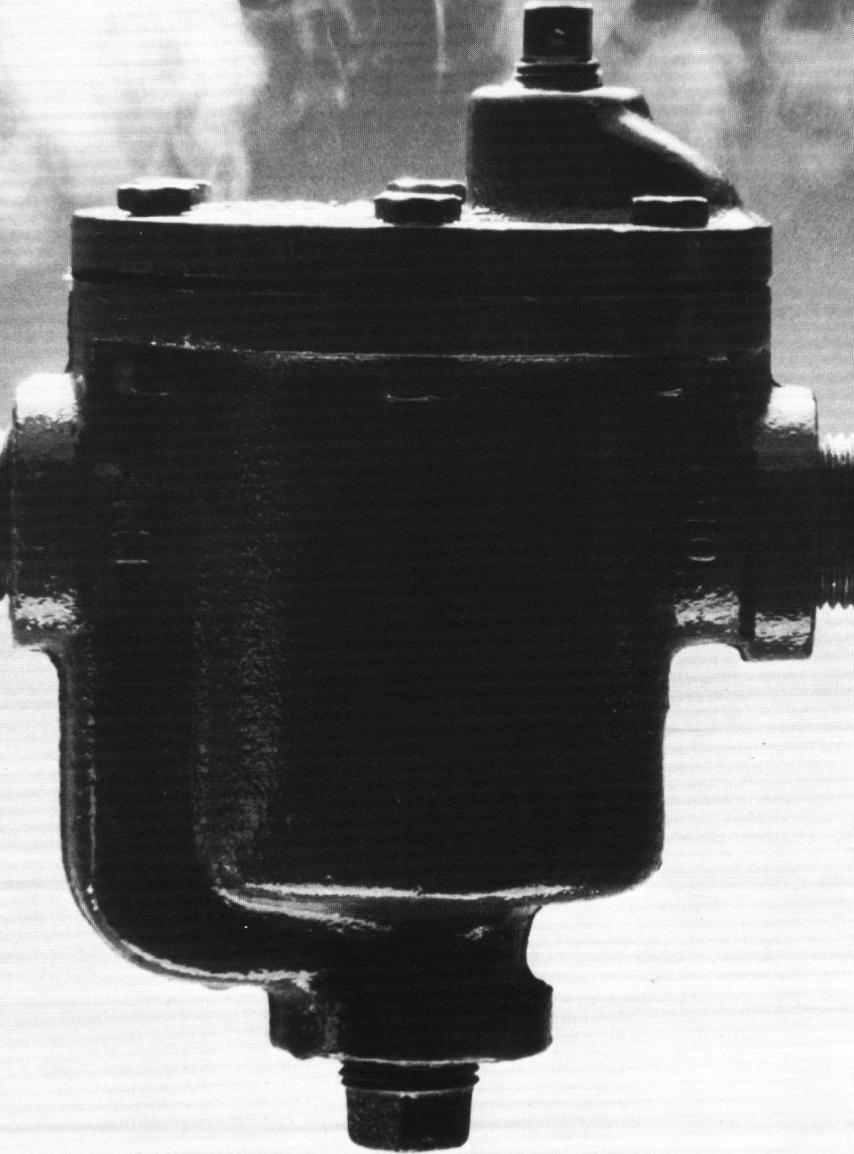
Printed in U.S.A.

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



**It's Expensive To Let Off
A Little Steam.**

Heating Pumps...

The Fuel Savers.

Boiler Feed Pumps

Controlled by the demands of the boiler, these pumps are fully equipped to save energy by efficiently returning hot condensate and make-up water to the boiler. Capacities available from 6000 EDR to 200000 EDR, 10 through 75 PSI.

Vacuum Pumps

Designed for return of hot condensate while rapidly removing air from the system, use of the vacuum pump speeds warm-up times while reducing fuel consumption. Capacities range from 5000 EDR to 65000 EDR.

Condensate Pumps

These pumps save fuel by returning hot condensate to a boiler feed pump instead of wasting it to the sewer. Capacities available from 2000 EDR to 10000 EDR, 10 through 70 PSI.

Boiler Feed/Vacuum Pumps

A compact unit that functions both as a vacuum pump and as a boiler feed pump, its design makes it an ideal choice for retrofit situations involving small capacity boilers while saving precious boiler room space. Capacities from 10000 EDR through 60000 EDR, 10 to 40 PSI.

Leaking steam traps and malfunctioning traps are a major source of just steam. They waste energy and are a major source of heat loss, wasted fuel, and increased operating costs.

For example, a trap with a $\frac{3}{8}$ " orifice will waste 680,000 lbs. of steam per year. This translates into \$6,800 loss annually.

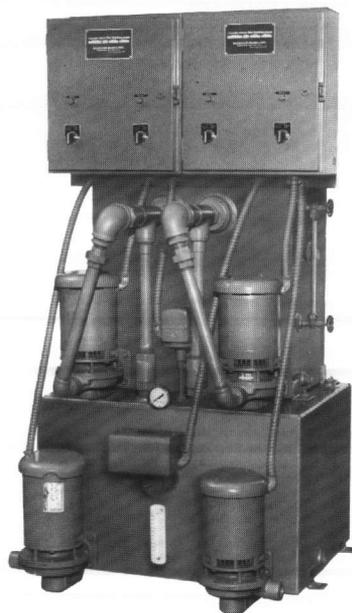
A condensate pump that is down for a day wastes condensate that should be returned to the boiler. Result—several days of make-up water at room temperature must be used to produce steam.

Properly functioning vacuum pumps assist morning warm-up cycles and maintain higher room temperatures.

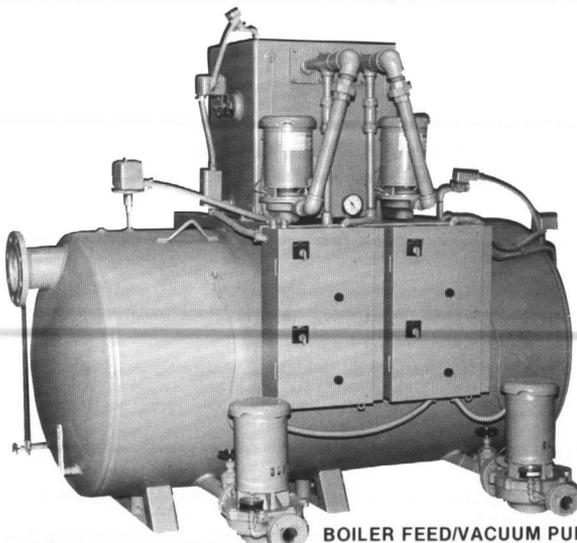
From the broadest line of steam traps in the industry, your entire steam system can be made energy efficient thus preventing the loss caused by faulty traps and malfunctioning traps.



BOILER FEED PUMP



VACUUM PUMP



BOILER FEED/VACUUM PUMP



CONDENSATE PUMP

Cost of Leaking Steam Traps at 5 PSIG and a pressure differential high of \$10.00 per 1,000 lbs. of Steam

Size of Orifice	Pounds Steam* Wasted Per Year	Total Loss Per Trap Per Year At \$3.50/1,000 lbs
$\frac{1}{8}$ "	80,000	\$ 280.00
$\frac{3}{16}$ "	172,000	662.00
$\frac{1}{4}$ "	296,000	1,036.00
$\frac{5}{16}$ "	492,000	1,722.00
$\frac{3}{8}$ "	680,000	2,380.00

* 8 months per year heating season.

** #6 Oil, 7.81 gals. to generate 1000 lbs. steam at 5 PSIG

THE
Dunham
Steam

Steam Specialties . . .

The Full Line.

ioning pumps waste more than
d money, and they are a major
and excessive water treatment

trifice leaking steam at 5 PSIG will
ear. At \$10/1,000 lbs., that
y from a single leaking trap.
n can account for energy losses
e returning to the boiler is
ere loss of energy because make-
st be continually added to the

mps improve steam circulation,
d provide more uniform room-to-

n specialties and heating pumps
heating system can be retrofitted
eventing expensive energy losses
ctioning pumps.

based on low of \$3.50 per 1,000 lbs. and

Total Loss Per Trap Per Year At \$10.00/1,000 lbs.	BBLS #6** Oil To Generate Steam Loss
\$ 800.00	14.90
1,720.00	31.98
2,960.00	55.04
4,920.00	91.49
6,800.00	126.45

84% efficiency, 42 gals./BBL. of oil.

he
m-Bush
Team

Radiator Valves

Available in three models as packless and packed type, ½" through 2" sizes.

Thermostatic Radiator Traps

From 25" Hg vacuum to 125 PSI, available in two different models, up to five different patterns, sizes ½" to 1".

Strainers

Operating pressures up to 250 PSI, available in sizes ½" through 2".

Float and Thermostatic Traps

Models available from 25" Hg vacuum to 125 PSI, sizes ¾" through 2½".

Inverted Bucket Traps

Operating pressures up to 200 lbs.; sizes ½" to 1¼".

Vacuum Breaker

Adjustable from 1" to 28" Hg of vacuum, maximum operating pressure of 65 lbs.



Energy Conservation . . .

Become familiar with your system.

Keep records of fuel bills and maintenance costs.

Become aware of suspect trouble spots. Spots that need to be attended to: repaired, replaced, tightened, or eliminated.

Look for sudden fluctuations in the system; excessively hot return piping, noise, water spots or corrosion.

Set up a regular maintenance schedule.

Inspect your equipment. Listen to your traps.

Educate your occupants. Inform them of things to be aware of that would indicate suspect trouble spots.

Devise a reporting system.

Plan for breakdowns.

Know your equipment by name and know where to get repair parts or new components.

Get to know your Dunham-Bush Heating Representatives and let them help you solve your heating problems.

With Dunham-Bush

REPRESENTED BY:



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

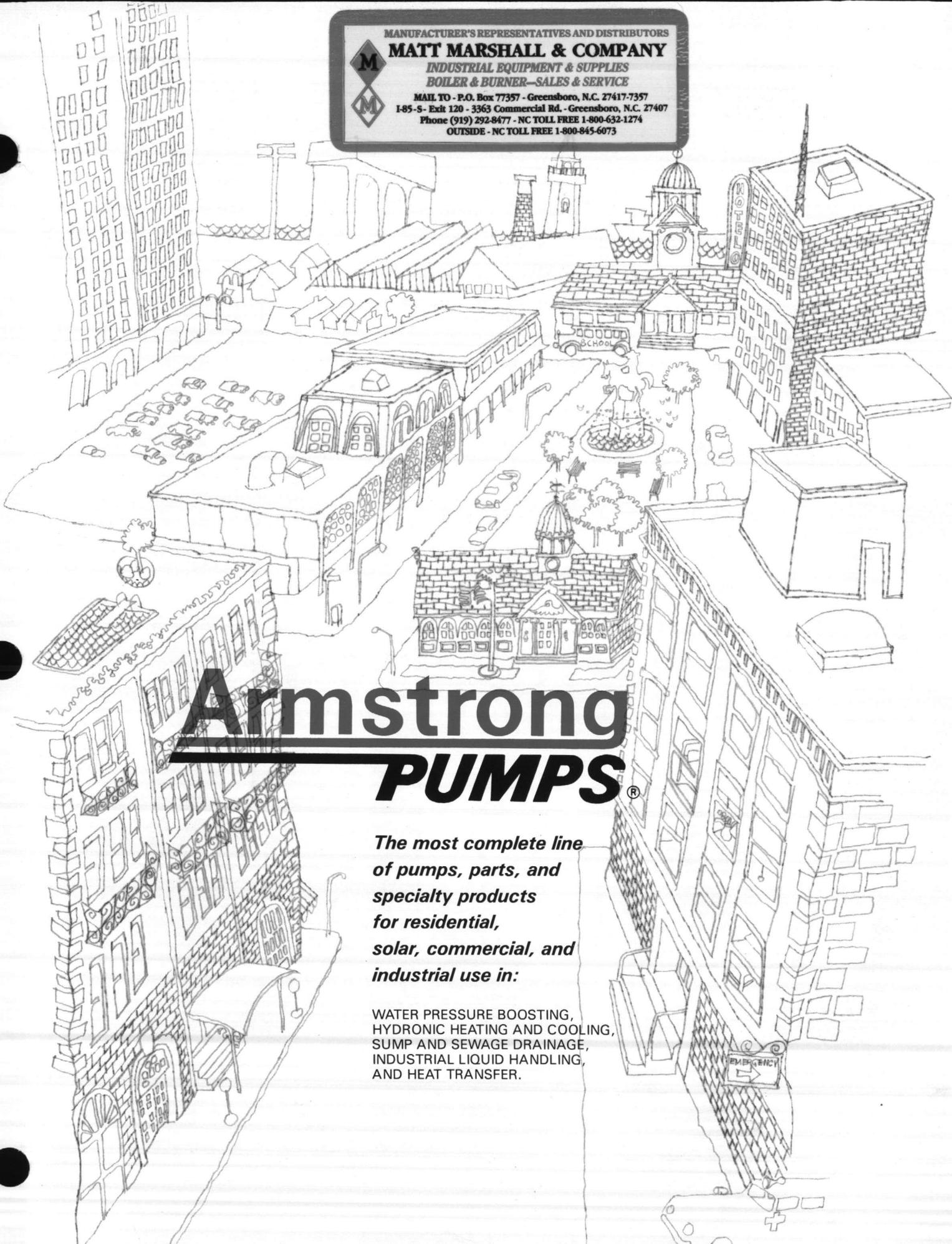
DUNHAM-BUSH, INC. • Marshalltown, Iowa 50158, U.S.A.

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS

MATT MARSHALL & COMPANY

INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

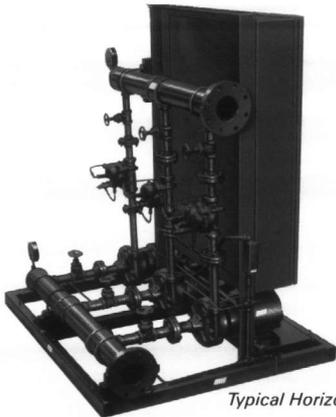


Armstrong PUMPS®

*The most complete line
of pumps, parts, and
specialty products
for residential,
solar, commercial, and
industrial use in:*

WATER PRESSURE BOOSTING,
HYDRONIC HEATING AND COOLING,
SUMP AND SEWAGE DRAINAGE,
INDUSTRIAL LIQUID HANDLING,
AND HEAT TRANSFER.

Armstrong is the most complete line of packaged pressure booster pumps, circulators, and heat exchangers for commercial and industrial use.



Typical Horizontal Triplex

Packaged pressure booster systems

To meet requirements of high rise apartment houses, commercial buildings, institutions, and industrial plants Armstrong pressure booster systems are available in a wide range of sizes and ratings, with one, two or three pumps, and with constant speed motors. Compact, preassembled packages save floor space, cut installation costs and reduce start-up time. Pump output is matched to demand automatically while minimum-run timers prevent rapid cycling. Automatic alternation of pump sequence extends pump life, minimizes maintenance. Dynamic balancing and isolation pad mounting ensure quiet operation. Optional is the "No Flow" energy-saving shutdown. Request Bulletin 6610.



Heat transfer package

(ready to install)

Delivered with all parts and piping completely assembled on a sturdy steel support frame, Armstrong steam-to-water Heat Transfer Packages are installed simply by bolting down the frame, wiring, and connecting to steam inlet, system supply, and return.

Each package is built to individual design specifications. All pressure vessels are constructed in accordance with ASME code. Whether base mounted, close coupled, or in line, Armstrong centrifugal pumps ensure quiet, vibrationless operation.

It's satisfying to know that all valves and tank fittings are of Armstrong manufacture or specification, assuring highest standards of construction, and ready availability of replacement parts. Request Bulletin 6578.



Motor-mounted, self-venting pumps, center-line discharge

Compactness, ease of installation, elimination of alignment problems, freedom from maintenance, and simplification of foundations are among the advantages offered by Armstrong motor mounted centrifugal pumps. All models feature radially-split volute and back pull-out design. Attached motor with bracket and impeller can be easily withdrawn without having to break piping connections. Request Bulletin 6667.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
4260	Mechanical	160	115	175	225°F*
4280	Mechanical	2000	575	175**	225°F*

*275° maximum pumping temp. with optional construction.

**250 psig with optional construction.



Base-mounted, self-venting pumps, center-line discharge

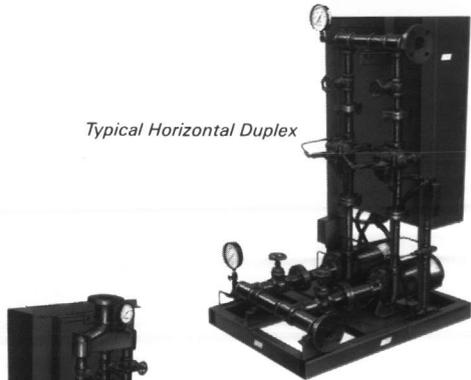
Excellent choice from a wide range of single stage, end suction centrifugal pumps for numerous applications in heating, refrigeration, air conditioning, pressure boosting, and general industry. Split case design facilitates leaving the volute in place while servicing the pump in reduced downtime. Optional features to meet specific pumping services. Request Bulletin 6666.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
4030	Mechanical	2100	575	175**	225°F*

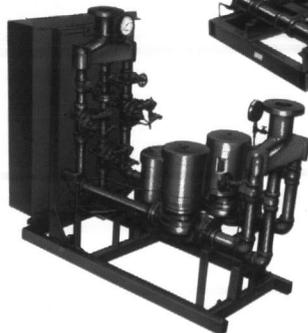
*275° maximum pumping temp. with optional construction.

**250 psig with optional construction.

Typical Horizontal Duplex



Typical Vertical Triplex

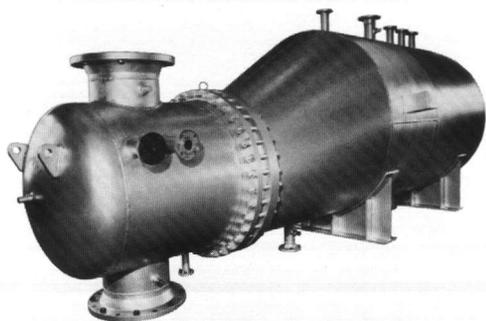


Typical Vertical Duplex



Heat exchangers — Shell and U-Tube

Designed for instantaneous heating of water and other liquids, Armstrong "WS" and "W" heat exchangers are of shell and tube construction. Built to ASME specifications, they are available in either two or four-pass construction with U-bends expanded into a stationary tube sheet. For every application, there is a wide range of standard sizes from 4" to 20" diameter and lengths up to 10 ft. Custom units in larger sizes, special material, higher working pressures and temperatures are all available. For radiation heating, snow melting, swimming pool heating, industrial processing, and many more applications, there is an Armstrong heat exchanger to do the job. Request Bulletin 6669.



Heat exchangers — Custom-built

For industry and process fluid flow requirements, Armstrong Heat Exchangers meet the most exacting specifications. Total engineering expertise and state-of-the-art manufacturing facilities produce customized packages in heat recovery, condensate transfer, and air-drying applications. In sizes as large as today's industry demands. In a wide range of materials. All designed to meet ASME Section VIII specifications. Custom built units are also available to meet TEMA configurations. In addition, Armstrong offers complete planning and engineering services for custom designing, for individual application or for specific problems.



Industrial, Heavy-Duty use pumps Self-venting, center-line discharge. Motor-mounted or Base-mounted

Designed for heavy duty industrial applications, these Armstrong pumps are highly efficient in every way. Self-venting center-line discharge casings simplify piping design. Balanced impellers are fully enclosed for greater efficiency and smoother operation. Improved interchangeability of parts provides better, more economical maintenance. Most pump models in series 40P are obtainable built to ANSI B73.1 dimensions.

Available in a base-plate-mounted series (series 40P) with multiple sealing arrangements and a motor-mounted series (series 42P) with multiple sealing arrangements, these centrifugal pumps have countless applications such as: heating, refrigeration, and air conditioning; machinery cooling and product transfer; pollution control systems and powerhouse auxiliary services. Choice of grey iron, ductile iron, bronze, and stainless steel. Request Bulletins 7091, 7092.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
40P	Multiple Sealing	4250	680	375	375°F
42P	Multiple Sealing	2000	680	375	375°F



Vertical in-line pumps

Developed initially for the pipeline and process industries, this design is proving more and more attractive for a diversified list of applications... hydronic heating, ventilating and air conditioning; high rise water service; general industrial and power plant use; and a variety of other pumping jobs.

There are many reasons. Valuable savings in floor space and piping. Savings also in installation time and costs — no foundations or grouting needed, no flexible connectors necessary. Reduced maintenance and parts inventory because of fewer pump components, no bearing frame assembly to maintain, and extensive interchangeability of parts between all pump models and sizes.

Close-coupled and spacer-coupled units are available. The latter feature a unique split coupling which permits reversal or replacement of the seal by regular maintenance personnel without disturbing pump, motor, or wiring. Request Bulletins 6849 and 6850.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
4300 (Spacer Coupling)	Mechanical	5000	440	300	400°F
4300 (Spacer Coupling)	Packing Gland	5000	440	300	250°F
4360 (Close Coupled)	Mechanical	340	210	175	225°F*
4380 (Close Coupled)	Mechanical	2000	440	250	225°F*

*275° maximum pumping temp. under specific conditions.

Armstrong is the most complete line of specialties and parts for commercial and industrial pumping installations.

Commercial specialties

A complete range of auxiliary products for commercial and industrial pumping installations is always available from Armstrong. This includes suction guides, flo-trex control valves (angle and straight), flex connectors, expansion tanks, vortex air separators, precharged bladder ASME expansion tanks, air purgers, and check valves.

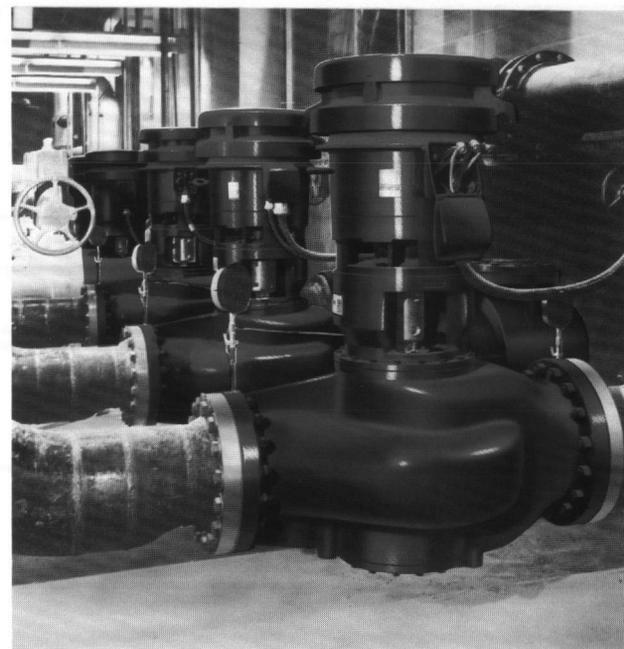
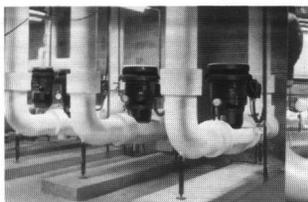
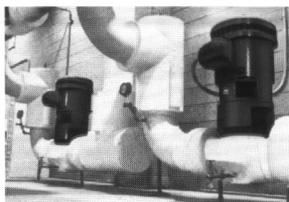
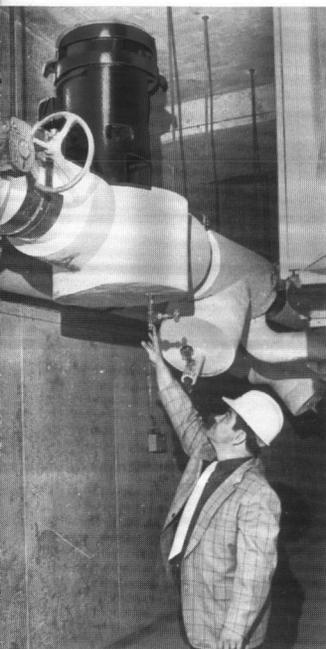


Pump and circulator service parts

More than 70 stocking Armstrong representatives, coast-to-coast, draw upon the complete inventory at Armstrong's Parts Depot to keep major distributors well supplied with impellers, shafts, seals, couplers, bearing assemblies, volutes, and other replacement parts. Immediate availability is assured.



Armstrong offers complete-line capability to serve any size installation.



Represented locally by

Armstrong **PUMPS®**

Armstrong Pumps Inc., 93 East Avenue, North Tonawanda, N.Y. 14120 • Phone: (716) 693-8813, Telex: 91-6400 FAX: (716) 693-8970
In Canada: S.A. Armstrong Limited, Toronto • In U.K.: Armstrong Pumps Limited, Colchester, England

Form No. 6506-C 25M-4/87-HWA

Litho in U.S.A.

Armstrong is the most complete line of circulators, valves, and component specialties for hydronic systems.

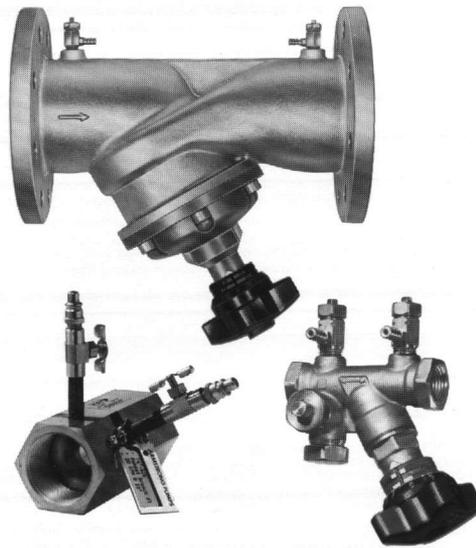


Hydronic wet-rotor circulators

Glandless, two-speed hydronic circulator saves energy and eliminates maintenance. No seals, couplers or lubrication needed. For circulating water or ethylene glycol solutions in closed hydronic, solar heating or chilled water systems. The Armstrong Sure-Start (Models SS-30, SS-50 and SS-100 in cast iron; Models SS-30B, SS-50B and SS-100B in bronze) circulator is unequalled for home use, and for small industrial and commercial installations. Two-speed, high-torque motor makes it simple and easy to fine tune the circulator to match GPM and head requirements. Features include graphite bearings, ceramic thrust bearing, dynamically-balanced stainless steel rotor, and a unique bronze filter that protects the rotor chamber from system impurities, extending the life and reliability of the circulator. Request Bulletin 6870.

Series	Construction	Connector	Max. Capacity (USGPM)	Max. Head (ft.)
SS-30	cast iron	flange	14	16
SS-50	cast iron	flange	23	20
SS-100	cast iron	flange	27	28
SS-30B	bronze	flange	14	16
SS-50B	bronze	flange	23	20
SS-100B	bronze	flange	27	28

Maximum pumping temperature for all models is 230°F (110°C).
Maximum working pressure for all models is 140 psig.



Flow balancing and measuring valves

Designed to balance hydronic circuits or zones by creating a precise pressure drop, Armstrong circuit balancing valves (models CBV S, CBV I and CBV II) can be opened or closed as desired to cause a pressure drop variance. Unique hydronic circuit balancing valves provide precise flow measurement, precision flow balancing, isolation positive shut-off, and drain connections for the system or individual zones (½"-1½" sizes). Features include: Teflon disc ring ensures positive shut off; unique "Hidden Memory" maintains tamper-proof balance within range of one percent; and unequalled fine tuning. Also available are ½" thru 16" orifice and venturi read out indicators. Request Bulletins 6587 and 6629.

Model		Connection	Max. Working Pressure (psi)	Drain Connection Size	Material of Construction	No. of Handwheel Turns (360°)
Style	Size (in.)					
CBV S	½, ¾	Sweat	125	—	Ametal® Bronze Copper Alloy	1
CBV I	½, ¾, 1, 1¼, 1½, 2	Screwed NPT	250	¾" NPS*	Ametal® Bronze Copper Alloy	4
CBV II	2½, 3, 4, 5, 6, 8, 10, 12	Flanged	250	—	Cast Iron, with Ametal® Trim	8 12 16

Maximum operating temperature for all models is 250°F (121°C).
Polyurethane insulation -22°F to 248°F is standard on Model CBV I.
(-30°C to 120°C)

Special insulation is available as an option on Model CBV II.
*excluding 2" size.



Typical portable differential readout pressure meters.



Hydronic specialties

The complete Armstrong selection of components for use in the installation of hydronic systems includes: tank fittings, pipe-mounted air eliminators, air charger and tank drainers, float type automatic air vents, flow-control valves, one-pipe tees, relief valves, reducing valves, combination valves, gate valves and diaphragm tanks.



Thermostatic radiator valves

A self-contained, nonelectric valve for temperature control of individual rooms, Armstrong's TRV valves are designed for use in either hot water or LP steam heating systems. Available in sizes from ½" to 1¼" NPT, the valve body is constructed from a special copper alloy which is resistant to dezincification, and then nickel plated. Valves may be locked to a pre-set high position or on a permanent setting. TRV valves are made in three valve body options: straight, angle or side reverse angle; and have three sensor options: attached sensor with adjustment on valve, remote sensor with adjustment on valve, or remote sensor and adjustment.



Sump and sewage pumps

Several series of Armstrong pumps are listed under this category. Sump pumps for small capacity drainage. Medium and heavy duty verticals. Screenless, non-clog, sewage pumps for heavy duty service.

Models are available for drainage duties in home cellars, building basements, elevator and boiler pits, parking lot sumps, construction sites, industrial plants, and many other locations.

Verticals can be furnished for a wide variety of sump depths; in simplex (one-pump) and duplex (two-pump) units; and with inlets, fittings, and controls to meet job requirements. Above the floor, grease-lubricated, thrust ball bearing is standard on Series 5240 & 5400. Request Bulletin on type 5000.

Series	Max. Capacity (USGPM)	Max. Total Head (ft.)	Max. Sump Depth (ft.)
5200 (Medium Duty Sump)	120	52	12
5240 (Heavy Duty Sump)	350	110	12
5400 (Sewage)	700	100	12



Horizontal in-line circulators (High Duty and High Flow Units)

Engineered for durability, these custom circulators are offered with impellers and matching motor ratings to suit customer's requirements — often can be used for capacities normally available only in base mount pumps. They are recommended especially for hydronic heating and cooling systems (including those with multiple zoning) in larger commercial installations and for a variety of industrial uses.

The radially-split body can be left in the line while servicing the pump, eliminating needless disconnecting of pipes.

Proven "ARMSEAL" construction prevents water leakage and ensures years of noise-free, trouble-free service. The seal bearing assembly is readily interchangeable on the full range of models and only one standby replacement unit need be carried in stock. Request Bulletins 6381, 6382, 6387.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
1000 (High Duty)	Mechanical	130	54	175	225°F*
600 (High Flow)	Mechanical	280	54	175	225°F*
1020 (High Flow)	Mechanical	280	54	175	225°F*

*275° maximum pumping temp. under specific conditions.



Horizontal in-line circulators (Standard Units)

Carefully designed and precision-built for quiet operation, Armstrong horizontal in-line circulators, the most complete line in the industry, feature over-sized shafts machined to exacting tolerances. Extra long sleeve bearings for perfect shaft alignment, a positive mechanical seal, and a balanced impeller of centrifugal design for maximum water delivery are other important features. An outstanding feature is the money-saving Armstrong Seal/Bearing Conversion Assembly incorporating an interchangeable pump shaft bearing module. Request Bulletins 6566, 6567, 6579.

Series	Type of Seal	Max. Capacity (USGPM)	Max. Head (ft.)	Max. Working Pressure (psig)	Max. Pumping Temp.
"S"	Mechanical	170	34	125	225°F*
"H"	Mechanical	130	54	125/175	225°F*

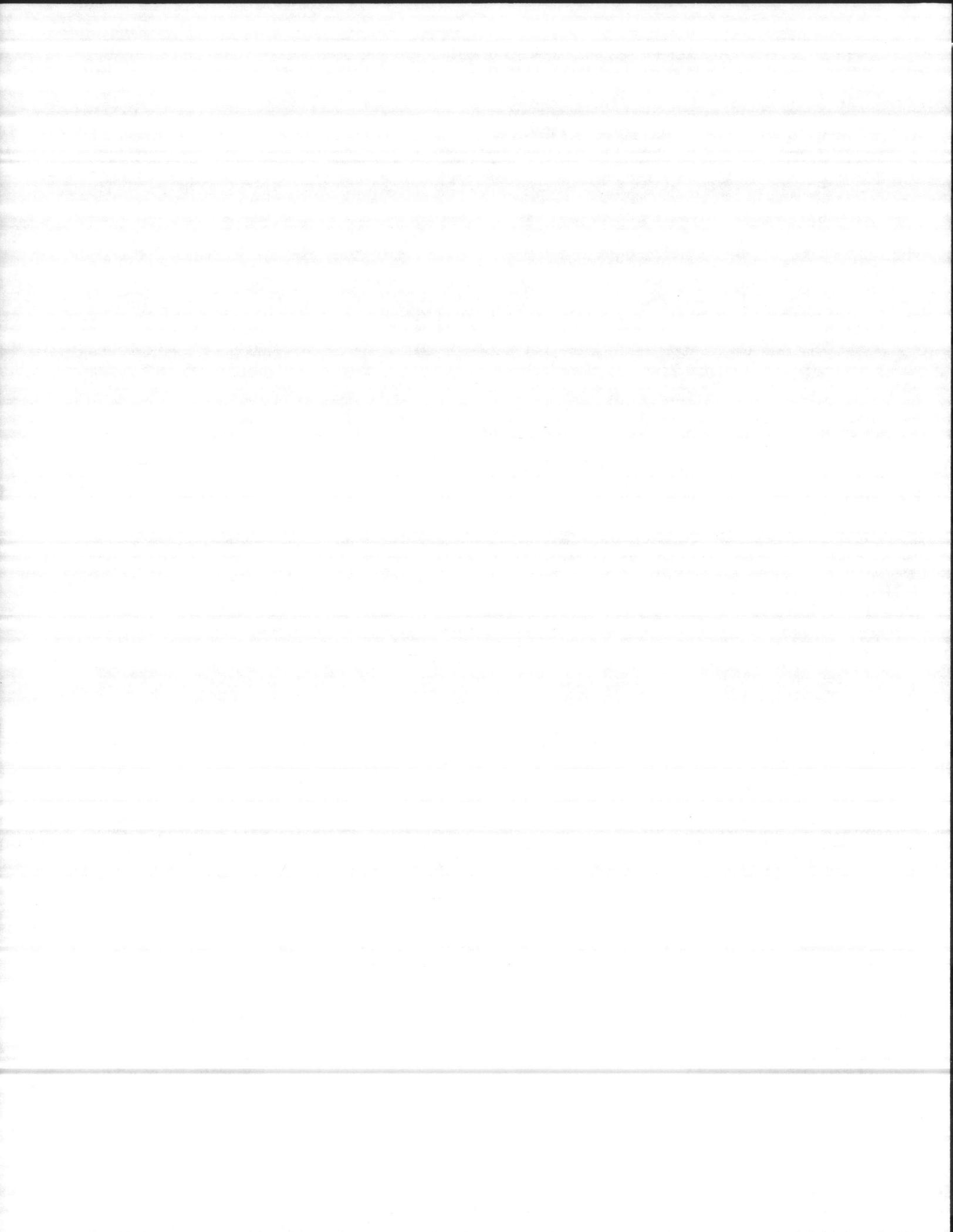
*275° maximum pumping temp. under specific conditions.



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



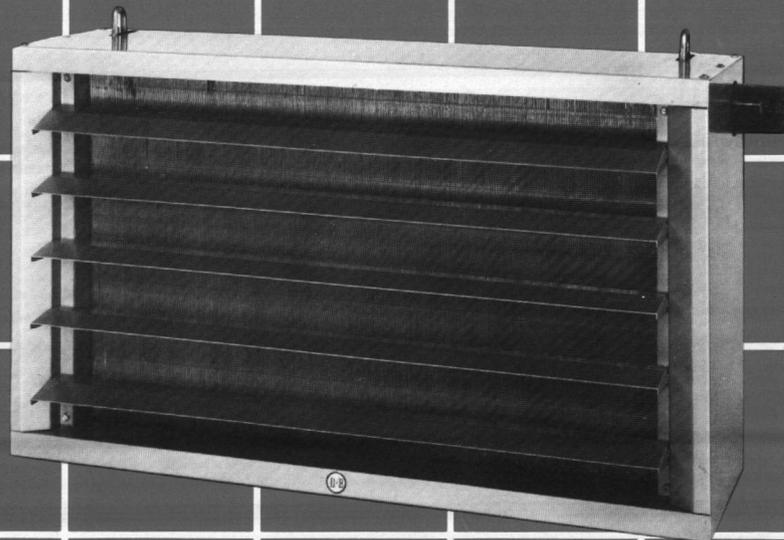
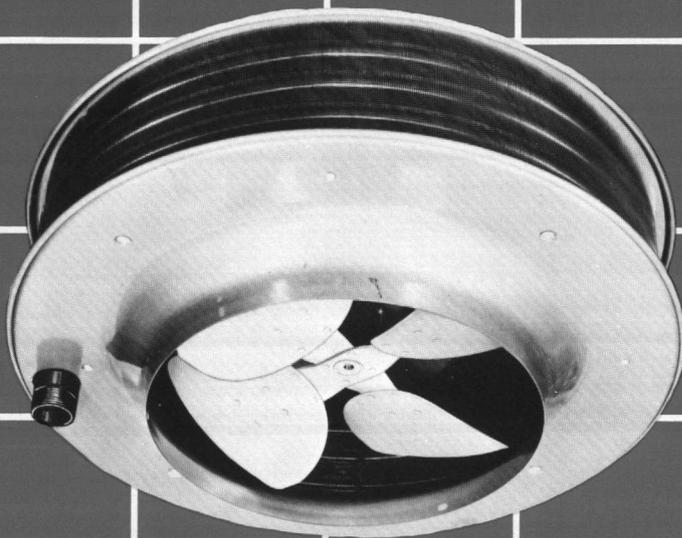
Unit Heaters

For Steam and Hot Water Applications
Horizontal and Vertical Discharge

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS

MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-5 - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



DUNHAM-BUSH
COMMERCIAL PRODUCTS DIVISION

Products That Perform...By People Who Care

NOMENCLATURE

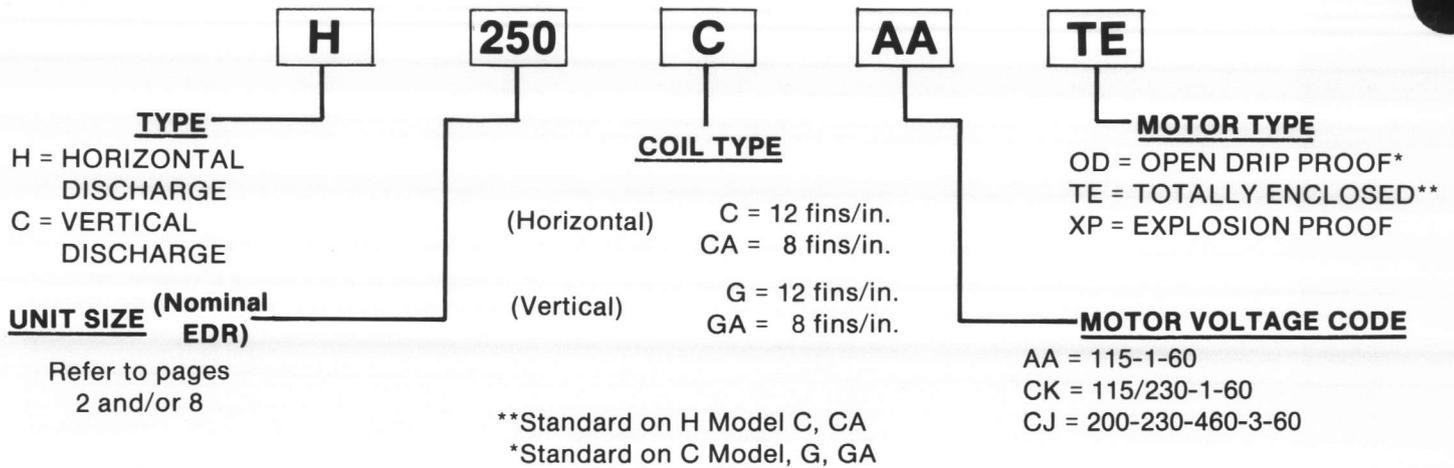


TABLE OF CONTENTS

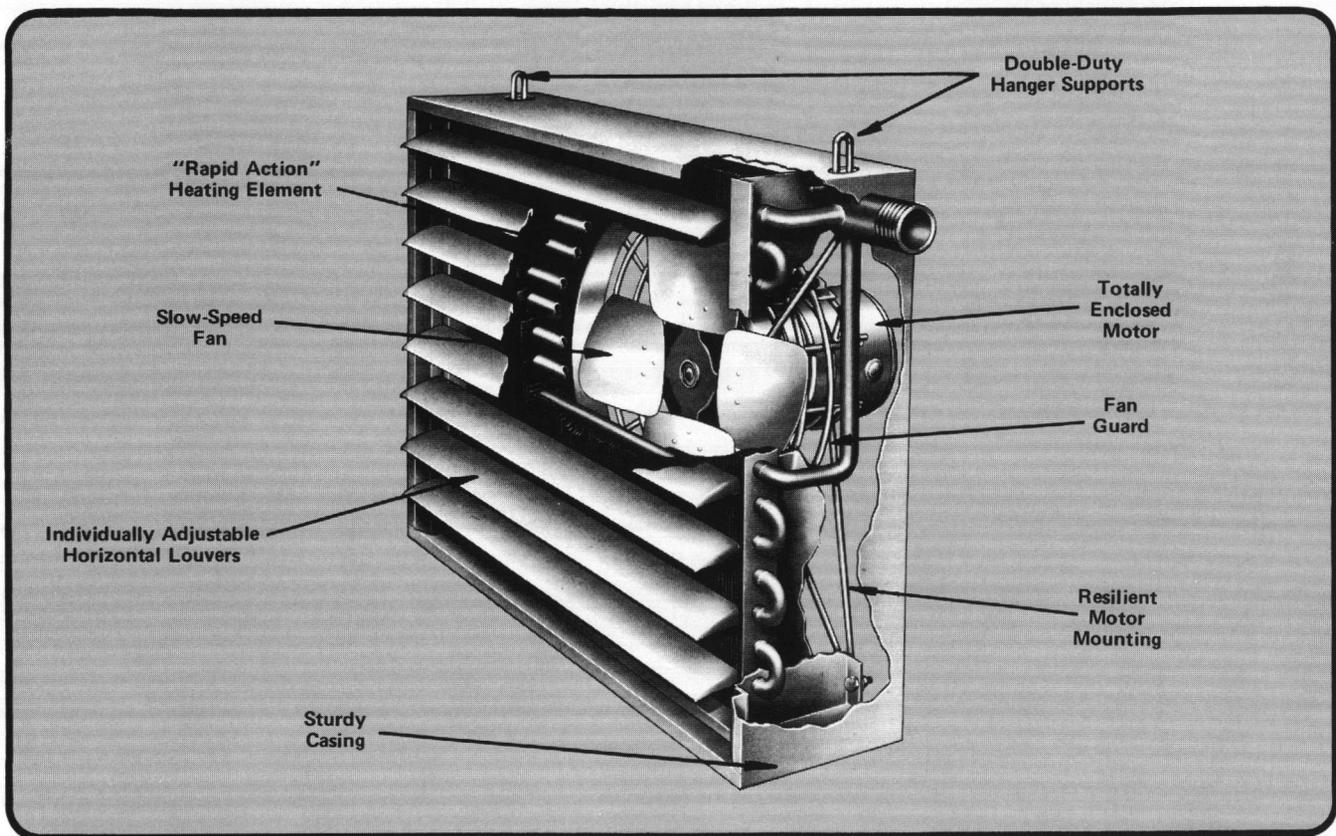
HORIZONTAL DISCHARGE UNIT HEATERS	
FEATURES	1
STEAM CAPACITY	2
MOTOR, FAN, AIR DELIVERY DATA	3
DIMENSIONS	3
HOT WATER CAPACITIES	4
VERTICAL LOUVERS	6
OPTIONS	6
VERTICAL DISCHARGE UNIT HEATERS	
FEATURES	7
STEAM CAPACITY	8
MOTOR, FAN, AIR DELIVERY DATA	9
DIMENSIONS	9
HOT WATER CAPACITIES	10
OPTIONS	12
DIFFUSERS	13
ENGINEERING DATA	14

ADDITIONAL LITERATURE

UNIT HEATER SUBMITTAL FORM (H model C, CA)	FORM 1306
UNIT HEATER SUBMITTAL FORM (C model G, GA)	FORM 1326
INSTALLATION OPERATION, AND MAINTENANCE INSTRUCTIONS, PROPELLER UNIT HEATERS	FORM 3300

HORIZONTAL DISCHARGE UNIT HEATERS

FEATURES



Dunham-Bush Horizontal Discharge Unit Heaters are available in twelve sizes for either steam or hot water service with capacities ranging from 100 EDR to 1500 EDR (based on 2 lbs. steam pressure and 60° F entering air). They are applicable to steam systems up to 125 psi working pressure.

With hot water heating systems they are adaptable to entering water temperatures of up to 340° F. The capacity range based on 200° F entering water 20° F drop ranges from 16.1 MBH to 320 MBH.

Years of experience in the production of quality heating equipment through the construction of high grade, long lasting materials and superior craftsmanship make Dunham-Bush unit heaters the standard of quality in the industry.

HORIZONTAL DISCHARGE UNIT DESIGN FEATURES

MOTOR AND SUPPORT

All standard single-phase motors have sleeve bearings and are totally enclosed. Variable speed units are furnished with a solid-state speed controller. Three-phase motors are constant speed only.

All standard single phase motors are mounted on a sturdy motor mount, which also serves as a fan guard, and is securely fastened to the unit heater casing. Explosion proof and three phase motors on all units are mounted on an adjustable motor platform attached to support arms in lieu of the standard motor mount.

CASING

The sturdy steel casing being of simplicity in design consists of only five major components thus assuring maximum rigidity and freedom from vibration. The casing is phosphatized to resist rust and finished in a beige baked enamel.

HEATING ELEMENT

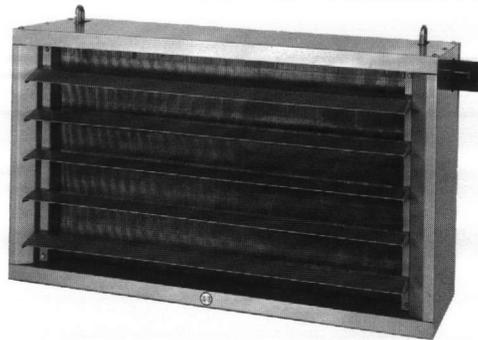
The heating element fins are aluminum. Tubes are heavy copper expanded into fins to provide a positive and permanent mechanical bond. The complete assembly is tested with air pressure under water and hydrostatically at 400 lbs. psi. The H Model C and CA is suitable for pressures up to 125 psi and temperatures up to 340° F.

GENERAL

All units are equipped with horizontal adjustable discharge louvers. This arrangement permits deflection of the discharge air in a vertical plain.

The double duty hanger support provides strong support for the units. There is no support strain on the piping. Propeller fan blades are aluminum.

HORIZONTAL DISCHARGE UNIT HEATERS



CAPACITY DATA STEAM CAPACITY

Unit No.	EDR	BTU Per Hour	SCFM	CFM @ LAT	LAT	Cond. Lb./Hr.	Outlet Velocity FPM
H100C	104	25,000	350	384	126	26.0	555
H175C	175	42,000	600	660	127	43.0	565
H250C	254	61,000	900	990	125	63.0	600
H300C	305	73,200	1,050	1,160	125	76.0	540
H400C	391	94,000	1,400	1,540	124	97.0	585
H500C	500	120,000	1,700	1,880	127	125.0	590
H600C	600	144,000	2,000	2,200	129	149.0	580
H700C	708	169,900	2,400	2,655	126	177.0	515
H850C	833	200,000	2,800	3,100	128	208.0	580
H1100C	1,103	265,000	3,900	4,300	125	274.0	630
H1350C	1,359	326,000	4,800	5,300	125	338.0	610
H1500C	1,540	370,000	5,500	6,060	124	384.0	605

Unit No.	EDR	BTU Per Hour	SCFM	CFM @ LAT	LAT	Cond. Lb./Hr.	Outlet Velocity FPM
H100CA	80	19,100	380	406	106	19.8	585
H175CA	133	32,000	645	688	106	33.2	590
H250CA	196	47,000	960	1,024	105	48.7	620
H300CA	263	63,300	1,080	1,170	114	65.8	555
H400CA	375	90,000	1,440	1,570	118	93.3	596
H500CA	483	116,000	1,900	2,066	116	120.0	648
H600CA	583	140,000	2,250	2,450	117	145.0	646
H700CA	693	166,300	2,560	2,800	120	173.3	550
H850CA	821	197,000	2,980	3,260	121	204.0	578
H1100CA	1,046	251,000	4,160	4,518	116	260.0	593
H1350CA	1,333	320,000	5,100	5,560	118	332.0	640
H1500CA	1,517	364,000	5,700	6,225	119	377.0	621

Based on 2 psig steam pressure, 60° F entering air.

MOTOR AND FAN DATA (115-1-60)

UNIT SIZE	TYPE	HP	RPM	AMP.	FAN DIA (In)
100	TENV	1/30	1550	1.2	9
175	TENV	1/30	1550	1.2	10
250	TENV	1/20	1550	1.3	12
300	TENV	1/8	1140	1.3	14
400	TENV	1/8	1140	1.3	12
500	TENV	1/8	1075	2.8	16
600	TENV	1/6	1075	2.8	16
700	TENV	1/6	1075	2.8	20
850	TENV	1/6	1075	2.8	24
1100	TENV	1/3	1075	5.6	24
1350	TENV	1/3	1075	5.6	24
1500	TENV	1/3	1075	5.6	30

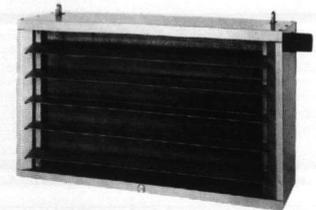
All motors are UL approved.

AIR DELIVERY (Approximate-ft.)

UNIT SIZE	MOUNTING HEIGHT					
	8		12		16	
	THROW	SPREAD	THROW	SPREAD	THROW	SPREAD
100	30	12	,	,	,	,
175	36	14	,	,	,	,
250	45	17	38	15	,	,
300	50	19	42	17	,	,
400	62	25	49	20	,	,
500	68	27	56	22	47	19
600	74	30	62	25	52	21
700	,	,	64	26	54	21
850	,	,	68	27	56	22
1100	,	,	74	29	64	25
1350	,	,	80	32	70	28
1500	,	,	85	34	74	31

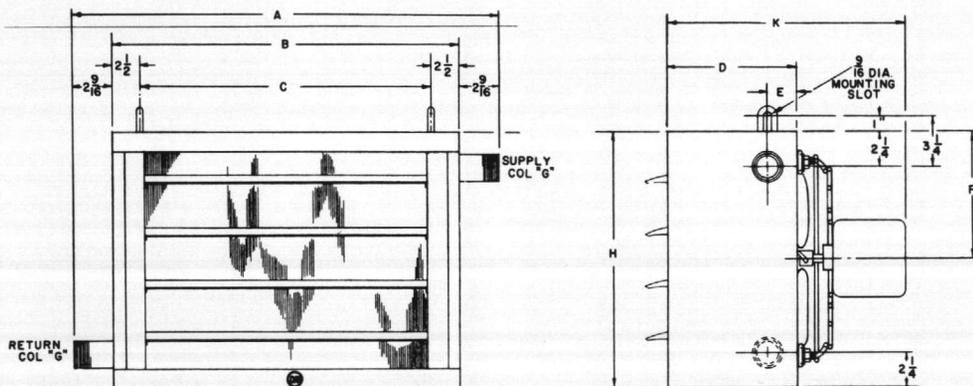
WEIGHTS

UNIT SIZE	lbs.
100	32
175	42
250	54
300	70
400	78
500	82
600	98
700	115
850	122
1100	141
1350	180
1500	195



H Model C, CA

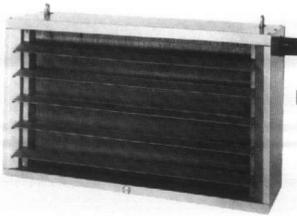
Optional motors are available with Explosion Proof, multi-voltage, or three-phase characteristics. See page 6.



DIMENSIONS

UNIT SIZE	DIMENSIONS IN INCHES								
	A	B	C	D	E	F	G	H	K
H100	20%	15½	10½	8 ⁷ / ₁₆	2	6¼	1¼	12½	14¾
H175	22%	17½	12½	8 ⁷ / ₁₆	2	8¼	1¼	16½	15½
H250	27%	22½	17½	8 ⁷ / ₁₆	2	8¼	1¼	16½	16%
H300	30%	25½	20½	8 ⁷ / ₁₆	2	8¼	1¼	16½	16%
H400	30%	25½	20½	10 ⁷ / ₁₆	3 ⁵ / ₁₆	10¼	2	20½	20
H500	36%	31	26	10 ⁷ / ₁₆	3 ⁵ / ₁₆	10¼	2	20½	19%
H600	41%	36	31	10 ⁷ / ₁₆	3 ⁵ / ₁₆	10¼	2	20½	20%
H700	41%	36	31	10 ⁷ / ₁₆	3 ⁵ / ₁₆	12¼	2	24½	20%
H850	38%	33	28	10 ⁷ / ₁₆	3 ⁵ / ₁₆	15¼	2	30½	20¾
H1100	45%	40½	35½	10 ⁷ / ₁₆	3 ⁵ / ₁₆	15¼	2	30½	21¾
H1350	45%	40½	35½	10 ⁷ / ₁₆	3 ⁵ / ₁₆	19¼	2	38½	21
H1500	50%	45½	40½	10 ⁷ / ₁₆	3 ⁵ / ₁₆	19¼	2	38½	20%

Supply and return labeled for steam.
Reverse for hot water applications.



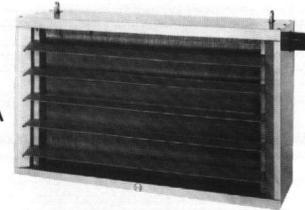
H model C

HOT WATER CAPACITIES

UNIT NO.	TEMP. DROP	ENTERING WATER TEMPERATURE															
		180°F				200°F				220°F				240°F			
		MBH	GPM	LAT	PD	MBH	GPM	LAT	PD	MBH	GPM	LAT	PD	MBH	GPM	LAT	PD
H100C	10°	16.4	3.38	103	.12	20.6	4.24	114	.19	24.9	5.10	126	.27	28.8	5.90	136	.36
	20°	11.9	1.22	91	.02	16.1	1.65	103	.03	20.3	2.08	114	.05	24.5	2.52	125	.07
	30°	7.4	.50	80	.01	11.5	.79	90	.01	15.8	1.08	102	.01	19.7	1.34	112	.02
1550 RPM	40°	—	—	—	—	7.0	.36	79	.01	11.2	.57	90	.01	15.1	.78	100	.01
350 CFM	50°	—	—	—	—	—	—	—	—	6.7	.27	79	.01	10.6	.43	84	.01
H175C	10°	29.6	6.08	106	.54	36.0	7.39	116	.80	42.4	8.71	125	1.10	48.8	10.0	135	1.46
	20°	23.6	2.42	96	.08	30.0	3.08	106	.14	36.4	3.74	110	.20	42.8	4.39	126	.28
1/30 HP	30°	17.6	1.20	87	.02	24.0	1.64	97	.04	30.4	2.08	107	.06	36.8	2.52	117	.09
1550 RPM	40°	11.6	.60	78	.01	18.0	.92	88	.01	24.4	1.25	98	.02	30.8	1.58	108	.04
600 CFM	50°	—	—	—	—	12.0	.49	79	.01	18.4	.76	88	.01	24.8	1.02	98	.02
H250C	10°	45.1	9.25	106	2.36	54.2	11.1	116	2.22	63.5	13.0	125	3.04	72.7	14.9	135	3.98
	20°	38.3	3.93	99	.42	47.5	4.88	109	.43	56.7	5.82	118	.61	65.9	6.77	128	.82
1/20 HP	30°	31.6	2.16	93	.13	40.7	2.79	102	.14	50.0	3.42	111	.21	59.2	4.05	121	.29
1550 RPM	40°	24.8	1.27	86	.04	34.0	1.75	95	.05	43.2	2.22	104	.09	52.4	2.69	114	.13
900 CFM	50°	18.1	.741	79	.01	27.2	1.12	88	.02	36.5	1.50	98	.04	45.7	1.87	107	.06
H300C	10°	47.3	9.7	102	3.02	56.7	12.0	110	4.25	67.3	13.6	119	5.46	76.1	15.21	127	7.55
	20°	45.7	4.5	99	.75	51.3	5.3	105	.98	58.5	5.91	112	1.21	66.2	6.6	118	1.51
1/8 HP	30°	38.9	2.75	94	.32	48.6	3.4	103	.44	52.7	3.48	106	.48	59.6	3.89	113	.80
1140 RPM	40°	32.9	1.7	89	.14	43.7	2.3	98	.22	48.6	2.36	103	.24	55.0	2.64	109	.30
1050 CFM	50°	27.7	1.15	84	.07	38.1	1.6	94	.12	44.5	1.77	99	.16	50.3	1.98	104	.20
H400C	10°	71.7	14.7	107	5.58	85.5	17.6	111	7.95	99.3	20.4	116	10.7	113.1	23.2	135	13.9
	20°	63.2	6.49	102	1.08	77.0	7.91	111	1.61	90.8	9.32	120	2.24	104.6	10.7	129	2.97
1/8 HP	30°	54.7	3.74	96	.36	68.5	4.69	105	.57	82.3	5.63	114	.82	96.1	6.58	124	1.11
1140 RPM	40°	46.2	2.37	91	.15	60.0	3.08	100	.24	73.8	3.79	109	.37	87.6	4.50	118	.52
1400 CFM	50°	37.7	1.55	85	.06	51.5	2.12	94	.11	65.3	2.68	103	.18	79.1	3.25	112	.27
H500C	10°	92.0	18.9	110	10.6	109.0	22.4	119	14.9	126.0	25.8	129	20.0	143.0	29.4	138	25.8
	20°	81.0	8.32	104	2.07	98.0	10.1	113	3.03	115.0	11.8	123	4.17	132.0	13.5	132	5.49
1/8 HP	30°	70.0	4.79	98	.69	87.0	5.96	107	1.06	104.0	7.12	117	1.51	121.0	8.28	126	2.05
1075 RPM	40°	59.0	3.03	92	.27	76.0	3.90	101	.45	93.0	4.77	111	.68	110.0	5.65	120	.95
1700 CFM	50°	48.0	1.97	86	.12	65.0	2.67	95	.21	82.0	3.37	105	.34	99.0	4.07	114	.49
H600C	10°	111.1	22.8	111	17.8	131.5	27.0	121	14.9	151.9	31.2	130	33.3	172.3	35.4	140	42.9
	20°	98.6	10.1	106	3.51	119.0	12.2	115	5.10	139.4	14.3	125	7.02	159.8	16.4	134	9.22
1/6 HP	30°	86.1	5.89	100	1.19	106.5	7.29	109	1.81	126.9	8.69	119	2.59	147.3	10.1	128	3.48
1075 RPM	40°	73.6	3.78	94	.50	94.0	4.83	104	.80	114.4	5.87	113	1.18	134.8	6.92	122	1.64
2000 CFM	50°	61.1	2.51	88	.22	81.5	3.35	98	.38	101.9	4.18	107	.60	122.3	5.02	117	.86
H700C	10°	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20°	111.1	11.7	103	6.48	130.2	13.5	110	8.69	148.4	14.8	117	10.44	167.9	16.8	125	13.45
1/6 HP	30°	103.3	7.15	100	2.67	125.7	8.5	108	3.81	133.6	8.7	111	4.20	151.1	9.91	118	5.38
1075 RPM	40°	93.7	4.9	96	1.36	116.8	6.1	105	1.95	123.2	5.9	108	2.10	139.4	6.72	114	2.69
2400 CFM	50°	81.9	3.4	92	.71	108.0	4.5	102	1.14	112.8	4.4	104	1.41	127.6	5.04	109	1.75
H850C	10°	153.7	31.6	111	6.14	182.5	37.5	120	8.59	211.3	43.4	130	11.6	240.1	49.3	139	14.9
	20°	136.2	13.9	105	1.20	165.0	16.9	115	1.76	193.8	19.9	124	2.44	222.6	22.8	134	3.21
1/6 HP	30°	118.7	8.12	99	.41	147.5	10.1	109	.62	176.3	12.1	118	.89	205.1	14.0	128	1.21
1075 RPM	40°	101.2	5.20	93	.17	130.0	6.70	103	.27	158.8	8.15	113	.41	187.6	9.63	122	.57
2800 CFM	50°	83.7	3.44	88	.07	112.5	4.60	97	.13	141.3	5.80	107	.21	170.1	6.99	116	.30
H1100C	10°	206.6	42.4	109	12.3	245.0	50.3	118	17.3	283.4	58.2	127	23.2	321.8	66.1	136	29.8
	20°	186.6	19.1	104	2.51	225.0	23.1	113	3.65	263.4	27.0	123	5.00	301.8	30.9	132	6.57
1/3 HP	30°	166.6	11.4	100	.89	205.0	14.0	109	1.35	243.4	16.7	118	1.89	281.8	19.3	127	2.54
1075 RPM	40°	146.6	7.53	95	.39	185.0	9.50	104	.62	223.4	11.5	113	.90	261.8	13.4	122	1.23
3900 CFM	50°	126.6	5.20	90	.18	165.0	6.80	99	.31	203.4	8.35	108	.48	241.8	9.93	117	.67
H1350C	10°	256.0	52.6	109	23.0	304.0	62.4	119	32.4	352.0	72.2	128	43.5	378.0	38.8	133	12.5
	20°	234.0	24.0	105	4.80	282.0	28.9	114	6.97	330.0	33.8	124	9.55	356.0	24.3	129	4.94
1/3 HP	30°	212.0	14.5	101	1.75	260.0	17.8	110	2.63	308.0	21.1	119	3.70	334.0	17.1	124	2.45
1075 RPM	40°	190.0	9.75	97	.79	238.0	12.2	106	1.24	286.0	14.7	115	1.79	312.0	12.8	120	1.37
4800 CFM	50°	168.0	6.90	92	.39	216.0	8.87	102	.65	264.0	10.8	111	.98	312.0	12.8	120	1.37
H1500C	10°	289.0	59.3	109	28.9	345.0	70.8	118	41.2	376.0	38.6	123	12.5	432.0	44.3	133	16.2
	20°	264.0	27.1	104	6.04	320.0	32.8	114	8.86	351.0	24.0	119	4.74	407.0	27.9	129	6.38
1/3 HP	30°	239.0	16.4	100	2.20	295.0	20.2	110	3.35	326.0	16.7	115	2.30	382.0	19.6	124	3.16
1075 RPM	40°	214.0	10.0	96	.99	270.0	13.9	105	1.58	301.0	12.3	111	1.26	357.0	14.7	120	1.78
5500 CFM	50°	189.0	7.76	92	.49	245.0	10.1	101	.88	286.0	10.8	111	1.26	357.0	14.7	120	1.78

Based on 60°F entering air temperature
 *For conversion factors see page 15.

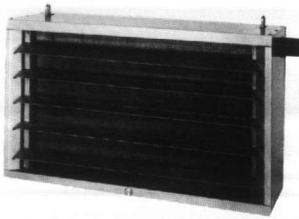
H model CA



HOT WATER CAPACITIES

UNIT NO.	TEMP. DROP	ENTERING WATER TEMPERATURE											
		200° F				220° F				240° F			
		MBH	GPM	FT	PD	MBH	GPM	FT	PD	MBH	GPM	FT	PD
H100CA 1/30 HP 1550 RPM 380 CFM	10°	12.7	2.6	91	.05	15.6	3.4	98	.10	18.9	4.1	106	.15
	20°	11.0	1.1	87	.01	14.4	1.48	95	.02	17.5	1.8	103	.03
	30°	9.9	.67	84	.01	12.9	.87	91	.01	15.8	1.1	99	.01
	40°	—	—	—	—	12.0	.59	89	.01	14.5	.72	95	.01
H175CA 1/30 HP 1550 RPM 645 CFM	10°	18.4	3.6	86	.15	28.8	6.2	101	.55	34.3	7.4	109	.75
	20°	16.0	1.5	83	.03	26.7	2.7	98	.11	31.8	3.2	106	.15
	30°	14.4	.92	81	.01	24.0	1.6	94	.04	28.6	2.4	101	.06
	40°	13.3	.62	79	.01	22.2	1.1	92	.02	26.4	1.4	98	.03
H250CA 1/20 HP 1550 RPM 960 CFM	10°	34.7	7.1	95	.05	46.0	9.9	107	1.7	54.0	11.7	116	2.3
	20°	30.2	3.1	91	.13	42.6	4.3	104	.33	50.0	5.1	111	.46
	30°	27.2	1.8	88	.05	38.3	2.5	99	.21	45.0	3.5	106	.18
	40°	24.9	1.3	86	.03	35.4	1.7	96	.09	41.5	2.6	103	.09
H300CA 1/8 HP 1140 RPM 1080 CFM	10°	44.2	8.9	98	2.8	47.1	9.9	100	3.6	57.1	12.0	109	4.7
	20°	38.9	3.9	93	.55	43.6	4.3	97	.71	52.9	5.2	105	.94
	30°	35.0	2.3	90	.22	39.2	2.5	94	.46	47.6	3.5	101	.38
	40°	32.3	1.6	88	.11	36.2	1.7	91	.18	43.9	2.6	98	.19
H400CA 1/8 HP 1140 RPM 1440 CFM	10°	61.4	12.4	99	3.3	70.8	14.7	106	4.6	84.1	17.5	114	6.5
	20°	53.4	5.4	94	.65	65.6	6.4	102	.93	77.9	7.6	110	1.3
	30°	48.1	3.2	91	.26	59.0	3.8	98	.37	70.1	4.5	105	.52
	40°	44.3	2.2	88	.13	54.4	2.2	95	.19	64.7	3.0	102	.21
H500CA 1/8 HP 1075 RPM 1900 CFM	10°	85.1	17.0	101	8.2	89.2	19.6	103	7.8	105.6	23.1	111	10.9
	20°	74.0	7.4	96	1.6	82.6	8.5	100	1.6	97.8	10.0	108	2.2
	30°	66.6	4.4	92	.64	74.4	5.0	96	.62	88.0	5.9	103	.87
	40°	61.4	3.0	90	.32	68.6	3.4	93	.32	81.2	4.0	100	.44
H600CA 1/6 HP 1075 RPM 2250 CFM	10°	103.7	20.3	103	14.0	115.1	25.1	107	20.5	132.6	29.0	115	27.5
	20°	90.2	9.1	97	2.8	106.6	10.9	104	4.1	122.8	12.6	111	5.5
	30°	81.2	5.4	93	1.1	95.9	6.4	99	1.6	110.5	7.4	105	2.2
	40°	74.9	3.6	91	.56	88.5	4.4	96	.82	101.9	5.0	102	1.1
H700CA 1/6 HP 1075 RPM 2560 CFM	10°	98.8	19.8	96	18.5	120.5	25.5	104	32.5	—	—	—	—
	20°	85.9	8.6	91	3.7	111.6	11.1	100	6.5	126.2	12.4	106	8.1
	30°	77.3	5.1	88	1.5	100.4	6.5	96	2.6	113.6	7.3	101	3.2
	40°	71.3	3.4	86	.74	92.6	4.4	93	1.3	104.7	5.0	98	1.6
H850CA 1/6 HP 1075 RPM 2980 CFM	10°	65.3	2.6	84	.48	84.8	3.3	91	.85	95.9	3.7	95	1.1
	20°	117.3	24.2	96	3.4	—	—	—	—	—	—	—	—
	30°	102.0	10.5	92	.68	148.1	15.0	106	1.4	171.0	17.6	113	1.9
	40°	91.8	6.2	80	.27	133.3	8.9	101	.56	153.9	10.4	108	.76
H1100CA 1/3 HP 1075 RPM 4160 CFM	10°	84.7	4.2	86	.14	122.9	6.0	98	.28	141.9	7.0	104	.38
	20°	77.5	3.2	84	.09	112.6	4.5	95	.18	130.0	5.3	100	.25
	30°	162.5	33.4	96	7.0	—	—	—	—	—	—	—	—
	40°	141.3	14.5	91	1.4	202.7	20.8	105	2.9	233.4	23.4	112	3.9
H1350CA 1/3 HP 1075 RPM 5100 CFM	10°	127.2	8.6	88	.58	182.4	12.3	101	1.2	215.2	13.8	108	1.6
	20°	117.3	5.8	86	.28	168.2	8.3	97	.58	197.1	9.4	104	.78
	30°	107.4	4.4	84	.18	154.1	6.2	72	.38	177.4	7.0	99	.51
	40°	—	—	—	—	—	—	—	—	163.6	4.1	96	.20
H1500CA 1/3 HP 1075 RPM 5700 CFM	10°	205.2	41.4	97	13.5	—	—	—	—	—	—	—	—
	20°	178.4	18.0	92	2.7	255.9	26.2	106	5.7	293.1	29.4	113	7.21
	30°	160.6	10.6	89	1.1	230.3	15.5	102	2.3	268.4	19.9	109	3.6
	40°	148.1	7.2	87	.54	212.4	10.5	99	1.1	241.5	14.9	104	2.3
H1500CA 1/3 HP 1075 RPM 5700 CFM	10°	135.6	5.4	85	.35	194.5	7.9	95	.74	222.8	8.8	100	.94
	20°	231.0	47.4	98	17.5	—	—	—	—	—	—	—	—
	30°	201.2	20.6	93	3.5	290.4	24.9	107	7.3	335.6	34.0	115	9.5
	40°	181.1	12.0	89	1.4	261.4	17.6	102	2.9	307.8	20.1	110	4.8
H1500CA 1/3 HP 5700 CFM	1075 RPM	167.0	8.2	87	.71	241.0	12.0	99	1.5	276.6	13.6	105	3.1
	50°	152.9	6.2	85	.45	220.7	9.0	96	.95	255.1	10.2	101	1.2

Based on 60° F entering air.
*For conversion factors see page 15.



H model C, CA

OPTIONS

SOLID STATE SPEED CONTROL

Adjustable solid state speed controllers are available for unit sizes 100 through 850. Speed controllers are shipped loose and feature adjustable trimpot for minimum speed selection. Speed controllers are shipped in a 2" x 4" J-box with face plate.

MOTOR OPTIONS

UNIT SIZE	EXPLOSION PROOF (1)				TOTALLY ENCLOSED (2)				EXPLOSION PROOF (3)			
	VOLTAGE	HP	RPM	AMP	VOLTAGE	HP	RPM	AMP	VOLTAGE	HP	RPM	AMP
100	115/1-60	1/6	1725	3.0	Consult Factory				N/A			
175	115/1-60	1/6	1725	3.0	Consult Factory				N/A			
250	115/1-60	1/6	1725	3.0	Consult Factory				N/A			
300	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
400	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
500	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
600	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
700	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
850	115/1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	1.7/1.6/.8
1100	115/230-1-60	1/2	1140	8.0/4.0	200/230/460-3-60	1/2	1140	2.2/2.0/1.0	200/230/460-3-60	1/2	1140	2.5/2.4/1.2
1350	115/230-1-60	1/2	1140	8.0/4.0	200/230/460-3-60	1/2	1140	2.2/2.0/1.0	200/230/460-3-60	1/2	1140	2.5/2.4/1.2
1500	115/230-1-60	1/2	1140	8.0/4.0	200/230/460-3-60	1/2	1140	2.2/2.0/1.0	200/230/460-3-60	1/2	1140	2.5/2.4/1.2

(1) Class I, Group D; Class II, Group E, F, & G.

(2) Totally Enclosed, Fan Cooled.

(3) Class I, Group D; Class II, Group F & G.

Consult factory for 575/3/60 applications.

VERTICAL LOUVERS

Four way air deflection can be attained with the addition of optional vertical louvers. All Horizontal Discharge Unit Heaters have individually adjustable horizontal louvers as standard. Vertical louvers are shipped loose for field installation. Removal of the top panel and installation of the vertical louvers is easily accomplished. Instructions are included.

SPECIAL COILS

For high temperature, high pressure systems coils may be constructed of .049" wall 90/10 cupro-nickel tubing and red brass headers for supply and return. Operating pressures up to 300 psi at 350° F may be accomplished with this option.

PROTECTIVE COATINGS

Waste water treatment facilities, paint booths, and many other such applications pose a particular threat to air moving equipment. Corrosive atmospheres are responsible for much premature failure of coils and sheet metal parts. Coils, fan propellers, and/or entire units may be ordered with a 3 mil. thick "Libcote 7" baked phenolic coating for additional protection against these hazardous environments.

DISCONNECT SWITCH

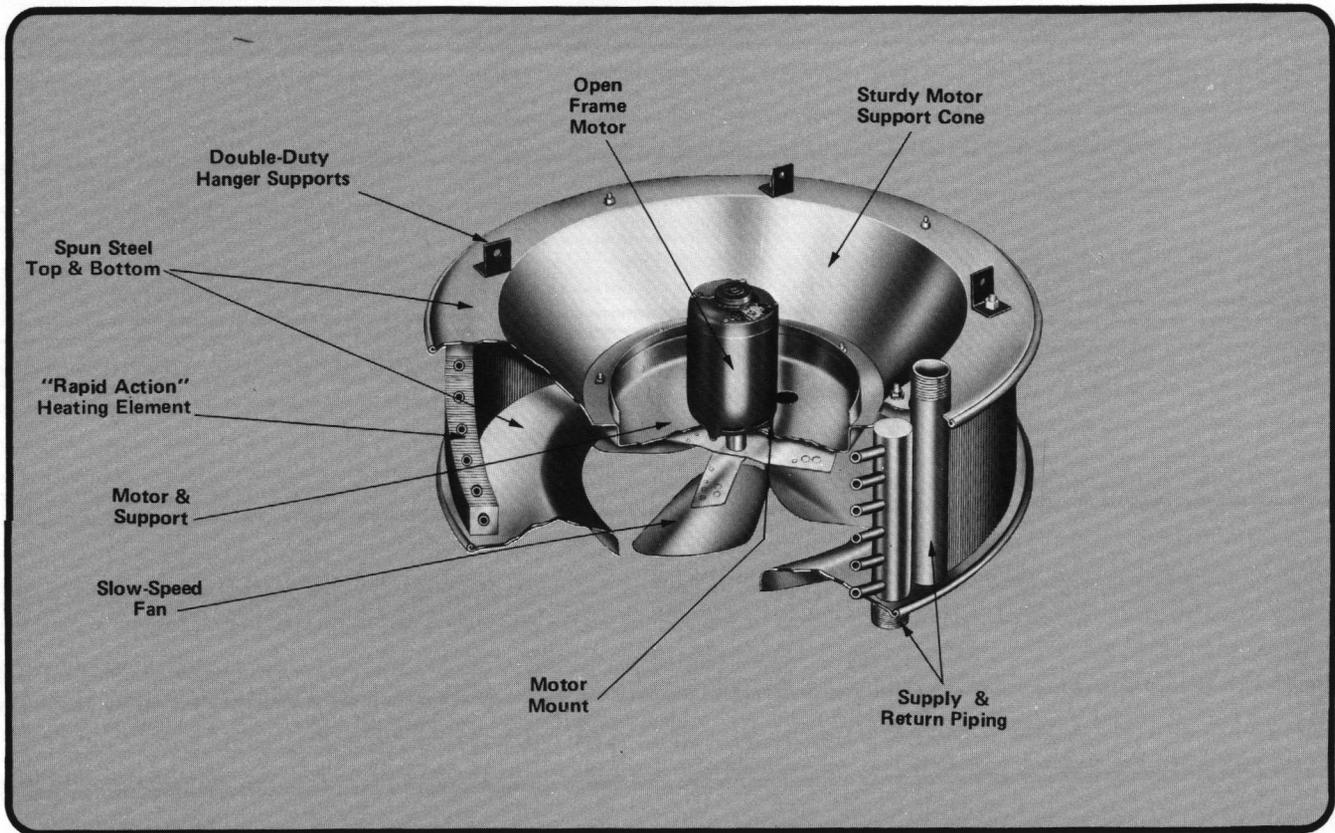
Single phase units may be ordered with factory installed disconnect switch mounted in a 2" x 4" junction box on the back of the unit.

THERMOSTATS (shipped loose for wall mounting)

PART NUMBER	CONTROL RANGE	ELEC. RATINGS	FUNCTION
009632A1	40° F-90° F	1.5A, 3.5A inrush at 30 VAC	Low voltage SPDT makes contact for heating and/or cooling.
009634A1	56° F-94° F	6.0/3.0 amps at 120V/240V	Line voltage contacts make on temperature fall.

VERTICAL DISCHARGE UNIT HEATERS

FEATURES



Dunham-Bush Vertical Discharge Unit Heaters are available in ten sizes for steam or hot water heating, with capacities ranging from 133 EDR to 2490 EDR (based on 2 lbs. steam pressure and 60° F entering air). They are designed for working pressures up to 125 psi. Entering hot water temperatures of up to 340° F may be used with hot water heating systems. Based on 200° F entering water 20° F drop, capacities ranging from 19 MBH to 427 MBH may be obtained.

VERTICAL DISCHARGE UNIT DESIGN FEATURES

MOTORS

Standard motors are open frame and flange mounted. Motors on Models C175 thru C525 have permanently oiled sleeve bearings while motors on Models C650 thru C2400 have grease packed ball bearings. Motors 1/3 HP and smaller can be operated at reduced speeds by the addition of a speed controller. All motors can be removed from the bottom of the unit, permitting installation close to the ceiling.

CONSTRUCTION

The sturdy motor support cone and the spun steel top and bottom direct the air from the heating element to the fan, furnishing improved air flow and quiet operation while protecting the motor from excessive heat, dust and other impurities.

HEATING ELEMENT

Supply and return lines are located on top and bottom of the unit, approximately in line with each other, for ease of installation. All units are finished in beige baked enamel.

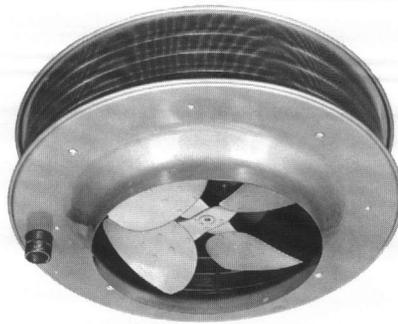
ELEMENT

The heating element fins are aluminum. Tubes are heavy copper expanded into fins to provide a positive and permanent mechanical bond. The complete assembly is tested with air pressure under water and hydrostatically at 400 lbs. psi. The C Model G and GA are suitable for pressures up to 125 psi and temperatures up to 340° F.

GENERAL

The double duty hanger support provides strong support for the units. There is no support strain on the piping. Propeller fan blades are aluminum with exception of C2400G and GA.

VERTICAL DISCHARGE UNIT HEATERS



CAPACITY DATA STEAM CAPACITY

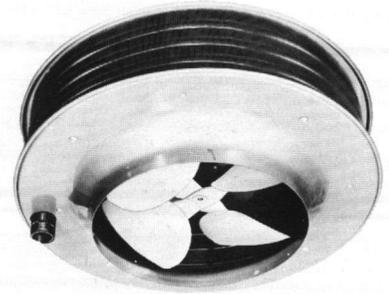
Unit No.	EDR	BTU Per Hr.	SCFM	CFM @ LAT	LAT	Cond. Lb./Hr.	Outlet Velocity FPM
C175G	189	45,400	557	625	135	47	1105
C300G	310	74,500	1000	1110	129	77	1000
C400G	411	98,700	1382	1530	126	102	1050
C525G	538	129,000	1658	1850	132	134	1270
C650G	629	151,000	2370	2575	116	156	1135
C900G	885	212,500	3160	3470	122	220	1540
C1250G	1304	313,000	5250	5700	115	324	1485
C1650G	1650	396,000	5980	6560	121	410	1710
C2000G	2065	488,000	8040	8740	116	505	1715
C2400G	2490	598,000	8750	9640	123	618	1890

Unit No.	EDR	BTU Per Hr.	SCFM	CFM @ LAT	LAT	Cond. Lb./Hr.	Outlet Velocity FPM
C175GA	133	31,900	615	660	108	33	1170
C300GA	244	58,500	1040	1120	112	61	1015
C400GA	298	71,600	1400	1500	107	74	1030
C525GA	390	93,700	1795	1925	108	97	1320
C650GA	529	126,900	2790	3020	102	131	1340
C900GA	672	161,400	3720	3940	100	167	1735
C1250GA	950	228,000	5700	5980	97	236	1560
C1650GA	1195	287,000	6300	6690	102	297	1740
C2000GA	1416	365,000	8210	8680	101	378	1710
C2400GA	1675	402,000	9750	10280	98	415	2020

Based on 2 psig steam pressure, 60° F entering air.

Refer to page 15 for conditions other than above.

MOTOR AND FAN DATA (115-1-60)



C Model G, GA

Optional motors are available with Explosion Proof, multi-voltage, or three-phase characteristics. See page 12.

UNIT SIZE	TYPE	HP	RPM	AMP	FAN DIA (in)
175	ODP	1/20	1550	1.14	10
300	ODP	1/20	1550	1.11	14
400	ODP	1/20	1550	1.11	16
525	ODP	1/8	1550	4.0	16
650	ODP	1/4	1075	3.5	20
900	ODP	1/3	1140	3.8	20
1250	ODP	1/2	1140	7.8	26
1650	TEFC (1)	3/4	1140	11.0	26
2000	TEFC (1)	3/4	1140	11.0	30
2400	ODP (2)	1	1140	14.7	30

All motors are UL approved.

(1) 115/230-1-60

(2) 115/208/230-1-60

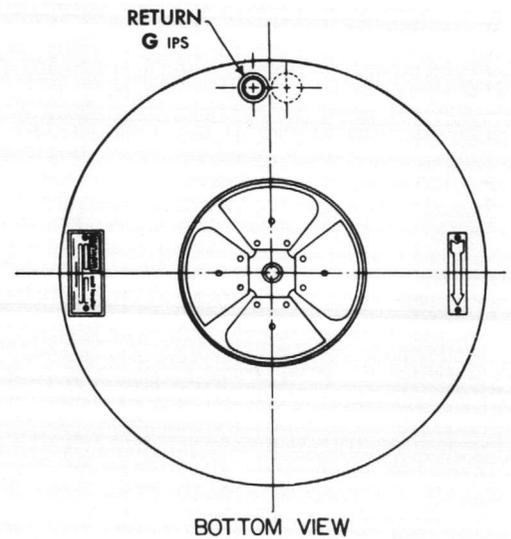
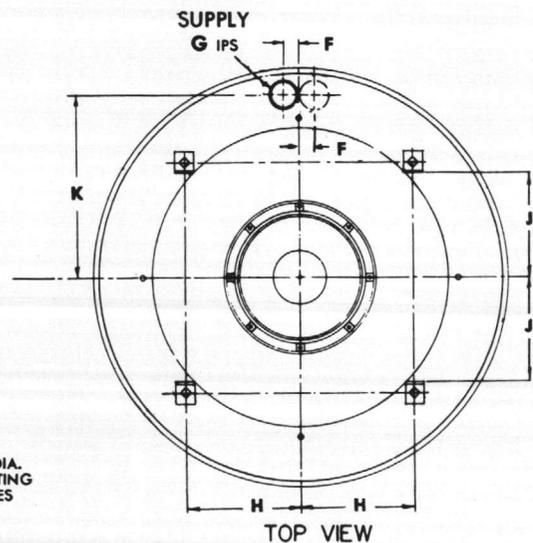
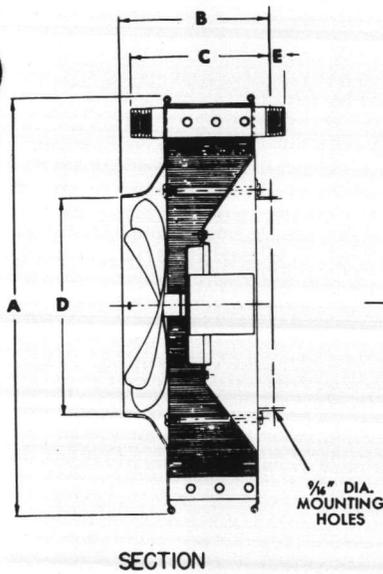
AIR DELIVERY (Approximate-ft.)

C Model G

UNIT SIZE	MOUNTING HEIGHT	HEAT SPREAD DIAMETER
175	11	20
300	12	30
400	12	33
525	13	35
650	18	44
900	20	46
1250	24	56
1650	26	60
2000	31	69
2400	35	67

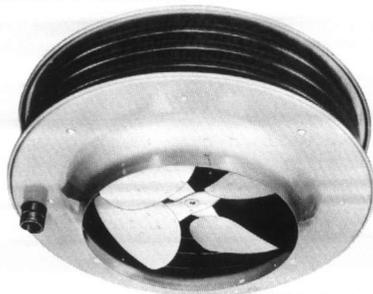
C Model GA

UNIT SIZE	MOUNTING HEIGHT	HEAT SPREAD DIAMETER	UNIT SIZE	WEIGHT Lb.
175	14	26	175	44
300	14	38	300	37
400	15	42	400	67
525	18	46	525	73
650	22	51	650	105
900	24	59	900	115
1250	29	72	1250	197
1650	35	74	1650	250
2000	38	91	2000	350
2400	41	93	2400	403



UNIT SIZE	DIMENSIONS IN INCHES									
	A	B	C	D	E	F	G	H	J	K
C175	26 ⁵ / ₁₆	9 ³ / ₈	7 ¹¹ / ₁₆	10 ³ / ₁₆	1 ³ / ₁₆	5 ³ / ₆₄	1 ¹ / ₄	7 ³ / ₁₆	6 ³ / ₈	11 ⁹ / ₁₆
C300	27 ⁷ / ₈	10 ¹ / ₂	9 ¹¹ / ₁₆	14 ¹ / ₄	1 ³ / ₁₆	6 ¹ / ₆₄	1 ¹ / ₂	7 ¹¹ / ₁₆	6 ⁷ / ₈	12
C400	31 ³ / ₈	11	9 ¹¹ / ₁₆	16 ⁵ / ₁₆	1 ³ / ₁₆	6 ¹ / ₆₄	1 ¹ / ₂	8 ¹³ / ₁₆	8 ¹ / ₁₆	13 ¹³ / ₁₆
C525	31 ³ / ₈	13	11 ¹¹ / ₁₆	16 ⁵ / ₁₆	1 ³ / ₁₆	6 ¹ / ₆₄	1 ¹ / ₂	8 ¹³ / ₁₆	8 ¹ / ₁₆	13 ¹³ / ₁₆
C650	35 ¹ / ₈	13 ¹ / ₄	11 ¹¹ / ₁₆	20 ³ / ₈	1 ³ / ₁₆	1 ³ / ₁₆	2	10 ¹³ / ₁₆	9 ⁷ / ₁₆	15 ³ / ₈
C900	35 ¹ / ₈	17 ¹ / ₄	15 ¹¹ / ₁₆	20 ³ / ₈	1 ³ / ₁₆	1 ³ / ₁₆	2	10 ¹³ / ₁₆	9 ⁷ / ₁₆	15 ³ / ₈
C1250	41 ³ / ₈	17 ³ / ₈	15 ⁵ / ₈	26 ⁷ / ₁₆	5/ ₈	1 ³ / ₁₆	2	12 ⁵ / ₁₆	11 ¹ / ₄	18 ⁹ / ₁₆
C1650	41 ³ / ₈	21 ³ / ₈	19 ⁵ / ₈	26 ⁷ / ₁₆	5/ ₈	1 ³ / ₁₆	2	12 ⁵ / ₁₆	11 ¹ / ₄	18 ⁹ / ₁₆
C2000	52 ¹ / ₄	23 ¹ / ₂	20 ³ / ₈	30 ¹ / ₂	1 ¹ / ₈	1 ⁷ / ₁₆	2 ¹ / ₂	16 ¹ / ₈	15	23 ³ / ₄
C2400	52 ¹ / ₄	25 ¹ / ₈	22 ³ / ₈	30 ¹ / ₂	1 ¹ / ₈	1 ⁷ / ₁₆	2 ¹ / ₂	16 ¹ / ₈	15	23 ³ / ₄

Supply and return labeled for steam. Reverse for hot water applications.



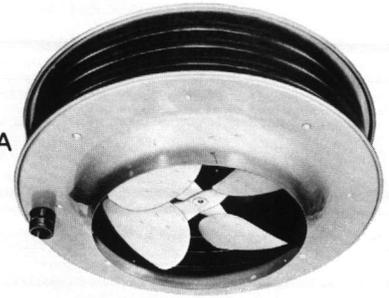
C model G

HOT WATER CAPACITIES

UNIT NO.	TEMP. DROP	ENTERING WATER TEMPERATURE															
		180°F				200°F				220°F				240°F			
		MBH	GPM	LAT	WPD	MBH	GPM	LAT	WPD	MBH	GPM	LAT	WPD	MBH	GPM	LAT	WPD
C175G	10°	27.7	5.65	106	.85	34.0	7.28	110	1.17	40.5	8.58	127	1.57	46.6	9.50	137	1.85
1/40 HP	20°	23.7	2.41	99	.17	29.7	3.02	109	.26	36.3	3.69	120	.36	42.6	4.30	131	.48
1550 RPM	30°	19.9	1.35	93	.03	25.7	1.83	103	.11	32.2	2.30	113	.15	38.7	2.63	124	.22
557 CFM	40°	15.6	.80	86	.02	21.4	1.14	96	.05	28.0	1.40	107	.07	34.8	1.77	118	.10
	50°	12.1	.50	80	.01	17.3	.74	89	.02	24.0	.96	100	.04	30.8	1.25	111	.05
C300G	10°	48.5	9.90	105	1.05	52.0	11.1	108	1.31	70.4	14.9	125	2.12	81.0	16.4	135	2.5
1/20 HP	20°	40.9	4.16	98	.23	46.4	4.72	103	.29	62.4	6.34	118	.49	73.0	7.42	128	.64
1550 RPM	30°	33.8	2.30	91	.08	41.9	2.99	99	.14	55.2	3.94	111	.26	65.9	4.48	121	.28
1000 CFM	40°	26.5	1.35	85	.02	37.2	1.99	94	.07	47.6	2.55	104	.12	58.9	3.00	115	.15
	50°	19.3	.79	78	.01	32.6	1.4	90	.04	40.1	1.72	97	.05	51.8	2.10	108	.07
C400G	10°	63.0	12.8	102	1.9	76.2	16.3	111	2.9	88.6	18.5	119	3.60	102.1	20.6	128	4.05
1/12 HP	20°	53.0	5.39	95	.37	66.7	6.78	105	.64	80.1	8.14	114	.86	93.3	9.48	122	1.13
1550 RPM	30°	43.4	2.95	89	.10	57.4	4.10	98	.26	71.5	5.10	108	.40	84.8	5.77	117	.50
1382 CFM	40°	33.9	1.73	83	.03	47.9	2.56	92	.12	62.9	3.36	102	.20	75.9	3.87	111	.25
	50°	24.2	.99	76	.01	38.4	1.65	86	.06	54.4	2.33	102	.11	67.4	2.73	105	.13
C525G	10°	77.8	15.9	103	1.65	95.2	20.4	113	2.53	113.0	23.7	123	3.30	140.0	28.3	138	4.22
1/8 HP	20°	66.6	6.77	97	.38	83.9	8.53	107	.57	101.5	10.3	117	.80	117.0	11.9	125	1.05
1550 RPM	30°	55.9	3.80	91	.18	72.7	5.19	100	.24	90.3	6.43	110	.35	106.4	7.24	119	.45
1658 CFM	40°	44.5	2.27	85	.09	61.3	3.28	94	.12	78.6	4.21	104	.17	95.5	4.87	113	.22
	50°	33.8	1.38	79	.03	50.3	2.15	88	.06	67.5	2.89	99	.09	84.5	3.42	107	.11
C650G	10°	111.3	23.0	103	3.60	130.5	27.9	111	4.90	154.4	32.4	120	6.40	179.3	36.2	130	7.80
1/4 HP	20°	94.0	9.55	97	.79	114.9	11.7	105	1.15	138.7	14.1	114	1.55	161.2	16.4	123	2.10
1075 RPM	30°	77.6	5.28	90	.30	100.1	7.15	99	.49	123.5	8.81	108	.70	145.8	9.91	117	.98
2370 CFM	40°	60.6	3.10	84	.10	84.5	4.53	93	.22	107.3	5.76	102	.30	130.0	6.63	111	.50
	50°	44.2	1.80	77	.05	68.9	2.95	93	.10	92.4	3.99	96	.25	114.6	4.64	105	.28
C900G	10°	145.0	29.6	102	2.35	175.7	37.6	111	4.20	206.0	43.1	120	5.22	237.0	47.9	129	6.50
1/3 HP	20°	124.8	12.7	97	.64	155.4	15.8	106	.92	186.1	18.9	115	1.25	216.4	22.0	123	1.60
1140 RPM	30°	105.2	7.16	91	.32	135.9	9.68	100	.30	166.5	11.3	109	.51	197.0	13.4	118	.70
3160 CFM	40°	85.4	4.35	85	.15	115.3	6.16	94	.12	145.8	7.80	103	.23	176.9	9.02	112	.38
	50°	66.1	2.70	79	.06	96.0	4.11	88	.09	126.8	5.43	97	.10	156.2	6.33	106	.20
C1250G	10°	194.0	39.6	94	5.43	234.0	50.1	101	8.20	273.0	58.0	108	10.8	310.0	62.6	115	12.3
1/2 HP	20°	168.4	17.1	90	1.27	206.9	21.0	96	1.85	246.4	25.0	103	2.50	284.7	28.9	110	3.17
1140 RPM	30°	143.0	9.72	85	.51	181.1	12.9	92	.70	221.0	15.8	99	1.15	260.0	17.7	106	1.38
5250 CFM	40°	117.0	5.97	81	.23	154.1	7.71	87	.30	195.6	10.5	94	.54	235.0	11.9	101	.75
	50°	91.6	3.74	76	.13	128.0	5.48	83	.25	168.0	7.19	90	.24	210.0	8.51	97	.42
C1650G	10°	261.0	53.6	100	5.65	320.0	68.5	110	8.30	368.0	78.9	117	11.7	432.0	87.3	127	13.9
3/4 HP	20°	227.0	23.0	95	1.28	282.0	28.7	104	1.90	334.0	33.9	112	2.50	385.8	39.2	120	3.25
1140 RPM	30°	193.0	13.1	90	.53	246.0	17.5	98	.80	300.0	21.3	112	1.15	349.0	23.7	114	1.22
5980 CFM	40°	157.8	8.03	84	.23	207.0	11.1	93	.37	264.5	14.2	101	.58	311.0	15.9	108	.68
	50°	123.8	5.04	79	.10	170.8	7.30	87	.19	231.0	9.91	97	.30	274.0	11.1	103	.40
C2000G	10°	362.0	73.8	102	12.3	409.0	87.5	107	16.4	496.0	106.0	117	23.0	544.0	109.9	123	27.6
3/4 HP	20°	318.2	32.3	97	3.00	370.3	37.6	103	3.90	452.7	46.0	112	5.45	508.3	51.5	119	6.50
1140 RPM	30°	272.0	18.5	91	1.20	336.0	24.0	99	1.67	411.0	29.3	107	2.60	472.0	32.1	114	3.5
8040 CFM	40°	226.0	11.5	86	.60	296.0	15.8	94	.75	366.0	19.6	102	1.30	439.0	22.4	111	1.9
	50°	181.3	7.41	81	.30	258.0	11.1	90	.40	327.0	14.0	98	.60	405.0	16.4	107	1.20
C2400G	10°	398.0	81.2	102	12.6	478.0	102.3	111	17.3	548.0	117.0	118	23.5	582.0	119.6	122	23.0
1 HP	20°	351.2	35.7	97	2.95	426.6	43.4	105	3.85	500.9	50.9	113	5.40	556.8	57.6	119	6.90
1140 RPM	30°	302.0	20.5	92	1.35	378.0	27.0	100	1.60	453.0	30.8	108	2.40	522.0	35.5	115	3.00
8750 CFM	40°	250.0	12.7	86	.69	326.5	20.2	95	.98	406.0	22.2	103	1.40	485.0	24.7	111	1.70
	50°	204.0	8.32	82	.38	277.0	11.9	89	.43	360.0	14.7	98	.60	451.0	18.3	108	1.0

Conversion factors can be found on page 15. Based on 60° entering air temperature.

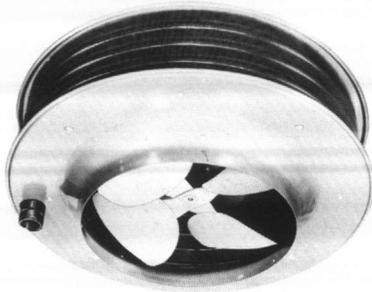
C model GA



HOT WATER CAPACITIES

UNIT NO.	TEMP. DROP	ENTERING WATER TEMPERATURE											
		200°F				220°F				240°F			
		MBH	GPM	LAT	WPD	MBH	GPM	LAT	WPD	MBH	GPM	LAT	WPD
C175GA	10	21.6	4.50	93	.53	27.2	5.66	101	.85	31.8	6.63	108	1.06
1/40 HP	20	18.9	1.97	88	.12	24.4	2.56	97	.19	29.1	3.03	104	.27
1550 RPM	30	16.3	1.13	85	.05	21.7	1.50	93	.08	26.4	1.76	100	.10
615 CFM	40	13.6	.71	80	.02	18.9	.99	88	.04	23.7	1.23	96	.05
	50	11.0	.46	77	.01	16.2	.68	84	.02	21.0	.88	92	.03
C300 GA	10	34.9	7.28	91	.64	47.1	9.81	102	1.05	54.6	8.80	109	.92
1/20 HP	20	31.6	3.30	88	.16	42.0	4.37	97	.29	49.7	5.17	104	.36
1550 RPM	30	28.4	1.97	85	.07	37.0	2.57	93	.12	44.8	3.11	100	.16
1040 CFM	40	25.1	1.31	82	.02	31.9	1.66	88	.05	39.9	2.08	96	.07
	50	21.9	.91	80	.01	26.8	1.11	84	.02	35.0	1.46	91	.04
C400GA	10	51.5	10.72	94	1.36	59.9	12.50	100	1.80	69.3	14.40	106	2.36
1/12 HP	20	45.1	4.70	90	.33	54.1	5.64	96	.48	63.4	6.70	102	.66
1550 RPM	30	38.7	2.68	86	.13	48.3	3.34	92	.20	57.5	3.98	98	.26
1400 CFM	40	32.3	1.68	81	.06	42.5	2.21	88	.10	51.6	1.69	94	.13
	50	25.9	1.08	77	.02	36.7	1.53	84	.05	45.7	1.91	90	.08
C525GA	10	71.6	14.90	97	1.46	84.9	17.70	104	2.09	105.0	21.90	114	2.83
1/8 HP	20	63.1	6.57	93	.37	76.3	7.95	99	.52	94.6	9.89	109	.77
1550 RPM	30	54.7	3.79	88	.12	67.7	4.70	95	.19	84.2	5.84	103	.31
1795 CFM	40	45.2	2.35	83	.97	59.1	3.08	90	.10	73.8	3.84	98	.14
	50	37.7	1.57	79	.04	50.5	2.11	86	.06	63.4	2.64	93	.08
C650GA	10	110.0	22.90	97	3.63	130.0	27.10	103	4.80	151.0	31.45	110	6.20
1/4 HP	20	96.9	10.90	92	1.02	116.9	12.20	99	1.27	137.3	14.30	106	1.75
1075 RPM	30	83.9	5.82	88	.30	103.8	7.17	94	.47	123.6	8.56	101	.78
2790 CFM	40	70.8	3.68	83	.16	90.7	4.72	90	.27	109.9	5.72	96	.40
	50	57.8	2.41	79	.08	77.5	3.22	86	.13	96.2	4.00	92	.25
C900GA	10	133.0	27.65	93	2.55	157.5	32.80	99	3.39	180.0	37.50	105	4.30
1/3 HP	20	117.9	12.30	89	.53	142.4	14.85	95	.79	164.6	17.20	101	1.10
1140 RPM	30	102.9	7.14	86	.16	127.3	8.84	92	.31	149.3	10.38	97	.48
3720 CFM	40	87.8	4.57	82	.10	112.2	5.85	88	.11	133.9	6.97	93	.16
	50	72.8	3.03	78	.07	97.0	4.04	84	.09	118.5	4.94	89	.11
C1250GA	10	170.5	34.4	88	4.6	198.5	41.4	92	6.05	226.0	47.1	97	7.73
1/2 HP	20	150.5	15.7	84	1.15	179.5	18.7	89	1.50	207.5	21.6	94	1.92
1140 RPM	30	131.8	9.1	81	.48	160.8	11.2	86	.65	189.9	13.2	91	.75
5700 CFM	40	112.0	5.8	78	.26	142.5	7.7	83	.30	171.2	8.9	88	.47
	50	93.3	3.9	75	.14	122.2	5.4	80	.24	152.8	6.3	85	.26
C1650GA	10	232.0	48.3	94	5.6	266.5	55.5	99	6.30	312.5	65.0	106	7.9
3/4 HP	20	204.0	21.2	90	1.14	242.0	25.2	96	1.47	280.0	29.2	101	1.9
1140 RPM	30	178.0	12.3	86	.46	217.0	15.1	92	.73	252.5	17.5	97	.42
6300 CFM	40	150.0	7.8	82	.22	191.5	10.0	88	.31	225.0	11.7	93	.42
	50	123.8	5.2	78	.11	167.5	6.9	85	.17	198.5	8.2	89	.28
C2000GA	10	306.0	63.8	95	9.8	372.0	72.5	102	14.1	408.0	85.1	106	18.7
3/4 HP	20	278.0	29.0	91	2.58	338.0	35.2	71	3.6	380.0	39.5	103	4.9
1140 RPM	30	251.0	17.4	88	1.40	307.0	21.3	95	1.6	352.0	24.4	100	2.23
8210 CFM	40	221.0	11.3	85	.40	274.0	14.3	91	.65	328.0	17.0	97	1.25
	50	193.0	8.0	82	.31	244.0	10.1	88	.38	303.0	12.6	94	.50
C2400GA	10	358.0	74.6	94	10.4	410.0	85.5	99	15.2	436.0	91.0	101	15.1
1 HP	20	318.0	33.2	90	2.7	375.0	39.1	96	3.5	416.0	43.8	100	4.3
1140 RPM	30	283.0	19.7	87	1.2	336.0	23.3	92	1.55	390.0	27.0	97	2.05
9750 CFM	40	244.2	12.8	83	.55	304.0	15.7	89	.73	363.0	19.0	94	1.1
	50	207.0	8.6	80	.39	269.0	11.2	86	.42	337.0	14.0	92	.55

Conversion factors can be found on page 15. Based on 60°F entering air temperature.



C model G, GA

OPTIONS

SOLID STATE SPEED CONTROL

Adjustable solid state speed controllers are available for unit sizes 175 through 900. Speed controllers are shipped loose and feature adjustable trim pot for minimum speed selection. Speed controllers are shipped in a 2" x 4" J-box with face plate.

MOTOR OPTIONS

UNIT SIZE	TOTALLY ENCLOSED					EXPLOSION PROOF (1)				TOTALLY ENCLOSED (2)				EXPLOSION PROOF (3)			
	VOLTAGE	TYPE	HP	RPM	AMP	VOLTAGE	HP	RPM	AMP	VOLTAGE	HP	RPM	AMP	VOLTAGE	HP	RPM	AMP
175	115/230-1-60	TENV	1/6	1625	2.0/1.0	115-1-60	1/6	1725	3.0	Consult Factory				Not Available			
300	115/230-1-60	TENV	1/6	1625	2.0/1.0	115-1-60	1/6	1725	3.0	Consult Factory				Not Available			
400	115/230-1-60	TENV	1/6	1625	2.0/1.0	115-1-60	1/6	1725	3.0	Consult Factory				Not Available			
525	115/230-1-60	TENV	1/6	1625	2.0/1.0	115-1-60	1/6	1725	3.0	Consult Factory				Not Available			
650	115/230-1-60	TENV	1/4	1140	4.0/2.0	115-1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	2.5
900	115/230-1-60	TENV	1/3	1140	4.8/2.4	115-1-60	1/4	1140	3.0	200/230/460-3-60	1/3	1140	1.7/1.6/.8	200/230/460-3-60	1/3	1140	2.4
1250	115/230-1-60	TEFC	1/2	1140	8.0/4.0	115-1-60	1/4	1140	3.0	200/230/460-3-60	1/2	1140	2.2/2.0/1.0	200/230/460-3-60	1/2	1140	1.2
1650	115/230-1-60	TEFC	3/4	1140	10.0/5.0	115-230-1-60	3/4	1140	11.0/5.5	200/230/460-3-60	3/4	1150	3.3/3.1/1.6	200/230/460-3-60	3/4	1150	3.0
2000	115/230-1-60	TEFC	3/4	1140	10.0/5.0	115-230-1-60	3/4	1140	11.0/5.5	200/230/460-3-60	3/4	1150	3.3/3.1/1.6	200/230/460-3-60	3/4	1150	2.8
2400	115/230-1-60	TEFC	1	1140	14.0/7.0	115-230-1-60	1	1140	14.0/7.0	200/230/460-3-60	1	1140	4.0/3.8/1.9	200/230/460-3-60	1	1140	3.0

(1) Class I, Group D; Class II, Group E, F & G.

(2) Totally Enclosed, Fan Cooled.

(3) Class I, Group D; Class II, Group F & G.

Consult factory for 575/3/60 applications.

DIFFUSERS, ANEMOSTATS

A variety of options are available to attain desired air delivery with Vertical Discharge Unit Heaters. These include adjustable cone diffuser, radial louver diffuser, and 3 or 4 cone anemostats. All are shipped loose with complete instructions for installation. See page 13 for dimensions.

SPECIAL COILS

Special coils for use with high temperature, high pressure systems are available. Tubes will be .049" wall 90/10 cupro-nickel and supply and return header will be constructed of red brass pipe nipples suitable for pressures up to 300 psi at temperatures up to 350°F.

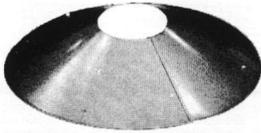
PROTECTIVE COATINGS

Waste water treatment facilities, paint booths, and many other such applications pose a particular threat to air moving equipment. Corrosive atmospheres are responsible for much premature failure of coils and sheet metal parts. Coils, fan propellers, and/or entire units may be ordered with a 3 mil. thick "Libcote 7" baked phenolic coating for additional protection against these hazardous environments.

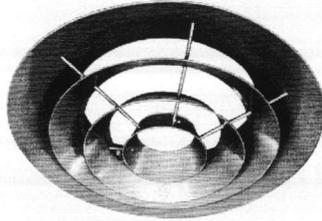
THERMOSTATS (shipped loose for wall mounting)

PART NUMBER	CONTROL RANGE	ELEC. RATINGS	FUNCTION
009632A1	40°F-90°F	1.5A, 3.5A inrush at 30 VAC	Low voltage SPDT makes contact for heating and/or cooling.
009634A1	56°F-94°F	6.0/3.0 amps at 120V/240V	Line voltage contacts make on temperature fall.

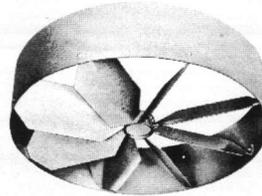
OPTIONS



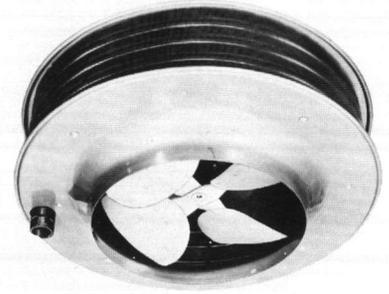
Adjustable Cone Diffuser



Anemostat 3 and 4 Cone

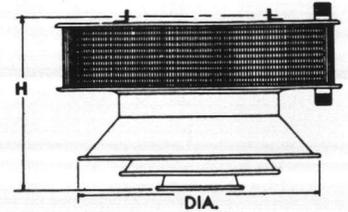
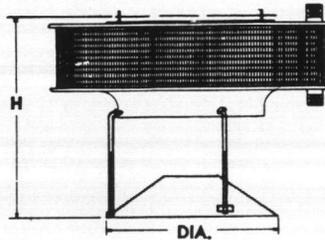
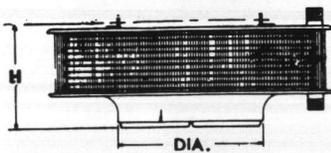


Radial Louver Diffuser



C Model G, GA

UNIT NUMBER	MOUNTING HEIGHT—FEET					HEAT SPREAD: DIAMETER CIRCLE—FEET						
	Louvers Vertical		Louvers 45°	Cone	Anemostat		Louvers Vertical		Louvers 45°	Cone	Anemostat	
	Max.	Min.	Diffuser	HU-3	HU-4	Min.	Max.	Diffuser	HU-3	HU-4		
C175G	12	8	10	9	8	14	23	20	25	29		
C175GA	16	11	11	11	10	18	31	26	33	38		
C300G	15	11	12	11	8	18	31	30	34	40		
C300GA	19	14	15	14	11	23	39	36	45	52		
C400G	16	12	12	11	9	20	35	30	36	46		
C400GA	21	16	16	15	12	25	45	42	47	57		
C525G	19	13	13	12	9	26	36	40	40	48		
C525GA	24	20	17	16	13	33	49	45	54	63		
C650G	23	16	16	14	11	27	48	43	45	58		
C650GA	27	22	19	18	17	34	60	50	58	70		
C900G	26	16	16	16	13	31	48	50	56	60		
C900GA	34	23	20	21	18	42	62	55	68	80		
C1250G	34	21	18	17	14	43	59	58	64	80		
C1250GA	45	28	22	23	19	55	75	63	85	95		
C1650G	40	24	20	18	14	49	65	63	72	85		
C1650GA	55	34	27	24	19	64	86	75	92	100		
C2000G	48	24	20	20	14	53	70	74	77	94		
C2000GA	61	34	26	27	18	65	92	80	100	120		
C2400G	52	26	20	20	14	53	68	75	85	95		
C2400GA	64	36	26	27	19	65	90	80	110	120		



UNIT SIZE	RADIAL LOUVER		CONE DIFFUSER			HU-3	ANEMOSTATS		HU-4
	H	DIA.	H MAX.	H. MIN.	DIA.	H	DIA.	H.	DIA.
C175	13 ³ / ₁₆	10 ¹ / ₂	21 ⁷ / ₁₆	16 ³ / ₁₆	13 ³ / ₁₆	16 ³ / ₁₆	19 ⁹ / ₁₆	15 ³ / ₁₆	25
C300	14 ⁹ / ₁₆	14 ¹ / ₂	23	17 ¹ / ₂	17 ¹¹ / ₁₆	19 ¹ / ₄	24	17 ¹ / ₂	28
C400	15	16 ³ / ₁₆	23 ¹ / ₂	18	19 ³ / ₁₆	20 ¹ / ₄	27	18 ¹ / ₂	32
C525	17	16 ³ / ₁₆	25 ¹ / ₂	20	19 ³ / ₁₆	22 ¹ / ₄	27	20 ¹ / ₂	32
C650	17 ⁹ / ₁₆	20 ³ / ₁₆	25 ³ / ₁₆	20 ³ / ₁₆	23 ¹³ / ₁₆	24	30 ⁹ / ₁₆	22	36
C900	21 ³ / ₁₆	20 ³ / ₁₆	29 ³ / ₁₆	24 ³ / ₁₆	23 ¹³ / ₁₆	28	30 ⁹ / ₁₆	26	36
C1250	21 ³ / ₁₆	26 ³ / ₁₆	29 ³ / ₁₆	26 ⁷ / ₁₆	29 ³ / ₁₆	33 ³ / ₁₆	45 ⁹ / ₁₆	29 ³ / ₄	52
C1650	25 ³ / ₁₆	26 ³ / ₁₆	33 ³ / ₁₆	30 ³ / ₁₆	29 ³ / ₁₆	37 ¹ / ₁₆	45 ⁹ / ₁₆	33 ³ / ₄	52
C2000	27 ¹ / ₁₆	30 ³ / ₁₆	35 ³ / ₁₆	33 ³ / ₁₆	33 ¹⁵ / ₁₆	38 ³ / ₁₆	45 ⁹ / ₁₆	35 ¹ / ₂	52
C2400	29 ¹ / ₁₆	30 ³ / ₁₆	37 ³ / ₁₆	35 ³ / ₁₆	33 ¹⁵ / ₁₆	40 ³ / ₁₆	45 ⁹ / ₁₆	37 ¹ / ₂	52

Note: All dimensions are in inches.

ENGINEERING DATA

An understanding of forced air heating equipment is most easily obtained with a knowledge of the following terms.

- ATR Air Temperature Rise. The difference between the entering air temperature and leaving air temperature due to amount of heat added.
- CFM Volume of air moved in cubic feet per minute.
- EAT Entering air temperature.
- EDR Heat output measured in square feet of Equivalent Direct Radiation. (1 Ft.²EDR = 240 Btu @ 2 psi steam)
- EWT Entering water temperature.
- FPM Velocity of air leaving the coil in feet per minute.
- GPM The flow of water in gallons per minute.
- LAT Leaving air temperature.
- MBH One thousand btu per hour
- RPM Fan motor revolutions per minute.
- SCFM Standard CFM. Air moved at standard temperature (68°F) and pressure (14.7 psi).
- WPD Water Pressure Drop. The resistance to the flow of water through a system created by friction between the water and piping.
- WTD Water Temperature Drop. The difference between the entering water temperature and the leaving water temperature due to amount of heat removed.

All types of forced air heating equipment obey certain thermodynamic principles. Among them are:

$ATR = \frac{Btu}{CFM \times 1.08}$	$LAT = EAT + \frac{Btu}{CFM \times 1.08}$	$WTD = \frac{Btu}{GPM \times 500}$	<u>HORIZONTAL UNITS</u> $CFM_f = CFM_i \left(\frac{LAT + 460}{530} \right)$
-------------------------------------	---	------------------------------------	---

$\frac{CFM_f}{CFM_i} = \frac{RPM_f}{RPM_i}$	$Btu_f = \left(\frac{RPM_f}{RPM_i} \right)^{.6} \times Btu_i$	$GPM = \frac{Btu}{WTD \times 500}$	<u>VERTICAL UNITS</u> $CFM_f = \frac{Btu (LAT + 460)}{ATR \times 575}$
---	--	------------------------------------	---

$\frac{WPD_f}{WPD_i} = \frac{GPM_f^2}{GPM_i^2}$, or $WPD_f = WPD_i \left(\frac{GPM_f}{GPM_i} \right)^2$	where i = initial value, and f = final value
---	---

GENERAL

In analyzing mathematical data, such as capacities and correction factors, keep in mind that not all points can be listed in tables. Normal engineering practice allows that linear relationships, such as the tables on page 15, be plotted on ordinary graph paper.

Once two or more values have been correctly plotted, a straight line will be indicated. This process will allow you to select accurate values between points published on your charts and tables.

EFFECT OF OPERATING CONDITIONS

Many times, the conditions of service differ from the tables published in this catalog.

Even though thermodynamic principles, discussed on page 14, apply rigidly, correction factors may not. For example, the correction factor for differing steam pressures for Horizontal Discharge Unit Heaters which are of the blow-through design differ from the correction factors for Vertical Discharge Unit Heaters, which are of the draw-through design.

DETERMINING Btu CAPACITY AT VARYING STEAM PRESSURES OR EAT

Multiply the Btu @ 2 psi steam pressure, 60° EAT by the factor in the table below:

STEAM CONVERSION FACTORS (BASED ON 2 LB. STEAM, 60° ENTERING AIR)

Horizontal Discharge Unit Heaters	ENTERING AIR TEMPERATURE	STEAM PRESSURE—LBS. PER SQ. IN. (SATURATED)															
		0	2	5	10	15	20	30	40	50	60	70	75	80	90	100	125	150
	30°	1.191	1.237	1.289	1.375	1.441	1.498	1.597	1.683	1.755	1.811	1.872	1.896	1.925	1.968	2.015	2.114	2.198
40°	1.110	1.155	1.206	1.290	1.335	1.416	1.509	1.596	1.666	1.725	1.782	1.808	1.836	1.880	1.927	2.022	2.105
50°	1.034	1.078	1.127	1.211	1.275	1.333	1.429	1.511	1.582	1.640	1.696	1.721	1.748	1.792	1.836	1.932	2.015
60°	.956	1.000	1.050	1.131	1.194	1.251	1.346	1.430	1.498	1.555	1.610	1.635	1.660	1.705	1.749	1.842	1.925
70°	.881	.926	.974	1.056	1.117	1.174	1.266	1.349	1.416	1.472	1.527	1.552	1.577	1.621	1.663	1.757	1.837
80°	.809	.853	.901	.982	1.043	1.097	1.190	1.270	1.338	1.393	1.447	1.472	1.497	1.541	1.581	1.675	1.755
90°	.739	.782	.829	.908	.970	1.024	1.115	1.194	1.262	1.314	1.368	1.392	1.418	1.461	1.502	1.592	1.672
100°	.671	.713	.760	.838	.897	.952	1.042	1.119	1.187	1.239	1.293	1.316	1.342	1.383	1.424	1.513	1.592

Vertical Discharge Unit Heaters	ENTERING AIR TEMPERATURE	STEAM PRESSURE—LBS. PER SQ. IN. (SATURATED)															
		0	2	5	10	15	20	30	40	50	60	70	75	80	90	100	125	150
	30°	1.178	1.215	1.260	1.328	1.382	1.421	1.497	1.563	1.628	1.673	1.722	1.750	1.770	1.804	1.845	1.911	1.978
40°	1.105	1.141	1.187	1.253	1.310	1.350	1.423	1.491	1.554	1.601	1.651	1.680	1.698	1.732	1.770	1.840	1.906
50°	1.032	1.069	1.114	1.182	1.239	1.278	1.352	1.420	1.483	1.531	1.582	1.609	1.629	1.661	1.700	1.770	1.835
60°	.962	1.000	1.045	1.112	1.168	1.208	1.281	1.350	1.416	1.463	1.512	1.540	1.560	1.590	1.630	1.700	1.768
70°	.892	.930	.975	1.042	1.099	1.138	1.212	1.282	1.347	1.394	1.443	1.471	1.491	1.523	1.560	1.629	1.698
80°	.822	.861	.906	.973	1.028	1.070	1.145	1.215	1.278	1.325	1.377	1.402	1.422	1.457	1.492	1.560	1.630
90°	.754	.792	.838	.903	.960	1.002	1.078	1.148	1.211	1.260	1.319	1.333	1.354	1.387	1.425	1.493	1.564
100°	.688	.728	.771	.838	.895	.936	1.010	1.081	1.145	1.194	1.243	1.268	1.288	1.321	1.359	1.428	1.497

When heat is removed from steam, it condenses to water. The amount of condensate is related to heat output in the following manner.

$$\frac{\text{Btu}}{L} = \text{condensate} \left(\frac{\text{lbs}}{\text{hr}} \right)$$

$$\frac{\text{EDR}}{4} = \text{condensate} \left(\frac{\text{lbs}}{\text{hr}} \right)$$

where L = latent heat of steam

PROPERTIES OF SATURATED STEAM

STEAM PRESSURE PSIG	STEAM PRESSURE PSIA	BOILING POINT OF STEAM TEMP.	VOLUME OF 1 LB. OF STEAM CU. FT.	HEAT OF THE LIQUID Btu.	LATENT HEAT OF EVAP. Btu.	TOTAL HEAT OF STEAM Btu.
1	14.70	212.0	26.79	180.00	970.4	1150.4
1	15.70	215.3	25.20	183.3	968.2	1151.6
2	16.70	218.5	23.78	186.6	966.2	1152.8
4	18.70	224.4	21.40	192.5	962.4	1154.9
6	20.70	229.8	19.45	198.0	958.8	1156.8
8	22.70	234.8	17.85	203.0	955.5	1158.6
10	24.70	239.4	16.49	207.7	952.5	1160.2
15	29.70	249.8	13.87	218.2	945.5	1163.7
25	39.70	266.8	10.57	235.6	933.6	1169.2
50	64.70	297.7	6.68	267.2	911.2	1178.4
75	89.70	320.1	4.91	290.3	894.2	1184.4
100	114.70	337.9	3.891	308.8	880.0	1188.8
125	139.70	352.9	3.225	324.4	867.8	1192.2

DETERMINING Btu CAPACITY AT VARYING EWT OR EAT

Multiply the Btu @ 200°F EWT, 60° EAT by the factor in the table below:

Horizontal Discharge Unit Heaters	ENTERING AIR TEMPERATURE	ENTERING WATER TEMPERATURE													
		110°	120°	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°	250°
30°	0.575	0.660	0.737	0.812	0.889	0.963	1.037	1.112	1.185	1.260	1.332	1.408	1.481	1.555	1.628
40°	0.502	0.576	0.652	0.729	0.805	0.878	0.952	1.025	1.098	1.172	1.244	1.317	1.391	1.464	1.537
50°	0.431	0.505	0.575	0.648	0.723	0.796	0.868	0.941	1.012	1.085	1.157	1.231	1.302	1.375	1.447
60°	0.360	0.430	0.500	0.572	0.643	0.715	0.786	0.857	0.928	1.000	1.072	1.143	1.214	1.286	1.358
70°	0.282	0.354	0.423	0.492	0.561	0.636	0.706	0.777	0.848	0.918	0.989	1.060	1.130	1.201	1.272
80°	0.210	0.278	0.348	0.416	0.488	0.558	0.628	0.698	0.768	0.837	0.907	0.977	1.047	1.117	1.187
90°	0.138	0.206	0.276	0.352	0.414	0.483	0.552	0.621	0.690	0.759	0.828	0.897	0.966	1.035	1.104
100°	0.066	0.135	0.205	0.272	0.341	0.409	0.477	0.546	0.613	0.682	0.750	0.818	0.887	0.955	1.023

Vertical Discharge Unit Heaters	ENTERING AIR TEMPERATURE	ENTERING WATER TEMPERATURE													
		110°	120°	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°	250°
30°	0.639	0.708	0.778	0.846	0.913	0.980	1.047	1.113	1.177	1.238	1.301	1.360	1.418	1.474	1.530
40°	0.560	0.629	0.698	0.765	0.832	0.900	0.966	1.033	1.095	1.159	1.221	1.282	1.340	1.398	1.453
50°	0.471	0.539	0.608	0.677	0.747	0.815	0.881	0.948	1.012	1.077	1.138	1.200	1.259	1.317	1.376
60°	0.418	0.481	0.546	0.610	0.671	0.739	0.816	0.872	0.937	1.000	1.062	1.123	1.183	1.241	1.298
70°	0.331	0.398	0.462	0.529	0.593	0.661	0.728	0.795	0.859	0.923	0.985	1.047	1.107	1.166	1.223
80°	0.242	0.310	0.359	0.446	0.515	0.583	0.651	0.718	0.783	0.846	0.909	0.971	1.030	1.090	1.147
90°	0.163	0.230	0.300	0.370	0.437	0.506	0.573	0.639	0.705	0.769	0.832	0.894	0.954	1.012	1.070
100°	0.088	0.162	0.230	0.297	0.364	0.433	0.501	0.567	0.633	0.696	0.759	0.822	0.882	0.940	0.997

DETERMINING Btu CAPACITY AT VARYING WTD

Multiply the Btu @ 20°F WTD by the factor in the table below:

WTD	5	10	15	20	25	30	35	40	45	50	55	60
BTU Correction Factor	1.25	1.15	1.08	1.0	.94	.90	.87	.83	.80	.76	.74	.72

Example: H1100C at 200°F EWT, 60°F EAT, 25°F WTD (in lieu of 20°F WTD) 225,000 Btu x .94 = 211,500 Btu

DETERMINING GPM AT VARYING WTD

Multiply the GPM at 20°F WTD by the factor in the table below:

WTD	5	10	15	20	25	30	35	40	45	50	55	60
GPM Correction Factor	5	2.3	1.4	1.0	.74	.59	.49	.40	.35	.30	.27	.24

Example: H1100C at 200°F EWT, 60°F EAT, 25°F WTD (in lieu of 20°F WTD) 23.1 GPM x .74 = 17 GPM

DETERMINING Btu AT VARYING GPM

Multiply the Btu at initial conditions by the factor in the table below:

% Water Flow	5	2.3	1.4	1.0	.74	.59	.49	.40	.35	.30	.27	.24
Btu Correction Factor	1.25	1.15	1.08	1.0	.94	.90	.87	.83	.80	.76	.74	.72

Example: H1100C at 200°F EWT, 60°F EAT, 17 GPM (in lieu of 23.1 GPM) 225,000 Btu x .94 = 211,500 Btu

$$\% \text{ water flow} = \frac{\text{actual GPM}}{\text{catalog GPM}}$$

DETERMINING WPD AT VARYING GPM

Multiply the WPD at initial GPM by the factor in the table below:

% Water Flow	5	2.3	1.4	1.0	.74	.59	.49	.40	.35	.30	.27	.24
WPD Correction Factor	20.0	5.0	2.0	1.0	.60	.40	.28	.20	.18	.13	.10	.07

Example: H1100C at 200°F EWT, 60°F EAT, 17°F GPM (in lieu of 23.1 GPM)

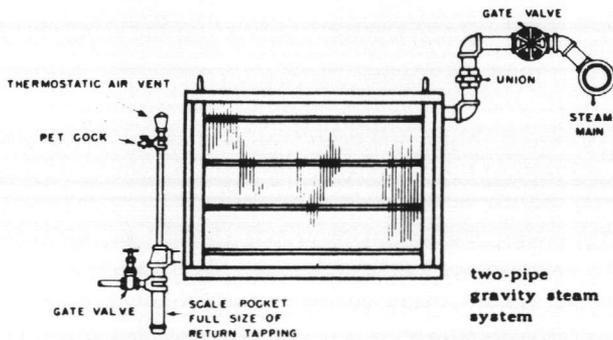
$$\frac{17 \text{ GPM}}{23.1 \text{ GPM}} = .74, \text{ so } 3.65' \text{ PD} \times .60 = 2.19' \text{ PD}$$

For points not appearing in table: $WPD_r = WPD_i \left(\frac{GPM_r}{GPM_i} \right)^2$

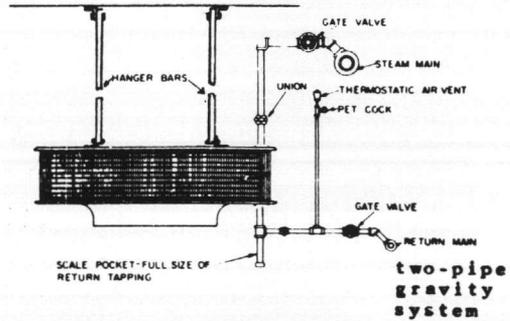
TYPICAL PIPING CONNECTIONS

HORIZONTAL

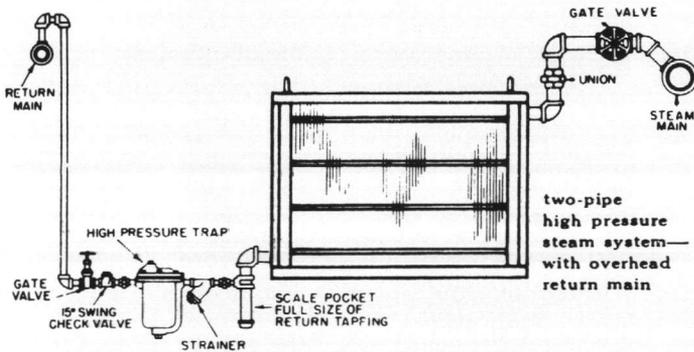
VERTICAL



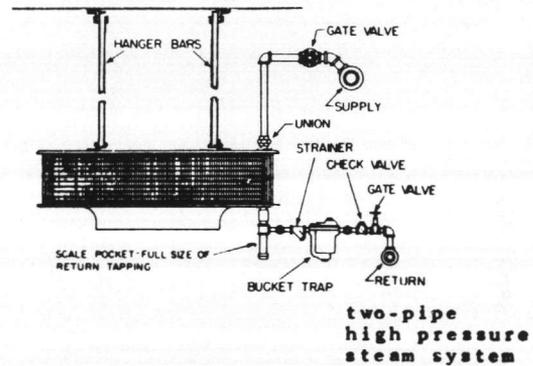
two-pipe gravity steam system



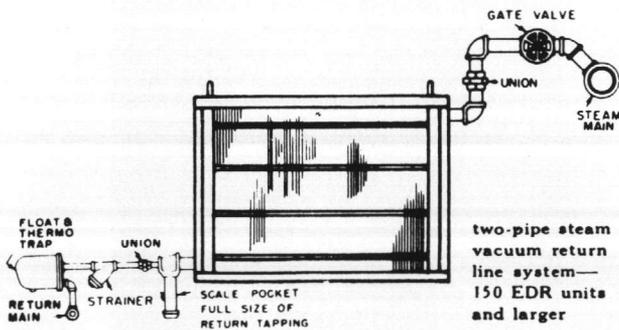
two-pipe gravity steam system



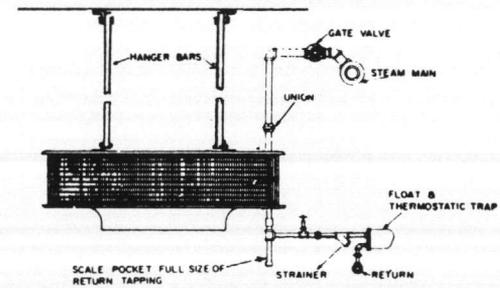
two-pipe high pressure steam system with overhead return main



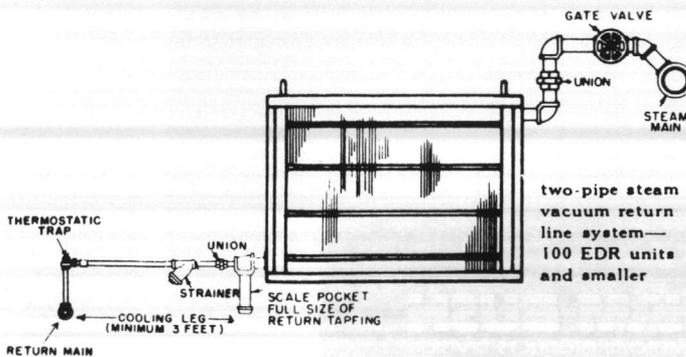
two-pipe high pressure steam system



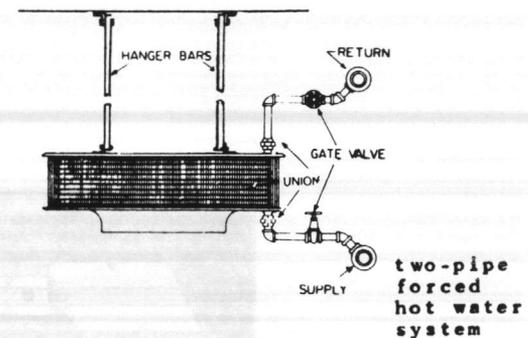
two-pipe steam vacuum return line system—150 EDR units and larger



low pressure steam (up to 15 P.S.I.)



two-pipe steam vacuum return line system—100 EDR units and smaller



two-pipe forced hot water system

TYPICAL SPECIFICATIONS

HORIZONTAL

Horizontal Delivery Steam and Hot Water Unit Heaters casing shall consist of 18 ga. steel phosphatized and finished in a beige baked enamel. Unit shall be equipped with double duty hangers so that unit weight shall not be supported by supply or return piping.

Standard coil shall consist of .980" diameter .035" wall seamless copper tubing mechanically expanded into .010" aluminum fins, spaced at 12 fins/in. for maximum heat transfer. The coil shall be suitable for operating pressures up to 125 psi., at temperatures up to 340° F.

Low Outlet Temperature coil shall consist of .980" diameter .035" wall seamless copper tubing mechanically expanded into .010" aluminum fins, spaced at 8 fins/in. for maximum heat transfer. The coil shall be suitable for operating pressures up to 125 psi., at temperatures up to 340° F.

Supply and return headers shall be steel. The entire coil assembly shall be leak tested at 400 psi air pressure under water.

Motor shall be totally enclosed with thermal overload protection and shall be suitable for use with 115/1/60 power source.

Horizontal Discharge Unit Heaters shall be equipped with individually adjustable horizontal deflection louvers (and shall be available with vertical louvers for four way deflection).

VERTICAL

Vertical Delivery Steam and Hot Water Unit Heater casing shall consist of 18 ga. spun steel, phosphatized and finished in a beige baked enamel. Unit shall be equipped with four double duty hangers, equally spaced, so that unit weight shall not be supported by supply or return piping.

Standard coil shall consist of .625" diameter .035" wall seamless copper tubing mechanically expanded into .010" aluminum fins, spaced at 12 fins/in. for maximum heat transfer. The coil shall be suitable for operating pressures up to 125 psi., at temperatures up to 340° F.

Low Outlet Temperature coil shall consist of .625" diameter .035" wall seamless copper tubing mechanically expanded into .010" aluminum fins, spaced at 8 fins/in. for maximum heat transfer. The coil shall be suitable for operating pressures up to 125 psi., at temperatures up to 340° F.

Supply and return headers shall be steel. The entire coil assembly shall be leak tested at 400 psi. air pressure under water.

Motor shall be open drip proof design with thermal overload protection and shall be suitable for use with 115/1/60 power source.

Where specified, Vertical Discharge Unit Heaters shall be equipped with radial diffusers, cone diffusers, or 3 or 4 cone anemostats for desired air deflection.

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

Turbine Pumps

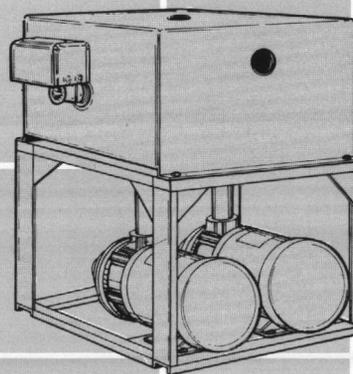
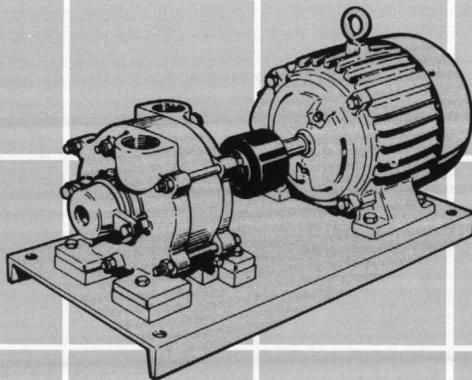
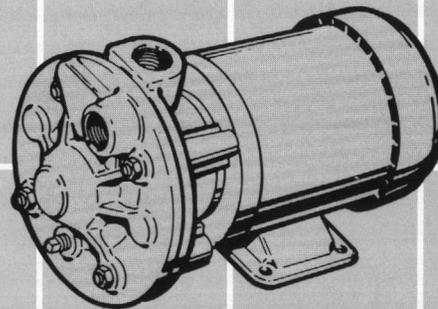
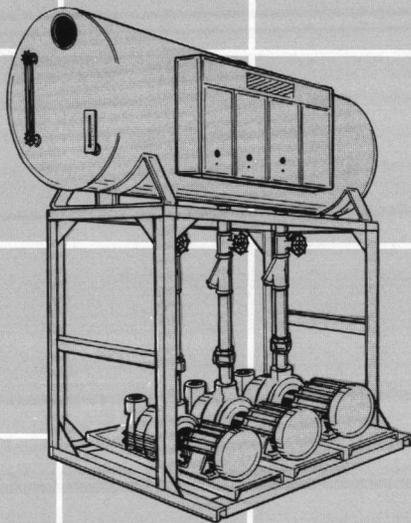
by Dunham-Bush

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85 - S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



Motor Units · Condensate Pump Units · Boiler Feed Pump Units

 **DUNHAM-BUSH**
DUNHAM DIVISION

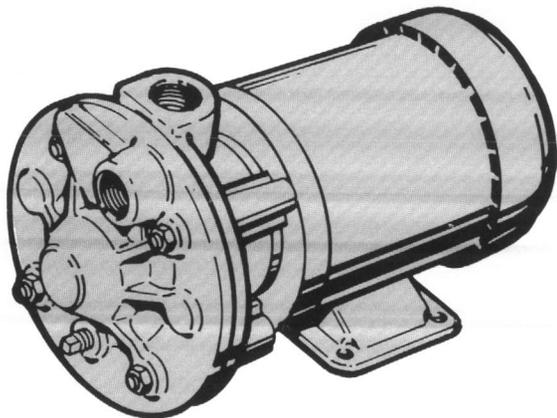
Products That Perform...By People Who Care

Motor Units

The Turbine Motor Units are high pressure/low capacity pumps for non-lubricating fluid handling services. Used for boiler feed, condensate return and other hot water or glycol applications, these pumps are especially designed to handle entrained air or other trapped gases in quantities that will bind normal centrifugal pumps. These pumps are an optimum selection for process, chemical and other services requiring a steep constantly rising performance curve.

Design Features

- **NO METAL TO METAL CONTACT** — Pump clearances enable handling of non-lubricating fluids while maintaining adequate heads.
- **LOW NPSH REQUIREMENTS** — Pumps have excellent NPSH requirements, which makes them ideally suited for difficult applications.
- **MINIMUM SHAFT DEFLECTION** — Provided by heavy duty bearings and large diameter shafts.
- **BALANCED AXIAL LOADS** — Impeller design balances thrust to promote long service life.
- **STANDARD CONSTRUCTION** — Is bronze fitted with bronze shaft sleeve and corrosion resistant mechanical seals.
- **CRANE TYPE 21 MECHANICAL SEAL** — Incorporates EPR rubber, Ni-resist seats and stainless steel metal components for high temperature service. (225° F is max. temp. with this optional seal.)

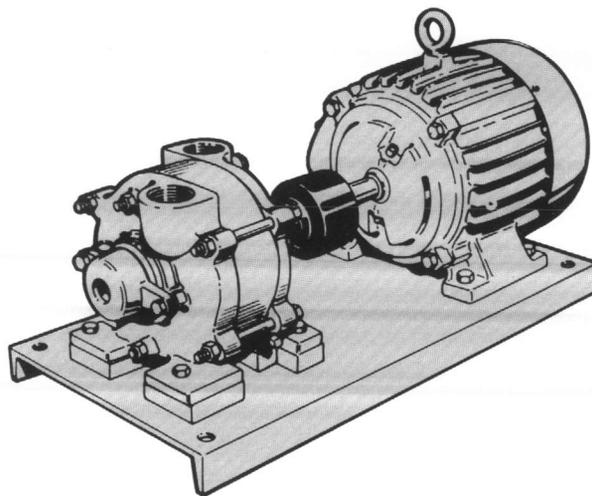


Close-Coupled Units

Close-Coupled Turbine Pumps are offered in both 1750 and 3500 RPM. They come in horsepower ranging from 1/3 HP to 7-1/2 HP.

Maximum Working Pressure	300 PSI
Maximum Suction Pressure	150 PSI
Hydrostatic Test Pressure	500 PSI
Maximum Temp. (Ceramic Seals)	212°F

Refer to Form No. 1485-1 (DB041 Series)
1485-2 (DB052 Series)



Based Mounted Units

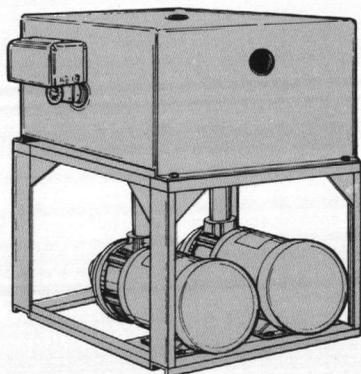
Base Mounted Turbine Pumps are offered in 1750 RPM only. They have a horsepower range from 1/3 HP to 50 HP.

Maximum Working Pressure	400 PSI
Maximum Suction Pressure	150 PSI
Hydrostatic Test Pressure	500 PSI
Maximum Temperature	225°F

Refer to Form No. 1486

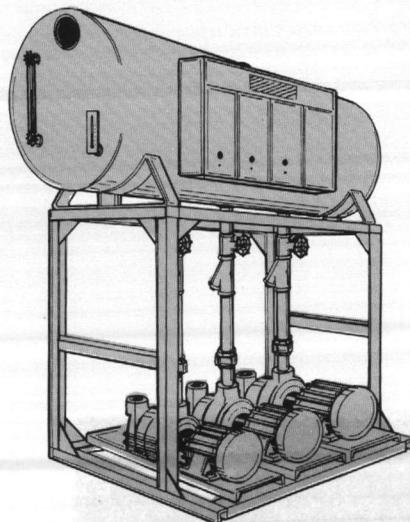
Condensate Pump Units

Controlled by the demands of a tank mounted float control device, Dunham-Bush Condensate Turbine Pump Units are complete assemblies for returning water from atmospheric heating systems, boiler feed systems, low pressure steam process equipment or from any combination. These pumps lift condensate from extremely low to high return lines. Use of these pumps can account for impressive fuel savings by returning hot condensate instead of wasting it to the sewer.



Model CHTB

The Dunham-Bush Model CHTB consists of a rectangular receiver, float control device and turbine pumps mounted on a rigid steel base. Covering a range from 1 GPM to 100 GPM in pressures from 10 PSI to 250 PSI, this pump is offered in 5 standard tank sizes from 24 to 100 gallons in either single or duplex configurations. **Refer to Form No. 1487**

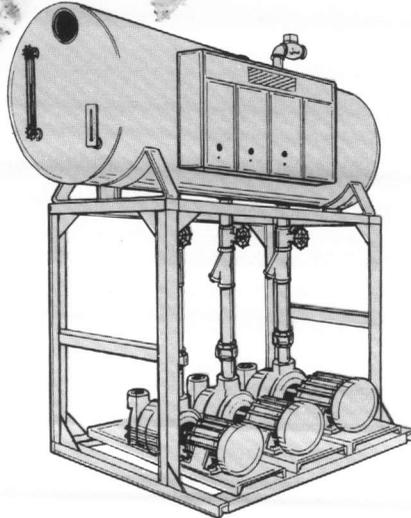


Model CHLTB

The Dunham-Bush Model CHLTB is equipped with water level and temperature gauges, isolation valves and suction strainers, low water cut-off protection and electrical panel for the control of all pump functions mounted on an elevated structural steel frame. Covering 1 GPM to 100 GPM, 10 PSI to 250 PSI, these premium condensate turbine pumps are offered in 9 standard tank sizes from 94 to 1500 gallons. The elevated tank is of copper bearing steel and makes these pumps especially suited for high temperature conditions. The CHLTB features pumps tucked within the silhouette of the tank to save precious boiler room floor space. **Refer to Form No. 1488.**

Boiler Feed Pump Units

Controlled by the demands of the boiler, Water Level Controller, Dunham-Bush Boiler Feed Turbine Pump Units are fully equipped units designed to efficiently return hot condensate and make-up water. They may be used on low to high pressure atmospheric heating systems, steam process equipment or combinations of both. Performing many of the same functions of a condensate turbine unit, these pumps additionally provide increased storage ability and automatic make-up response to meet boiler water demands.



Model AWLTB

The Dunham-Bush Model AWLTB comes standardly equipped with water level and temperature gauges, isolation valves and suction strainers, low water cut-off protection and electrical panel for the control of all pump functions. Covering a range from 1 GPM to 100 GPM in pressures from 10 PSI to 250 PSI, these pumps are offered with 9 standard tank sizes from 94 to 1500 gallons. The AWLTB is especially applicable where floor space as well as temperature conditions are of concern.

Refer to Form No. 1489.

Special Customer Needs

In an effort to meet our customers most special needs, the Marshalltown facility of Dunham-Bush, Inc. is well equipped with trained, experienced personnel to help with even the most special design and application needs. Built-in design flexibility and personalized manufacturing attention to each unit makes our complete line of turbine pumps the perfect choice for your new or retrofit situation . . . whatever the situation.

Contact Dunham-Bush for more details and application assistance . . . today



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

Centrifugal Pumps

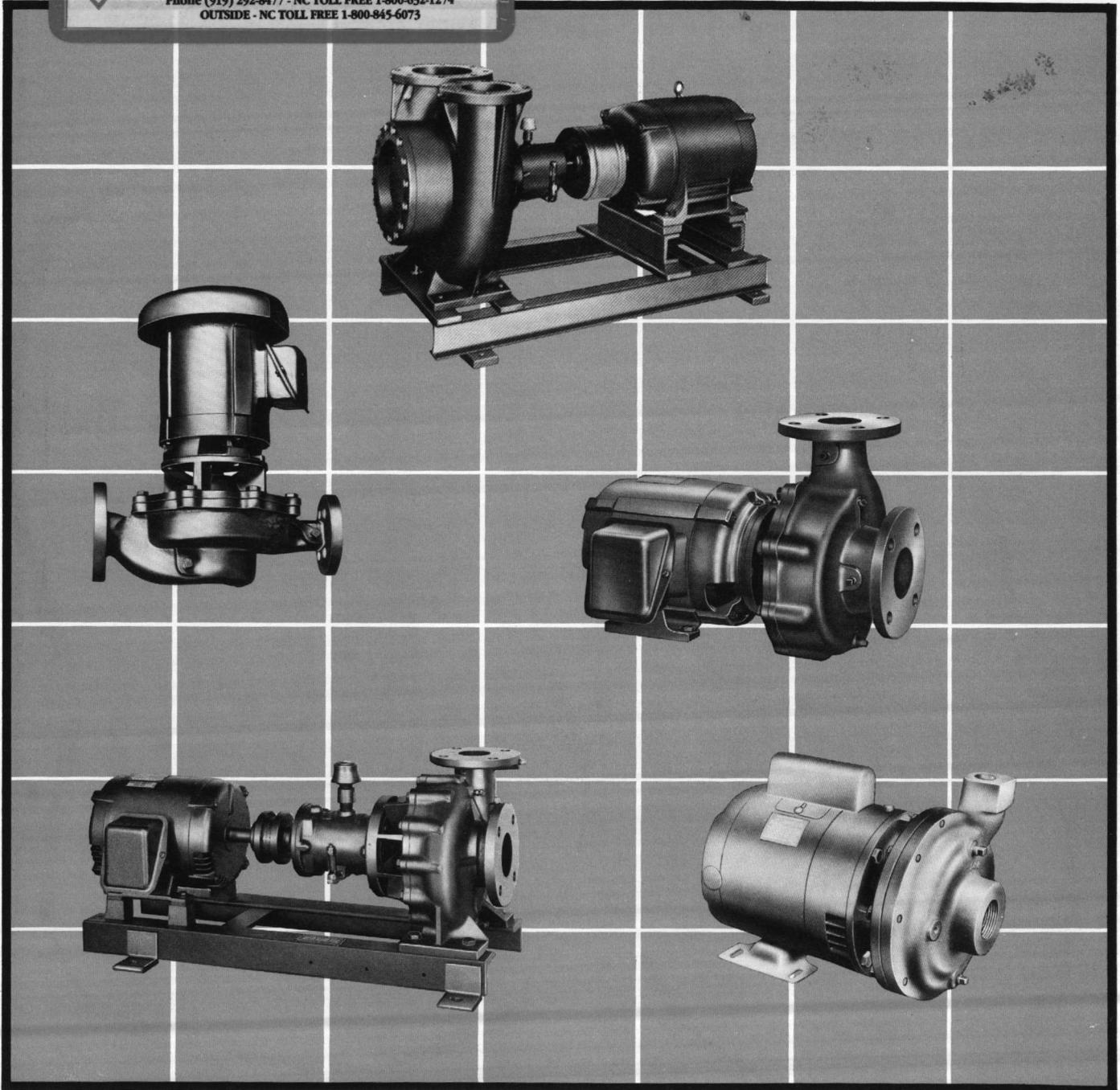
MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

by **Dunham-Bush**



DUNHAM-BUSH
DUNHAM DIVISION

Products That Perform...By People Who Care

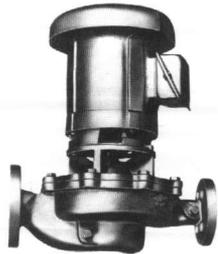
Dunham-Bush's Complete

Here's a line of centrifugal pumps designed to handle a wide range of applications. Used where water or other general purpose liquids are to be circulated, such as in cooling towers, chilled or hot water circulating systems, drainage and many other institutional, commercial and industrial applications. The table on the back page will supply you with the necessary information for locating data on a specific pump and its characteristics.

Close-Coupled & In-Line

Close-coupled and In-line pumps are used in supply system applications such as boiler feed, processing, drainage, washer service and booster service. These pumps are also used as circulators in evaporative condensers, cooling towers, hot water and chilled water systems.

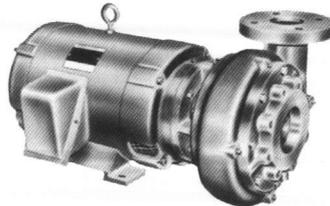
For applications involving fluids other than water, consult factory for recommendations.



Model PM7

The Dunham-Bush Type PM7 pump is of the volute type and is for horizontal or vertical position. Fifty-four models are available in the PM7 pump with ranges from 1/4 HP to 25 HP and capacities to 480 GPM.

Refer to Form No. 1470.



Model C

The Dunham-Bush Type C is of the volute type for horizontal or vertical installation. Fifty models are available in the C pump with ranges from 1 HP to 60 HP and capacities to 1755 GPM.

Refer to Form No. 1493.



Model A7

The Dunham-Bush Type A7 pump is of the volute type for horizontal or vertical installation. Fifty-four models are available in the A7 pump with ranges from 1/4 HP to 25 HP and capacities to 480 GPM. Sizes over 2" with flanged case.

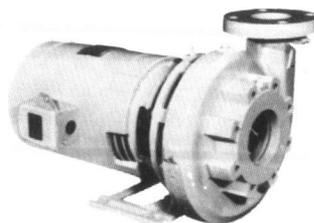
Refer to Form No. 1474.



Model V

The Dunham-Bush Type V is of the volute type and is for horizontal or vertical installations. Forty-five models are available in the V pump with ranges from 1 HP to 15 HP and capacities to 850 GPM.

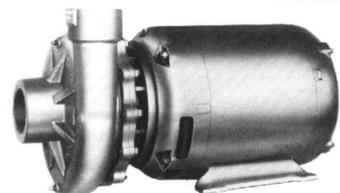
Refer to Form No. 1490.



Model C300

The Dunham-Bush Type C300 pump is of the volute type and is for horizontal or vertical installation. Forty-four models are available in the C300 pump with ranges from 1 HP to 20 HP and capacities to 1470 GPM.

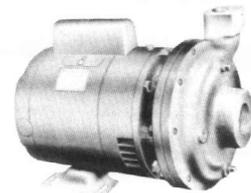
Refer to Form No. 1492.



Model A9A

The Dunham-Bush Type A9A pump is of the volute type for horizontal or vertical installation. Forty-one models are available in the A9A pump with ranges from 1/2 HP to 20 HP and capacities to 350 GPM.

Refer to Form No. 1440.



Model A5

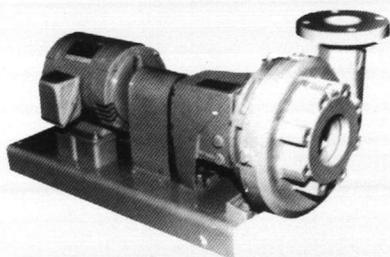
The Dunham-Bush Type A5 pump is of the volute type for horizontal or vertical installation. Sixteen models are available in the A5 pump with ranges from 1/4 HP to 2 HP and capacities to 150 GPM.

Refer to Form No. 1440.

Line of Centrifugal Pumps

Base Mounted

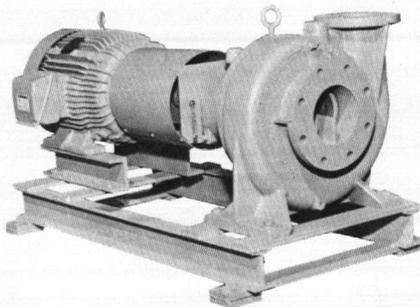
Base Mounted pumps are most commonly applied for water circulation to be used for heating or air conditioning. The particular quietness of these pumps makes them most suitable for handling hot and chilled water for hydronic systems. They are also very successfully applied for condenser water, domestic hot water and water supply systems.



Model F300

The Dunham-Bush Type F300 pump is of the volute type for horizontal mounting. Forty-five models are available in the F300 pump with ranges from 1 HP to 25 HP and capacities to 1470 GPM.

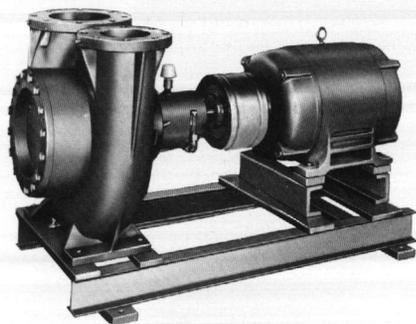
Refer to Form No. 1491



Model E

The Dunham-Bush Type E pump is of the double volute type for horizontal mounting. Thirty-two models are available in the E pump with ranges from 7-1/2 HP to 150 HP and capacities to 2600 GPM.

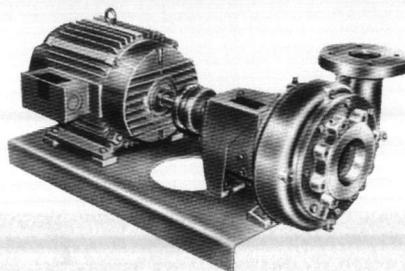
Refer to Form No. 1451.



Model F11

The Dunham-Bush Type F pump is of the double volute type for horizontal mounting. Particularly suited for applications where net positive suction head available may be limited. Ten models are available with ranges from 7-1/2 HP to 75 HP and capacities to 2600 GPM.

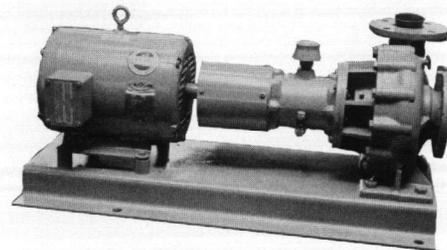
Refer to Form No. 1433.



Model F

The Dunham-Bush Type F pump is of the volute type for horizontal mounting. Ninety-two models are available in the F pump with ranges from 3/4 HP to 75 HP and capacities to 1755 GPM.

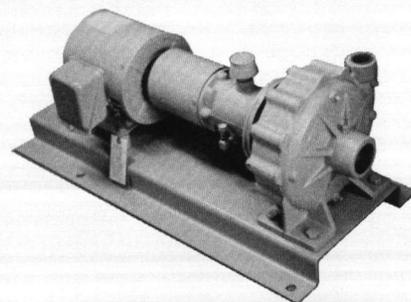
Refer to Form No. 1494.



Model B9

The Dunham-Bush Type B9 pump is of the volute type for horizontal mounting. Twenty-eight models are available in the B9 pump with ranges from 3/4 HP to 25 HP and capacities to 1,000 GPM.

Refer to Form No. 1445.



Model AB9

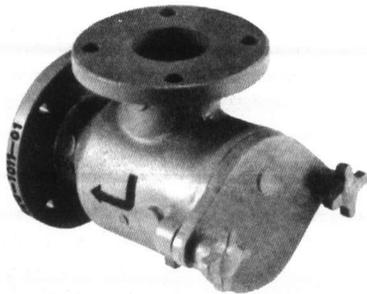
The Dunham-Bush Type AB9 pump is of the volute type for horizontal mounting. Twenty-five models are available in the AB9 pump with ranges from 1/2 HP to 10 HP and capacities to 450 GPM.

Refer to Form No. 1452.

Centrifugal Pump Specification Chart

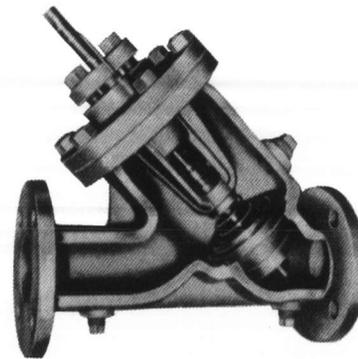
PUMP MODEL	TYPE	CAPACITIES	HEAD	WORKING PRESSURE	HP	REFERENCE CATALOG NO.
A5	Close-Coupled	To 150 GPM	115 Ft.	175 PSI	1/4 - 2 HP	1440
A9	Close-Coupled	To 350 GPM	170 Ft.	175 PSI	1/2 - 20 HP	1440
A7	Close-Coupled	To 480 GPM	240 Ft.	175 PSI	1/4 - 25 HP	1474
C300	Close-Coupled	To 1470 GPM	290 Ft.	175 PSI	1 - 20 HP	1492
C	Close-Coupled	To 1755 GPM	180 Ft.	175 PSI	1 - 20 HP	1493
AB9	Base Mounted	To 450 GPM	100 Ft.	175 PSI	1/2 - 10 HP	1452
B9	Base Mounted	To 1000 GPM	90 Ft.	175 PSI	3/4 - 25 HP	1445
F300	Base Mounted	To 1470 GPM	290 Ft.	175 PSI	1 - 25 HP	1491
F	Base Mounted	To 1755 GPM	180 Ft.	175 PSI	3/4 - 75 HP	1494
E	Base Mounted	To 2600 GPM	220 Ft.	175 PSI	7-1/2 - 150 HP	1451
F11	Base Mounted	To 2600 GPM	140 Ft.	175 PSI	7-1/2 - 75 HP	1433
PM7	In-Line	To 480 GPM	240 Ft.	175 PSI	1/4 - 25 HP	1470
V	In-Line	To 850 GPM	150 Ft.	175 PSI	1 - 15 HP	1490

Centrifugal Pump Accessories



Suction Diffuser

The Suction Diffuser, as offered by Dunham-Bush, furnishes ideal flow conditions to the centrifugal pump, has a built-in strainer and purge port, provides a method for pipe support and eliminates the use of reducing fittings. Available in twenty sizes from 2" x 1-1/4" to 12" x 12". **Refer to Form No. 1480.**



Pump Discharge Valve

The Pump Discharge Valve, as offered by Dunham-Bush, combines the functions of a gate valve, balancing valve and check valve in one body. This combination offers savings in space, hardware cost and labor. Available in sizes from 2" to 8" and in working pressures to 175#. **Refer to Form No. 1483.**

Contact Dunham-Bush for more details and application assistance . . . today

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
 Industrial Equipment & Supplies
 Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
 1-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
 Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
 OUTSIDE - NC TOLL FREE 1-800-845-6073

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1482B © 1989, Copyright Dunham-Bush, Inc. (9/89)

Printed in U.S.A.

Heating Pumps

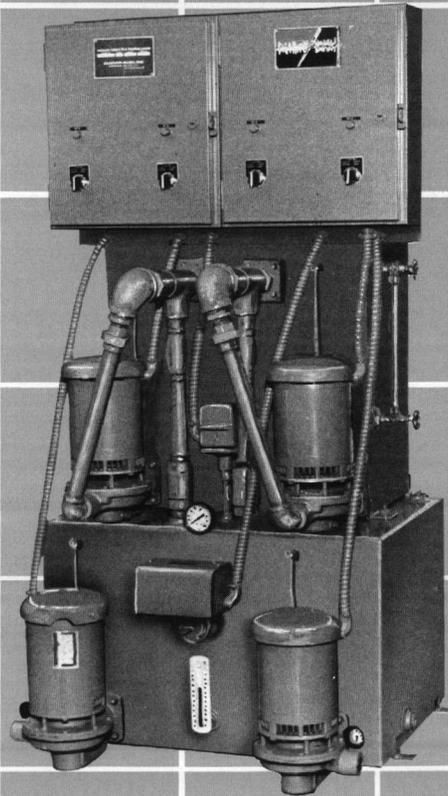
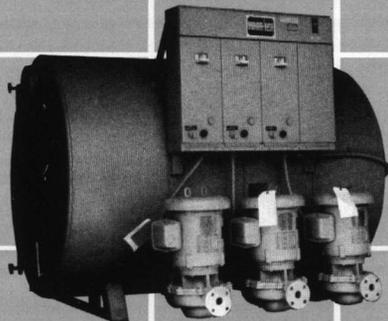
by Dunham-Bush

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS



MATT MARSHALL & COMPANY
INDUSTRIAL EQUIPMENT & SUPPLIES
BOILER & BURNER—SALES & SERVICE

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

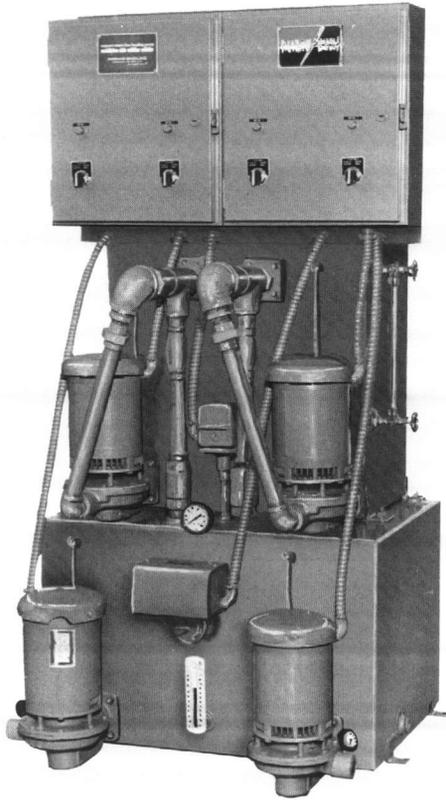


 **DUNHAM-BUSH**
DUNHAM DIVISION

Products That Perform...By People Who Care

Condensate Pumps

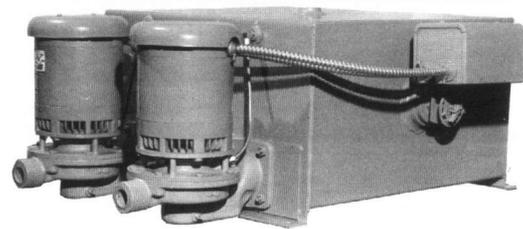
Controlled by the demands of a tank mounted float control device, Dunham-Bush Condensate Pumps are compact, complete assemblies for returning water from atmospheric heating systems, boiler feed systems, low pressure steam process equipment or from any combination. These pumps lift condensate from extremely low to high return lines. Use of these pumps can account for impressive fuel savings by returning hot condensate to the boiler or boiler feed pump instead of wasting it to the sewer, thus reducing the amount of make-up water required and minimizing difficulties from boiler encrustation.



Vacuum Pumps

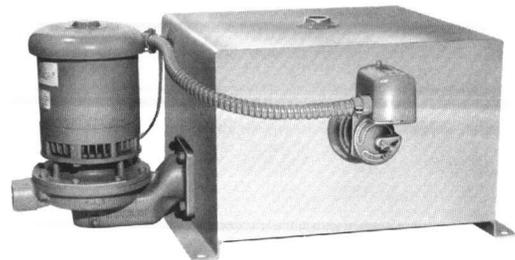
MODEL E2

The Dunham-Bush Model E2 Vacuum Pump is the heart of a steam heating system. For either new construction or retrofitting of older systems, the rapid removal of air from the system speeds warm-up times while reducing fuel consumption. Over 80 years of design background and production expertise, along with complete factory testing of each unit in all aspects including its ability to pull 25 inches of vacuum assures product quality and dependability. The pump features Dunham-Bush designed 3450 RPM centrifugal pumps, jet-type exhausters, heavy gauge copper bearing steel receivers with a ten year warranty, and comes complete with electrical controls and necessary accessories. The Model E Vacuum Pump is manufactured in single, duplex and semi-duplex configurations in capacities ranging from 5000 EDR (7.5 GPM) through 65000 EDR (97.5 GPM). Independence of condensate and hurling tanks offers great flexibility of design. CFM and GPM can be specifically suited to individual job requirements. Optional high temperature limiting equipment is available to meet even hostile operating conditions (160°+). **Refer to Form No. 1407.**



MODEL CRV

The Dunham-Bush Model CRV Condensate Pump is offered in single and duplex configurations in capacities ranging from 2000 EDR to 50000 EDR (3 GPM to 75 GPM) in pressures from 10 through 70 PSI at both 3450 and 1750 RPM. Standard tank sizes are 24, 33 and 44 gallons with 70 and 100 gallon optional sizes available. Standard thickness of tank is 10 gauge. Optional material thicknesses on available tanks are 3/16", 1/4" and 3/8". A wide variety of accessories from customized control panels to isolation valves are factory available with this model. The Model CRV is also offered as an AWCRV boiler feed model. **Refer to Form No. 1437.**



MODEL CHV

The Dunham-Bush Model CHV Condensate Pump is furnished in single and duplex configurations for capacities from 6000 EDR to 10000 EDR (9 GPM to 15 GPM) in pressures of 20 and 30 PSI at 3450 RPM. Tank sizes available are 10 and 16 gallons. Standard thickness of tanks is 10 gauge, with optional thicknesses of 1/4" and 3/8". This pump is factory stocked, and is especially designed to answer standardized needs. **Refer to Form No. 1426.**

Boiler Feed Pumps

Controlled by the demands of the Boiler Water Level Controller, the Dunham-Bush complete line of Boiler Feed Pumps are fully equipped units designed to efficiently return hot condensate and make-up water. They may be used on low and medium pressure atmospheric heating systems, steam process equipment, or combinations of both. Their use often permits increasing the usable heated space in a building by allowing the installation of radiation below the boiler water level. Performing many of the same functions of a condensate pump, these pumps additionally provide increased storage ability and automatic make-up response to meet boiler water demands. Dunham-Bush Boiler Feed Pumps are offered in an economy model (described at right) and a complete premium line in three configurations (described below).



MODEL AWCHVS

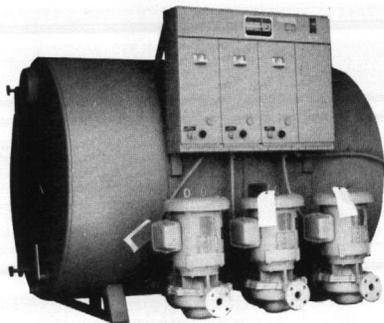
The Dunham-Bush Model AWCHVS is comprised of a receiver, water make-up circuit and close-coupled centrifugal pump. Offered in either single or duplex, four standard models cover 6000 EDR through 30000 EDR (9 GPM to 45 GPM) in 20 and 30 PSI. Standard tank sizes are 94, 150, 225 and 300 gallons. **Refer to Form No. 1428.**

Premium Boiler Feed Line

The Dunham-Bush line of premium Boiler Feed Pumps features models to meet all combinations of space and temperature requirements (as described below). As standard these pumps are fully equipped with water level and temperature gauges, isolation valve and suction strainers, low water cut-off protection and electrical panel for the control of all pump functions. Covering EDRs ranging from 10000 to 200000 (15 GPM to 200 GPM), in pressures from 10 to 75 PSI, these pumps are offered with 9 standard tank sizes from 94 to 1500 gallons and can be equipped with a wide variety of options to meet most any condition or application.

MODEL AWLCH

The Dunham-Bush Model AWLCH is the most popular of the boiler feed line. An elevated tank in an L configuration gives free discharge piping opportunities. This pump is especially applicable where temperature rather than space requirements is of concern. **Refer to Form No. 1410.**

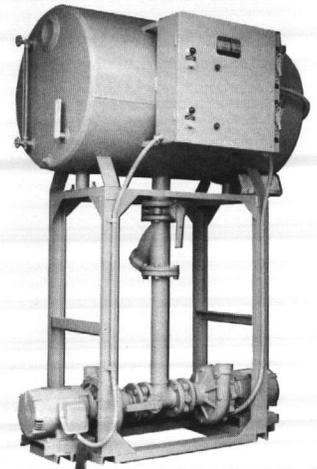


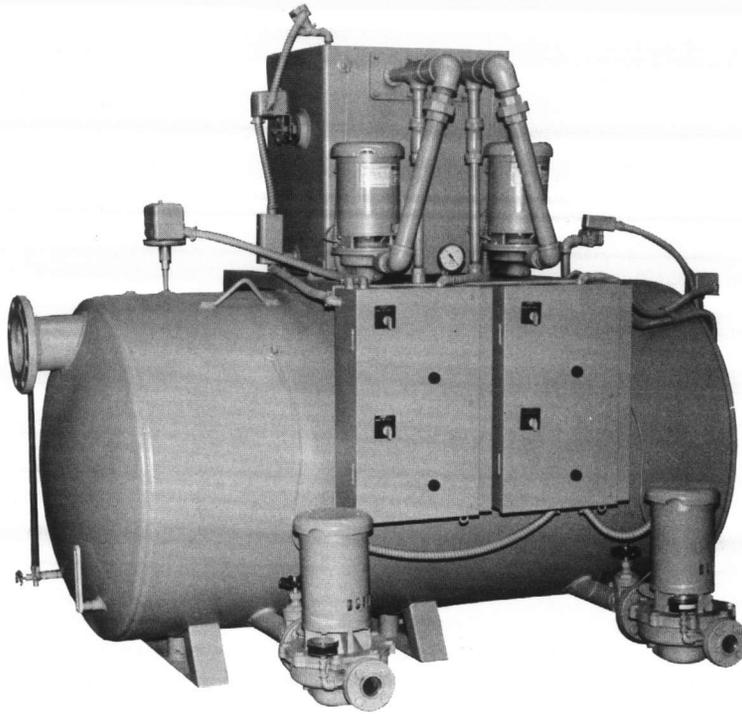
MODEL AWPCH

The Dunham-Bush Model AWPCH is especially designed for those applications where height is of concern. Its low profile configuration lends itself to space problem solutions. **Refer to Form No. 1412.**

MODEL AWICH

The Dunham-Bush Model AWICH is especially designed for applications where temperature and space are of concern. An elevated tank in an I configuration with the pumps tucked within the tank silhouette helps with the handling of high temperature condensate while saving boiler room floor space. **Refer to Form No. 1411.**





Boiler Feed/Vacuum Pumps

MODEL AWR

The Dunham-Bush AWR Boiler Feed/Vacuum Pump is a compact unit that functions both as a vacuum pump and as a boiler feed pump. Its design makes it an ideal choice for retrofit situations involving small capacity boilers while saving precious boiler room space. The pump features Dunham-Bush designed centrifugal pumps, heavy gauge copper bearing steel receivers, and is shipped complete with all necessary electrical controls and accessories including water level gauges, thermometers, isolation valves, high temperature limit switch and high water alarm contact. All standard AWR are duplex (two air pumps - two condensate pumps). However, simplex, triplex and an unlimited variety of optional air and condensate pump configurations are available. Offered in standard capacities of 10000 EDR through 60000 EDR (5 GPM to 60 GPM) in pressures from 10 to 40 PSI, these pumps offer the design flexibility to be custom built for most special capacity applications and space requirement conditions. **Refer to Form No. 1413.**

Special Customer Needs

In an effort to meet our customers most special needs, the Marshalltown facility of Dunham-Bush, Inc. is well equipped with trained, experienced personnel to help with even the most special of design and application needs. Built-in design flexibility and personalized manufacturing attention to each unit makes our complete line of heating pumps the perfect choice for your new or retrofit situation . . . whatever the situation.

Contact Dunham-Bush for more details and application assistance . . . today



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1481B © Copyright, 1988 Dunham-Bush, Inc.

Printed in U.S.A.

Hydronic Specialties

by Dunham-Bush

MANUFACTURER'S REPRESENTATIVES AND DISTRIBUTORS

MATT MARSHALL & COMPANY

INDUSTRIAL EQUIPMENT & SUPPLIES

BOILER & BURNER—SALES & SERVICE

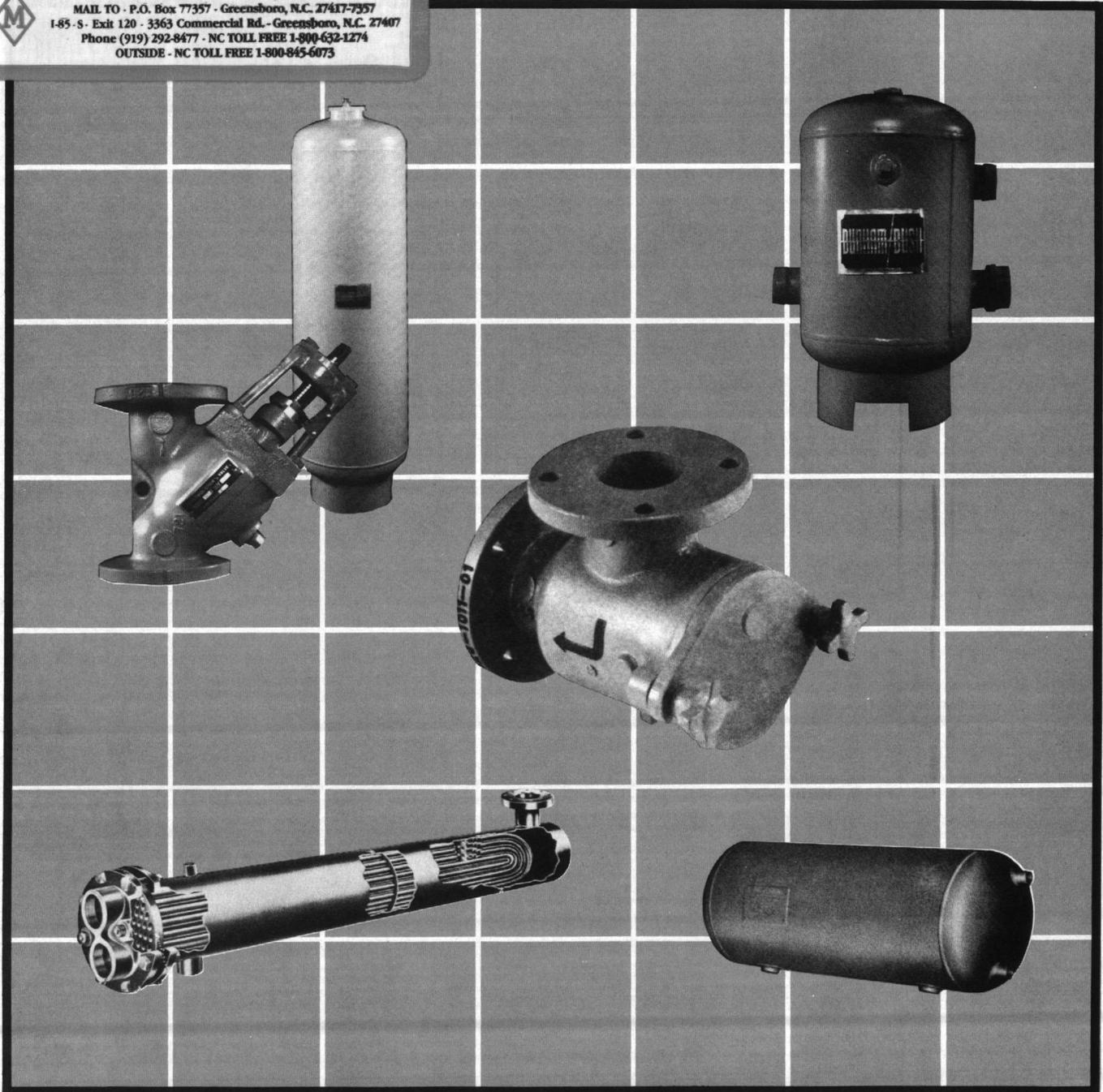
MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357

1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407

Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274

OUTSIDE - NC TOLL FREE 1-800-845-6073

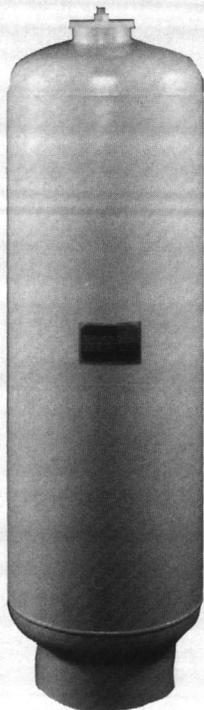
A Complete Line For Hot Water Systems



Hydronic Specialties To Compliment Dunham-Bush Centrifugal Pump Line

DUNHAM-BUSH
DUNHAM DIVISION

Products That Perform...By People Who Care



ASME BAG EXPANSION TANK

ASME Bag Expansion Tank eliminates air in system through pressurization. A diaphragm-type expansion tank which will accommodate the expanded water of the system generated within the normal operating temperature range, limiting this pressure increase at all components in the system to the maximum allowable pressure at those components. It maintains minimum operating pressure necessary to eliminate all air. The only air in the system shall be the permanent sealed-in air cushion contained in the diaphragm-type tank. Unlike a conventional tank, the permanently sealed air cushion does not require replenishment.

The Dunham-Bush Bag Expansion Tank includes the following features:

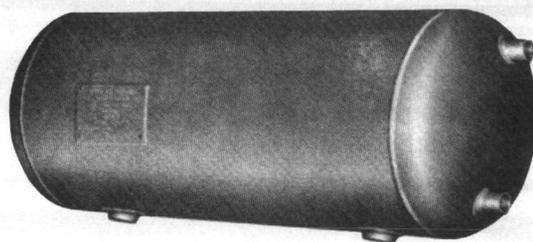
- Carbon steel construction.
- Full volume flexible Elastomer Bag.
- Eliminates water logging.
- Smaller tank saves space & installation costs.
- Bag easily replaceable.
- Water and air separation eliminates corrosion.

Design and construction specifications are ASME type, with maximum working pressures of 125 psig. Maximum operating temperature is 240°F. The Bag Expansion Tank can be installed vertically or horizontally. **Refer to File No. 620.**

ASME EXPANSION COMPRESSION TANK

The Dunham-Bush ASME Expansion Compression Tank accommodates the expanded water generated by the increase in temperature in a water heating or chilled water system. It maintains the necessary minimum operating pressure and ensures that all "system air" will be eliminated. It controls the increase in pressure at all critical components in the system to the maximum allowable for those components.

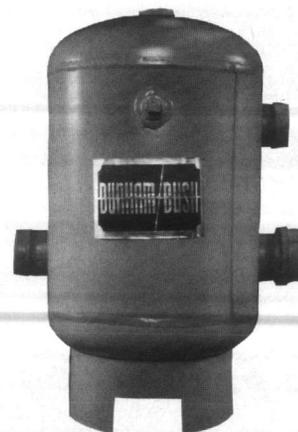
Tank capacities range from 15 gallons to 2,000 gallons. 15 through 525 gallon tank sizes are normally stocked for prompt shipment. Telltale holes are furnished in lieu of inspection openings on all sizes 15 to 135 gallon. Two 2" plugged inspection openings are provided on sizes 175 through 505 gallon. 525 gallon and larger are equipped with an 11" x 15" manhole. As with any expansion tank, it is recommended to connect to the suction side of the pump. **Refer to File No. 1575.**



ASME TANGENTIAL AIR SEPARATOR (With Strainer)

The Dunham-Bush ASME constructed and stamped Air Separator helps prevent waterlogged compression tanks. Its tangential design results in smaller unit requirements than a straight flow separator and provides air free fluid flow which protects against damage and system noise. Features include 125 psig design pressure and 500°F maximum operating temperature. Pipe sizes are NPT 2" and 2-1/2" with 3" and larger flanged. 2" and 2-1/2" strainer access is pipe capacities.

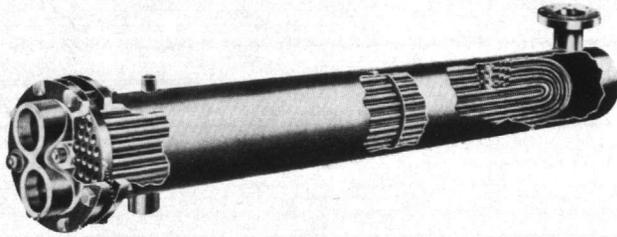
Refer to File No. 1576.



CONVERTER SECTION TYPE SW

Steam to Water

(TYPES WW-Water to Water, WG-Water to Glycol and SG-Steam to Glycol)



Dunham-Bush Type SW steam converters are used primarily for heating radiation water with steam. Definite advantages are to be found in many types of application. Examples would be large installations where zoning is desirable and steam is the source of heat which simplifies the piping design. They are commonly used for heating water for office

space in industrial buildings, including renovation, additions and new construction. If steam is used for process work, a converter is a logical selection for providing heating water for the occupied space. Converters are often applied for zoning in high-rise buildings to keep static heads at a reasonable level and simplify piping design.

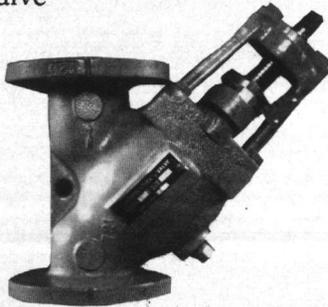
U-tube design allows free expansion and contraction of the tubes under changing operating conditions. Impingement erosion of the tubes by steam is impossible, since the steam inlet is located beyond the tube bundle.

Maximum thermal performance is obtained since condensing temperature of the steam is at the highest possible temperature.

Standard size exchangers are cataloged in 13 diameters from 3-1/2" to 24" with tube bundle lengths increasing in one foot increments. **Refer to File No. 1460.**

PUMP DISCHARGE VALVE

Combination Balancing, Shut-off, and Check Valve

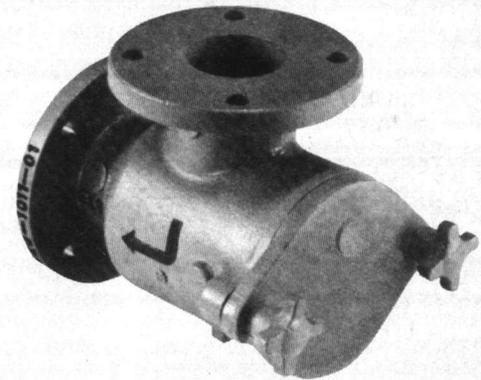


The Dunham-Bush Pump Discharge Valve is primarily designed for installation in pump discharge piping where it functions as a spring loaded silent check valve, balancing valve, and shut-off valve. It operates automatically and silently.

It features an externally guided disc which has a soft seat to insure that there is no leakage. The disc lifts a generous 1/3 inch for each inch of pipe diameter. The rising stem design incorporates a graduated position indicator to assure accurate disc positioning for throttling service. The yoke and valve stem are unwetted, external parts so they cannot be corroded or eroded by the line fluid. All mating threaded parts are made of dissimilar, non-galling metals; body and yoke are cast iron.

Field servicing can be done without special tools and the back seat for the stem allows packing replacement under full line pressure. **Refer to File No. 1483.**

SUCTION DIFFUSERS



A suction diffuser, as offered by Dunham-Bush, provides many distinct advantages. It furnishes ideal flow conditions to the centrifugal pump, has a built in strainer and blow down (purge port), provides a method of pipe support and eliminates the use of reducing fittings. These advantages save space, money, time and trouble.

The Suction Diffuser does more than just remove foreign particles. Since it replaces the elbow, strainer, and entry pipe on the suction side of the pump, installation costs are reduced.

The usual pipe saddle is not needed to mount the Suction Diffuser because special pads are provided which fit the I.D. of standard pipe. This relieves the stress on hangers and inlet piping.

Suction Diffuser features and cast iron construction eliminate the following:

- Long Entrance Pipe
- Pipe Saddle
- At Least Two Welds
- Reducing Elbow
- Two Flanges
- Conventional Strainer
- Gaskets and bolting

Refer to File No. 1480.

COUNT ON DUNHAM-BUSH FOR PERFORMANCE AND VALUE.

Count on Dunham-Bush to supply you with the best steam and hot water systems for churches, schools, offices, hospitals, apartment complex applications, and other large scale heating applications.

If you heat with steam or hot water, it pays to work with the heating specialists. Call on your Dunham-Bush representative for expert advise today.

At Dunham-Bush, every product reflects more than 80 years of unmatched engineering and manufacturing expertise.

Contact Dunham-Bush for more details and application assistance . . . today



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P.O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S-Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



Products That Perform...By People Who Care

DUNHAM DIVISION 811 E. Main Street, Marshalltown, IA 50158, (515) 752-4291

Form 1583 © 1987, Copyright Dunham-Bush, Inc.

Printed in U.S.A.

Honeywell

COMMERCIAL/INDUSTRIAL FLAME SAFEGUARD CONTROLS



Manufacturer's Representatives and Distributors

MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

FEATURING:
BC7000 Microcomputer
Burner Control System
R7795 Full Function
Primary Control

LOOK FOR THESE HONEYWELL EXTRAS IN THIS CATALOG

TRADELINE AND SUPER TRADELINE CONTROLS

- TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value.
- SUPER TRADELINE controls offer features not available on TRADELINE or standard models. Added features and installation accessories, such as special adapters, universal mounting, and extra-wide control ranges give Honeywell SUPER TRADELINE controls a built-in versatility—one SUPER TRADELINE model can quickly and easily replace a wide range of Honeywell and competitive controls.
- Both SUPER TRADELINE and TRADELINE models provide a picture of the control, critical specs, and cross-reference information *on the box label* to allow immediate on-the-job replacement.

HONEYWELL FLAMESAFEGUARD

“MODERNIZATION” AND “REPLACEMENT” DEFINITIONS

- *Modernization* is the installation of *all controls* necessary to meet a current code or insurance company requirement or recommendation. Flame safeguard technology is changing; current flame safeguard systems provide a high standard of safety and efficiency that few older installations can match.
- *Replacement* can be accomplished in two ways—either like-for-like replacement (RA890F for RA890F), or upgrading to the latest generation device (RA890H for RA890F).
- *Honeywell Modernization and Replacement Packages* are designed for maximum versatility and minimum overall cost. For information on specific flame safeguard modernization/replacement packages see pages 55-59.
- *For complete information* on flame safeguard system modernization/replacement refer to: The Firing Line, Honeywell form 70-8900. See page 84 for a description and for an order form for The Firing Line.



FLAME TIPS

The flame indicates additional information, such as cross-reference information and other helpful ideas for designing a safe, efficient flame safeguard system. These Flame Tips appear throughout the body of the catalog.

Table of Contents

SYSTEM SELECTOR GUIDE	2 to 7
AUXILIARY EQUIPMENT	8 to 22
CONTROLLERS	23 to 27
FIRING RATE CONTROLS	28 to 31
FUEL VALVE AND ACTUATORS	32 to 45
LIMITS AND INTERLOCKS	46 to 52
MICROCOMPUTER BURNER CONTROL SYSTEMS	53 to 55
MODERNIZATION AND REPLACEMENT PACKAGES	56 to 59
PRIMARY CONTROLS	61 to 74
PROGRAMMING CONTROLS	75 to 77
TEST EQUIPMENT	78 to 82
PARTS AND ACCESSORIES	83
GENERAL INFORMATION	86 to 95
Training Capabilities	86 to 89

Order Specification Number System	90
Date Code	90
Approval Bodies	91
NEMA Standard Classification Code For Flame Safeguard Enclosures	90
SI Metric Units and Conversion Factors	92
Conversion of Pressure Units	92
Weight & Volume Table	92
Gas Capacities	93
Power & Heat Table	93
Btu Content of Fuels	93
Horsepower Ratings	93
Flame Safeguard Conversion Factors	94
Sales Offices	95
AUTHORIZED FLAME SAFEGUARD DISTRIBUTORS	97 to 100

Model Number Index

NUMBERS			
101079	21	L411A,B	26
121708	78	L604A,F-H,L	23
123514A,B	78	L608A	25
22042	21	L6008H	26
		L4079A,B	46
A		M	
A7001A	81	M941A,C,D	29
B		P	
BC7000L	54	P455A	27
C		PM	
C437D-H,J,K	47	PM720G,L,M	55
C637B	47	Q	
C645A-E	49	Q179A,B	20
C647A	50	Q179C,D	19
C7003A	8	Q270A	64
C7004B	9	Q518A	73
C7005A,B	10	Q519A	73
C7007A	9	Q520A	75
C7008A	11	Q520E	81
C7009A	14	Q624A	21
C7010A	14	Q795A	66
C7012A,C,E,F	11	QW	
C7013A	15	QW700A,B	51
C7014A	15	R	
C7015A	15	R482D,F	22
C7027A	16	R485B	61
C7035A	17	R4075C,D,E	63
C7076A	17	R4138C,D	71
FSP		R4140G,L,M	75
FSP1535	78	R4155A,B	18
FSP1975-8	79	R4795A,D	61
FSP1992	79	R7023B,C	64
FSP5004	79	R7247A,C	76
L		R7248A,B	76
L91A,B,D	28	R7249A	76
L404A-D,F	23	R7257A-59A	74
L404T,V,W,Y	46	R7289A, 90A	63
L408A,B	25	R7476	76
		R7795A,B,C,D	65
		R9107A	29
		RA	
		RA890F	67
		RA890G	68
		RA890H,J	70
		RW	
		RW700A-D	51
		S	
		S43A,B,D	52
		S427B,C,D	8
		S445A	8
		S446A	8
		ST71A	63
		ST795A	66
		T	
		T991E,F	30
		V	
		V48A,F,J	32
		V51E	44
		V88A,J	32
		V4046C	33
		V4055A,B,D,E	39
		V4062A,D	41
		V5055A-E	34
		V8046C	33
		V9055A,D	43
		W	
		W136A	80
		W688A	73
		Y	
		Y593A	59
		Y4140G,L,M	58
		Y4795	56
		Y7000	58

Subject Index

A	
Accessories	83
Actuators, Fluid Power	39, 41, 43
Air Pressure Switches	47, 49, 50
Alarm Silencing Relay	18
Amplifiers	76
Approval Bodies	91
Authorized Flame Safeguard Distributors	97 to 100
B	
Balancing Relay	29
Btu Content of Fuels	93
Butterfly Valves—see Valves	
C	
Cells—see Photocells	
Combustion Efficiency Analyzers	81
Cutoff Relay	22
D	
Date Code	90
Differential Pressure Controls	47, 49
Dynamic Self Check Controls	11-13
F	
THE FIRING LINE	84
Flame Detectors, Ultraviolet	11, 16, 17
Flame Detector Relay	64
Flame Rods and Holders	9, 11, 14
Flame Safeguard Conversion Factors	93
Flame Safeguard Modernization Packages	56
Flame Safeguard Reference Manual	85
Flame Safeguard Replacement Package	59
Flame Simulators	78
Fluid Power Gas Valves	34, 39, 41, 43
G	
Gas Capacities	92
Gas Pilots	19, 20
Gas Pressure Switches	47, 49, 50
Gas Valves—see Valves	
H	
Holdings, Flame Rod	9, 11, 14
Horsepower Ratings	92
I	
Industrial Gas Valves/Fluid Power	
Actuator Selection Chart	34-36
Industrial Multiburner Panels	73
L	
Lead Sulfide Flame Detector	15
Limit Controls, Pressure	23-27
Low Fire Aquastat	26
Low Water Cutoff Controls	51
M	
Microcomputer Burner Control System	53-55
Miniature Rectification Pilots	19
Modernization Packages	56-60
Motorized Gas Valves	39-44
Motors:	
Firing Rate	29
Modutrol	29
Reversing	29
Mounting Bases	79
Multiburner Modules	73
N	
NEMA Standard Classification Code for	
Flame Safeguard Enclosures	90
O	
Oil Pressure Switch	46, 49
Oil Valves—see Valves	
Order Specification Number System	90

P	
Parts	83
Photocells:	
Mount	8, 14, 15
Lead Sulfide	15, 16
Rectifying	8, 14, 15
Pilot Burners, Gas	19, 20
Pilot Gas Valves—see Valves	
Power & Heat Table	93
Pressure Controllers:	
Boiler	23-28, 46
Modulating	27
Oil Burner System	46
Steam Systems	23, 26, 27, 28, 30
Vapor Systems	25
Pressure Switches:	
Air	47, 49, 52
Gas	47, 49, 50
Oil	46, 49
Pressure Units, Conversion of	92
Primary Controls	61-74
Programming Controls	75-77
Protectorelay Primary Controls	61, 67, 68, 70
Purge Timer	8

R	
Relays:	
Alarm Silencing	18
Balancing	29
Cutoff	22
Flame Detector	64
Replacement Programmer Package	58

S	
Sales Offices	95
SI Metric Units and Conversion Factors	92
Simulator, Flame	78
Spark Generator	27
Start-Stop Station	8
Switches:	
Airflow	52
Sail	52
Start-Stop	8
System Selector Guide	2-7

T	
Temperature Controllers:	
Modulating	30
Warm Air	30
Test Meter	80
Tester, Primary Safety Control	78
Tester, Programmer	79
Tester, Protectorelay	78
Timers	8
Training Capabilities	86-89
Transformers, Ignition	21

U	
Ultraviolet Flame Detectors	11, 16, 17

V	
Vacuumstat Controller	26
Valves:	
Butterfly	44
Gas, Diaphragm	32
Gas, Industrial	34, 36
Gas, Pilot	33
Vaporstat Controller	25

W	
Weight & Volume Table	92

Honeywell

Residential Division FLAME SAFEGUARD CONTROLS

- System Selector Guide
- Auxiliary Equipment
- Controllers
- Firing Rate Controls
- Fuel Valve and Actuators
- Limits and Interlocks
- Microcomputer Burner Control Systems
- Modernization and Replacement Packages
- Primary Controls
- Programming Controls
- Test Equipment
- Parts and Accessories



Controls are available only through Authorized Honeywell Flame Safeguard Distributors/wholesalers.

PRODUCTS TO CONSERVE FUEL

The latest in Flame Safeguard state-of-the-art technology is the BC7000. The BC7000 "Blue Chip" is an intelligent microcomputer-based integrated control system for automatically fired gas, oil, coal, or combination fuel single burner applications. The energy conservation features significantly reduce unnecessary and wasteful purge-related heat losses. The Energy Saving Prepurge (ESP) prevents blower operation at startup until the damper reaches the purge position. Energy Saving Prepurge saves approximately 300,000 Btuh per boiler horsepower annually on cycling boilers in typical heating applications. The energy saving intelligence feature terminates burner/blower operation and energizes the alarm circuit whenever the high fire purge switch, low fire start switch, or running interlocks fail to close after a sufficient time delay. See page 54.

FULL FUNCTION PRIMARY

The R7795 is Honeywell's latest in Primary Safety Controls. The R7795 Flame Safeguard full function primary provides flameout protection plus automatic control of commercial and industrial gas and oil burners. Models provide intermittent pilot or interrupted pilot with delayed main valve. The R7795 has two field selectable options: trial for pilot flame ignition (10 or 4 seconds), action on flame failure (recycle or lockout). See page 65.

THE FIRING LINE

The Firing Line is your total reference for flame safeguard modernization. New safety codes and changing technology make necessary this flame safeguard encyclopedia packed with essential modernization information for the combustion industry. See page 84 for information about *The Firing Line*.

System Selector Guide

This catalog is put to best advantage when used in conjunction with *The Firing Line* to modernize or replace flame safeguard systems. *The Firing Line* is Honeywell's flame safeguard handbook containing essential information for the combustion industry. Included in *The Firing Line* are professional survey guides and work sheets to help you select the proper modernization system in a minimum of time, and cross-reference sheets to aid you in replacing controls. See page 84 for a complete description and page 85 for an order form.

Modernization is the installation of all controls necessary to meet current code requirements. Many older systems don't comply with current codes, don't have all the newer safety features, or have exceeded the 100,000 cycle limit recommended for good reliability, thereby making them prime candidates for modernization. For example, Underwriters Laboratories Inc. and the insurance companies now require a 120 V grounded control circuit instead of the old 208/240 V system. A 120 V grounded control circuit is a great deal safer. Other new features such as shorter trial-for-ignition; recycle, or cutoff versus relight on flame failure; shorter valve closing time; use of high and low limits; the introduction of maximum safety (Dynamic Self Check) systems; the greater dependability of solid state devices . . . all provide increased safety and reliability.

You can modernize a flame safeguard system in any one of three ways. (1) By installing a complete new system (boiler, burner, controls, etc.), you not only meet current safety requirements, but also gain maximum system efficiency. (2) By installing a new burner, you bring the burner system up to current safety requirements and provide maximum burner efficiency. (3) By modernizing the control system and tuning the burner, you still meet current safety requirements and you get the maximum obtainable efficiency from the existing burner.

There are five basic steps in modernizing a flame safeguard system: (1) survey, (2) compare, (3) select, (4) price, and (5) evaluate.

(1) Survey. The first step is to survey the existing system. Use the "Complete Flame Safeguard System Modernization Survey and Proposal Form," which can be found in the MODERNIZATION section of *The Firing Line*. (There is also a shorter, "Mini-Mod Form" in the MODERNIZATION section for modernizing a flame safeguard control system only.) Fig. 1 is a page from a sample Survey and Proposal Form. This form allows you to survey and quote complete new systems (Section I), new burners (Section II), and/or modernization control systems (Section III), depending on the customer's needs and desires. Just fill in the data required in the "General Information" section and Sections I and II. To complete Sections I and II, use information provided by the equipment manufacturers and fill in lines I and II of the "Proposal(s)" section of the Survey and Proposal Form (see Fig. 2).

You will complete Section III by referring to the existing system, *The Firing Line*, this catalog, and an up-to-date price guide. Section III, the "Flame Safeguard Control Systems Survey," is in table form. Fig. 3 shows a sample Section III. The first column, "Control and System Specifications," lists by function various controls and devices found in flame safeguard control systems. The second column is called "Controls Presently on the Job" and the third "Modernization Flame Safeguard Control Recommendations." These two columns are to be completed by you. The first step to completing Section II is to survey the existing system and fill in the column "Controls Presently on the Job."

continued next page

System Selector Guide

System Selector Guide continued

Fig. 1— Sample "Complete Flame Safeguard System Modernization Survey and Proposal Form."

FLAME SAFEGUARD
MODERNIZATION SURVEY

GENERAL SURVEY INFORMATION Date of Survey _____

A. Send Recommendation to Independent School District 101
Address 800 Excelsior St.
City, State, Zip Subwaydale 23436 ATTN: Lionel Gray

B. Name of Job Lincoln High School
Address _____
City, State, Zip _____

C. Unit Number _____

D. Unit Location _____

E. Applicable Code Requirements (circle applicable items)

<input checked="" type="checkbox"/> 1. UL (Underwriters Laboratories Inc.)	<input type="checkbox"/> 7. KEMPER INSURANCE	<input type="checkbox"/> 13. OTHER (state, county, city, local, etc. specify) _____
<input type="checkbox"/> 2. ANSI Z21 STANDARD	<input type="checkbox"/> 8. NFPA 88A, B, C, D, E	
<input type="checkbox"/> 3. ASME CODE	<input type="checkbox"/> 9. NFPA 88A, B, C, D	
<input type="checkbox"/> 4. IRI (FIA) INSURANCE	<input type="checkbox"/> 10. IHEA/IRI (FIA)	
<input type="checkbox"/> 5. FACTORY MUTUAL INSURANCE	<input type="checkbox"/> 11. CSA	
<input type="checkbox"/> 6. IRM INSURANCE	<input type="checkbox"/> 12. ANSI Z83.3 STANDARD	

I. EQUIPMENT (BOILER/FURNACE/OVEN/MAKEUP AIR HEATER) SURVEY

A. Type of Equipment (circle or specify)

<input checked="" type="checkbox"/> 1. Boiler	<input type="checkbox"/> 4. Makeup Air Heater
<input type="checkbox"/> 2. Furnace	<input type="checkbox"/> 5. Other _____
<input type="checkbox"/> 3. Oven	

B. Manufacturer XYZ Boiler Company

C. Model Number 123

D. Installation Date 1957

E. Purpose of Installation (circle applicable items)

<input checked="" type="checkbox"/> 1. Heating	<input type="checkbox"/> 4. Air Conditioning
<input type="checkbox"/> 2. Domestic Water (hot water)	<input type="checkbox"/> 5. Other (specify) _____
<input type="checkbox"/> 3. Process	

70-8238

Fig. 2— Sample lines I and II of "Proposal(s)" section.

PROPOSAL(S)

- I. INSTALL COMPLETE NEW EQUIPMENT W/BURNER (write in "See Attached" or "xxxx" out) _____
- II. INSTALL NEW BURNER (only) (write in "See Attached" or "xxxx" out) _____

continued next page

System Selector Guide

System Selector Guide continued

Fig. 3— Sample Section III, Modernization Survey and Proposal Form.

CONTROL AND SYSTEM SPECIFICATIONS	CONTROLS PRESENTLY ON THE JOB		MODERNIZATION FLAME SAFEGUARD CONTROL RECOMMENDATIONS (SELECT FROM APPROPRIATE CODE OR INSURANCE TABULATION FORM)	
	MANUFACTURER AND MODEL NUMBER	CONDITION/SPECIFICATIONS (AS READ)	CONTROL(S)	COST
INTERLOCKS/LIMITS				
Controller (temperature or pressure)	HONEYWELL L404A1KA	old (100#)	L604A 1185	
High Limit (temperature or pressure)	"	"	L404C 1121	
High Oil Pressure				
Low Oil Pressure				
High Oil Temperature				
Low Oil Temperature				
Low Atomizing Medium Pressure				
Rotating Cup Drive Interlock				
Manual Supervisory Cock				
High Gas Pressure			C437D1005	
Low Gas Pressure			C437E1038	
Valve Seal Overtravel				
High Fire Switch				
Low Fire Switch	in M931C			
High Furnace Pressure				
Low Water Cutoff(s)	MM 150			
Hinged Firing Head				
Supervise Purge Air				
Proven Combustion Air	Dwyer 42-X	OK - relatively new		
Induced Draft Fan Starts before Forced Draft Fan				
Outlet Dampers (when used)				

(continued)

CONTROL AND SYSTEM SPECIFICATIONS	CONTROLS PRESENTLY ON THE JOB		MODERNIZATION FLAME SAFEGUARD CONTROL RECOMMENDATIONS (SELECT FROM APPROPRIATE CODE OR INSURANCE TABULATION FORM)	
	MANUFACTURER AND MODEL NUMBER	CONDITION/SPECIFICATIONS (AS READ)	CONTROL(S)	COST
PILOT VALVE TRAIN				
Approved Safety Shutoff Valve(s)	V4001D (3/4")	obsolete 230V Model Replace with 120V Valve.	V4046C1054	
Manual Shutoff Valve	✓	OK		
N.O. Vent Valve				
Gas Pressure Regulator	Maxitrol ABC	OK		
MAIN VALVE TRAIN				
Approved Safety Shutoff Valve(s)	HONEYWELL V4034 1/2-50.34 3"	obsolete 240V model	V4055 D1001 V5055C 1026	
Firing Rate Valve	Butterfly/M931C	replace 240/240 xformer 2/200v	AT 72 D1683	
Manually Operated Leak Test Valve(s)				
Manual Shutoff Valve	✓	OK		
N.O. Vent Valve				
Gas Pressure Regulator	Fisher Def	OK		
AUXILIARY EQUIPMENT				
Alarm on Burner Shutdown				
Combustibles/Oxygen Analyzer				
Firing Rate Controller	L91A1A0A	Warn Pt./no Adj.	L91B1050	
Lead Lag System				
Draft Control System				

CONTROL AND SYSTEM SPECIFICATIONS	TABULATE (SURVEY) THE CONTROLS PRESENTLY ON THE JOB		MODERNIZATION FLAME SAFEGUARD CONTROL RECOMMENDATIONS (SELECT FROM APPROPRIATE CODE OR INSURANCE TABULATION FORM)	
	MANUFACTURER AND MODEL NUMBER	CONDITION/SPECIFICATIONS (AS READ)	CONTROL(S)	COST
APPROVED SAFETY CONTROL SPECIFICATIONS				
Purge Timing				
Purge Air Changes				
High Fire Purge Proving Circuit				
Low Fire Start Circuit				
Continuous Pilot				
Intermittent Pilot				
Proved Pilot				
Pilot Flame Establishing Period				
Direct Spark Ignition				
Main Flame Establishing Period				
Supervise Main Flame				
Flame Failure Response Time				
Action on Flame Failure				
Action on Limit Opening				
Post purge Timing				
SAFETY CONTROL PROGRAMMER/RELAY	Fireye 26R3100# PROG. AMPLI. SENSOR VOLTAGE 230V	230V Vacuum Tube Model. Replace motor starter coil, Ignition xformer, etc. with 120V devices	Y414061024	
ADDITIONAL CONTROL(S) (as required by local codes/equip.)				
SUBTOTAL \$				

continued next page

System Selector Guide

System Selector Guide continued

(3) Select. Use data from Sections I and II of the survey form to select the appropriate control family and then the complete order number(s) for the device(s) you need to modernize. The controller which best meets the required specifications in the example is the L604A1185. Put the order number(s) in the "Modernization Flame Safeguard Control Recommendations" column on the survey form (see Fig. 3).

(4) Price. Find the base price in your latest base price list. Enter prices in the "Modernization Flame Safeguard Control Recommendations" column on the survey form (see Fig. 3). When you've totaled the prices, you are ready to complete the "Proposal(s)" section of the survey form by filling in Part III. Fig. 5 shows a "Proposal(s)" section.

Fig. 5— Sample "Proposal(s)" section.

PROPOSAL(S)

I. INSTALL COMPLETE NEW EQUIPMENT W/BURNER (write in "See Attached" or "xxxx" out) _____

II. INSTALL NEW BURNER (only) (write in "See Attached" or "xxxx" out) _____

OR

III. INSTALL COMPLETE FLAME SAFEGUARD MODERNIZATION CONTROL SYSTEM (only) TO MEET CURRENT 4,795 SAFETY REQUIREMENTS (write in) CODE _____

A. CONTROLS ONLY \$ _____

B. ADDITIONAL DEVICES (draft control, heat recovery system, gas analyzers, economizers, pumps, tapks, etc.) \$ _____

 (Attach supporting data, if required.)

C. INSTALLATION, STARTUP, CHECKOUT, WIRING, AND LABOR \$ _____

D. ADJUST/TUNE/SET UP EXISTING BURNER/BOILER SYSTEM TO MAXIMUM OBTAINABLE EFFICIENCY \$ _____

E. PERMITS AND LICENSES \$ _____

F. APPROVALS \$ _____

G. TAXES \$ _____

H. GRAND TOTAL COST TO MODERNIZE THIS SYSTEM TO THE REFERENCED SAFETY LEVEL \$ _____

PREPARED BY: _____ REPRESENTING _____ (Name)
 (Print) _____
 (Signature) _____ (Address)
 _____ (City, State, Zip)
 DATE _____ (Phone)

ALL PRICES SUBJECT TO CHANGE AFTER 30 DAYS OR WITH ANY CHANGE IN SPECIFICATIONS
 WARRANTY TERMS: _____

8

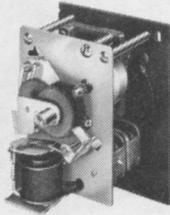
(5) Evaluate. Check off quoted controls on the chart on the back page of the Modernization Survey and Proposal Form (Fig. 6). These photos provide a handy visual reference and make it easier to remember the chosen controls. Also check off applicable benefits in the "Flame Safeguard Modernization Benefits" section of the survey form. Fig. 7 is a page from a sample Modernization Benefits section. This section is a list of 25 common modernization benefits, all in one location for easy reference. It will help you evaluate the effects of modernization on a particular flame safeguard system. The Modernization Benefits, the Proposal(s) sheet, and the visual checklist enable you to choose the right modernization system to fit your customer's needs.

continued next page

Auxiliary Equipment



S427B,C



S427D

S427B,C,D Purge Timers

Provide purge period to completely clear combustion chamber of unburned fuel prior to burner lightoff.

See ordering table for application. Motor-driven timers reset automatically when power is interrupted. Adjustable timing period. Voltage and Frequency: 120 V, 60 Hz. Contact Rating: 10 A at 120 Vac, 5 A at 240 Vac, 125 VA pilot duty. Listed by Underwriters Laboratories Inc: S427B,C—File No. MP2168, Guide No. MFHX. S427D—File No. MP2168, Guide No. MFHX2. Industrial Risk Insurers (formerly FIA) approvable.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Application	Timing (adjustable)	Switch Action	Max. Power Input (W)	Ambient Temp. Range
S427B1009	General applications.	2 to 15 min.	Spdt	6.5	0 F to 125 F [-18 C to +52 C]
S427B1058		4 to 30 min.		6.5	
S427B1124		8 to 60 sec.		8.5	
S427C1008		2 to 10 min.	Dpdt	6.5	
S427D1007	For plug-in use in R4138 and W688.	2 to 15 min.	Dpdt	6.5	0 F to 150 F [-18 C to +52 C]
S427D1163		8 to 60 min.		8.5	



S445A, S446A Start-Stop Stations

Pushbutton switches for manual control of electrical devices.

Refer to ordering table for application. Industrial Risk Insurers (formerly FIA) approvable, and listed by Underwriters Laboratories Inc: S446A—File No. E29640, Guide No. NLRV.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Operation	Application	Electrical Ratings ^a		
				120 Vac	240 Vac
S445A1010	Closes circuit when START button is depressed; opens circuit when button is released. STOP button shuts down entire system.	For use with manually operated oil or gas burner sequencing relays, such as R485, R4075, and R4138.	Full load	7.2	4.9
			Locked rotor	43.2	29.4
S446A1018	With power failure release. With power applied, holding contact keeps switch energized until stop button is depressed or until power is removed.	For use with RA890F and other types of automatic burner relays and electrical equipment.	Full load	7.2	4.9
			Locked rotor	43.2	29.4

^aPilot Duty—125 VA; 6 Vdc rating—7.5 A.



C7003A Rectifying Photocell and Mount

Detects flame in commercial or industrial oil or coal burner applications. Not suitable for gas flames.

Used with Honeywell flame safeguard controls requiring rectification type flame detector. For external use where photocell cannot be mounted in burner blast tube. Equipped with focusing lens. Mounting adapter with 3 setscrews, finned to help dissipate heat, slips over end of 2 in. pipe. Includes 3 interchangeable aperture discs: 1-3/8 in. [34.9 mm] dia., 1-1/32 in. [26.2 mm] dia., and 1/2 in.

continued next page

C7003A continued

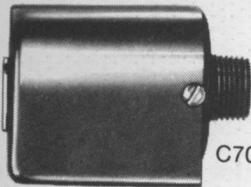
[12.7 mm] dia. Removable glass window. Max. Ambient Temp: 165 F [74 C] at photocell. Dimensions: 8-1/2 in. [215.9 mm] long, 4-3/8 in. [111.1 mm] diameter. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

REPLACEMENT PARTS:

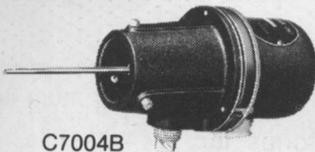
- 102288 Lens—magnifying.
- 100459A Slide Assembly—holding glass plate.
- 38316 Photocell—rectification.
- 100449 Glass Window.

Order Number	Kind of Flame Sensed	Maximum Ambient Temperature
C7003A1005 ^a	Oil or coal	165 F [74 C] at photocell

^aIncludes Honeywell 38316 Photocell.



C7007A



C7004B

C7004B, C7007A Flame Rod Holders

Used to apply flame rod in gas-fired system controlled by rectification type flame safeguard control.

Refer to ordering table for application and description. Order flame rod separately from flame rods table, below. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

ACCESSORIES:

C7004B—

- 38564A-00021 Extension Assembly.
- 102708A Chuck Assembly for holding Globar rod.

FLAME RODS (order separately)—

Kanthal A-1, 2200 F [1204 C] max:

Part Number	Length		Use With
	in.	mm	
102709A	12	304.8	C7004B, C7007A
102709B	18	457.2	
102709C	24	609.6	
102709D	36	914.4	
102709E	48	1219.2	

Globar, 2600 F [1427 C] max:

Part Number	Length		Use With
	in.	mm	
102711 ^a	12	304.8	C7004B

^a102708A Crank Assembly required, because Globar rod is larger diameter.

REPLACEMENT PARTS:

C7004B—

- 102769-00027 Adapter—1-3/4 in. setscrew mtg.
- 103761-00021 Chuck—electrode mtg.
- 38561 Gasket—housing.
- 38566 Insulator.
- 38560-00019 Terminal.

C7007A—

- 105465 Insulator.

continued next page

Auxiliary Equipment

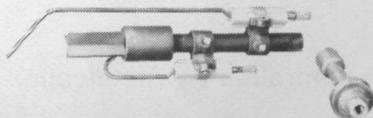
C7004B, C7007A continued

Order Number	Application/Description	Mounting	Approximate Overall Dimensions ^b					
			Height		Width (diameter)		Length	
			in.	mm	in.	mm	in.	mm
C7004B1002	Gas pilot or gas-ignited oil burner; 1/2 in. [12.7 mm] tapping in body allows ventilation for cooling or minimizing soot deposits.	2 in. pipe—3 setscrews	4- 1/8 ^c	104.8	3-5/8	92.1	6-9/16	166.7
C7004B1028		1-1/4 in. pipe—3 setscrews	4- 1/8 ^c	104.8	3-5/8	92.1	6-3/8	161.9
C7004B1051 ^a		1-1/4 in. pipe—threaded	4- 1/8 ^c	104.8	3-5/8	92.1	5-5/8	142.9
C7007A1001	Gas pilot or gas-ignited oil burner.	1/2 in. male NPT	1-15/16	49.2	2-3/16	55.6	3-3/16	81.0

^aWith compression fitting for securing flame rod and to provide seal when used on positive pressure fire boxes.

^bDimensions exclusive of flame rod and extension (if applicable).

^cIncludes pressure tapping.



C7005A,B Flame Rectifier Pilots

Combination rectification flame rod and pilot burner for use with suitable electronic relay on industrial or commercial gas or gas pilot-ignited oil burners.

For natural gas applications. Mount in vertical, horizontal, or inclined position. Flame retention type pilot head with bomb type fins provides maximum flame current. Mounting Means: 1/2 in. male thread. Mixing tube tapped for 1/4 in. inlet and 3/8 in. outlet. Max. Operating Temp. (flame rod): 2200 F [1205 C]. Overall Dimensions: 13-1/2 in. [342.9 mm] high; width can be adjusted to pass through 3 in. pipe. Pilot Head Dimensions: 4-7/16 in. [112.7 mm] long, 1-5/8 in. [41.3 mm] diameter. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified: C7005A—File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

ACCESSORIES:

High Temperature Cable (125 F [52 C]).

R1298020 Flame Rod Lead (specify length) rated at 400 F [204 C].

R1061012 Ignition Lead (specify length) rated at 350 F [177 C].

REPLACEMENT PARTS:

101743 Bracket—mounting.

101742-00021 Clamp—electrode mounting.

37356-520 Connector—Rajah, socket end—straight.

101741-00020 Connector—Rajah, plug end. 7/8 in. [22.2 mm] long.

103534 Electrode—flame; 8 in. [203.2 mm] Kanthal.

101740 Electrode—flame; 8 in. [203.2 mm] stainless steel.

101739 Electrode—ignition; 4 in. [101.6 mm] stainless steel—C7005B only.

101738B Flame Rod Assembly.

100205B Grounding Assembly.

101738A Ignition Assembly—includes electrode, Rajah connector and bracket.

7617CV Insulator Assembly—includes electrode insulator and mounting hardware.

100204B Mixing Tube (Venturi type—used with natural gas).

14182-00019 Washer—brass (plain)—Rajah connector to electrode mounting.

continued next page

C7005A,B continued

Order Number	Application	Ignition Electrode
C7005A1037	For continuous (standing) pilot applications.	No
C7005B1035	For automatic electric-gas pilot applications.	Yes



C7008A Flame Rod and Holder

Miniature "spark plug" type flame rod holder with threaded base, snap-on cover, and Kanthal A-1 Flame Rod.

Used with Honeywell flame safeguard controls requiring rectification type flame detector. For use with gas only. May be used with or without cover. Flame rod may be cut to desired length. Mounting Means: 1/4 in. NPT male. Rajah electrical connector. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report No. 24181.03.

REPLACEMENT PART:
37356 Rajah Connector.

FLAME RODS—
Kanthal A-1, 2200 F [1204 C] max:

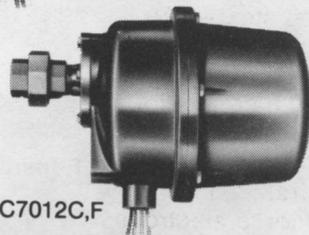
Part Number	Length	
	in.	mm
105478A	6	152.4
105478B	12	304.8
105478C	18	457.2
105478D	24	609.6

*TRADELINE models.

Order Number	Flame Rod Length		Overall Dimensions Without Flame Rod			
			Length		Dia.	
	in.	mm	in.	mm	in.	mm
*C7008A1174	12	304.8	3-3/4	95.3	7/8	22.2
*C7008A1182	24	609.6				



C7012A,E



C7012C,F

C7012A,C,E,F Solid State Purple Peeper Ultraviolet Flame Detectors

Solid state electronic flame detectors for use with appropriate Honeywell relays and amplifiers. Sense ultraviolet radiation produced by combustion of gas, oil, coal, or other fuels.

Direct replacement for C7012 detectors with vacuum tubes. These flame detectors can be mounted horizontally, vertically, or at any angle in between. For C7012E,F notch and arrow on faceplate must be aligned in vertical plane for proper shutter operation. Threaded conduit fitting and color-coded leadwires for quick electrical hookup. Two detectors can be wired in parallel to reduce nuisance shutdowns. Mounting Means: C7012A,E—mounting flange with either

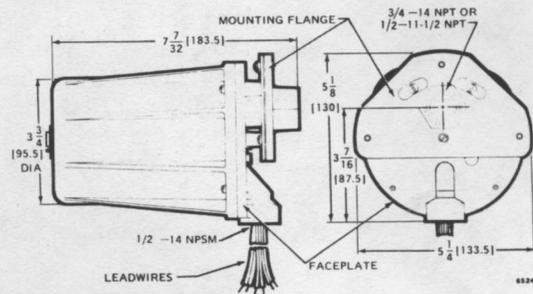
continued next page

Auxiliary Equipment

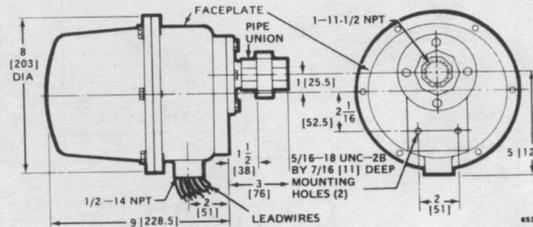
C7012A,C,E,F continued

3/4 or 1 in. NPT internal threads (depending on model) for attaching to sighting pipe; C7012C,F—pipe union with 1 in. NPT internal threads for attaching to sighting pipe. Power Consumption: C7012A,C—2.5 W; C7012E,F—7.0 W. Lead Length: 8 ft [2.4 m]. Listed by Underwriters Laboratories Inc. (120 V models only): C7012A and E (except C7012E1161)—File No. MP268, Guide No. MCCZ; C7012C,F—File No. E34649, Guide No. ZTSZ. Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified (120 V models only): C7012A and E—File No. LR1620; Guide No. 140-A-2 and 300-1-0.2; Factory Mutual approved, Report No. 14740.01.

Dimensions of C7012A,E in in. [mm in brackets].



Dimensions of C7012C,F in in. [mm in brackets].



REPLACEMENT PARTS:

All models—

113228 Ultraviolet Sensing Tube.

191286 Ultraviolet Sensing Tube—for operation down to minus 40 F [minus 40 C] outside case.

continued next page

C7012A,C,E,F continued

C7012A and E—

- 114372 Quartz Viewing Window, rated for 20 psi [137.9 kPa].
- 114465 Gasket, silicone rubber—for installing viewing window (3 required).
- 120739 Gasket, asbestos-neoprene—heat insulation and seal-off for mounting flange.

C7012C and F—

- 122037 Quartz Viewing Window, rated for 100 psi [689.5 kPa].

C7012E and F—

- 190971B Coil and Shutter Assembly—for 120 V models.

ACCESSORIES:

All models—

- 118369 Bushing, galvanized iron, with 3/4 in. NPT internal threads on one end and 1 in. NPT external threads on other end. For adapting detector with 1 in. NPT internal threads (for mounting) to a 3/4 in. sighting pipe, or to pipe nipple and tee for connecting air supply.

W136A Test Meter (includes 196146 Meter Connector Plug).

117053 Meter Connector Plug (for older W136A models).

118367A Swivel Mount.

C7012A and E—

122748 Quartz Viewing Window, rated for 50 psi [344.7 kPa].

124204 Quartz Magnifying Lens, rated for 20 psi [137.9 kPa]; for increasing the ultraviolet radiation sensed by the detector.

120934 Mounting Flange, aluminum, with 3/4 in. NPT internal threads for attaching to sighting pipe.

124198 Mounting Flange, aluminum, with 1 in. NPT internal threads for attaching to sighting pipe.

123539 Antivibration Mount.

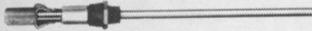
Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Application/Description	Voltage (50/60 Hz)	Pipe Mounting Size	Ambient Temp. Rating		Housing
				F	C	
C7012A1145	Use with Honeywell rectification type flame safeguard controls EXCEPT Dynamic Self Check models ^b . Field replaceable viewing window and ultraviolet sensing tube.	120	3/4 in. NPT	+25 to +175	-4 to +79	Violet, cast-aluminum cover; mounting flange (with heat block) and faceplate are separate to provide heat insulation and seal-off. NEMA 4 standards (watertight and dust-tight indoor and outdoor).
C7012A1152		120	1 in. NPT	+25 to +175	-4 to +79	
C7012A1160		120	1 in. NPT	-40 to +175	-40 to +79	
C7012A1186		208	3/4 in. NPT	+25 to +175	-4 to +79	
C7012A1194		240	3/4 in. NPT	+25 to +175	-4 to +79	
C7012C1042 ^a		120	1 in. NPT	+25 to +175	-4 to +79		Explosion-proof, 2-piece, violet, cast-aluminum.
C7012E1104	Use <i>only</i> with Dyanmic Self check flame safeguard controls ^b . Field replaceable viewing window, ultraviolet sensing tube, self-checking coil and shutter.	120	3/4 in. NPT	-20 to +175	-29 to +79	Violet, cast-aluminum cover; mounting flange (with heat block) and faceplate are separate to provide heat insulation and seal-off. Meets NEMA 4 standards (watertight and dust-tight, indoor and outdoor).
C7012E1112		120	1 in. NPT	-20 to +175	-29 to +79	
C7012E1120		120	1 in. NPT	-40 to +175	-40 to +79	
C7012E1146		208	3/4 in. NPT	-20 to +175	-29 to +79	
C7012E1153		240	3/4 in. NPT	-20 to +175	-29 to +79	
C7012E1161 ^c		120	1 in. NPT	-20 to +175	-29 to +79	
C7012F1052 ^a		120	1 in. NPT	-20 to +175	-29 to +79		Explosion-proof, 2 piece, violet, cast-aluminum.

^aWith explosion-proof housing for use in hazardous atmospheres.

^bDynamic Self Check models are R4138A/B, R4181A, R4126/R4127 with R7256B, R4150 with R7253B, and R4075C/D/E, R4138C/D, or R4140 with R7247C Amplifier.

^cWith 10 ft [3.0 m], 5-wire cable with amp connector.



C7009A Flame Rod and Holder

Subminiature "spark plug" type flame rod holder with flame rod.

Especially suited for use on industrial flame-retention burner nozzle. Used with Honeywell flame safeguard controls requiring rectification type flame detector. Flame rod may be cut to desired length. Mounting Means: 1/8 in. NPT male. Rajah electrical connector. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ, Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report No. 24181.03.

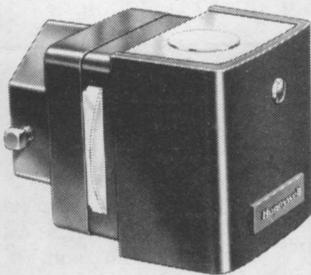
REPLACEMENT PART:
37356 Rajah Connector.

FLAME RODS (Kanthal A-1, 2200 F [1204 C] max.):

Part Number	Length	
	in.	mm
105644A	4	101.6
105644B	8	203.2
105644C	12	304.8

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Flame Rod Length		Overall Dimensions Without Flame Rod			
			Length		Diameter	
	in.	mm	in.	mm	in.	mm
C7009A1009	4	101.6	2-3/8	60.3	3/8	9.5
C7009A1025	12	304.8				



C7010A Rectifying Photocell and Mount

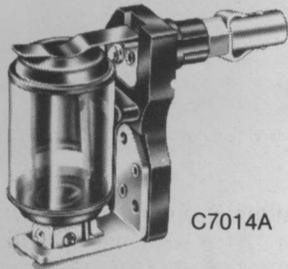
Detects flame in commercial and industrial oil and coal burner applications.

Used with Honeywell flame safeguard controls requiring rectification type flame detector. For external use where photocell is not installed in burner blast tube; 1/8 in. tapping allows ventilation for cooling and minimizing soot deposits. Removable glass window. Ambient Temperature: 165 F [74 C] maximum at photocell, 200 F [93 C] maximum at forward end of adapter. Mounting Means: 1-1/4 in. NPT. Dimensions: 3 in. [76.2 mm] high, 3-1/16 in. [77.8 mm] wide, 3-7/8 in. [98.4 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association approved, File No. LR1620, Guide No. 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

REPLACEMENT PARTS:

- 110422 Cork Gasket—lens mounting.
- 110409 Heat Block.
- 110420 Lens—magnifying.
- 110412A Slide Assembly.
- 38316 Photocell—rectification.
- 110421 Window—photocell.

Order Number	Includes
C7010A1006	Mount, 38316 Photocell.



C7014A

C7013A, C7014A Rectifying Photocells and Mounts

Compact flame detectors for mounting inside air tube of oil and coal burners.

Used with Honeywell flame safeguard controls requiring rectification type flame detector. Includes 38316 Photocell. Ambient Temperature: 165 F [74 C] maximum at photocell. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620; Guide No. 300-1-0.2; Factory Mutual approved, Report No. 24181.03.



C7013A

REPLACEMENT PARTS:

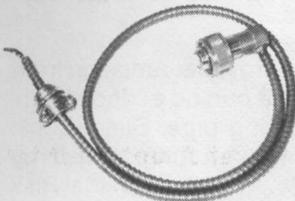
101851 Rajah Connector, socket end—C7013A.
38316 Photocell—C7013A and C7014A.

ACCESSORIES (C7013A only):

38576 Filter—used to reduce heat or effect of hot refractory on photocell.
38570 Holder for filter and magnifying lens.
38242 Rajah Connector (plug end).
121610 Magnifying Lens.

Order Number	Type of Rajah Connector	Approx. Overall Dimensions					
		Width		Height		Depth (incl. connector)	
		in.	mm	in.	mm	in.	mm
C7013A1003	Stud terminal	1-1/4	31.8	2	50.8	1-5/8	41.3
C7014A1002 ^a	Spring-snap terminal	13/16	20.6	1-3/4	44.5	2-1/4	57.2

^aDesigned for use with Shell Head oil burners.



C7015A Infrared (Lead Sulfide) Flame Detector

C7015A combination mount and 104662 Plug-in Lead Sulfide Cell senses infrared radiation from gas, oil, coal, or dual-fuel flames.

Detects pilot and/or main flame. Mounts on 3/4 in. sighting pipe. Suitable where flame rods or rectifying photocell mounts are difficult to apply. Includes 110634A Bushing with Magnifying Lens and 105134-00021 Orifice. Lead sulfide cells are available for replacement as listed. Ambient Temperature: 125 F [52 C] at photocell. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

REPLACEMENT PARTS:

Lead Sulfide Cells—

Part No.	Color	Sensitivity Range
104662A	Red	Lowest
104662B	Yellow	Medium
104662C	Green	High
104662D	White	Highest

105134 Orifice.

110634A Bushing with Magnifying Lens.

continued next page

Auxiliary Equipment

C7015A continued

ACCESSORIES:

- 105061 Heat Block. Insulates cell against excessive heat.
- 105172A Seal-off Adapter. Pressure block.
- 390427A Reducer Bushing: 3/4 x 1/2 in. [19 x 12.7 mm].

Available only through Authorized Honeywell Flame Safeguard Distributors.

• *SUPER TRADELINE model.*

Order Number	Use With	Lead Sulfide Cell ^b	Lead Length	
			in.	mm
C7015A1076	R7254A Amplifier and R4126, R4127 Programmer; R7258A Amplifier and R4150 Programmer; R7248A,B Amplifier and R4140 Programmer; R4075C,D,E and R4138C,D relays; also any flame safeguard controls that use Honeywell infrared amplifiers.	104662B	30.0	762.0
C7015A1092		104662C	96.0	2438.3
•C7015A1126 ^a		104662D	48.0	1219.2

^aIncludes 105061 Heat Block and 390427 Reducer Bushing, 3/4 x 1/2 in. [19.1 x 12.7 mm] to replace Fireye 48PT sensors on 1/2 in. sighting pipe.

^bSee table above for description.

C7027A Minipeeper Ultraviolet Flame Detector

Compact flame detector for use with RA890G, R7023C, R4795, R4126, R4127, R4075, R4138, R4150, and R4140 flame safeguard controls with ultraviolet amplifiers.

Used on gas, oil, coal, or combination burners. Detects ultraviolet radiation from all flames. Sensing tube is not field replaceable; entire unit can be economically replaced. Mounting Means: Integral nut for 1/2 in. sighting pipe. Dimensions: 1-1/8 in. [28.6 mm] (mounting nut), 3-7/8 in. [98.4 mm] long. Listed by Underwriters Laboratories Inc: File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2; Factory Mutual approved, Report No. 24181.03.

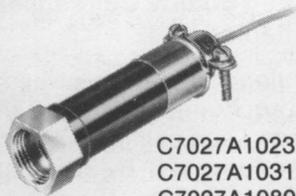
REPLACEMENT PARTS:

- 129685 Flange Gasket.
- 136733 Heat Block.

NOTE: UV sensing tube is NOT field replaceable.



C7027A1049
C7027A1064
C7027A1072



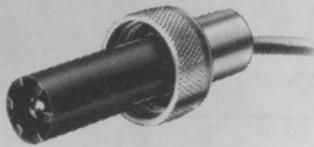
C7027A1023
C7027A1031
C7027A1080

• *SUPER TRADELINE model.*

Order Number	Ambient Temp. Range		Lead Length	
	F	C	ft	m
C7027A1023	0 to +215	-18 to +102	6	1.8
C7027A1031	-40 to +215	-40 to +102	6	1.8
C7027A1049 ^a	0 to +215	-18 to +102	6	1.8
C7027A1064 ^a	-40 to +215	-40 to +102	24	7.3
C7027A1072 ^a	-40 to +215	-40 to +102	6	1.8
•C7027A1080 ^b	0 to +215	-18 to +102	6	1.8

^a1/2 in. NPT threaded spud connector.

^bIncludes 136733 Heat Block and 390427B Bushing, 1/2 x 3/8 in. [12.7 x 9.5 mm] to replace Fireye UV2 sensor.



C7035A Minipeeper Ultraviolet Flame Detector

Compact flame detector for use with RA890G, R7023C, R4795, R4126, R4127, R4075, R4138, R4150 and R4140 flame safeguard controls with ultraviolet amplifiers.

Used on gas, oil, coal, or combination burners. Detects ultraviolet radiation from all flames. Sensing tube is field replaceable. Mounting Means: Integral collar for 1 in. NPT sighting pipe. Dimensions: 1-1/2 in. [38.1 mm] diameter (mounting collar), 4-1/8 in. [104.8 mm] long. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report No. 24181.03.

REPLACEMENT PARTS:

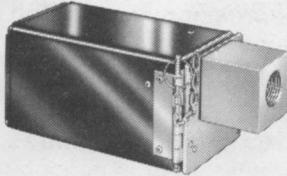
129808 Flange Gasket.

129464M Ultraviolet Sensing Tube (0 F to 250 F [minus 18 C to plus 121C]).

129464N Ultraviolet Sensing Tube (minus 40 F to plus 250 F [minus 40 C to plus 121 C]).

Order Number	Ambient Temp. Range		Lead Length	
	F	C	ft	m
C7035A1023	0 to +250	-18 to +121	6	1.8
C7035A1031	-40 to +250	-40 to +121	6	1.8
C7035A1056	-40 to +250	-40 to +121	12	3.5
C7035A1080 ^a	0 to +250	-18 to +121	6	1.8

^a600 F 6 ft leadwires.



C7076A,D Ultraviolet Flame Detectors

Solid state dynamic self check flame detector for use with R4140, R4075C,D,E; R4138C,D flame safeguard controls, and R7476 amplifier.

Used on gas, oil, coal, or combination burners. Detects ultraviolet radiation from all flames. Includes dual sensitivity adjustment. Enclosure meets NEMA 4 standards. Sensor Ambient Temperature Range: Minus 20 F to plus 160 F [minus 29 C to plus 71 C]. Sensor Dimensions: 4 in. [100.6 mm] square, 10 in. [254 mm] long. C7076A, listed by Underwriters Laboratories Inc. (120 V models only) File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified (120 V models only), File No. LR1620; Factory Mutual approved, Report No. FM26980; C7076D, Underwriters Laboratories Inc. listed, File No. E34649, Guide No. ZTSZ.

REPLACEMENT PARTS:

Plug-in Electronics Chassis.

Coil and Shutter Assembly—

190971E for all models, except 100 V model.

191053 Ultraviolet Sensing Tube.

191050 Viewing Lens.

190999 Grommet—silicone-rubber for viewing lens.

191054 Gasket—silicone-rubber seal for front and rear cover plates.

ACCESSORIES:

118367A Swivel Mount.

W136A Test Meter—includes 196146 Meter Connector Plug.

196146 Meter Connector Plug—for older W136A models.

continued next page

Auxiliary Equipment

C7076A,D continued

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Voltage and Frequency	Mounting Means
C7076A1007	120 V, 60 Hz	1 in. pipe—threaded.
C7076A1031	220/240 V, 50/60 Hz	
C7076D1027 ^a	120 V, 60 Hz	

^aWith explosion-proof housing for use in hazardous atmospheres.



Flush Mounting

R4155A,B Relays

R4155A line voltage spst alarm silencing relay is used on control systems with audible alarms. R4155B line voltage spdt cutout relay is used in applications requiring cutout when end point is reached. R4155A,B for use with 2-wire controls.

R4155A

When external contacts close, red warning lamp lights and alarm sounds. Depressing alarm button silences alarm, but red light remains on as long as external contacts are closed. Provision for connecting remote alarm silencing switch.

R4155B

Used with solenoid valves, industrial motors, or Modutrol motors on applications requiring automatic shutdown and manual reset. Depressing pushbutton actuates equipment and green lamp. Green light remains on until controller contacts open.

Listed by Underwriters Laboratories Inc., File No. E4436, Guide No. XAPX; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 400-E-0.

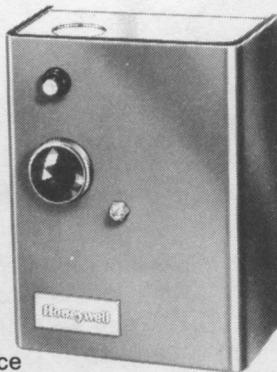
REPLACEMENT PARTS:

283093 Green Lens.

283083 Red Lens.

283084 Replacement Bulb.

No other parts replaceable.



Surface Mounting

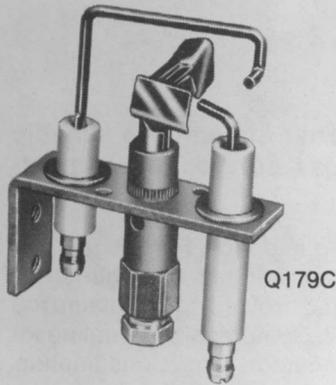
VOLTAGE AND FREQUENCY: 120 V, 60 Hz.

ELECTRICAL RATING (A):

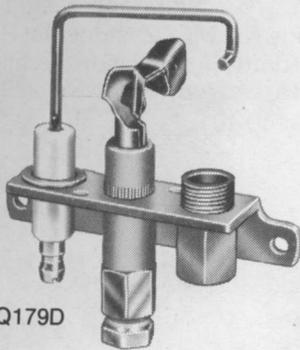
Motor Load	120 V	220/240 V
Full Load	7.4	3.7
Locked Rotor	44.4	22.2
Resistive	10.0	5.0

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Mounting	Switch Action	Indicating Light
R4155A1002	Surface	Spst	Red
R4155A1044	Flush	Spst	Red
R4155B1000	Surface	Spdt	Green



Q179C



Q179D

Q179C,D Miniature Rectification Pilots

Gas pilot burner assemblies prove pilot flame on industrial or commercial gas burners or gas pilot-ignited oil burners.

Q179C and D functionally replace Q179A and B, respectively; see ordering table for application. Includes natural gas orifice. For LP gas, use 388146KD Orifice Assembly (order separately). Primary-aerated burner is equipped with stainless steel target to stabilize flame and provide correct flame rod area to ground area ratio for maximum flame current. Compression coupling for 1/4 in. [6.4 mm] O.D. tubing. Natural Gas Orifice Diameter: 0.026 in. [0.66 mm] for dual wing target; 0.024 in. [0.60 mm] for single wing target. Listed by Underwriters Inc., File No. MH9928, Guide No. MCUR2; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR29652, Guide No. 140-A-2; American Gas Association certified, Report No. G-140-1-4.

REPLACEMENT PARTS:

Orifices—

388146AF—for natural gas single wing target, 0.024 in. [0.60 mm] diameter.

388146KD—for LP gas, 0.016 in. [0.40 mm] diameter.

No other parts replaceable.

ACCESSORIES:

High Temperature Cable (over 125 F [52 C])—

R1298020 Flame Rod Lead (specify length), rated at 400 F [204 C].

R1061012 Ignition Lead (specify length), rated at 350 F [177 C].

388146KD LP Orifice—0.016 in. [0.40 mm] diameter.

Electrode Connectors—

Straight- or right-angle electrode connectors can be obtained at any automotive store.

37356 Female Rajah Connector.

Order Number	Application	Mounting	Target			
			Mount	Wingspan		
				in.	mm	
Q179C1009	Combination pilot burner and rectifying flame rod flame detector. With ignition electrode; suitable for use on interrupted or intermittent electrically ignited gas pilot applications. Use with Q624 or other suitable ignition transformer.	End	Dual wing—rear	1	25.4	
Q179C1025		End	Single wing ^b —rear	13/16	20.6	
Q179C1033		Side	Dual wing—left side	1	25.4	
Q179C1041		Side	Dual wing—right side	1	25.4	
Q179C1058		Side	Single wing ^b —left side	13/16	20.6	
Q179C1066		Side	Single wing ^a —right side	13/16	20.6	
Q179D1008		Combination pilot burner and rectifying flame rod flame detector. With thermocouple adapter; suitable for use on continuous (standing) pilot applications. Use with Q309 or Q340 thermocouple or Q313A thermopile generator.	End	Dual wing—rear	1	25.4
Q179D1016			Side	Dual wing—left side	1	25.4
Q179D1024	Side		Dual wing—right side	1	25.4	
Q179D1032	End		Dual wing—rear	2	50.8	
Q179D1057	Side		Single wing ^b —left side	13/16	20.6	

^aRight-hand target.

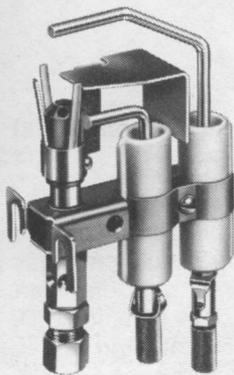
^bLeft-hand target.



Be Y's—Modernize

See pages 56-60 for information on Honeywell's modernization "Y" packs. To help you get the most out of modernization, use THE FIRING LINE.

See pages 84 and 85 for a description and order form.



Q179A,B Flame Rectifier Gas Pilots

Combination rectifying flame rod and pilot burner for use with suitable electronic relay on industrial or commercial gas burners or gas pilot-ignited oil burners.

See ordering table for application. Includes natural gas orifice. For LP gas, use 47540 Orifice Assembly (order separately). Primary-aerated type burner is equipped with stainless steel fins to stabilize flame and provide correct flame rod area to ground area ratio for maximum flame current. Compression coupling for 1/4 in. [6.4 mm] O.D. tubing. Includes Rajah connector. Gas Consumption: Approximately 2 cu ft/hr [0.06 m³/hr]. Mounting Means: Bracket with holes for side mounting, 2 lugs for end mounting. Approx. Overall Dimensions: 4-5/8 in. [117.5 mm] high, 1-11/16 in. [42.9 mm] wide, 3 in. [76.2 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report No. 22961; American Gas Association certified, Certified No. G140.401.

REPLACEMENT PARTS:

37356 Rajah Connector—for ignition electrode.
104312 Rajah Connector—for flame electrode.
4074BHT Screw Terminal Connectors—thread to rod—Q179A.
133445A Ignition Electrode and Insulator Assembly.
See table below for additional replacement parts.

ACCESSORIES:

102490 Connector—Special straight adapter female fitting for use when bottom connection for 1/8 in. iron pipe is desired instead of 1/4 in. [6.4 mm] O.D.
Thermocouple Adapters (for Q309 Thermocouple):
131065 for Q179A.
131065 and 102462 for Q179B.
High Temperature Cable (125 F [52 °C])—
R1298020 Flame Rod Lead (specify length) rated at 400 F [204 °C].
R1061012 Ignition Lead (specify length) rated at 350 F [177 °C].

Order Number	Application	Tip Style ^b
Q179A1001	For intermittent or interrupted ignition. Has both flame electrode and ignition electrode.	I
Q179A1035		45 deg. RH
Q179A1050		T
Q179A1076		45 deg. Y
Q179A1092		45 deg. T
Q179A1167 ^a		I
Q179B1042	For continuous (standing) pilot. Has flame electrode only.	T
Q179B1117		45 deg. I (large)

^a0.028 in. [0.7 mm] orifice.

^bTip styles are illustrated on the following page.

continued next page

Q179A,B continued

ADDITIONAL Q179A,B REPLACEMENT PARTS TABLE

Tip Style ^e	Tip	Ground and Ground Shield ^d	Orifice		Flame Rod and Insulator Assembly
			Natural Gas	LP Gas	
I	105063A	102464A	47542 ^a	47540 ^b	133448A
45 deg. I	105064A	102464B	47542 ^a		133450A
45 deg. RH	105066A	102464D	47542 ^a		133452A
45 deg. LH	105067A	102464D	47542 ^a		133444A
T	105068A	102464F	102916 ^c		133451A
45 deg. Y	105069A	102464C	102916 ^c		133446A
45 deg. T	105070A	102464H	102916 ^c		133452A
Large I	121831A	102464A	47542 ^a		133448A

^aOrifice 0.025 in. [0.635 mm] hole diameter.

^bOrifice 0.0130 in. [0.330 mm] hole diameter (order separately).

^cOrifice 0.028 in. [0.711 mm] hole diameter.

^dOn some ground areas, one or more prongs have been intentionally removed at factory.

^eTip styles illustrated below.



Q624A

Q624A Solid State Ignition Transformer; 22042, 101079 Ignition Transformers

Ignite pilots on commercial or industrial gas burners.

See ordering table for description/application. Industrial Risk Insurers (formerly FIA) approvable and listed by Underwriters Laboratories Inc: Q624A—File No. MH7453, Guide No. JHYR2; Canadian Standards Association certified: Q624A—File No. LR1620, Guide No. 140-A-2. American Gas Association certified: Q624A—Certified No. G140.401.

ELECTRICAL RATINGS:

	Voltage (60 Hz)	Maximum Output Voltage	Primary VA Rating (at 120 V)
Q624A	120 V	15,000 V Peak	66 VA
22042	120 V	6,000 V RMS	150 VA
101079	240 V	6,000 V RMS	150 VA

22042
101079



ACCESSORIES:

C7005 Gas Pilot—with ignition electrode.

Q179 Gas Pilot—with ignition electrode.

R1061012 Ignition Cable—(specify length) rated at 350 F [177 C].

134666 Insulator (Q624A only)—to cover terminal to prevent contamination.

continued next page

Auxiliary Equipment

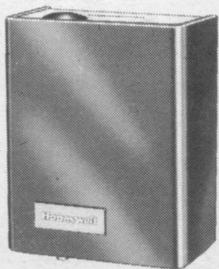
Q624A; 22042, 101079 continued

Order Number	Ambient Temperature Rating		Description/Application
	F	C	
Q624A1006 ^{a,b}	-40 to +125	-40 to +52	Can be used to replace single electrode ignition transformers in interrupted gas or gas pilot applications. Prevents detection of ignition spark when properly applied in flame detection system with C7027 or C7035 Ultraviolet Flame Detector. Mounting plate designed to replace standard ignition transformers.
Q624A1014 ^{a,c}	-40 to +125	-40 to +52	
22042	-40 to +125	-40 to +52	Single electrode ignition transformer for use on gas burners.
101079	-40 to +125	-40 to +52	

^aAvailable only through Authorized Honeywell Flame Safeguard Distributors.

^bWith quick-connect high voltage electrode.

^cWith threaded terminal nut high voltage electrode.



R482D,F Switching Relays

Line voltage switching relays for use in flame safeguard control circuits.

Refer to ordering table for application. Listed by Underwriters Laboratories Inc: R482D—File No. E14480, Guide No. NLDX. R482F—File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable. Canadian Standards Association certified: R482D—File No. LR1620, Guide No. 400-E-0.

VOLTAGE AND FREQUENCY: 120 V, 50/60 Hz.

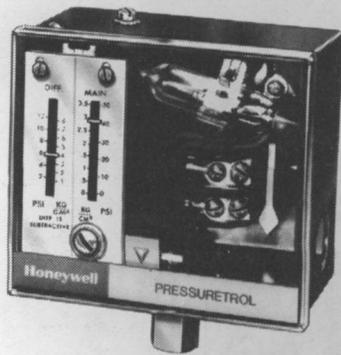
ELECTRICAL RATINGS (A):

R482D—4.4 A Full Load, 26.4 A Locked Rotor.

R482F—

Load	Normally Open Contacts		Normally Closed Contacts	
	120 Vac	240 Vac	120 Vac	240 Vac
Full Load	7.2	3.6	2.0	1.0
Locked Rotor	43.2	21.6	12.0	6.0
Resistive	10.0	5.0	3.0	1.5

Order Number	Application	Description	Switching
R482D1005	For use in cutoff circuits with RA890E,F, or G Primary Controls to prevent recycling if the burner flame goes out.	With overlapping contacts. Allows ignition (and pilot) control to be transferred to main valve terminal after start so ignition cannot return in event of flame failure.	Dpdt with overlapping contacts. N.O. contacts make before N.C. contacts break.
R482F1003	Momentarily interrupts power supply in RA890 circuit. Provides safe-start check in continuous pilot applications, or provides fuel changeover at set point in gas-oil applications.	With built-in thermistor which delays pull-in time.	One single-pole, 3 branch circuit, with 1 pair isolated N.O. and 1 pair isolated N.C. contacts.



L404A-D,F; L604A,L,M,N Pressuretrol Controllers

Provide operating control, automatic or manual reset limit protection for pressure systems up to 300 psi [2068 kPa].

May be used with steam, air, noncombustible gases, or fluids noncorrosive to pressure sensing element. Mercury switch expect as noted in ordering table. Maximum Ambient Temperature: 150 F [66 C]. Pressure Sensing Element: Stainless steel diaphragm (phos-bronze bellows in models with 20 to 300 psi [138 to 2068 kPa] scale range). Mounting Means: 1/4 in. NPT female threads, or surface mounted through back of case. Listed by Underwriters Laboratories Inc: L404A-D,F; L604A,L,N—File No. MP466, Guide No. MBPR. Industrial Risk Insurers (formerly FIA) approvable. Canadian Standards Association certified: L404A-D; L604A,L,N—File No. LR1620, Guide No. 400-E-O.

ELECTRICAL RATINGS (A):

Model	Load	120 Vac	240 Vac	120 Vdc	240 Vdc
L404 ^a	Full Load	8.0	5.1	2.4	1.2
	Locked Rotor	48.0	30.6	24.0	12.0
	Resistive Load	10.0	5.0	5.0	2.0
L604A,L	Full Load	8.0	5.1	2.0	1.0
	Locked Rotor	48.0	30.6	20.0	10.0
	Resistive Load	10.0	5.0	8.0	4.0
L604N	Full Load	8.0	5.1		
	Locked Rotor	48.0	30.6		

^aL404F, L604N do not have dc ratings.

DIMENSIONS:

Range		Height		Width		Depth	
psi	kPa	in.	mm	in.	mm	in.	mm
2 to 15	14 to 103	4-27/32	123.0	4-1/2	114.3	3-1/4	82.6
5 to 50	35 to 345	4-31/32	126.2	4-1/2	114.3	2-3/4	69.9
10 to 150	69 to 1034	4-31/32	126.2	4-1/2	114.3	2-3/4	69.9
20 to 300	138 to 2068	5- 3/4	146.1	4-1/2	114.3	2-3/4	69.9

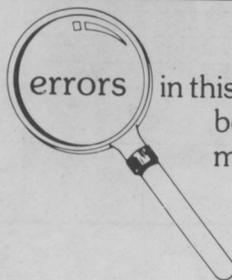
ACCESSORIES:

33312B Knurled Adjustment Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.
 4074BWJ Limit Stop Assembly—to limit set point. Includes 129564 Range Stop, 107194 Range Stop Screw and 23466 Wrench.
 14026 Siphon Loop.

REPLACEMENT PART:

129178 Thermoplastic Cover.

If you detect any errors in this Catalog, please let us know. We want the information to be as accurate as possible; we appreciate your help in making it so. Write:



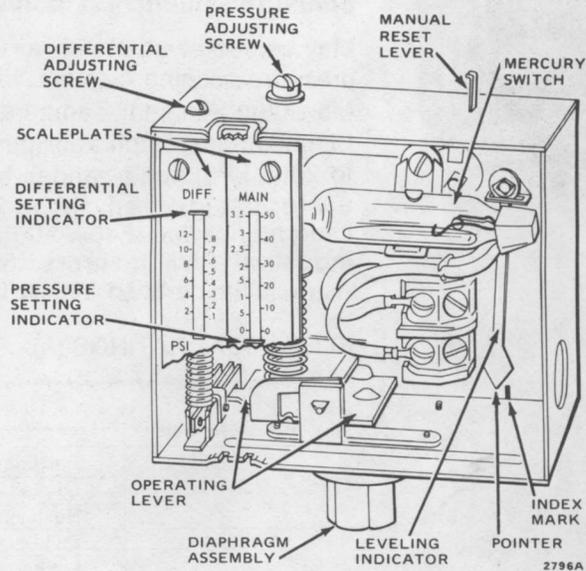
Creative Services Supervisor
 Honeywell Inc.
 MN10-1430
 1985 Douglas Drive North
 Golden Valley, MN 55422-3992

continued next page

Controllers

L404A-D,F; L604A,L,N continued

Internal view of Pressuretrol controller.



*TRADELINE models.

Order Number	Operating Range		Subtractive Differential ^b		Surge Pressure		Includes Siphon Loop	Switch	
	psi	kPa	psi	kPa	psi	kPa		Type	Action on Pressure Rise
L404A1354	2 to 15	14 to 103	1 to 6	7 to 41	25	172	No	Spst	Breaks
L404A1370	5 to 50	35 to 345	4 to 12	28 to 83	85	586	No		
L404A1396	10 to 150	69 to 1034	8 to 16	55 to 110	225	1151	No		
L404A1404 ^a	20 to 300	138 to 2068	15 to 40	103 to 276	350	2413	Yes		
L404B1304	2 to 15	14 to 103	1 to 6	7 to 41	25	172	No	Spst	Makes
L404B1320	5 to 50	35 to 345	4 to 12	28 to 83	85	586	No		
L404B1346	10 to 150	69 to 1034	8 to 16	55 to 110	225	1151	No		
L404B1353 ^a	20 to 300	138 to 2068	15 to 40	103 to 276	350	2413	Yes		
L404C1139 ^a	20 to 300	138 to 2068	Manual Reset		350	2413	Yes	Spst	Breaks
L404C1147	2 to 15	14 to 103	Manual Reset		25	172	No		
L404C1162	10 to 150	69 to 1034	Manual Reset		225	1151	No		
L404D1088	2 to 15	14 to 103	Manual Reset		25	172	Yes	Spst	Makes
L404D1096	10 to 150	69 to 1034	Manual Reset		225	1151	Yes		
L404F1060	2 to 15	14 to 103	2 to 6	14 to 41	25	172	Yes	Spdt	R-W makes R-B breaks
L404F1078	5 to 50	35 to 345	6 to 14	41 to 97	85	586	Yes	snap-acting Micro Switch	
L404F1094 ^a	20 to 300	138 to 2068	20 to 50	138 to 345	350	2413	Yes		
L404F1102	10 to 150	00 to 1034	10 to 22	00 to 152	225	1151	No		
*L604A1169	2 to 15	14 to 103	1 to 6	7 to 41	25	172	Yes	Spdt	R-W makes R-B breaks
*L604A1177	5 to 50	35 to 345	4 to 12	28 to 83	85	586	Yes		
*L604A1185	10 to 150	69 to 1034	8 to 16	55 to 110	225	1151	Yes		
*L604A1193 ^a	20 to 300	138 to 2068	15 to 40	103 to 276	350	2413	Yes		
L604L1035	2 to 15	14 to 103	Manual Reset		25	172	Yes	Spdt	R-W makes R-B breaks
L604N1009	10 to 150	69 to 1034	7	48	225	1151	Yes	2 Spdt snap-acting Micro Switch	Make R-W Break R-B

^aPhos-bronze bellows.

^bDifferential at midscale.



L408A,B; L608A Vaporstat Controllers

Provide operating control and automatic high limit protection for vapor heating systems with pressures up to 4 psi [8 kPa].

Stainless steel diaphragm may be used with liquids, air, noncombustible gases, ammonia, oxygen, distilled water, and similar media. All models have trouble-free mercury switch. Maximum Ambient Temperature: 150 F [66 C]. Includes 14026 Siphon Loop. Mounting Means: Hexagonal fitting with 1/4 NPT internal threads. May be surface mounted through back of case. Approximate Case Dimensions: 6-7/8 in. [174.5 mm] high, 4-7/8 in. [123.8 mm] wide, 4-7/8 in. [123.8 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP466, Guide No. MBPR; Industrial Risk Insurers (formerly FIA) approvable, Canadian Standards Association certified, File No. LR1620, Guide No. 400-E-O.

ELECTRICAL RATINGS (A at 50/60 Hz):

	Load	120	240	120	240
		Vac	Vac	Vdc	Vdc
L408A,B	Full Load	8.0	5.1	2.4	1.2
	Locked Rotor	48.0	30.6	24.0	12.0
	Resistive Load	10.0	5.0	5.0	2.0
L608A	Full Load	8.0	5.1	2.0	1.0
	Locked Rotor	48.0	30.6	20.0	10.0
	Resistive Load	10.0	5.0	8.0	4.0

REPLACEMENT PART:

129178 Thermoplastic Cover—L408, L608.

ACCESSORIES:

33312B Knurled Adjusting Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.

4074BWJ Limit Stop Assembly—to limit set point. Includes 129564 Range Stop, 107194 Screw, 23466 Wrench.

Order Number ^c	Range			Subtractive Differential ^b		Switch	
	oz	psi	kPa	oz/in. ²	kPa	Type	Action On Pressure Rise
L408A1132a,b	0 to 16	—	0 to 6.9	2 to 16	0.9 to 6.9	Spst	Breaks
L408A1157	—	0 to 4	0 to 28	4 to 16	1.7 to 6.9	Spst	Breaks
L408B1131a,b	0 to 16	—	0 to 6.9	2 to 16	0.9 to 6.9	Spst	Makes
L408B1149	—	0 to 4	0 to 28	4 to 16	1.7 to 6.9	Spst	Makes
L608A1046	0 to 16	—	0 to 6.9	2 to 16	0.9 to 6.9	Spdt	R-B breaks R-W makes
L608A1053	—	0 to 4	0 to 28	4 to 16	1.7 to 6.9	Spdt	R-B breaks R-W makes

^aFor distilled water.

^bDifferential at midscale.

^cComplete order number includes siphon loop.



L411A,B Vacuumstat Controllers

Provide operating or limit control for vacuum and pressure systems.

Used with steam, air, noncombustible gases, or fluids not corrosive to stainless steel diaphragm. Includes 14026 Siphon Loop. Range: 22 in. [555.8 mm] Hg (mercury) vacuum to 35 psi [241 kPa]. Max. Ambient Temp: 150 F [66 C]. Diff. at Midscale (subtractive): 2 to 30 psi [14 to 207 kPa], adjustable. Max. Surge Pressure: 85 psi [685 kPa]. Mounting Means: 1/4 NPT female fitting on diaphragm assembly, or surface mounted through back of case. Approximate Overall Dimensions: 5-1/16 in. [128.6 mm] high, 4-1/2 in. [114.3 mm] wide, 2-3/4 in. [69.9 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP466, Guide No. MBPR; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 400-E-O.

ELECTRICAL RATINGS (A):

Load	120 Vac	240 Vac	115 Vdc	230 Vdc
Full Load	8.0	5.1	2.4	1.2
Locked Rotor	48.0	30.6	24.0	12.0
Resistance Load	10.0	5.0	5.0	2.0

REPLACEMENT PART:

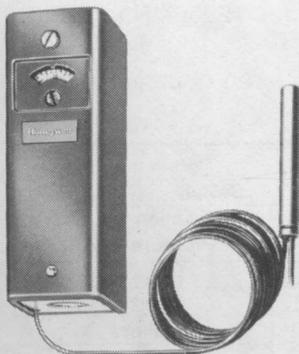
129178 Thermoplastic Cover.

ACCESSORIES:

33312B Knurled Adjusting Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.

4074BWJ Limit Stop Assembly—to limit set point. Includes 129564 Range Stop, 107194 Range Stop Screw and 23466 Wrench.

Order Number	Mercury Switch Action
L411A1029	Opens on pressure rise.
L411B1036	Closes on pressure rise.



L6008H Low Fire Aquastat Controller

The low fire Aquastat Controller is an immersion type device for maintaining boiler burner low fire until the boiler water has risen to a preset value. As the temperature rises to the set point, expansion of the fluid in the sensing element operates the internal switch, allowing the controller to return to normal operation.

The L6008H provides spdt switching for low fire control. Visible control point scale and external adjustment screw permit easy setting. Remote bulb isolates controller from potentially high temperature at the probe and well. Totally enclosed snap-acting Micro Switch switch used. Available copper well (order separately) for operation up to 160 psi or stainless steel well (order separately) for use from 160 to 300 psi.

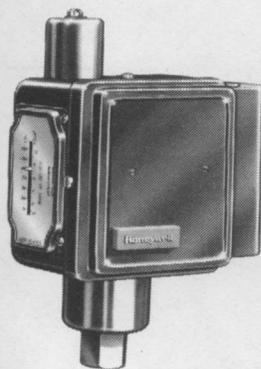
continued next page

L6008H continued

IMMERSION WELLS (for use with the L6008H)—insertion length; 3-3/8 in. [85.7 mm]:

Part No.	Thread Size (NPT)	Material	Insulation Length	
			in.	mm
12137A	1/2	Copper 0-160 psi [0-11.2 kg/cm ²]	1-1/2	38.1
12137L			3	76.2
12137B			1-1/2	38.1
12137M				76.2
12137E	1/2	Stainless Steel 160-300 psi [11.2-21.1 kg/cm ²]	1-1/2	38.1
12137F	3/4			

Order Number	Application	Range F [C]	Insertion	Miscellaneous
L6008H1007	Low Fire Hold	150-200 [65.6-93.3]	Remote Bulb	Well must be ordered separately. Order copper well for applications below 160 psi [11.2 kg/cm ²]. For 160-300 psi [11.2-21.1 kg/cm ²] application, order stainless steel well.



P455A Pressuretrol Operating Controller

Provides both on-off and modulating control of steam boilers.

The modulating portion of the controller operates the burner over 85% of the on-off differential. The on-off portion of the controller shuts the burner off when pressures rise to main scale set point. Common bellows assembly actuates spst snap switch (on-off operation) and wiper of the 135 ohm potentiometer (modulating operation). Switch Action: Breaks on pressure rise. Max. Ambient Temp: 125 F [52 C]. Listed by Underwriters Laboratories Inc., File No. E4436, Guide No. XAPX; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide Nos. 380-W-1.16, 400-E-O.

ELECTRICAL RATINGS (50/60 Hz):

On-Off Snap Switch	Modulating Potentiometer		
	Load	120 Vac	240 Vac
Full Load	8.0 A	5.1 A	24 V, 3-wire (series 90) circuits only.
Locked Rotor	48.0 A	30.6 A	

REPLACEMENT PART:

127120A Potentiometer—all ranges.

ACCESSORIES:

33312B Knurled Adjustment Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.

14026 Siphon Loop.

MOUNTING MEANS AND DIMENSIONS:

Range		Mounting Means	Height		Dimensions			
psi	kPa		in.	mm	Width		Depth	
					in.	mm	in.	mm
0 to 15	0 to 103	Male pipe fitting, 1/4—18 NPT	6-7/8	174.6	5-1/16	128.6	2-1/2	63.5
5 to 150	34 to 1034	Female pipe fitting, 1/4—18 NPT	8-1/16	204.8				
10 to 300	7 to 2068	Female pipe fitting, 1/4—18 NPT	8-5/8	219.1				

Order Number	Range		On-Off Differential (adjustable)		Maximum Surge Pressure		Throttling Throttling Range	
	psi	kPa	psi	kPa	psi	kPa	psi	kPa
P455A1006	0 to 15	0 to 103	0.5 to 5.5	3.4 to 38.0	20	138	0.4 to 4.0	2.8 to 27.0
P455A1022	5 to 150	34 to 1034	5.0 to 20.0	34.0 to 138.0	225	1151	3.5 to 16.0	24.0 to 110.0
P455A1030 ^a	10 to 300	69 to 2068	10.0 to 45.0	69.0 to 310.0	325	2240	9.0 to 40.0	62.0 to 276.0

^aIncludes knurled adjustment knob.

Firing Rate Controls

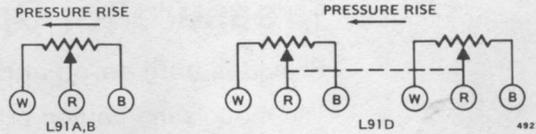


L91A,B,D Proportional Pressuretrol Controller

Modulating pressure-operated high limit control for steam systems.

Also used for pressure regulation of liquid or air and other noncorrosive gases. Should not be used with combustible mediums, or any medium chemically harmful to phos-bronze bellows. Electrical Rating: 24 Vac only. Potentiometer: 135 ohm. Connections: 1/4 in. NPT male fitting for up to 15 psi [103 kPa]; 1/4 in. NPT female fitting for higher ranges. Models with 10 to 300 psi [69 to 2068 kPa] rating include 14026 Siphon Loop. Max. Ambient Temp: 125 F [52 C]. Dimensions: 3-7/8 in. [98.4 mm] high, 5-1/16 in. [128.6 mm] wide, 2-1/2 in. [63.5 mm] deep. Top Housing Dimensions (150 and 300 psi [1034 and 2068 kPa] models only): 1-1/8 in. [28.6 mm] high, 1-1/8 in. [28.6 mm] diameter.

Internal connections.



Order Number	Control Range		Max. Surge Press.		Differential At Midscale			No. Potentiometers	Main Setting Means
	psi	kPa	psi	kPa	psi	kPa	adj.		
L91A1037 ^b	0 to 15	0 to 103	20	138	7 oz.	3	No	1	Screw adj. top of case.
L91A1052 ^c	5 to 150	34 to 1034	225	1151	5 psi	34	No	1	Screw adj. above top housing.
L91A1078	10 to 300	69 to 2068	325	2241	12	83	No	1	Knurled knob above top housing.
L91A1136 ^a									
L91B1019	0 to 1	0 to 7	6	41	2 to 38 oz.	0.9 to 16	Yes	1	
L91B1035 ^b	0 to 15	0 to 103	20	138	1 to 12	7 to 83	Yes	1	Screw adj. top of case; (with mounting lugs on back of case).
L91B1043	2 to 50	14 to 340	85	578	4 to 32	27 to 218	Yes	1	
L91B1050 ^c	5 to 150	34 to 1034	225	1151	5 to 23	34 to 159	Yes	1	Screw adj. above top housing.
L91B1068	10 to 300	69 to 2068	325	2241	28 to 110	193 to 758	Yes	1	Knurled knob above top housing.
L91B1241	10 to 300	69 to 2068	325	2241	12 to 48	83 to 331	Yes	1	Screw adj. above top housing.
L91D1015 ^b	0 to 15	0 to 103	20	138	1 to 12	7 to 83	Yes	2 ^d	Screw adj. top of case.
L91D1031 ^c	5 to 150	34 to 1034	225	1151	11 to 52	76 to 359	Yes	2 ^d	Screw adj. above top housing.
L91D1049 ^c	10 to 300	69 to 2068	325	2241	28 to 125	193 to 862	Yes	2 ^d	Knurled knob above top housing.

^aLess siphon loop.

^bPipe connection: 1/4 NPT, male fitting (requires standard pipe coupling to mount on siphon loop).

^cPipe connection: 1/4 NPT, female fitting (can be mounted directly on siphon loop).

^dPotentiometers operate in unison; can be used to control 2 motors in unison.



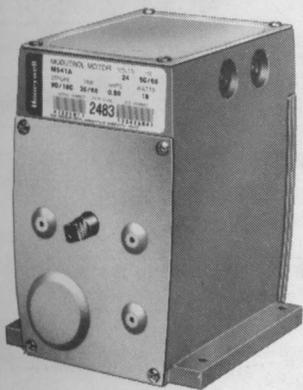
R9107A Balancing Relay

Used on Modutrol motors (without integral balancing relays) that are subject to excessive vibration.

Mounted separately from motor so vibrations will not affect relay. May be mounted vertically or horizontally. Rugged cover protects relay from dirt and physical damage. Switching Action: Spdt. Approx. Dimensions: 6-5/8 in. [168.5 mm] high, 4-7/16 in. [112.7 mm] wide, 3-1/2 in. [88.9 mm] deep.

ELECTRICAL RATING: 1 A at 24 V, 50/60 Hz.

Order Number	Motor
R9107A1000	M941B



M941A,C,D Modutrol Motors

Reversing, proportional motors used to drive burner firing rate valves, dampers, or auxiliary equipment.

Designed for flame safeguard applications in commercial/industrial oil or gas burner systems. With heavy duty, vibration resistant balancing relay. Regulated by 3-wire, proportional controller. Stroke is field adjustable to 90 or 160 degrees. Crankshaft: Double-ended, 3/8 in. [9.5 mm] square. Ambient Temperature Range: Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Dead Weight Load on Shaft: Power End—200 lb. [90.7 kg]; Auxiliary End—100 lb. [45.4 kg]. Dimensions: 7-7/16 in. [188.9 mm] high, 5-5/8 in. [142.9 mm] wide, 7-7/16 in. [189.9 mm] deep. Industrial Risk Insurers (formerly FIA) approvable. Listed by Underwriters Laboratories Inc: M941A,C,D—File No. E4436, Guide No. XAPX; Canadian Standards Association certified: M941C,D—File No. LR1620, Guide No. 400-E-0.

TORQUE:

90 Deg. Stroke	Timing (nominal)		Normal Running Torque		Breakaway Torque ^a	
	160 Deg. Stroke		lb.-in.	N·m	lb.-in.	N·m
15.0 sec	30 sec		75	8.5	150	17.0
30.0, 60.0 sec	60.0, 120.0 sec		150	17.0	300	34.0

^aMaximum torque available to overcome occasional large loads such as a seized damper or valve. MUST NOT BE USED CONTINUOUSLY AT THIS RATING.

ELECTRICAL RATING: 24 V, 50/60 Hz.

POWER CONSUMPTION:

M941A,C,D—21 VA.

AUXILIARY SWITCH RATINGS (A):

M941C—

	120 V Load	240 V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

M941D—

Load	120 V	240 V	277 V
Full Load	5.8	2.9	—
Locked Rotor	34.8	17.4	—
Resistive	11.0	11.0	11.0

continued next page

Firing Rate Controls

M941A,B,C,D continued

ACCESSORIES:

Q100 Linkage—connects Modutrol motor to butterfly valve.

Q601 Valve Linkage—connects Modutrol motor to water or steam valve.

Q605 Damper Linkage—connects motor to damper (includes motor crank arm).

Q607 Auxiliary Switch—controls auxiliary equipment as a function of motor position.

Q618 Valve Linkage—connects Modutrol motor to water or steam valve.

S443A Manual Potentiometer. Includes dpdt toggle switch.

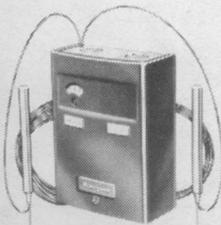
7640JS Weatherproofing Kit.

7616BR Motor Crank Arm.

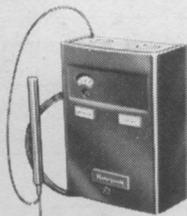
R9107 Balancing Relay (for M941B).

Order Number	Description	Timing ^a	Auxiliary Switch Differential	Additional Features
M941A1008	With heavy-duty, vibration-resistant balancing relay.	15.0 or 30.0 sec	—	—
M941A1016		30.0 or 60.0 sec	—	—
M941A1024		60.0 or 120.0 sec	—	—
M941A1032		30.0 or 60.0 sec	—	Shipped in 90 degree position.
M941A1057		15.0 to 30.0 sec	—	Shipped in 90 degree position.
M941C1006	With 1 cam-adjusted Micro Switch spdt auxiliary switch and heavy-duty, vibration-resistant balancing relay.	15.0 or 30.0 sec	Fixed at 10 angular degrees.	With tapped shaft.
M941C1014		30.0 or 60.0 sec		—
M941C1022		30.0 or 60.0 sec		Shipped in 90 degree position.
M941C1030		30.0 or 60.0 sec		Shipped in 90 degree position, switch set at 4 degrees. Includes motor crank arm.
M941C1063		30.0 or 60.0 sec		Shipped in 90 degree position, switch set at 4 degrees. With tapped shaft.
M941D1005	With 2 cam-adjusted Micro Switch spdt auxiliary switches and heavy-duty, vibration-resistant balancing relay.	30.0 or 60.0 sec	Adjustable.	Shipped in 90 degree position; 1 switch set at 5 degrees and 1 set at 54 degrees of 90 degree stroke.
M941D1021		15.0 or 30.0 sec		With tapped shaft.
M941D1039		30.0 or 60.0 sec		Shipped in 90 degree position; 1 switch set at 5 deg. and 1 set at 54 degrees of 90 degree stroke. With tapped shaft.
M941D1047		30.0 or 60.0 sec		1 switch set at 120 degrees from closed position of 160 degree stroke on opening, 1 set at 35 degrees before closed end of 160 degree stroke.

^aShorter timing applies when 90 degree stroke is selected.



T991E



T991F

T991E,F Proportional Temperature Controllers

Provide both on-off and modulating control of water or air temperatures in ducts, tanks, and similar applications.

Micro Switch end switch cycles burner on and off at low fire; T991 then modulates burner as required. Designed for use with V9055; can be used with any series 90 motor. Ambient compensated. Set point adjustment on front of case. Potentiometer: 135 ohm. Electrical Rating: 24 Vac only. Throttling Range: Fixed at 11 F [6 C]. End Switch Differential: 4 F [2 C] maximum. Switch makes 1 F [0.6 C] above end of throttling range. Bulb Pressure Rating: 50 psi [345 kPa] max. for direct immersion. Capillary Material: Copper. Controller Max. Operating Ambient Temp: 125 F [52 C]. For other temp. ratings, see ordering table. Bulb Size: 4-1/2 in. [114.3 mm] long, 1/2 in. [12.7 mm] diameter. Mounting Means: 3 holes in back of case. Approx. Dimensions: 5-7/8 in. [149.2 mm] high, 4-1/8 in. [104.8 mm] wide,

continued next page

T991E,F continued

2-3/16 in. [55.6 mm] deep. Listed by Underwriters Laboratories Inc., File No. E4436, Guide No. XAPX; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 400-E-0.

END SWITCH ELECTRICAL RATINGS (A):

Load	120 Vac	240 Vac
Locked Rotor	15.6 A	7.8 A
Full Load	2.6 A	1.3 A

ACCESSORIES:

Separable Immersion Wells—to be screwed into tank or boiler: 112622AA—1/2 in. NPT or 112630AA—3/4 in. NPT.

7617ABY Pressure Fitting—1/2 in. NPT, rated at 50 psi water or 15 psi air pressure.

105900 T-Strap—for strapping bulb to pipe.

107324A Bulb Holder—for mounting bulb in duct.

34886A Outdoor Bulb Shield—to protect outdoor bulb mounting.

801534 Calibration Wrench.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Temp. Setting Range		Capillary Length		Max. Element Temp.	
	F	C	ft	m	F	C
T991E1018 ^a	160 to 260	71 to 127	5	1.5	280	138
T991E1034	55 to 175	13 to 79	5	65	200	93
T991F1009 ^b	70 to 140 ^c	21 to 60 ^c	10 indoor; 30 outdoor	3 indoor; 9.1 outdoor	Indoor element temp. plus outdoor element temp. must not exceed 265.	Indoor element temp. plus outdoor element temp. must not exceed 129.

^aWith factory-installed stop at 240 F [116 C].

^bDual bulb model. Resets temp. control point according to change in outdoor air temp. Reset ratio: 1 to 1.

^cIndoor set point.

The Firing Line

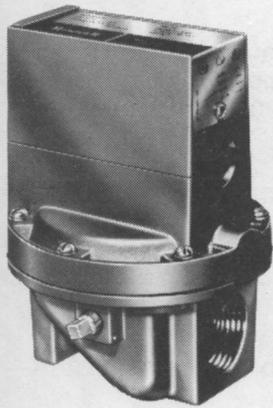
HONEYWELL'S FLAME SAFEGUARD TRADE REFERENCE HANDBOOK . . . AND YOUR BIGGEST SALES OPPORTUNITY IN THE FLAME SAFEGUARD MARKET!



New safety codes and changing Flame Safeguard technology have made modernization the newest concept in marketing Flame Safeguard controls! The FIRING LINE contains special survey guides, work sheets, and proposal forms which help you evaluate and quote on modernizing Flame Safeguard Systems!

See pages 84 and 85 for a description and order form.





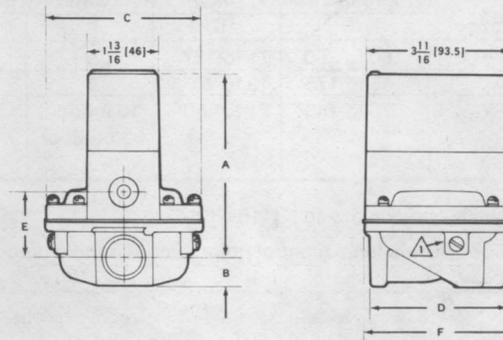
V48A,F,J; V88A,J Diaphragm Gas Valves

Solenoid-operated diaphragm valves for controlling fuel gases.

Used for LP, natural, or manufactured gases. Cast aluminum valves. Close on power failure. Recommended for final shutoff service. Valve Pattern: Straight-through. Bleed Tapping: 1/8 in.-27 NPT. Valve Closing Time: 2 seconds max. at 2 oz [0.86 kPa] pressure. Valve Opening Time: 5 seconds max. at 2 oz. [0.86 kPa] pressure. Power Consumption: 8 W, 14 VA max. Ambient Temperature Rating: 32 F to 125 F [0 C to 52 C]. Listed by Underwriters Laboratories Inc., File No. MH1639, Guide No. YIOZ; Industrial Risk Insurers (formerly FIA) approvable (60 Hz models); American Gas Association design certified, Report No. 21-7B (except 50 Hz models); Canadian Gas Association certified (60 Hz applications only).

V48, V88 dimensions.

VALVE SIZE	A		B		C		D		E		F	
	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
3/4	4-11/16	119	3/4	19.0	4-1/16	103.0	3-1/2	89.0	1-5/8	41.5	3-13/16	97.0
1	5- 1/8	130	1	25.5	4-1/2	114.5	3-1/2	89.0	2	51.0	4- 1/4	108.0
1-1/4	5- 5/16	135	1- 3/16	30.0	5-1/2	139.5	4-5/8	117.0	2-1/4	57.0	5- 5/16	135.0
1-1/2	5- 5/16	135	1- 1/4	32.0	5-1/2	139.5	5-5/16	135.0	2-1/2	63.5	5- 5/16	135.0
2	6- 5/8	168	1-15/16	49.0	9	228.5	8-3/8	212.5	3-5/16	84.0	9	228.5
2-1/2	6- 5/8	168	1-15/16	49.0	9	228.5	8-3/8	212.5	3-5/16	84.0	9	228.5
3	6-15/16	176	2- 1/4	57.0	9	228.5	8-3/8	212.5	3-5/8	92.0	9	228.5



▲ PILOT TAPPING (2). 1/8-27 NPT FOR 3/4 IN. THROUGH 1-1/2 IN. SIZES,
1/4-18 NPT FOR 2, 2-1/2, AND 3 IN. SIZES.

2223B

REPLACEMENT COILS FOR CURRENT SOLENOID-OPERATED VALVES^a:

- 116931—120 V, 60 Hz, V48A
- 116932—220 V, 50 Hz, V48A
- 116950—240 V, 50 Hz, V48A
- 116932—240 V, 60 Hz, V48A
- 137700—120 V, 60 Hz, V48F
- 139937—120 V, 60 Hz, V48J
- 116949— 24 V, 50 Hz, V88A
- 116930— 24 V, 60 Hz, V88A
- 118888— 24 V, 60 Hz, V88J

^aThe new V48/V88 bonnet assemblies and solenoid operators are NOT compatible with old style valve bodies.

ACCESSORIES:

- AT72D Transformer—(40 VA) for all V88 models.
- 126590 Adjustable Bleed Valve Assembly.
- Fixed bleed orifice. Required for field mounting—with 126070 Orifice Tool.
- 122161 Orifice—0.006 in. [0.15 mm] dia.
- 124927 Orifice—0.008 in. [0.20 mm] dia.
- 124674 Orifice—0.011 in. [0.28 mm] dia.
- 122160 Orifice—0.018 in. [0.46 mm] dia.

continued next page

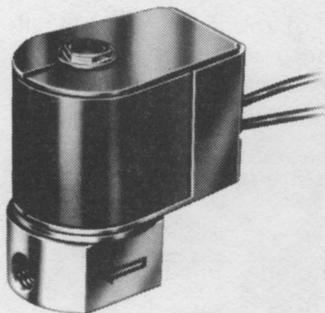
V48A,F,J; V88A,J continued

Order Number	Size (in.)	Capacity ^a		Voltage (50/60 Hz)	Maximum Sustained Pressure				
		cfh	M ³ /hr		psi	kPa			
V48A2151	3/4	668	18.9	120 V	1/2	3/4			
V48A2169	1	1021	28.9						
V48A2177	1-1/4	2100	59.5						
V48A2185	1-1/2	2400	67.9						
V48A2227 ^b	1-1/4	2100	59.5	120 V	1	6.9			
V48A2243	2	4178	118.3						
V48A2250	2-1/2	5100	144.4						
V48A2268	3	5562	157.5						
V48A2276	1-1/2	2400	67.9						
V48A2334	1	1021	28.9						
V48A2342	1-1/4	2100	59.5						
V48F1103 ^b	2	4178	118.3						
V48J1005 ^c	3/4	668	18.9				120 V	6	34.5
V48J1013 ^c	1	1021	28.9				120 V	1	6.9
V48J1021 ^c	1-1/4	2100	59.5	120 V	1	6.9			
V48J1039 ^c	1-1/2	2400	67.9	120 V	1	6.9			
V48J1047 ^c	2	4178	118.3	120 V	1	6.9			
V88A1618	1	1021	28.9	24 V	1/2	3.4			
V88A1626	1-1/4	2100	59.5						
V88A1634	1-1/2	2400	67.9						
V88A1659	3/4	668	18.9						
V88A1667	3/4	668	18.9	24 V	1	6.9			
V88A1675	1	1021	28.9						
V88A1683	1-1/4	2100	59.5						
V88A1691	1-1/2	2400	67.9						
V88A1709	2	4178	118.3						
V88A1717	2-1/2	5100	144.4						
V88A1725	3	5562	157.5						
V88J1006 ^c	1	1021	28.9				24 V	1	6.9
V88J1022 ^c	1-1/4	2100	59.5				24 V	1	6.9

^aCfh. nat. gas 1000 Btu/cu ft, 0.64 sp gr, p.d. 1 in. wc [m³/hr nat. gas 37.3 MJ/m³, 0.64 sp gr, p.d. 0.25 kPa].

^bIncludes position indicator.

^cAmbient temperature rating of 150 F.



V4046C, V8046C Pilot Gas Valves

Provide on-off control of manufactured, LP, and natural gases to pilot burners in industrial and commercial applications.

Magnetically operated, normally closed. Instantaneous action when energized. One second maximum closing time when deenergized. Powerhead assembly can be rotated 360 angular degrees. Solenoid coil is field replaceable without removing valve body from piping. Valve Pattern: Straight-through Power Consumption: 8 W maximum at rated voltage (14 VA). Ambient Temperature Range: Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Maximum Operating Pressure: 10 psi [68.9 kPa]. Mounting Means: Directly in pipe line or on support bracket. Approximate Dimensions: 3-1/4 in. [82.6 mm] high, 2-5/8 in. [66.7 mm] wide overall. Listed by Underwriters Laboratories Inc: V4046C—File No. MH1639, Guide No. YIOZ; Industrial Risk Insurers (formerly FIA) approvable; Factory Mutual approved: V4046C—Report No. 17450; American Gas Association certified, Certified Nos. (F-212.3 and -1.3) .001.

REPLACEMENT PARTS:

Coil assemblies include coil, leadwire, insulator and bobbin.

continued next page

Fuel Valves and Actuators

V4046C, V8046C continued

Coil Assembly for	Part Number
V4046C—120 Vac, 60 Hz	116671A
V4046C—208 Vac, 60 Hz	116782A
V4046C—110 Vac, 50 Hz	116671A
V8046C— 24 Vac, 60 Hz	116668A

Order Number	Voltage ac	Frequency (Hz)	Pipe Size ^a (NPT)	Capacity ^b	
				cfh	m ³ /hr
V4046C1005	120	60	1/8	20	0.57
	110	50			
V4046C1021	120	60	1/4		
	110	50			
V4046C1047	120	60	1/4	55	1.56
	110	50			
V4046C1054	120	60	3/8	67	1.90
	110	50			
V4046C1088	208	60	3/8	67	1.90
V8046C1006	24	60	1/8	20	.57
V8046C1014	24	60	1/4	20	0.57
V8046C1022	24	60	1/4	55	1.56
V8046C1030	24	60	3/8	67	1.90

^aFemale inlet and outlet.

^bCfh. nat. gas 1000 Btu/cu ft 0.64 sp gr at 1 in. p.d. [m³/hr. nat. gas 37.3 MJ/m³, 0.64 sp gr at 0.25 kPa p.d.].

V5055 Industrial Gas Valves with V4055, V4062, or V9055 Fluid Power Actuators Quick Selection Chart

The chart on the following page describes every model of V5055 Valve in the left column, and every model of Fluid Power Actuator across the top. While it's possible to combine any valve with any actuator, we've marked with a ● the valve/actuator combinations which cover most applications.

Each V5055 Industrial Gas Valve described in the left column is available—

- in these sizes: 3/4 to 3 in. (NPT or parallel BSP). V5055A,B,C are also available in 4 in. size (flange connection only).
- with upstream and/or downstream tap.

Options available on many Fluid Power Actuators include—

- Damper arm shaft, with or without spring return.
- NEMA 4 enclosure.
- Fast or slow open time (13 or 26 sec).
- Auxiliary switch.
- Valve seal overtravel interlock switch.

Refer to the pages listed for complete specifications and ordering information on these valves and fluid power actuators.

continued next page

Fuel Valves and Actuators

V5055 continued

Actuator V5055 Valves (page 36)	V4055A On-Off Lo Press. (page 39)	V4055B On-Off Hi Press. (page 39)	V4055D On-Off Lo Press. Valve Seal Over- Travel Inter- Lock (page 39)	V4055E On-Off Hi Press. Valve Seal Over- Travel Inter- Lock (page 39)	V4062A Hi-Lo-Off Lo Press. (page 41)	V4062D Modu- Lo Press. Valve Seal Over- Travel Inter- Lock (page 41)	V9055A Modu- Lating Lo Press. (page 43)	V9055D Modu- lating Lo Press. Valve Seal Over- Travel Inter- Lock (page 43)
V5055A On-Off Lo Pressure	•	• ^b						
V5055B Lo Pressure Characterized Guide ^a	•	• ^b			•		•	
V5055C Lo Pressure Double Seat (Use with actuators having valve seal over- travel interlock)			•	• ^b		•		•
V5055D On-Off Hi Pressure	• ^b	•						
V5055E Hi Pressure Double Seat (Use with actuators having valve seal over- travel interlock)			• ^b	•		• ^b		• ^b

^aProvides a predictable relationship between stem travel and gas flow.

^bSee next page for higher opening and close-off ratings for these combinations.

VALVE-ACTUATOR APPROVALS

The following combinations of V5055 Valves, and V4055, V4062, and V9055 Fluid Power Actuators are approved by these agencies.

INDUSTRIAL RISK INSURERS (FORMERLY FIA) APPROVABLE AND UNDERWRITERS LABORATORIES INC. LISTED—

- V4055A/V5055A-E, 3/4-4 in.
- V4055B/V5055A-E, 3/4-4 in.
- V4055D/V5055A-E, 3/4-4 in.
- V4055E/V5055A-E, 3/4-4 in.
- V4062/V5055B,C,E, 3/4-4 in.
- V9055/V5055A,B,C,E, 3/4-4 in.

continued next page

Fuel Valves and Actuators

V5055 continued

FACTORY MUTUAL APPROVED and AMERICAN GAS ASSOCIATION CERTIFIED—

V4055A/V5055A
 V4055D/V5055C
 V4055A/V5055B
 V4055B/V5055D
 V4055E/V5055E
 V4064/V5055B,C
 V9055/V5055B,C

CANADIAN GAS ASSOCIATION CERTIFIED—

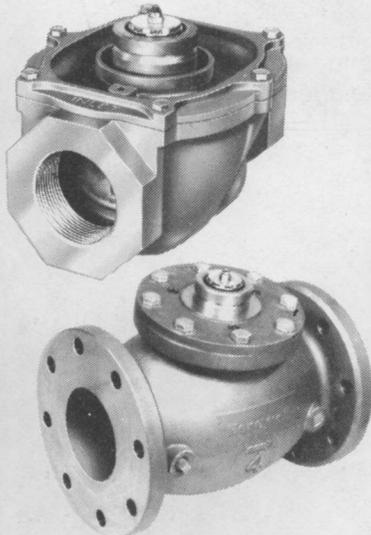
V4055A,B,D,E/V5055A,B,C,D,E (sizes 3/4 x 3/4 through 4 x 4 in.)
 V4062/V5055B (sizes 3/4 x 3/4 through 4 x 4 in.)
 V9055/V5055B (sizes 3/4 x 3/4 through 4 x 4 in.)

VALVE-ACTUATOR PRESSURE RATINGS

Maximum operating pressure differential (diff.).

Maximum close-off pressure without seat leakage (close-off).

Valve	Actuator			
	V4055A,D	V4055B,E	V4062A, V9055A	V4064D, V9055D (Use with V5055C,E)
V5055A,C 3/4-3 in.	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	15 psi [105 kPa] diff.; 15 psi [105 kPa] close-off	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off
V5055A,C 4 in.	3 psi [21 kPa] diff.; 15 psi [105 kPa] close-off	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	3 psi [21 kPa] diff.; 15 psi [105 kPa] close-off	3 psi [21 kPa] diff.; 15 psi [105 kPa] close-off
V5055B 3/4-3 in.	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	15 psi [105 kPa] diff.; 15 psi [105 kPa] close-off	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	—
V5055B 4 in.	3 psi [21 kPa] diff.; 15 psi [105 kPa] close-off	5 psi [35 kPa] diff.; 15 psi [105 kPa] close-off	3 psi [21 kPa] diff.; 15 psi [105 kPa] close-off	—
V5055D,E 3/4, 1, 1-1/4, 1-1/2 in.	5 psi [35 kPa] diff.; 75 psi [525 kPa] close-off	25 psi [175 kPa] diff.; 75 psi [525 kPa] close-off	5 psi [35 kPa] diff.; 75 psi [525 kPa] close-off	5 psi [35 kPa] diff.; 75 psi [525 kPa] close-off
V5055D,E 2, 2-1/2, 3 in.	5 psi [35 kPa] diff.; 45 psi [315 kPa] close-off	15 psi [105 kPa] diff.; 45 psi [315 kPa] close-off	5 psi [35 kPa] diff.; 45 psi [315 kPa] close-off	5 psi [35 kPa] diff.; 45 psi [315 kPa] close-off



V5055A-E Industrial Gas Valves

Safety shutoff valves used with V4055, V4062, and V9055 fluid power actuators to control gas flow to commercial and industrial burners.

Used with natural, mixed, manufactured, or LP gases. Refer to ordering table for application, valve size, and other specifications. Mounting Means: Directly in gas supply line. 1/4 in. NPT upstream tap and plug is standard on all V5055 valves; 4-in. models have flanged connections only. Ambient Temperature Rating: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. (When used with V9055 Actuator, amb. temp. rating is minus 40 F to plus 125 F [minus 40 C plus 52 C].) Pressure ratings and approvals for these valves depend on the actuator used. Refer to VALVE-ACTUATOR APPROVALS and PRESSURE RATINGS above.

VALVE CAPACITIES: Based on gas with 1000 Btu/cu ft, 0.64 at one in. wc p.d. [37.3 MJ/m³, 0.64 sp gr at 0.25 kPa p.d.].

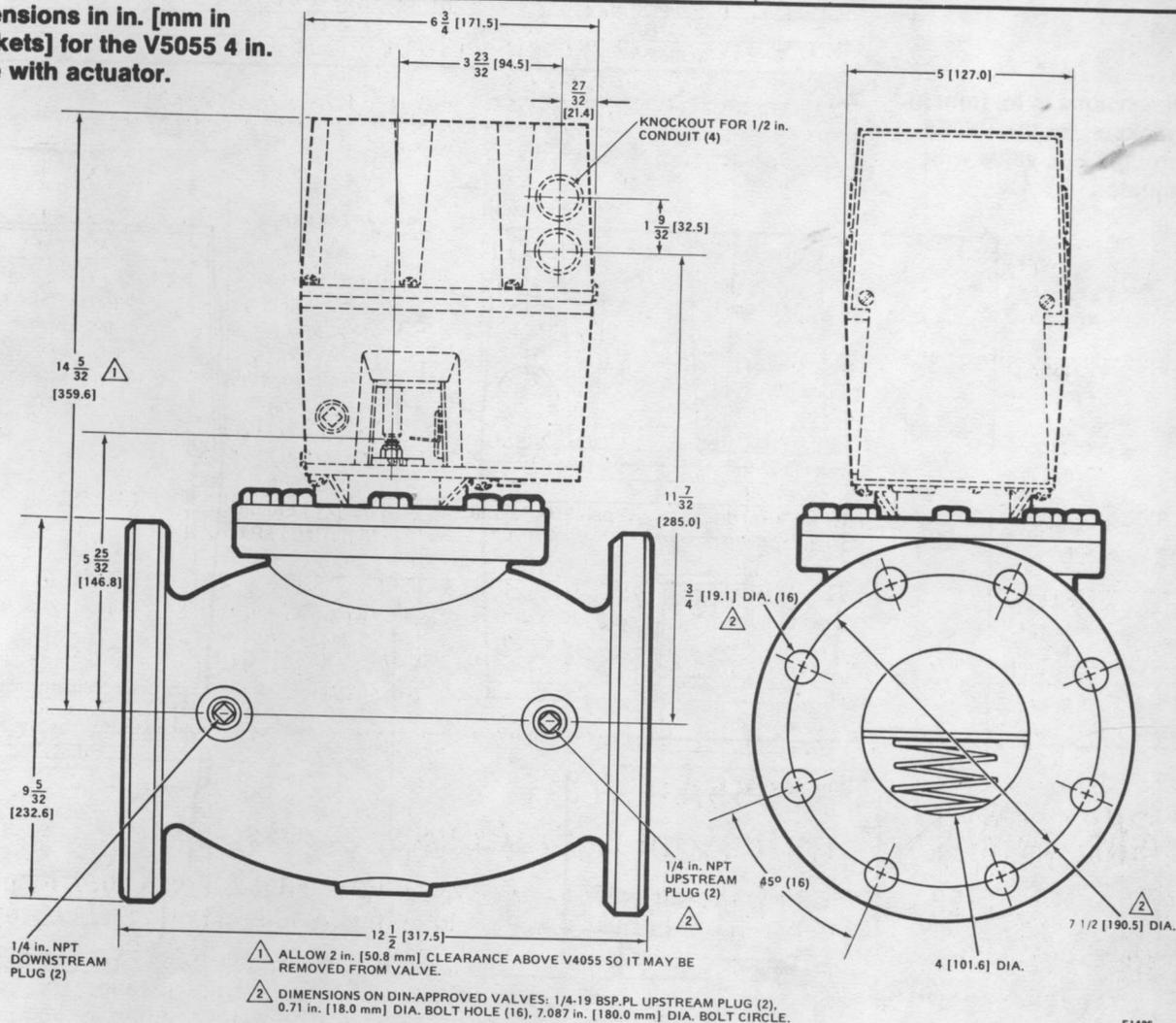
continued next page

Fuel Valves and Actuators

V5055A-E continued

Valve Size (in.)	American Gas Association Rated Capacity	
	cfh	m ³ /hr
3/4	665	18.8
1	960	27.2
1-1/4	1406	39.8
1-1/2	1717	48.6
2	3620	102.5
2-1/2	4250	120.3
3	5230	148.0
4 (V4055A)	10200	288.8
4 (V4055B,C)	9180	259.9

Dimensions in in. [mm in brackets] for the V5055 4 in. valve with actuator.



REPLACEMENT PARTS:

Replacement Seal Assembly—includes valve seal, bonnet seal, and tube of lubricant.

133393A for 3/4, 1, 1-1/4, and 1-1/2 in. valves.

133392A for 2, 2-1/2, and 3 in. valves.

137253A for 4 in. valves.

Replacement Bonnet Assembly—includes complete bonnet assembly, plus the required replacement seal assembly.

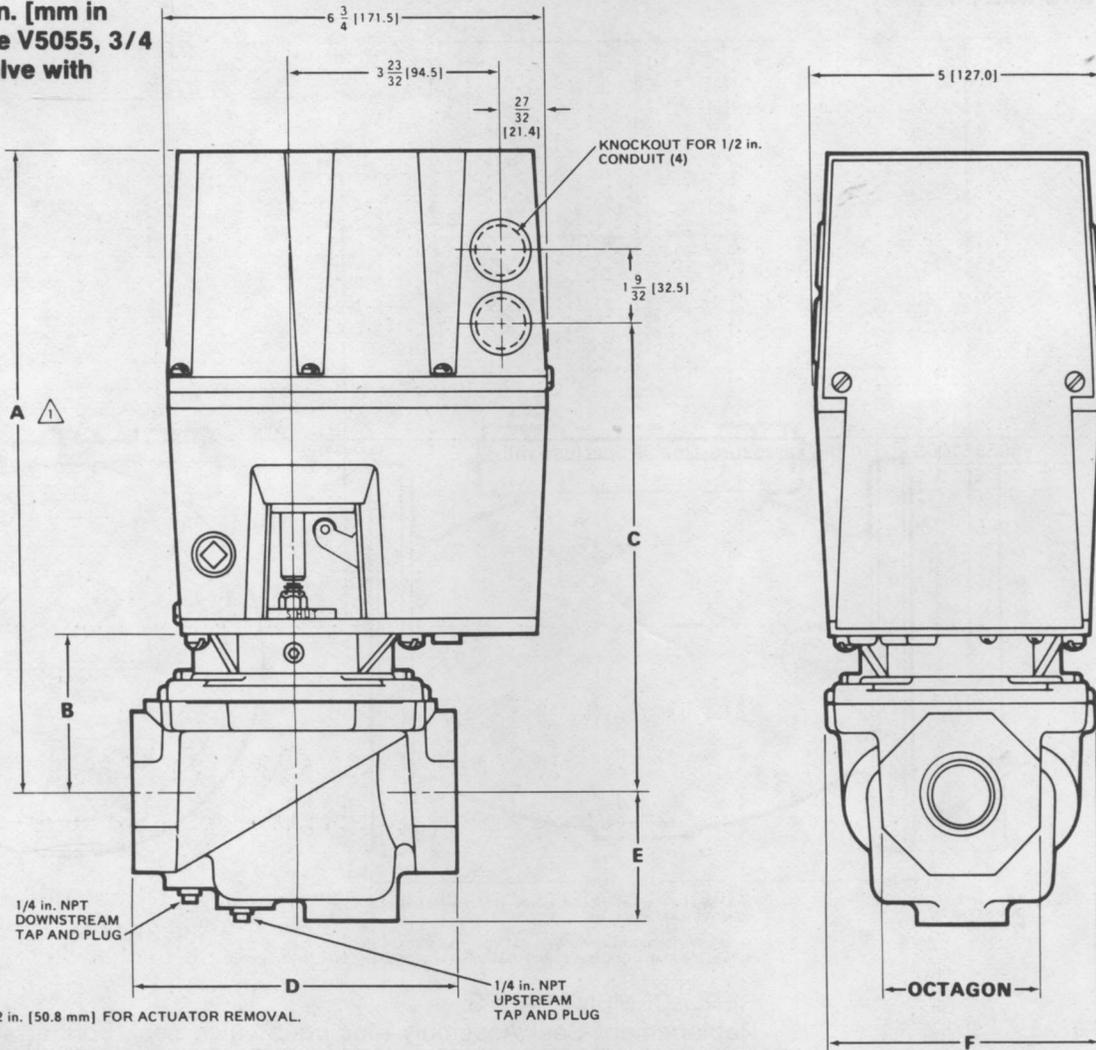
continued next page

Fuel Valves and Actuators

V5055A-E continued

Replacement Bonnet Assembly	Valve	Valve Size (in.)
133398AA	V5055A	3/4, 1, 1-1/4, 1-1/2
133417AA		2, 2-1/2, 3
136911AA		4
133398BA	V5055B	3/4, 1, 1-1/4, 1-1/2
133417BA		2, 2-1/2, 3
136911BA		4
133964AA	V5055C	2, 2-1/2, 3
137338AA		3/4, 1, 1-1/4, 1-1/2
136911CA		4
136307AA	V5055D	2, 2-1/2, 3
136308AA		3/4, 1, 1-1/4, 1-1/2
136307BA	V5055E	2, 2-1/2, 3
136308BA		3/4, 1, 1-1/4, 1-1/2

Dimensions in in. [mm in brackets] for the V5055, 3/4 through 3 in. valve with actuator.



VALVE SIZE	DIM. A		DIM. B		DIM. C		DIM. D		DIM. E		DIM. F		OCTAGON	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
3/4 in.	11-1/8	282.6	2-3/4	69.9	8-3/16	208.0	5-3/4	146.1	2-1/4	57.2	4-15/16	125.4	2-13/16	71.4
1 in.	11-1/8	282.6	2-3/4	69.9	8-3/16	208.0	5-3/4	146.1	2-1/4	57.2	4-15/16	125.4	2-13/16	71.4
1-1/4 in.	11-1/8	282.6	2-3/4	69.9	8-3/16	208.0	5-3/4	146.1	2-1/4	57.2	4-15/16	125.4	2-13/16	71.4
1-1/2 in.	11-1/8	282.6	2-3/4	69.9	8-3/16	208.0	5-3/4	146.1	2-1/4	57.2	4-15/16	125.4	2-13/16	71.4
2 in.	11-1/4	285.8	2-7/8	73.0	8-5/16	211.1	8-3/8	212.7	2-15/16	74.6	7-19/32	192.9	3-1/2	88.9
2-1/2 in.	11-3/4	298.5	3-3/8	85.7	8-13/16	223.8	9-1/4	235.0	2-3/4	69.9	7-19/32	192.9	4-1/2	114.3
3 in.	11-3/4	298.5	3-3/8	85.7	8-13/16	223.8	9-1/4	235.0	2-3/4	69.9	7-19/32	192.9	4-1/2	114.3

E1425

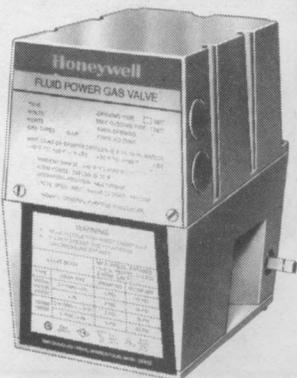
continued next page

V5055A-E continued

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Application ^a	Size (in.)	Remarks	
V5055A1004	Low pressure ON-OFF (with quick opening guide).	1		
V5055A1012		1-1/4		
V5055A1020		1-1/2		
V5055A1038		2		
V5055A1046		2-1/2		
V5055A1053		3		
V5055A1228		4	Flanged connection.	
V5055A1343		3/4		
V5055B1002		Low pressure characterized guide (provides slowly increasing gas flow on opening).	1	
V5055B1010			1-1/4	
V5055B1028	1-1/2			
V5055B1069	2			
V5055B1077	2-1/2			
V5055B1085	3			
V5055B1150	4		Flanged connection.	
V5055B1234	3/4			
V5055C1000	Low pressure. Double seat (use with actuators having valve seal over-travel interlock).	2		
V5055C1018		2-1/2		
V5055C1026		3		
V5055C1034		1		
V5055C1042		1-1/4		
V5055C1059		1-1/2		
V5055C1109		4	Flanged connection.	
V5055C1182		3/4	With 1/8 in. NPT downstream tap with plug.	
V5055D1008	High pressure ON-OFF (with quick opening guide).	1		
V5055D1016		1-1/4		
V5055D1024		1-1/2		
V5055D1032		2		
V5055D1040		2-1/2		
V5055D1057		3		
V5055D1065		3/4	With 1/8 in. NPT downstream tap with plug.	
V5055E1005		High pressure. Double seat (use with actuators having valve seal over-travel interlock).	2	
V5055E1013	2-1/2			
V5055E1021	3			
V5055E1039	1			
V5055E1047	1-1/4			
V5055E1054	1-1/2			
V5055E1062	3/4		With 1/8 in. NPT downstream tap with plug.	

^aSee page 36 for exact pressure ratings.



V4055A,B,D,E On-Off Fluid Power Gas Valve Actuators

Used with V5055 valve to control gas supply to commercial and industrial burners.

Refer to ordering table at end of section for application. Rated for final safety shutoff service when used with V5055 valve. Indicators on valve and actuator provide constant visual indication of valve position. Valve and actuator can be mounted in any position. Actuator mounts directly to valve bonnet with 2 setscrews. Ambient Temperature Rating: Minus 40 F to plus 150 F [minus 40 C to plus 66 C] for 60 Hz models. Closing Time: 1 second maximum. Pressure ratings and approvals for these actuators depend on the valve used. Refer to VALVE-ACTUATOR APPROVALS and PRESSURE RATINGS.

V4055B,E—120 V, 60 Hz.

Opening—60 W, 0.94 A (5.4 A inrush), 115 VA.

Holding—9.5 W, 0.16 A, 19 VA.

continued next page

Fuel Valves and Actuators

V4055A,B,D,E continued

DAMPER ARM RATING (electrically drives damper in 1 direction only):

Standard Models—20 lb. maximum at 2-11/16 in. radius at 20 F to 150 F and 5 lb. at minus 40 F to plus 20 F [9 kg maximum at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

Models With Damper Shaft Return Spring—10 lb. maximum at 2-11/16 in. radius at 20 F to 150 F and 5 lb. at minus 40 F to plus 20 F [4.5 kg at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

MAXIMUM DAMPER SHAFT ROTATION: 52 angular degrees.

AUXILIARY AND VALVE CLOSED (Factory Mutual) SWITCH RATINGS: 1/2 hp^a.

Load	120 V	240 V
Full Load	9.8 A	4.9 A
Locked Rotor	58.8 A	29.4 A

^aMaximum total connected power to both switches (if used) is 1800 VA.

ACCESSORIES:

133568 Auxiliary Switch Bag Assembly.

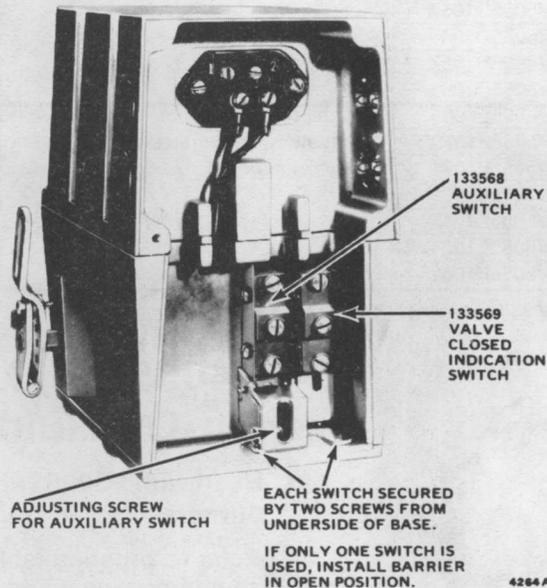
133569 Valve Closed Switch Bag Assembly. (Do not use with V5034 valve body.)

7616BR Damper Arm (damper arm and clip.)

133533A Short Stem Adapter for mounting actuator on V5034 valve with short stem.

133534A Long Stem Adapter for mounting actuator on V5034 valve with long stem.

V4055 Actuator with cover removed.



ELECTRICAL RATINGS:

V4055A,D—

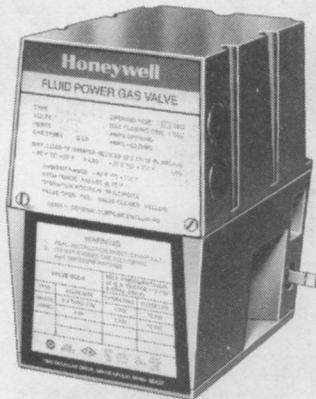
Voltage/ Frequency	Opening (Standard)				Opening (Fast)				Holding		
	Inrush	W	A	VA	Inrush	W	A	VA	W	A	VA
120/60	3.9	50.0	0.94	115	5.4	71.0	1.33	160	9.5	0.12	14
208/60	2.7	54.0	0.59	115	4.0	73.0	0.80	160	9.1	0.07	14
240/60	2.6	51.0	0.45	115	4.0	71.5	0.68	160	9.2	0.06	14

continued next page

V4055A,B,D,E continued

Order Number	Description Application	Voltage (60 Hz) ^a	Opening Time (sec) ^a	Includes	
V4055A1007	ON-OFF actuator. Normally used with V5055A,B valve bodies. Low pressure.	120	26	Damper shaft.	
V4055A1031		120	13		
V4055A1064		120	26		
V4055A1080		240	26		
V4055A1098		120	13		
V4055A1114		240	13		
V4055A1296		120	13		Installed auxiliary switch.
V4055A1304		120	26		Damper shaft and return spring installed.
V4055A1312		120	26		NEMA 4 enclosure.
V4055B1021		ON-OFF actuator. Normally used with 4 in. V5055A,B and all V5055D valve bodies. High pressure.	120		26	Damper shaft.
V4055B1039	120		13		
V4055D1001	ON-OFF actuator includes Factory Mutual "Proof of Closure" and Underwriters Laboratories Inc. "Valve Seal Overtravel Interlock" switch. Meets Factory Mutual and Underwriters Laboratories Inc. requirements when used with V5055C valve bodies. Low pressure.	120	26	Damper shaft.	
V4055D1019		120	13		
V4055D1027		120	13	Installed auxiliary switch and NEMA 4 enclosure.	
V4055D1035		120	13	Installed aux. switch.	
V4055D1043		120	13		
V4055E1016	ON-OFF actuator includes Factory Mutual "Proof of Closure" and Underwriters Laboratories Inc. "Valve Seal Overtravel Interlock" switch. Meets Factory Mutual and Underwriters Laboratories Inc. requirements when used with 4 in. V5055C and all V5055E valve bodies. High pressure.	120	13	Damper shaft.	
V4055E1024		120	26	With damper shaft, installed auxiliary switch. NEMA enclosure.	
V4055E1040		120	13	With damper arm, installed aux. switch, NEMA 4 enclosure.	

^aCan also be used at 50 Hz; however, opening time will increase by 20%.



V4062A,D Off-Lo-Hi Fluid Power Gas Valve Actuators

Control gas supply for commercial and industrial burners. Open valve to low fire position when power is applied; open valve all the way on demand.

Refer to ordering table for application. Rated for final safety shutoff service when used with V5055 valve. Indicators on valve and actuator provide constant visual indication of valve position. When replacing V4034, V6034, or V9034 actuators with a V4062, the V5034 valve body must also be replaced with a V5055 Valve. Valve and actuator can be mounted in any position. Actuator mounts directly to valve bonnet with 2 setscrews. Ambient Temperature Rating: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Normal Opening Time: 26 sec. Closing Time: 1 sec maximum. Low Fire Adjustment: 25 to 50% of full valve capacity. Pressure ratings and approvals for these actuators depend on the valve used. Refer to VALVE-ACTUATOR APPROVALS and to PRESSURE RATINGS, page 36.

continued next page

Fuel Valves and Actuators

V4062A,D continued

ELECTRICAL RATINGS:

Standard Actuators-

Voltage/ Frequency	Opening		Holding	
	W	VA	W	VA
120V/60 Hz	59.5	129.0	19.0	28.0
208V/60 Hz	63.5	129.0	18.2	28.0
240V/60 Hz	60.5	129.0	18.4	28.0

AUXILIARY AND VALVE CLOSED (Factory Mutual) SWITCH RATINGS: 1/2 hp^a

Load	120 V	240 V
Full Load	9.8 A	4.9 A
Locked Rotor	58.8 A	29.4 A

^aMaximum total connected power to both switches (if used) is 1800 VA.

DAMPER ARM RATING (electrically drives damper in 1 direction only):

Standard Models—20 lb. maximum at 2-11/16 in. radius at 20 F to 150 F and 5 lb. at minus 40 F to plus 20 F [9 kg maximum at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

Models with Damper Shaft Return Spring—10 lb. maximum at 2-11/16 in. radius at 20 F to 150 F and 5 lb. at minus 40 F to plus 20 F [4.5 kg at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

MAXIMUM DAMPER SHAFT ROTATION: 52 angular degrees.

ACCESSORIES:

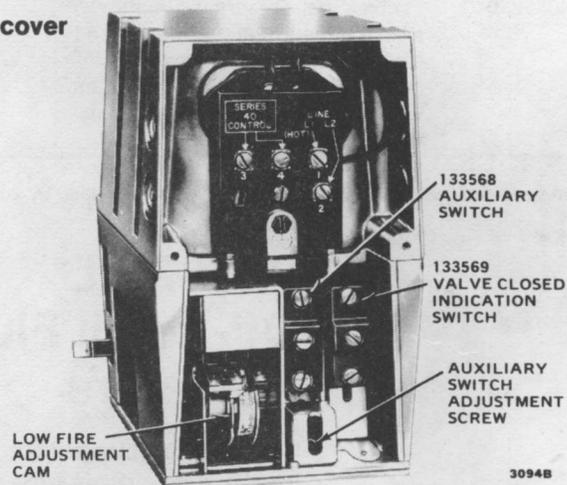
133568 Auxiliary Switch.

7616BR Damper Arm (damper arm and clip).

135796 Wrench (included with actuator).

133569 Valve Closed Indication Switch Bag Assembly—must be used with V5055C or E.

V4062 actuator with cover removed.



Order Number	Application/Description	Voltage (60 Hz) ^b	Includes
V4062A1008	HI-LO-OFF actuator for use with V5055B ^a valve bodies. Low pressure.	120	Damper shaft.
V4062A1123		120	Damper shaft, return spring (installed), and aux. switch calibrated to operate at approx. 90% of stem travel.
V4062A1131		120	13 sec opening time, with damper shaft.
V4062D1002	HI-LO-OFF actuator includes Factory Mutual "Proof of Closure" and Underwriters Laboratories Inc. "Valve Seal Overtravel Interlock" switch. Meets Factory Mutual and Underwriters Laboratories Inc. requirements when used with V5055C valve bodies. Low pressure.	120	Damper shaft.
V4062D1010		120	13 sec opening time, with damper shaft.

^aActuator can be used with all V5055 bodies; but best control and low fire repeatability will result with V5055B, with characterized guide.

^bCan also be used at 50 Hz; however, opening time (26 sec) will increase by 20%.

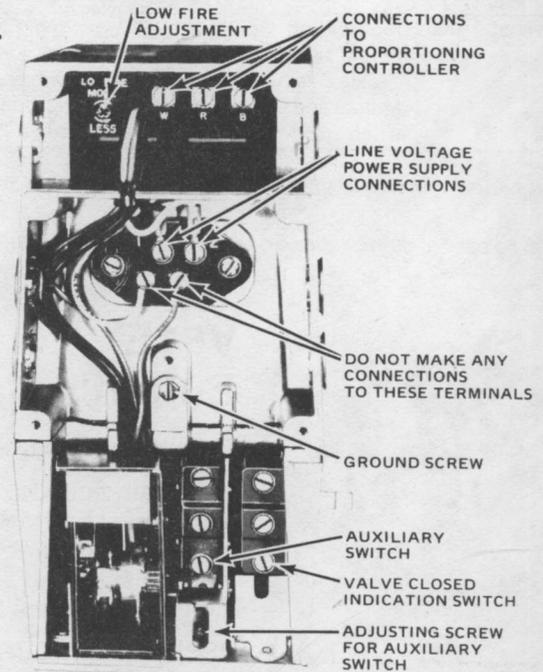


V9055A,D Modulating Fluid Power Gas Valve Actuators

Control gas supply for commercial and industrial burners. Open valve to low fire position when power is applied, then modulate to meet firing rate controller demand.

Refer to ordering table for application. Indicators on valve and actuator provide constant visual indication of valve position. Actuator is equipped with an integral shaft which may be used to drive combustion air damper in unison with valve. When replacing V4034, V6034, or V9034 actuators with a V9055, the V5034 valve body must also be replaced with a V5055 valve. Valve and actuator can be mounted in any position. Actuator mounts directly to valve bonnet with 2 setscrews. Ambient Temperature Rating: Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Normal Opening Time: 26 sec. Closing Time: 1 sec maximum. Low Fire Adjustment: 5 to 50% of actuator stem travel. Pressure ratings and approvals for these actuators depend on the valve used. Refer to VALVE-ACTUATOR APPROVALS and PRESSURE RATINGS, page 36.

Internal components and connections in the V9055.



ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 60 Hz.

Power Consumption—Opening, 60 W, 122 VA; holding, 20 W, 32 VA.

DAMPER ARM RATING (electrically drives damper in 1 direction only):

Standard Models—20 lb. maximum at 2-11/16 in. radius at 20 F to 125 F and 5 lb. at minus 40 F to plus 20 F [9 kg maximum at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

Models with Damper Shaft Return Spring—10 lb. maximum at 2-11/16 in. radius at 20 F to 125 F and 5 lb. at minus 40 F to plus 20 F [4.5 kg at 68 mm radius at minus 7 C to plus 66 C and 2.3 kg at minus 40 C to minus 7 C].

MAXIMUM DAMPER SHAFT ROTATION: 52 angular degrees.

continued next page

Fuel Valves and Actuators

V9055A,D continued

AUXILIARY AND VALVE CLOSED (Factory Mutual) SWITCH RATINGS: 1/2 hp^a.

Load	120 V
Full Load	9.8 A
Locked Rotor	58.8 A

^aMaximum total connected power to both switches (if used) is 1800 VA.

ACCESSORIES:

133568 Auxiliary Switch.

7616BR Damper Arm (damper arm and clip).

135796 Wrench (included with actuator).

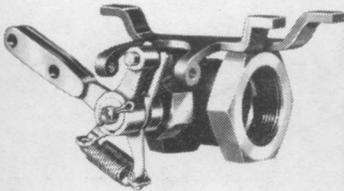
133569 Valve Closed Indication Switch Bag Assembly—must be used with V5055C or E.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Application/Description	Voltage (60 Hz) ^b	Includes
V9055A1055	Modulating-OFF actuator for use with V5055B ^a valve bodies. Low pressure.	120	Damper shaft.
V9055A1063		120	Damper shaft and NEMA 4 enclosure.
V9055A1113		120	Damper shaft, return spring (installed).
V9055D1000	Modulating-OFF actuator includes Factory Mutual "Proof of Closure" and Underwriters Laboratories Inc. "Valve Seal Overtravel interlock" switch. Meets Factory Mutual and Underwriters Laboratories Inc. requirements when used with V5055C valve bodies. Low pressure.	120	Damper shaft.

^aActuator can be used with all V5055 valve models; however, best control and low fire repeatability will result with V5055B, with characterized guide.

^bCan also be used at 50 Hz; however, opening time (26 sec) will increase by 20%.



V51E Butterfly Gas/Air Valve

Provides modulating control of natural, manufactured or LP gas, or air.

Especially suited to commercial and industrial installations where large amounts of gas must be closely controlled. NOT for use as safety shutoff valve. Firing rate motor, such as the M941, may be mounted directly on valve or close to it. Valve mechanism has strain release. Valve Pattern: Straight-through. Maximum Operating Pressure: 5 psi [34.5 kPa].

REPLACEMENT PARTS:

49084-00021 Strain Release Arm.

49090-00020 Yoke Pin—for mounting actuating arm to linkage.

ACCESSORIES:

80897BC Stop Screws for stop bracket (2 required).

122355 Stop Screw Locking Nuts (2 required).

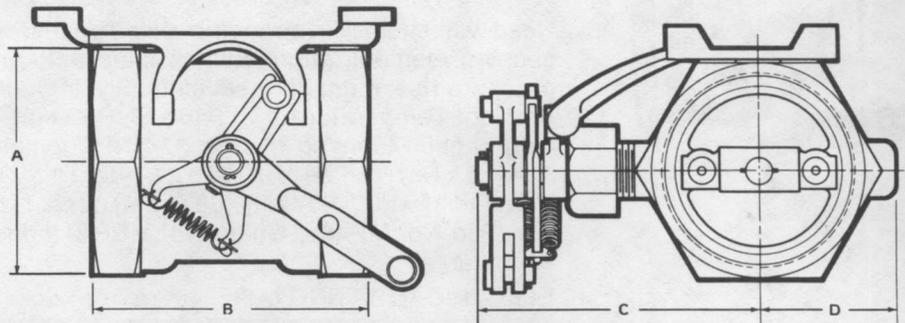
Modutrol motor required for driving valve. See M941, page 29, for ordering information.

Q100B1006 Linkage required for connecting motor and valve.

continued next page

V51E continued

V51E approximate dimensions in in. [mm in brackets].



VALVE SIZE	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
1-1/2	2-11/16	68.3	3- 1/16	77.8	4-7/8	123.8	1-5/8	41.3
2	3- 3/16	81.0	3- 9/16	90.5	4-7/8	123.8	1-7/8	47.6
2-1/2	3- 5/8	92.1	4-11/16	119.1	4-7/8	123.8	2-5/16	58.7
3	4- 1/16	103.2	4- 1/4	108.0	5-3/16	131.8	2-5/8	66.7
4	5- 5/16	134.9	5- 5/16	134.9	5-3/16	131.8	3-1/4	82.6

2895B

Order Number	Pipe Size	Gas Capacity Fully Open ^a		Compatible With
		cfh	m ³ /h	
V51E1000	1-1/2	4,200	118.9	Modutrol motor with Q100B.
V51E1018	2	9,210	260.7	
V51E1034	2-1/2	8,390	199.8	
V51E1059	3	14,640	414.5	
V51E1075	4	33,000	934.2	

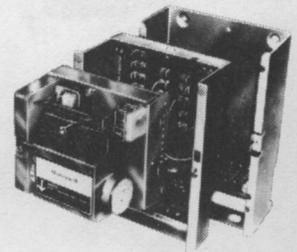
^aBased on gas with 1000 Btu/cu ft, 0.64 sp gr, p.d. 1 in. wc [37.3 MJ/m³, 0.64 sp gr, p.d. 0.25 kPa].

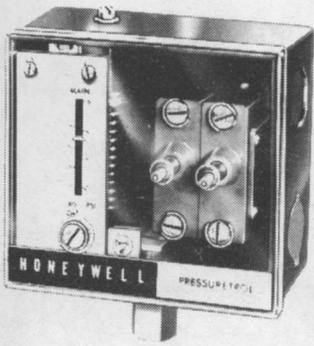
Y593 Replacement Packages

HONEYWELL OFFERS CONTROL PACKAGES LIKE THE Y593 FOR THE MOST UNIVERSAL REPLACEMENT EVER!



Y593 replacement pack contains everything you need to replace most Fireye "P" series programmers, right in the field! Each Y593 pack contains an R4140 Programming Control, a prewired Q520C Adapter Base, a Plug-in Flame Signal Amplifier and accessories and instructions for in-the-field replacement. See pages 59 and 60.





L4079A,B Pressuretrol Limit Controls

High pressure limit switches.

Used with steam, air, noncombustible gases, and fluids not corrosive to pressure sensing element. Micro Switch snap-acting switches open automatically on pressure rise; must be reset manually. Includes 14026 Siphon Loop. Maximum Ambient Temperature: 150 F [66 C]. Pressure Sensing Element: Stainless steel diaphragm. Mounting Means: 1/4 NPT female mounting, or surface mounted. Approximate Dimensions: 5 in. [127 mm] high, 4-1/2 in. [114.3 mm] wide, 3-1/2 in. [88.9 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP466, Guide No. MBPR; Industrial Risk Insurers (formerly FIA) approvable.

ELECTRICAL RATING (A)^a:

Load	120 Vac	240 Vac
Full Load	9.8	4.9
Locked Rotor	58.8	29.4

^aEach circuit.

REPLACEMENT PARTS:

131187 Thermoplastic Cover—L4079A.
131188 Thermoplastic Cover—L4079B.

ACCESSORIES:

33312B Knurled Adjustment Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.
4074BWJ Limit Stop Assembly—to limit set point. Includes 129564 Range Stop, 107194 Range Stop Screw, and 23466 Wrench.

Order Number	Switch Action On Pressure Rise	Operating Range		Max. Surge Pressure	
		psi	kPa	psi	kPa
L4079A1035	Breaks 2 circuits (may be both sides of power supply).	2 to 15	14 to 103	25	172
L4079A1050		10 to 150	69 to 1034	225	1151
L4079B1033	Breaks 1 circuit.	2 to 15	14 to 103	25	172



L404T,V,W,Y Oil Pressuretrol Limit Controls

Oil pressure sensing devices for use on oil burner systems using any type of fuel oil, including heavy preheated oils.

Refer to ordering table for application of models. Pressure Sensing Element: Stainless steel diaphragm. Maximum Oil Temperature: 150 F [66 C] at diaphragm. Siphon loop provides thermal buffer to diaphragm. Mounting Means: 1/4 NPT female or surface mounted. Approximate Case Dimensions: 5-1/2 in. [139.7 mm] high, 4-1/2 in. [114.3 mm] wide, 2-3/4 in. [69.9 mm] deep. Listed by Underwriters Laboratories Inc., File No. MP2168, Guide No. MFHX; Industrial Risk Insurers (formerly FIA) approvable; Factory Mutual approved, Report No. 26036.

ELECTRICAL RATINGS (A):

Load	120 Vac	240 Vac	115 Vdc	230 Vdc
Full Load	8.0	5.1	2.4	1.2
Locked Rotor	48.0	30.6	24.0	12.0
Resistance	10.0	5.0	5.0	2.0

continued next page

L404T,V,W,Y continued

REPLACEMENT PART:
129178 Thermoplastic Cover.

ACCESSORIES:
33312B Knurled Adjustment Knob—with setscrew. Fits head of main adjusting screw to permit adjusting without screwdriver.
14026 Siphon Loop.
4074BWJ Limit Stop Assembly—to limit set point. Includes 129564 Range Stop, 107194 Range Stop Screw, and 23466 Wrench.

Order Number	Application	Mercury Switch Action	Range		Subtractive Differential at Midscale (adjustable)		Reset	Max. Surge Pressure	
			psi	kPa	psi	kPa		psi	kPa
L404T1022	For high pressure safety cutoff.	Makes on fall.	10 to 50	69 to 345	4 to 8	28 to 55	Auto	85	586
L404T1030		Makes on fall.	25 to 150	172 to 1034	4 to 16	28 to 110	Auto	225	1151
L404V1046 ^a	For low pressure interlocks supervising starting and operating pressures of an oil supply line.	Makes on rise.	25 to 150	172 to 1034	8 to 16	55 to 110	Auto	225	1151
L404V1053 ^a		Makes on rise.	10 to 50	69 to 345	4 to 8	28 to 55	Auto	85	586
L404W1037	For high pressure safety cutoff.	Breaks on rise.	25 to 150	172 to 1034	—	—	Manual	225	1151
L404Y1043 ^a	For low pressure interlocks supervising starting and operating pressures of an oil supply line.	Breaks on fall.	25 to 150	172 to 1034	—	—	Manual	225	1151

^aLess 14026 Siphon Loop.



C437D-H,J,K; C637B Gas/Air Pressure Switches

Pressure or differential—pressure limit controls for industrial gas systems.

C437 has spst switching; C637 has spdt switching. Models for lockout application must be manually reset before resuming operation. Models with pressure range of 1 to 26 in. wc [0.25 to 6.5 kPa] have restrictive orifice in inlet pressure channel to compensate for momentary surges in gas pressure. Ambient Temperature Rating: 32 F to 125 F [0 C to 52 C]. Connections: 1/2 in. NPT female for main or high pressure; 1/8 in. NPT female for vent or low pressure. Listed by Underwriters Laboratories Inc., File No. MP2168, Guide No. MFHX; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 380-W-1.16. Factory Mutual approved, Report Nos. 22018, 24127, J.I. IF4A3.AF.

EQUIVALENT SI METRIC UNITS:

Pressure Range	Water	
	mm	kPa
1/2 to 5-1/2 in. water	10.0 to 150.0	0.124 to 1.337
1 to 26 in. water	50.0 to 700.0	0.249 to 6.464
1/2 to 5 psi	351.5 to 3516.0	3.447 to 34.47
1 to 10 psi	703.0 to 7031.0	6.895 to 68.95

continued next page

Limits and Interlocks

C437D-H,J,K; C637B continued

Differential	Water	
	mm	kPa
1-3/4 in. water	44.5	0.44
1/2 psi	351.5	3.447
1 psi	703.0	6.895
0.25 in. water	6.5	0.062
0.15 in. water	3.8	0.037
at	at	at
1/2 in. water	12.7	0.1243

SWITCH RATINGS (A):

Model	Load	120	240	120	240
		Vac	Vac	Vdc	Vdc
C437D,E,G,H	Full load	8.0	5.1	2.4	1.2
	Locked rotor	48.0	30.6	24.0	12.0
	Res. load	10.0	5.0	5.0	2.0
C437F,J,K	Full load	8.0	5.1	2.0	1.0
	Locked rotor	48.0	30.6	20.0	10.0
	Res. load	10.0	5.0	8.0	4.0
C637B	62.5 VA at 120 and 240 Vac, pilot duty	—			

REPLACEMENT PARTS:

- 106729 Cover Glass, 6 in. [152.5 mm] diameter.
- 139870A Cover Glass for rainproof enclosures.
- 106747 Cover Retaining Ring for C437 and C637 models manufactured before 1973.
- 137631 Cover Retaining Ring for C437 and C637 models manufactured in 1973 and 1974.
- 137558 Retaining Clip for Retaining Ring on C437 and C637 models manufactured in 1973 and 1974.
- 118733 Retaining Clip for C437 and C637 models manufactured since 1975.

ACCESSORIES:

- 4074BWK Mounting Brackets, for surface mounting.
- 4074BWN Orifice Tool.
- 122161 Orifice—0.006 in. [0.15 mm] dia.
- 124927 Orifice—0.008 in. [0.20 mm] dia.
- 124674 Orifice—0.011 in. [0.28 mm] dia.
- 122160 Orifice—0.018 in. [0.46 mm] dia.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Pressure Range ^g	Differential ^h	Maximum Surge Pressure		Mercury Switch	Switch Action (Breaks)	Manual Reset (Lockout on switch break)
			psi	kPa			
C437D1005	1 to 26 in. water	1-3/4 in.	5.0	34.5	Spst	Rise	Yes
C437D1013	1/2 to 5 psi	1/2 psi	15.0	103.4	Spst	Rise	Yes
C437D1021	1 to 10 psi	1 psi	30.0	206.8	Spst	Rise	Yes
C437E1004	1 to 26 in. water	1-1/4 in.	5.0	34.5	Spst	Fall	Yes
C437E1012	1/2 to 5 psi	1/4 psi	15.0	103.4	Spst	Fall	Yes
C437E1020	1 to 10 psi	1/2 psi	30.0	206.8	Spst	Fall	Yes
C437E1038	1/2 to 5-1/2 in. water	0.25 in.	3.0	20.7	Spst	Fall	Yes
C437F1003	1 to 26 in. water	1-1/4 in.	5.0	34.5	2 spst ^a	Fall and Rise	No
C437F1011	1/2 to 5 psi	1/4 psi	15.0	103.4	2 spst ^a	Fall and Rise	No
C437F1029	1 to 10 psi	1/2 psi	30.0	206.8	2 spst ^a	Fall and Rise	No
C437F1037	1/2 to 5-1/2 in. water	0.25 in.	3.0	20.7	2 spst ^a	Fall and Rise	No
C437G1002	1 to 26 in. water	1-1/4 in.	5.0	34.5	Spst	Rise	No
C437G1028	1/2 to 5 psi	1/4 psi	15.0	103.4	Spst	Rise	No
C437G1036	1 to 10 psi	1/2 psi	30.0	206.8	Spst	Rise	No

continued next page

C437D-H,J,K; C637B continued

Order Number	Pressure Range ^g	Differential ^h	Maximum Surge Pressure		Mercury Switch	Switch Action (Breaks)	Manual Reset (Lockout on switch break)
			psi	kPa			
C437G1069 ^e	1 to 26 in. water	1-1/4 psi	5.0	34.5	Spst	Rise	No
C437G1077 ^e	1/2 to 5 psi	1/4 psi	15.0	103.4	Spst	Rise	No
C437G1085 ^e	1 to 10 psi	1/2 psi	30.0	206.8	Spst	Rise	No
C437H1001	1 to 26 in. water	1-1/4 in.	5.0	34.5	Spst	Fall	No
C437H1027	1/2 to 5 psi	1/4 psi	15.0	103.4	Spst	Fall	No
C437H1035	1 to 10 psi	1/2 psi	30.0	206.8	Spst	Fall	No
C437H1043	1/2 to 5-1/2 in. water	0.25 in.	3.0	20.7	Spst	Fall	No
C437H1076 ^e	1 to 26 in. water	1-1/4 in.	5.0	34.5	Spst	Fall	No
C437H1084 ^e	1/2 to 5 psi	1/4 psi	15.0	103.4	Spst	Fall	No
C437H1092 ^e	1 to 10 psi	1/2 psi	30.0	206.8	Spst	Fall	No
C437J1008 ^b	1 to 26 in. water	1-3/4 in.	5.0	34.5	2 spst ^a	Fall and Rise	Yes ^c
C437J1016 ^b	1/2 to 5 psi	1/2 psi	15.0	103.4	2 spst ^a	Fall and Rise	Yes ^c
C437K1007 ^b	1 to 26 in. water	1-1/4 in.	5.0	34.5	2 spst ^a	Fall and Rise	Yes ^d
C437K1015 ^b	1/2 to 5 psi	1/4 psi	15.0	103.4	2 spst ^a	Fall and Rise	Yes ^d
C637B1002	1 to 26 in. water	1-1/4 in.	5.0	34.5	Spdt	Fall ^f	No
C637B1010	1 to 10 psi	1/2 psi	30.0	206.8	Spdt	Fall ^f	No
C637B1028	1/2 to 5 psi	1/4 psi	15.0	103.4	Spdt	Fall ^f	No
C637B1036	1/2 to 5-1/2 in. water	0.15 in.	3.0	20.7	Spdt	Fall ^f	No

^aTwo separate circuits. One circuit breaks and the other makes on a pressure rise or fall.

^bDual spst switch (one normally open and one normally closed) with 4 leads serves function of spdt switch.

^cLockout on rise.

^dLockout on fall.

^eWeatherproof enclosure (NEMA 3R).

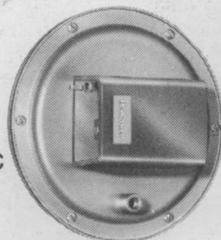
^fBreaks R-W and makes R-B on fall.

^gEquivalent SI metric units are listed on page 47 for each pressure range.

^hDifferential at midscale. Subtractive for C437D,J,G. Additive for C437E,F,H,K and C637B. Equivalent SI metric units are listed on page 47 for each differential in ordering table.



C645A,B
WITH
WINDOW



C645C



C645A,B,D,E

C645A,B Gas/Air Pressure Switches

C645C,D Air Pressure Switches

C645E Distillate Fuel Oil Pressure Switch

Positive- or differential-pressure limit controls.

Spdt diaphragm operated snap-acting Micro Switch. C645E models for use with distillate fuel oil only. Not for use with natural or LP gases. Ambient Temperature Rating: Minus 20 F to plus 125 F [minus 32 C to plus 52 C]. Connections: 1/4 in. NPT female for main or high pressure; 1/8 in. NPT female for venting or low pressure. Listed by Underwriters Laboratories Inc., File No. MP2168, Guide No. MFHX (C645A-E), File No. MP2168, Guide No. MFHX; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report Nos. 19268, 13233-S3.

continued next page

Limits and Interlocks

C645A,B; C645C,D; C645E continued

APPROX. DIMENSIONS:

	Diameter		Depth	
	in.	mm	in.	mm
C645A,B,D,E	4-3/4	120.6	3-1/2	88.9
C645C	7-7/8	200.0	3-1/2	88.9

ELECTRICAL RATINGS (A):^a

Model	Load	120 Vac	240 Vac
C645A,B,D,E	Full Load	7.4	3.7
	Locked Rotor	44.4	22.2
C645C	Full Load	8.0	5.1
	Locked Rotor	48.0	30.6

^a2 A at 30 Vac.

ACCESSORIES:

15865AC Mounting Bracket Assembly—C645A,B,D.

112657A Mounting Bracket Assembly—C645C. (Includes screws for attaching bracket to C645 only.)

137637B Cover with window—C645A.

137637C Cover with window—C645B.

14026 Siphon Loop.

Order Number	Scale Range		Suitable for		Includes	Differential				Switch Action On Press. Fall	Maximum Sustained Pressure	
			Natural or LP Gases ^d	Air		Nominal		Maximum				
	(in. water)	kPa				(in. water)	kPa	(in. water)	kPa		(psi)	kPa
C645A1022 ^a	3.0 to 21.0	0.7 to 5.2	Yes	Yes	Auto. Recycle	1.0	0.2	3.0	0.7	Breaks	5.0	34.5
C645A1030 ^a	3.0 to 21.0	0.7 to 5.2	Yes	Yes	Man. Reset ^b	1.0	0.2	3.0	0.7	Breaks	5.0	34.5
C645A1055 ^a	5.0 to 35.0	1.2 to 8.7	Yes	Yes	Man. Reset ^b	1.0	0.2	4.0	1.0	Breaks	5.0	34.5
C645A1063	5.0 to 35.0	1.2 to 8.7	Yes	Yes	Auto. Recycle	1.0	0.2	4.0	1.0	Breaks	5.0	34.5
C645B1013 ^a	3.0 to 21.0	0.7 to 5.2	Yes	Yes	Man. Reset ^c	1.0	0.2	3.0	0.7	Makes	5.0	34.5
C645B1039 ^a	5.0 to 35.0	1.2 to 8.7	Yes	Yes	Man. Reset ^b	1.0	0.2	4.0	1.0	Makes	5.0	34.5
C645B1047 ^{a,e}	3.0 to 21.0	0.7 to 5.2	Yes	Yes	Man. Reset ^c	1.0	0.2	3.0	0.7	Makes	5.0	34.5
C645C1020 ^a	0.6 to 5.3	0.1 to 1.3	No	Yes	Auto. Recycle	0.2	0.05	0.8	0.2	Breaks	1.5	10.3
C645C1038 ^a	0.6 to 5.3	0.1 to 1.3	No	Yes	Man. Reset ^b	0.2	0.05	0.8	0.2	Breaks	1.5	10.3
C645D1029	3.0 to 21.0	0.7 to 5.0	No	Yes	Auto Recycle	1.0	0.2	2.0	0.5	Breaks	5.0	34.5
C645D1052	2.0 to 20.0	0.5 to 5.0	No	Yes	Auto Recycle	1.0	0.2	3.0	0.7	Breaks	5.0	34.5
C645E1002 ^f	3.0 to 21.0	0.7 to 5.2	No	Yes	Auto Recycle	1.0	0.2	3.0	0.7	Breaks R-W Makes R-B	5.0	34.5

^aIncludes switch position indicator.

^bLocks out when pressure falls to set point minus differential; can be reset manually after pressure rises to set point.

^cLocks out when pressure rises to set point; can be reset manually after pressure falls to set point minus differential.

^dC645A,B also Underwriters Laboratories Inc. approved for distillate fuel oil (No. 1,2 oil) applications. For oil, use 14026 Siphon Loop.

^eWith scaleplate set point stop set at 5-1/4 in. [133.4 mm] wc. Meets A.G.A. high gas pressure switch requirements for burners with inputs greater than 2.5 million Btuh.

^fUsed with distillate fuel oil, cannot be used for natural or LP gases.



C647A Gas/Air Pressure Switch

LP, natural, or manufactured gas pressure limit control.

Breaks circuit on pressure drop and makes at preset low pressure. Refer to ordering table for description and specifications. Connections: 1/2 in. NPT female for main pressure. 1/8 NPT female for safety vent. Factory Mutual approved: C647A—Report No. 13720.

continued next page

C647A continued

ELECTRICAL RATING:

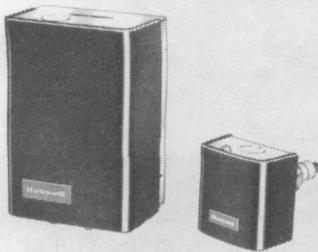
62.5 VA at 120 +240 Vac, pilot duty.

ACCESSORY:

110462-00021 Mounting Bracket—for surface mounting.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Mercury Switch Action	Reset	Pressure Range		Fixed Differential		Maximum Operating Pressure			
			psi	kPa	psi	kPa	Without Failure		Without Loss of Accuracy	
							psi	kPa	psi	kPa
C647A1002	Spdt; on pressure drop, breaks R-W and makes R-B at preset low pressure.	Automatically re-sets on pressure rise.	5 to 30	34.5 to 207.0	1 at 15	7.0 at 103.5	60	413.5	45	310.0
C647A1010			10 to 100	69.0 to 689.5	3 at 50	20.5 at 345.0	200	1379.0	150	1034.0



QW700A,C; RW700A-D Guard Ring Low Water Cutoff

Guard ring probe low water cutoff utilizes an electronic amplifier to detect true water level in boilers.

Unitary and remote models are available to suit most boiler applications. All models are available with response times of less than one or 8 to 10 seconds. Models available with or without a test switch. Manual reset or recycle models are available. Probes are rated for 160 psi hot water or 30 psi steam. Screw terminals and quick-connects for easy wiring. Probes have 3/4 in. NPT external threads. May be mounted vertically or horizontally in steam or hot water boilers. Listed by Underwriters Laboratories Inc., File No. MP466, Guide No. MBPR: Factory Mutual Approved, Report No. J.I.0E2A0.AF; Canadian Standards Association, File No. 1620.

Dimensions	Length		Width		Depth	
	in.	mm	in.	mm	in.	mm
RW700A-D	6-1/8	155.6	4-11/32	110.3	3-3/16	80.8
QW700A,C	2-21/32	67.5	2-21/32	67.5	1-53/64	46.6

Order Number	Unitary Mount	Remote Mount	Pressure Rating	
			Hot Water	Steam
QW700A1008	X		160 psi	30 psi
QW700C1004 ^a		X	160 psi	30 psi

^aIncludes 3 ft of 105 C rated hookup wire attached to probe.

ACCESSORIES:

PROBE EXTENDERS: Extension rods for probe (includes locknut). Available with or without Teflon[®] insulation.

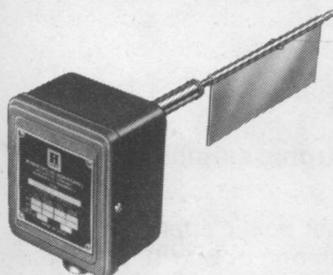
Extension Length	Uninsulated Part No.	Insulated Part No.
6 in. [512.4 mm]	193568	195303A
12 in. [304.8 mm]	193569	195304A
18 in. [457.2 mm]	193570	195305A
24 in. [609.6 mm]	193571	195306A
30 in. [762.0 mm]	193572	195307A
39 in. [914.4 mm]	193583	195308A

continued next page

Limits and Interlocks

QW700A,C; RW700A-D continued

Order Number	Mounting		Reset		Test Switch	Response	
	Remote	Unitary	Auto	Manual		1 sec	10 sec
RW700A1007		X	X			X	
RW700A1023		X	X				X
RW700A1031		X	X		X	X	
RW700A1056		X	X		X		X
RW700A1080		X	X				X Delayed Recycle
RW700B1021		X		X			X
RW700B1039		X		X	X	X	
RW700B1054		X		X	X		X
RW700C1003	X		X			X	
RW700C1029	X		X				X
RW700C1037	X		X		X	X	
RW700C1052	X		X		X		X
RW700D1027	X			X			X
RW700D1035	X			X	X	X	
RW700D1050	X			X	X		X



S43A,B,D Sail Switches

Make electrical circuit on increase in air velocity.

Especially suited for use with gas-fired unit heaters and air conditioning systems. Mount with steel sail in airstream. Spst mercury switch. Maximum Ambient Temperature: 160 F [71 C]. Mounting Means: Holes in rear of case (vertical mounting required). Insertion Length: 10-5/16 in. [261.9 mm]. Conduit Outlet: Bottom of case. Approximate Case Dimensions: 4-1/2 in. [114.3 mm] high, 3-9/16 in. [90.5 mm] wide, 2-1/2 in. [63.5 mm] deep. Listed by Underwriters Laboratories Inc: S43A,B—File No. E4436, Guide No. XAPX. Industrial Risk Insurers (formerly FIA) approvable. Canadian Standards Association certified: S43A,B—File No. LR1620. Factory Mutual approved: S43A1003, B1043—Report No. 19809.

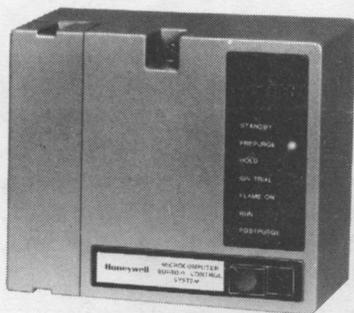
ELECTRICAL RATINGS (A):

Model	Load	120 Vac	240 Vac	115 Vdc	230 Vdc
S43A,B,D	Full Load	2.6	1.3	1.1	0.55
	Locked Rotor	15.6	7.9	11.0	5.6

Order Number	Operating Velocity		Sail Dimensions		Direction of Flow to Actuate ^a
	fpm	m/s	in.	mm	
S43A1037	1000	5.1	4-1/2 x 5	114.3 x 127.0	Left to right.
S43B1035	1000	5.1	4-1/2 x 5	114.3 x 127.0	Right to left.
S43D1007 ^b	1000	5.1	2 x 5-1/2	50.8 x 139.7	

^aAs seen from nameplate.

^bConduit outlet in top of case.



The BC7000 "Blue Chip" is an intelligent microcomputer-based integrated control system designed for automatically fired commercial and industrial single burner applications. The BC7000 System not only provides higher levels of protection, but also reaches far beyond the capability and scope of conventional flame safeguard "programmers" to reduce service, maintenance, downtime, and energy costs.

The BC7000 Blue Chip Microcomputer Burner Control System:

Referred to as the Blue Chip because of its computer "chip" technology and its distinctive blue color, the BC7000 provides a return on investment (ROI/Payback): a real Blue Chip investment! The BC7000 Blue Chip System delivers the following new and significant features in a single integrated burner control system:

Dynamic Self Check Logic—Provides Major Safety Improvement

A major breakthrough in safety through advanced microcomputer technology has allowed the extension of the original Honeywell Dynamic Self Check/Max Safety concept (formerly restricted to the flame detection circuit) to the basic program logic system. Called Dynamic Self Check Logic, it is a comprehensive family of unique safety provisions that continuously monitor the total system performance to provide the highest degree of safety available.

Annunciation and Self-Diagnostics—Cut Service Costs "Plug-Instantly"

Control and burner system startup, troubleshooting, and repair have never been easier, thanks to the BC7000 Microcomputer Burner Control System. Integral First-Out Annunciation and Self-Diagnostic functions reduce service costs and minimize the inconvenience and cost associated with downtime. These important new features are called "Plug-Instant" because they are a standard provision of the BC7000 System—no additional hardware need be purchased, installed, or maintained.

Energy Saving Innovations—Reduce Fuel Consumption

Unnecessary purge-related heat losses are minimized by innovative BC7000 System program logic provisions. Microcomputer intelligence is employed to reduce fuel consumption by optimizing the prepurge and terminating wasteful blower operation when the system encounters an inoperative field interlock. This condition can cause conventional sequencers to permanently stall in an unproductive purge.

Universal System Chassis—Minimizes Inventory Investment

Now, through the flexibility of microcomputer technology, a single control chassis can be universally applied to perform any standard burner program. Solid state program modules plug in to implement the required burner sequence of operation, timings and desired features. The universal BC7000 System chassis allows you to cover the full range of applications, supports standardization, and minimizes inventory investment.

Specify the BC7000 Blue Chip

When ordering a new burner, packaged boiler, or control replacement, specify the new standard in burner and flame safety control performance—the BC7000 "Blue Chip" Microcomputer Burner Control System:

- Enhanced safety improves plant protection
- Energy savings features provide on-going fuel savings and payback
- Plug-Instant annunciation and diagnostics reduce service and downtime costs
- Universal system chassis supports standardization and minimizes inventory investment
- Plug-in program modules and flame amplifiers provide control flexibility and cut maintenance costs

continued next page

Microcomputer Burner Control Systems

BC7000 continued

BC7000 'Blue Chip' Microcomputer Burner Control System

The BC7000 provides flameout protection, automatic sequencing, Dynamic Self-Check Logic, Plug-Instant Annunciation, self diagnostics, and energy conservation for commercial and industrial single burners. Requires a PM720G,L, or M Program Module.

Directly replaces R4150 and R4140 in most applications; mounts directly on the same Q520A subbase. Sequences burner motor, firing rate motor (PM720G and L models only), ignition, pilot valve, and main fuel valve(s). Expanded Safe Start Check. Dynamic Self Check Logic. Plug-Instant Annunciation. Self diagnostics. Energy conservation. Safety shutdown on flame failure (lockout). Ten second pilot flame establishing period. Flame failure response time: 2-4 seconds (see page 76 for plug-in amplifiers). Lockout switch timing: less than 1 second.

*TRADELINE model.

Order Number	Use With
*BC7000L1000	PM720G,L, or M Program Module, R7247, R7248, R7249, R7476 amplifier and matching rectification, infrared, or ultraviolet flame detector. Mounts on Q520A Mounting Subbase.

AMBIENT OPERATING TEMPERATURE RATING:

Wall mounted: 32 F to 130 F [0 C to 55 C].

Horizontal mounting: 32 F to 125 F [0 C to 53 C].

ELECTRICAL RATINGS:

Voltage and Frequency: 120 Vac (plus 10%, minus 15%), 60 Hz. (plus, minus 8%).

Power Consumption (no loads connected): BC7000—25 W maximum.

STORAGE TEMPERATURE RATING: Minus 30 F to plus 150 F [minus 34 C to plus 66 C].

APPROVAL BODIES:

Underwriters Laboratories Inc. listed—Section of Primary Safety Control, File No. MH11790; Guide No. MCCZ (when used with 60 Hz systems only).

Canadian Standards Association certified—LR1620-520.

Factory Mutual approved (when used with PM720L Program Module). Report No. J.I.1F6A1.AF.

Industrial Risk Insurers (formerly F.I.A.) approvable.

ACCESSORIES:

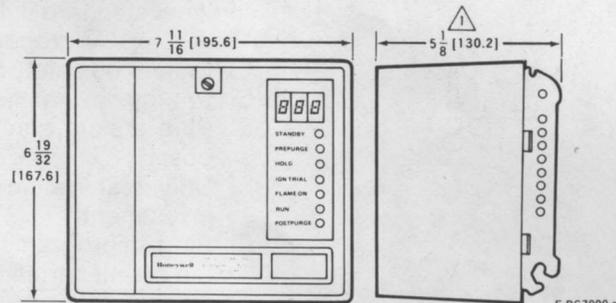
FSP5004 R4150/R4140/BC7000 Tester—provides a quick operational check of BC7000 Microcomputer Burner Control System.

Q520E1002 Service Tool—allows all programmer terminals to be monitored with the programmer operating.

W136A Test Meter (includes 196146 Meter Connector Plug)—has SPL position with damping for testing self checking flame detection systems.

Q624A Solid State Ignition Transformer.

 HEIGHT MOUNTED ON A Q520A SUBBASE IS 5-29/32 [150].



F-BC7000-a

continued next page

BC7000 continued

Order Number	Prepurge Timing (sec)	Power Supply Frequency (Hz)	Early Spark Termination	Flame Establishing Period (sec)		Post-Purge Timing (Sec)	Inter-Lock Circuits	Firing Rate Circuit	Energy Saving Prepurge (ESP)	
				Pilot	Main					
PM720L1030	30	60	Yes	10	10 or 15	15	Preignition, Lockout, Low Fire, High Fire	4-wire modulating	No	
PM720L2012		50							No	
PM720L2004		60	Yes						10	10 or 15	15	Yes
PM720G2005	40	60	Yes	10	10 or 15/30 ^b	15	Preignition, Running Low Fire	4-wire modulating	No	
PM720G2039	40	50	Yes	10					No	
PM720G2013	40	60	Yes	10					10 or Intermittent	No
PM720M2002	30/90 ^a	60	Yes	10	10 or Intermittent	15	Preignition, Running Low Fire	2-wire isolated ON-OFF-ON contacts	No	
PM720M2044	30/90 ^a	50	Yes	10					15	No
PM720M2036	30/7 ^c	60	Yes	10					15	Preignition, Running	None	No
PM720M2051	30/7 ^c	50	Yes	10	15	15	Running	None	No	

^a90 sec; 30 sec if terminal 15 is jumpered to terminal 8.

^b15 sec; 30 sec if terminal 15 is jumpered to terminal 8.

^c30 sec; 7 sec if terminal 15 is jumpered to terminal 8. Replaces PM720M2010.

The Firing Line

HONEYWELL'S FLAME SAFEGUARD TRADE REFERENCE HANDBOOK . . . AND YOUR BIGGEST SALES OPPORTUNITY IN THE FLAME SAFEGUARD MARKET!



New safety codes and changing Flame Safeguard technology have made modernization the newest concept in marketing Flame Safeguard controls! The FIRING LINE contains special survey guides, work sheets, and proposal forms which help you evaluate and quote on modernizing Flame Safeguard Systems!

See pages 84 and 85 for a description and order form.



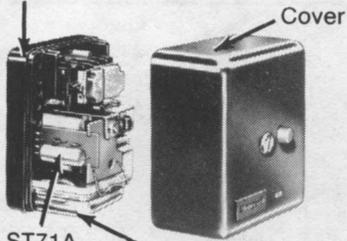
Modernization and Replacement Packages

RA890E/F Modernization Packages (Y4795)

Modernize Honeywell RA890 E/F relays to current UL requirements (also replace/modernize Fireye "M" Series).

Meet requirements for gas burners with 400,000 to 2-1/2 million Btuh [117.2 to 732.8 kW] input. R4795 Primary Controls provide proven prepurge period and either recycle (A model) or cutoff (D model) on flame failure. With 9.8 A contact rating for burner motor for longer life and solid state circuitry for greater dependability. Mount on same Q270A Subbase as RA890, use same flame detector. Plug-in purge timers and flame signal amplifiers are field replaceable to increase flexibility and reduce maintenance costs.

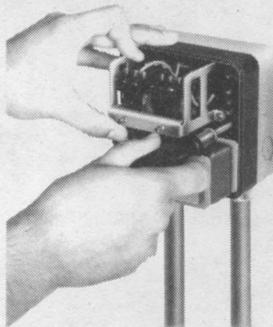
R4795 Primary Control
(R4795 — Recycle)



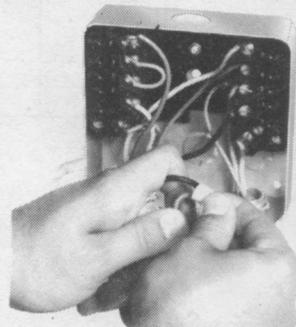
ST71A
Plug-in
Purge
Timer

Plug-in Flame Signal Amplifier
(R7289A — Green — Rectification)

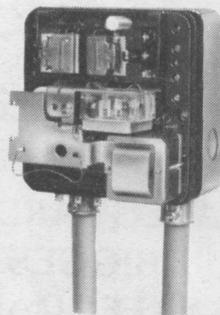
- 1 Disconnect power supply and remove RA890.



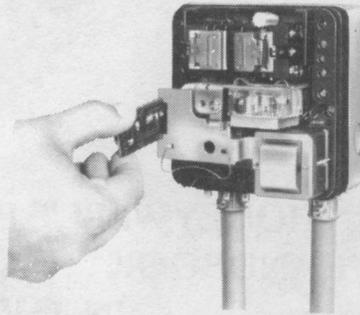
- 2 Make simple wiring change in subbase.



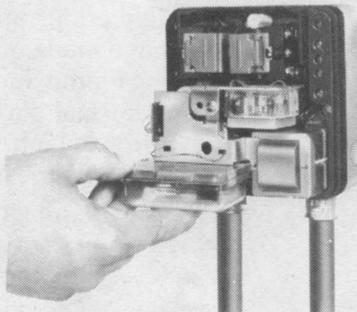
- 3 Install R4795.



- 4 Plug in ST71A purge timer.



- 5 Plug in R7289 amplifier.



continued next page

Modernization and Replacement Packages

RA890E/F continued

BENEFITS

- Flame signal strength (μA) labeled on amplifier to reduce service time.
- All controls in the Y4795 modernization packages are listed by Underwriters Laboratories Inc.
- Y4795 packages are available at reduced prices through TREP and PEP programs. TREP and PEP are special Honeywell exchange programs designed to facilitate sales and availability of flame safeguard controls. PEP (Programmer Exchange Program) allows you a discount for trading in competitive (Fireye, Wheelco, and McGraw Edison) and obsolete Honeywell automatic programmers against the purchase of Y-packs. TREP (Tradeline Replacement Exchange Program) allows you a discount for trading in Honeywell controls against the purchase of Y-packs. Ask your Honeywell Authorized Flame Safeguard Distributor how these plans can save you money.
- Y4795 packages contain only 120 V R4795's as required by Underwriters Laboratories Inc. and all insurance companies. 120 V circuits (2-wire, 1 leg grounded) are safer than other power supplies.
- Solid state amplifiers provide greater reliability and DO NOT require annual replacement like vacuum tubes.
- 3-second flame failure response time for increased safety.
- Plug-in components add versatility and reduce inventory and future replacement costs.

For complete Honeywell and competitive modernization information, refer to the Flame Safeguard System Modernization Survey and Proposal Form, in THE FIRING LINE, Honeywell from 70-8900. For information about THE FIRING LINE see page 84.

Programmer/Relay To Be Replaced/ Modernized	Replacement Programmer	Plug-in Amplifier	Detector	Plug-in ^b Timer (recommended)
RA890E,F	Use R4795A1016 for U.L. approved installations.	R7289A1004	Use existing rectification detector.	ST71A1000 (7-sec delay for oil) ST71A1018 (30-sec purge) ST71A1034 (90-sec purge)
RA890G		R7290A1001	Use existing U.V. detector.	
Fireye TFM Series ^a	Use R4795D1002 for installations to meet insurance code requirements.	R7289A1004	Use existing rectification detector.	
Fireye UVM Series ^a		R7290A1001	Replace Fireye detector with C7027A1080 U.V. detector.	

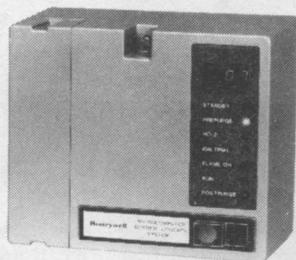
^aWhen replacing Fireye M-Series programmers, a Q270A1024 subbase must be installed in place of the Fireye subbase.

^bMany codes require 4 air changes during purge. Choose the timing needed to accomplish this (typically 30 seconds at high—open damper—fire or 90 seconds at low fire).

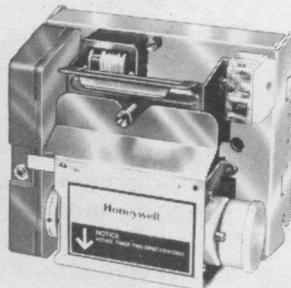
Included (at no additional charge) with the Y4795 package is 4074EAA Bag Assembly containing wire nuts, jumper wires, etc., and Literature Package No. 60-0640 containing code requirement summaries, modernization survey and proposal forms, Y4795 FSG modernization package instructions and wiring diagrams, and preprinted wire markers.

Modernization and Replacement Packages

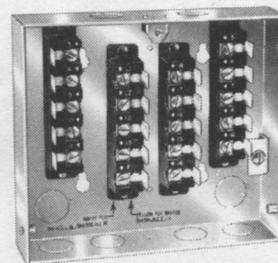
Y7000 and Y4140G,L,M Modernization Packages



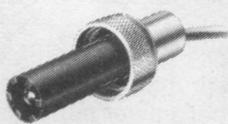
BC7000



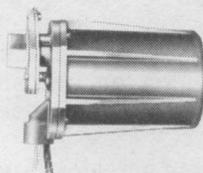
R4140 Programmer



Q520 Mounting Base



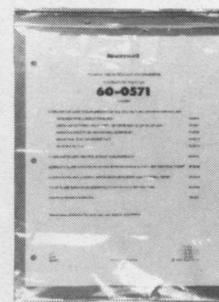
Detector



Amplifier



Amplifier



60-0571
Literature Package

MODERNIZE HONEYWELL AND COMPETITIVE FLAME SAFEGUARD CONTROLS TO MEET LATEST MINIMUM SAFETY REQUIREMENTS OF ANY APPROVAL BODY AND/OR ANY INSURANCE COMPANY.

HOW TO ORDER THE Y7000 OR Y4140 PACKAGES

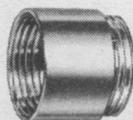
To order the Y4140G,L,M or Y7000 "Roll Your Own Packages," select any TRADELINE R4140 or BC7000 (with PM720), amplifier, Q520A Subbase and detector. A literature package (form 60-0571) will be included automatically, containing wiring instructions, code summaries, modernization survey forms, and preprinted wire markers.

BENEFITS

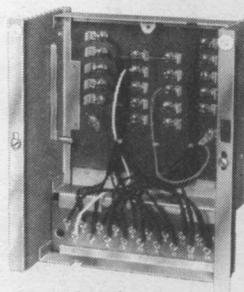
- Versatile Y7000 and Y4140 family modernizes most Honeywell and competitive programmers, thereby reducing replacement and inventory costs.
- Solid state interchangeable amplifiers for adapting to any one of 6 systems.
- Y7000/Y4140 packages are available at reduced prices through TREP and PEP programs. TREP and PEP are special Honeywell exchange programs designed to facilitate sales and availability of flame safeguard controls. PEP (Programmer Exchange Program) allows you a discount for trading in competitive (Fireye, Wheelco, and McGraw Edison) and obsolete Honeywell automatic programmers against the purchase of Y-packs, and TREP (TRADELINE Replacement Exchange Program) allow you a discount for trading in Honeywell controls against the purchase of Y-packs. Ask your Honeywell Authorized Flame Safeguard Distributor about how these plans can save you money.



R4140
With Plug-in Amplifier



Adapter For
Lead Sulfide Cell



Q520C Adapter
To Fireye Subbase

Y593 Flame Safeguard Replacement Packages For Fireye 'P' Series

DESIGNED FOR FIELD REPLACEMENT OF 43 FIREYE 'P' SERIES PROGRAMMERS.

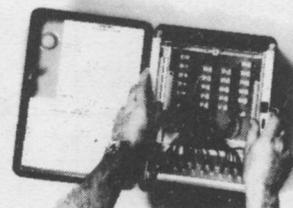
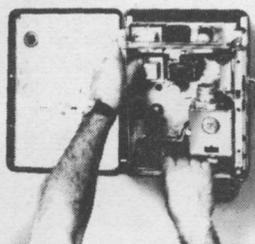
To order a Y593 Replacement Package, refer to the "Y593 Fireye 'P' Series Cross Reference." Choose the programmer, amplifier, subbase and detector to match the Fireye "P" Series programmer to be replaced.

The Q520C Adapter Subbase contains the following accessories:

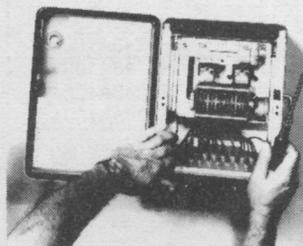
- Wiring hookup cover insert (sticky-back).
- 4074BZU Adapter for lead sulfide cell. The lead sulfide cell (Honeywell Part No. 104662 A-D) must be ordered separately.
- Plugs with grommets (2); 2 different sizes for plugging the unused hole in some cabinet covers.
- 96-2014 cover label (sticky-back).

INSTALLING A Y593 REPLACEMENT PACKAGE ON AN EXISTING SUBBASE

- 1 Disconnect power supply and remove old Fireye programmer.**
- 2 Place Y593 sticker inside the door and install Q520C adapter base.**



- 3 Plug in R4140 programmer.**
- 4 Plug in amplifier and check out system per instructions.**



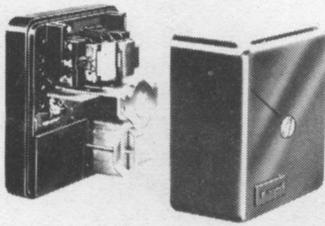
Y593 packages are available at reduced prices through the Programmer Exchange Program (PEP). PEP allows you to trade in competitive (Fireye, Wheelco, Edison) and obsolete Honeywell automatic programmers toward the purchases of Y-packs.

Modernization and Replacement Packages

Y593 Fireye 'P' Series Cross Reference

"P" Series Model Number	Voltage	Programmer	Amplifier	Subbase	Detector
25RU8-4580	120	R4140L1147	R7247C1001	Q520C1053	C7012E1104
25RU8-6558	120	R4140G1171	R7249A1003	Q520C1038	C7027A1080
25RU8-6560	120	R4140L1147	R7249A1003	Q520C1053	C7027A1080
25RU8-6566	120	R4140G1171	R7249A1003	Q520C1038	C7027A1080
25RU8-6570	120	R4140L1147	R7249A1003	Q520C1053	C7027A1080
25RU8-6580					
26RJ8-1000	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-1001	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-1002					
26RJ8-1003					
26RJ8-1004					
26RJ8-1005	120	R4140M1053	R7248A1004	Q520C1079	C7015A1126 ^a
26RJ8-1006	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-1008	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-1009	120	R4140M1053	R7248A1004	Q520C1079	C7015A1126 ^a
26RJ8-1011	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-1012	120	R4140G1171	R7248A1004	Q520C1087	C7015A1126 ^a
26RJ8-1012T	240	R4140G1114	R7248A1004	Q520C1087	C7015A1126 ^a
26RJ8-1016					
26RJ8-1016T					
26RJ8-1018	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-6008	208	R4140G1122	R7248A1004	Q520C1046	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-6009	120	R4140M1053	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-6012	120	R4140G1171	R7248A1004	Q520C1087	C7015A1126 ^a
26RJ8-6016	208	R4140G1122	R7248A1004	Q520C1087	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1087	C7015A1126 ^a
26RJ8-6018	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
	208	R4140G1122	R7248A1004	Q520C1046	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
26RJ8-6058	120	R4140G1171	R7248A1004	Q520C1038	C7015A1126 ^a
26RJ8-6060	120	R4140L1147	R7248A1004	Q520C1053	C7015A1126 ^a
26RJ8-6066	120	R4140G1171	R7248A1004	Q520C1038	C7015A1126 ^a
26RJ8-6068					
26RJ8-6070	120	R4140L1147	R7248A1004	Q520C1053	C7015A1126 ^a
26RJ8-6080					
26RJ8-6160					
29RF5-1000	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
29RF5-1001	120	R4140G1064	R7248A1004	Q520C1061	C7015A1126 ^a
29RF5-1002	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
29RJ5-1005	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
29RF5-1009	120	R4140G1064	R7248A1004	Q520C1061	C7015A1126 ^a
29RF5-1015	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
29RF5-1103	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a
29RF5-6009	120	R4140G1064	R7248A1004	Q520C1061	C7015A1126 ^a
29RF5-6015	120	R4140G1171	R7248A1004	Q520C1046	C7015A1126 ^a
	208	R4140G1122	R7248A1004	Q520C1046	C7015A1126 ^a
	240	R4140G1114	R7248A1004	Q520C1046	C7015A1126 ^a

^aExisting Fireye detector may be used. However, the Firetron cell must be changed to a 104662 Honeywell Lead Sulfide Cell.



R485B Protectorelay Primary Control

Manual start control provides solid state, electronic, flame safeguard protection for semi-automatic single or dual fuel applications.

Cuts off both pilot and main fuel and sounds alarm if flame fails. Can be used with flame rods, rectifying photocells, or C7012A,C Purple Peeper Ultraviolet Flame Detectors. For torch-ignited pilot or main burner, used with pushbutton or any conventional knee- or foot-operated start-stop station. For electrically ignited pilot, used with S445A Pushbutton Start-Stop Station which continues ignition as long as start button is pressed. Mounts on Q270A1024 Subbase (order separately). Ambient Temperature Range: Minus 20 F to plus 125 F [minus 29 C to plus 52 C]. Approximate Dimensions (including subbase): 5 in. [127 mm] high, 5 in. [127 mm] wide, 4-3/4 in. [120.7 mm] deep. Canadian Standards Association certified, File No. LR1620, Guide No. 140-A-2; Factory Mutual approved, Report No. 18301.

ELECTRICAL RATINGS (at 120 to 240 V, 60 Hz):

Pilot Gas Valve—125 VA.

Main Gas Valve—125 VA.

Alternate Rating: 25 VA pilot duty plus 1 or more motorized valves with total rating 400 VA opening. 200 VA holding.

Ignition Transformer—345 VA.

Alarm—125 VA.

ACCESSORIES:

Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.

S445A1010 Pushbutton Start-Stop Station.

121708 Flame Simulator (rectifying).

W136A Test Meter (includes 196146 Meter Connector Plug).

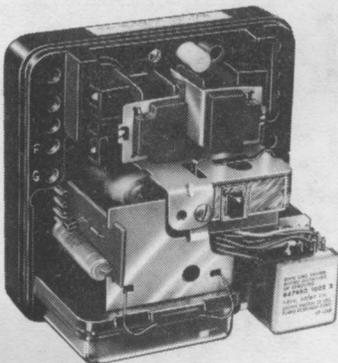
132569 Contact Cleaner.

22042 Ignition Transformer.

Q624A Solid State Ignition Transformer.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Voltage (50/60 Hz)	Flame Failure Response Time (sec)	Flame Detectors	Alarm
R485B1000	120	3	Use with rectification type—C7012A,C UV sensors for gas or oil flame; C7003A or C7010A photocell for oil flame; flame rod and suitable holder for gas flame; or any combination of the above.	Terminal and contacts provided for external alarm to sound on flame failure.
R485B1018	240	3		



R4795A,D Primary Controls

Provide solid state, electronic, flame safeguard protection for commercial and industrial single or dual fuel burners.

Interchangeable, plug-in amplifiers permit R4795 to be used with rectification or ultraviolet type flame detectors. R4795A recycles once after flame failure in attempt to re-establish pilot before lockout. R4795D provides lockout on flame failure or flame relay pull-in during prepurge. Power Consumption (at 60 Hz): 6.0 W maximum for rectification; 8.0 W maximum for ultraviolet. Safety Switch Timing: 15 sec, nominal. Listed by Underwriters Laboratories Inc: 120 V models using 30, 60, or 90 sec prepurge timers, including minus 40 F [minus 40 C] rated models—File No. MP268, Guide No. MCCZ. Underwriters Laboratories Inc. component

continued next page

Primary Controls

R4795A,D continued

recognized: 120 V models using 7 or 10 sec prepurge timers, including minus 40 F [minus 40 C] rated models; File No. MP268, Guide No. MCCZ2. Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified: 120 V models only, including minus 40 F [minus 40 C] rated models, File No. LR1620, Factory Mutual approved: R4795A, 120 V models—Report No. 18774. R4795D, 120 V models—Report No. 19608. Minus 40 F [minus 40 C] rated models—Report No. 19608.1.

AMBIENT TEMPERATURE RANGE:

	Minimum ^a		Maximum ^{a,b}	
	F	C	F	C
50 Hz	-20	-29	115	46
60 Hz	-20	-29	125	52

^aR4795A1081 and R4795D1051 have minimum ambient temperature rating of -40 F [-40 C] with maximum of 115 F [46 C] at 60 Hz, and 105 F [40 C] at 50 Hz.

^bSubtract 10 F [6 C] if optional alarm contacts are included.

ELECTRICAL RATINGS:

Terminal	Load	Rating
3	Pilot Valve Intermittent Ignition ^a	125 VA pilot duty. 360 VA.
4	Interrupted Ignition	360 VA.
5	Main Valve	125 VA pilot duty, or 25 VA pilot duty plus one or more motorized valves with total rating up to 400 VA opening, 200 VA holding.
6-7	Airswitch	0.6 A at 30 Vdc.
8	Fan or Burner Motor	9.8 A full load, 58.8 A locked rotor (inrush) at 120 Vac; 4.9 A full load, 29.4 A locked rotor (inrush) at 220 and 240 Vac.
Isolated Spdt Alarm Terminals (optional)	Alarm	3.0 A at 24 Vac, or 1.0 A at 120 Vac in suitable wiring enclo- sure.

^aIf ignition is connected to terminal 3, terminal 4 cannot be used.

APPROXIMATE DIMENSIONS (including cover and subbase):

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
R4795A	5	127	5	127	4-3/4	120.7
R4795D	5	127	5	127	5-1/4	133.4

REPLACEMENT PARTS:

131891C Cover Assembly—R4795A.

134075B Cover Assembly—R4795D.

ACCESSORIES:

Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.

W136A Test Meter (includes 196146 Meter Connector Plug).

121708 Flame Simulator (rectifying).

123514B Minipeeper Flame Simulator.

FSP1535 Tester—for operational check of all RA890's or R4795A,D.

continued next page

R4795A,D continued

118702B Remote Reset Cover—120 V, 60 Hz.

22042 Ignition Transformer.

Q624 Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detectors. For use only with gas pilots.

132569 Contact Cleaner.

Available only through Authorized Honeywell Flame Safeguard Distributors.

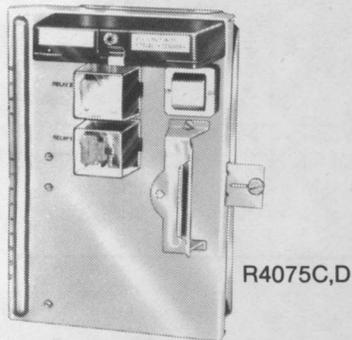
Order Number	Voltage (50/60 Hz)	Alarm Contacts spdt	Required Components (order separately)		
			Mounting Base	Plug-in Amplifier ^a	Plug-in Purge Timer
R4795A1016	120	Yes	Q270A1024 permits recessed or surface mounting.	1, 2, 4, or 5	ST71A1000, 7 sec
R4795A1040	220	Yes		1, 2, 4, or 5	ST71A1042, 10 sec
R4795A1081 ^b	120	Yes		3 or 6	ST71A1018, 30 sec
R4795D1002	120	Yes		1, 2, 4, or 5	ST71A1026, 60 sec
R4795D1036	240	Yes		1, 2, 4, or 5	ST71A1034, 90 sec
R4795D1051 ^b	120	Yes		3 or 6	

^aA number is listed for each amplifier in table below. These numbers correspond to those listed under "Plug-in Amplifier" in ordering table.

^bMinimum Ambient Temperature: -40 F [-40 C].

Number (see ordering table)	Order Number	Type	Flame Failure Response Time (sec)	Use With
1	R7289A1004	Rectification (green)	3.0	Rectifying photocell, flame rod, or C7012A,C Purple Peeper Ultraviolet Flame Detector.
2	R7289A1012		0.8	
3	R7289A1020 ^a		3.0	
4	R7290A1001	Ultraviolet (purple)	3.0	Use with C7027A, C7035A, or C7044A Minipeeper Ultraviolet Flame Detector.
5	R7290A1019		0.8	
6	R7290A1027 ^a		3.0	

^aMinimum Ambient Temperature: -40 F [-40 C].



R4075C,D

R4075C,D,E Industrial Flame Safeguard Primary Controls

Provide independent supervision of semiautomatic, constant-fired industrial single or dual fuel burner.

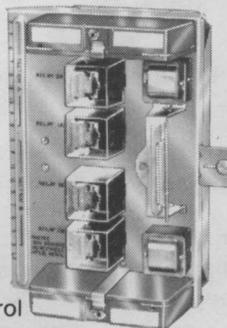
Delay admission of fuel to combustion chamber until pilot flame has been proven; then monitor flame through run period. Safety shutdown will occur on loss of flame while main burner is firing, or failure of flame detection system (if self-checking system is used). Flame Failure Response Time: 2-4 seconds (see page 76 for plug-in amplifiers.) Approvals (120 V models only): Industrial Risk Insurers (formerly FIA) approvable, listed by Underwriters Laboratories Inc: File No. MP268, Guide No. MCCZ2. Canadian Standards Association certified, File No. LR1620, Guide No.s 140-A-2, 300-1-0.2; Factory Mutual approved, Report Nos. 24313 and 24117.01.

AMBIENT TEMPERATURE RANGE^a:

	50 Hz		60 Hz	
	F	C	F	C
Minimum	-20	-29	-20	-29
Maximum	+125	+52	+130	+54

^aIf an R7248A Infrared Amplifier is used, the ambient operating temp. range will be 0 F to 125 F [-18 C to 52 C].

R4075E
Dual Control



continued next page

Primary Controls

R4075C,D,E continued

ELECTRICAL RATINGS:

Terminal	Typical Load	Pilot Duty Rating	Voltage
8	Alarm	50 VA	Up to 30 V
3	Pilot Valve	125 VA	120 to 240 V
5	Main Fuel Valve(s)	250 VA	120 to 240 V

ACCESSORIES:

S445A Start-Stop Station.

W136A Test Meter (includes 196146 Meter Connector Plug).

123514B Flame Simulator—for use with R7249A Ultraviolet Amplifiers.

R4155A Alarm Silencing Relay (available only in 120 V, 60 Hz models).

Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detectors. For use only with gas pilots.

22042 Ignition Transformer.

132569 Contact Cleaner.

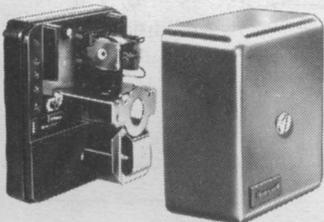
Q295A1054 Subbase—for mounting in cabinet (R4075E only).

Q295A1039 Subbase—for mounting in cabinet (R4075C,D only).

Available only through Authorized Honeywell Flame Safeguard Distributors.

Model Number	Application/Description	Voltage (50/60 Hz)	Maximum Power Consumption At 60 Hz (W)		Mounting (order separately)	Flame Detection Systems (order separately)
			Running	Standby		
R4075C1005	For supervising large, semi-automatic, constant-fired burners.	120	9	3	Q295A Subbase for mounting in cabinet.	Plug-in flame signal amplifier and matching flame detector. See page 76.
R4075C1013		208	10	4		
R4075C1039		240	10	4		
R4075D1003	For supervising large, semi-automatic, constant-fired burners. With power failure override to prevent shutdown during very short power outages (power line switching—approximately 1 sec or less).	120	9	3		
R4075E1000	Dual control for supervision of 2 large, semiautomatic, constant-fired burners. Consists of 2 independent primary controls on 1 chassis.	120	8 ^a	3 ^a	Q295A Wiring Subbase for mounting in cabinet.	2 plug-in flame signal amplifiers and matching flame detectors. See page 76.

^aPer burner. For 2 burners, 16 W running or 6 W standby total.



R7023B,C Flame Detector Relays

Solid state electronic relays contain transformer, flame signal amplifier circuit, and flame relay.

Suitable additional primary control must also be used to provide safe-start check, safety lockout, load switching, and other required functions in flame safeguard systems. Mounts on Q270A1024 Subbase (order separately). Contact Rating (pilot duty): 125 VA. Ambient Temperature Range: Minus 20 F to plus 125 F [minus 29 C to plus 52 C]. Approximate Dimensions (including subbase): 5 in. [127 mm] high, 5 in. [127 mm] wide, 4-3/4 in. [120.7 mm] deep. Industrial Risk Insurers

continued next page

R7023B,C continued

(formerly FIA) approvable; listed by Underwriters Laboratories Inc: R7023C—File No. MP268, Guide No. MCCZ2; Canadian Standards Association certified: R7023B,C—File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2.

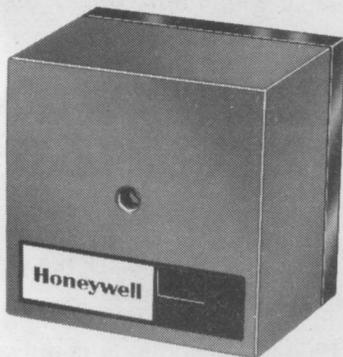
ACCESSORIES:

- Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.
- W136A Test Meter (includes 196146 Meter Connector Plug).
- 121708 Flame Simulator (rectifying).
- 123514B Minipeeper Flame Simulator.
- 132569 Contact Cleaner.
- 22042 Ignition Transformer.
- Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Flame Detectors. For use only with gas pilots.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Used With	Voltage (50/60 Hz)	Flame Failure Response Time (sec)	Switching
R7023B1003	Rectification type flame detector (flame rod, photocell, or C7012A,C Purple Peeper Ultraviolet Flame Detector) ^a .	120	3.0	Dpdt
R7023B1011		240	3.0	
R7023B1037		240	0.8	
R7023C1001	C7027A, C7035A, or C7044 Minipeeper Ultraviolet Flame Detector ^a .	120	3.0	Spdt
R7023C1019		120	0.8	

^aR7023C (or R7023B with photocell or C7012A,C) may be used in a wide range of other applications. Control can signal (by alarm, light, or other means) presence of any source of ultraviolet including electric arc in generators, motors, and switching gear.



R7795A,B,C,D Primary Controls

Provide solid state, electronic, flame safeguard protection for commercial and industrial single or dual fuel burners.

R7795 has 2 field selectable options:

1. Recycle or lockout after flame failure (3-sec nominal flame failure response time).
2. 10 or 4 seconds timed trial for pilot flame ignition.

R7795A,C use the C7027, C7035 or C7044 Minipeeper Ultraviolet Flame Detector for flame sensing. R7795B,D use rectification principle of electronic flame detection for use with flame rods, rectifying photocells, or C7012A,C Purple Peeper Ultraviolet Flame Detectors. Flame signal amplifiers are built integral to the R7795 and are color coded; purple for Ultraviolet, green for Rectification.

R7795A,B provide ignition cutoff and intermittent pilot. R7795C,D have interrupted pilot function to provide a 10-second main flame establishing period and also have a second main fuel valve terminal. All models require a plug-in prepurge timer of 1.5, 7, 10, 30, 60, 90 seconds. R7795 mounts on a Q795A wiring subbase.

ELECTRICAL RATINGS:

Voltage and Frequency—120 Vac, (+10, -15%), 50/60 Hz.

Power Consumption—

R7795A,C—17 VA (maximum).

R7795B,D—15 VA (maximum).

continued next page

Primary Controls

R7795A,B,C,D continued

Terminal	Load	Maximum Rating at 120 Vac
5	Pilot Valve	125 VA pilot duty
18	Ignition	360 VA
6,7	Main Fuel Valve(s)	125 VA pilot duty or 25 VA pilot duty plus one or more motorized valves with a total rating of 500 VA opening, 250 VA holding
8	Fan or burner motor	9.8 A full load; 58.8 A locked rotor
9	Alarm	1.0 A

AMBIENT TEMPERATURE RANGES:

Operating—minus 40 F [minus 40 C] to plus 135 F [plus 57 C].

FLAME FAILURE RESPONSE: 3 sec nominal.

DIMENSIONS: Approximately 5 x 5 x 5-1/4 in. [127 x 127 x 133.5 mm].

APPROVALS:

Underwriters Laboratories Inc. listed, File No. MP268, Guide No. MCCZ.

Canadian Standards Association certification pending.

Factory Mutual Listing pending.

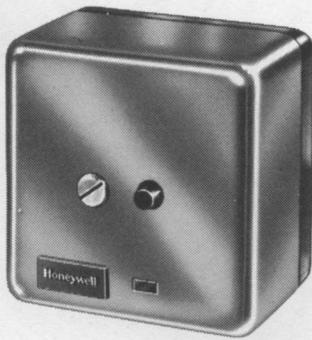
IRI approvable.

ACCESSORIES:

1. W136A Test Meter—(includes 196146 Meter Connector Plug).
2. 196146 Meter Connector Plug for older W136A Test Meters.
3. 123514A Flame Simulator for rectification systems.
4. 123514B Flame Simulator for ultraviolet systems.
5. Q624A Solid State Spark Generator.
6. Q795A Wiring Subbase.
7. ST795A Plug-in Purge Timer—models available with 1.5, 7, 10, 30, 60, and 90 sec timings.
8. 198355A adapter for use with FSP5004 Tester.
9. R1061012 Ignition Cable for ignition installations in high temperature environments; rated at 350 F [177 C] for continuous duty, and up to 500 F [260 C] for intermittent use; tested to 20,000 volts RMS.
10. R1239001 High Tension Ignition Cable; for ignition installations in a contaminating environment; very resistant to severe conditions of oil, heat, and corona. Tested to withstand high voltages up to 25,000 volts RMS in a salt bath for 1 minute without breakdown. Rated at 200 F [93 C] for continuous duty, and up to 350 F [177 C] for intermittent use.
11. R1298020 Cable; for flame detector ("F" leadwire) installations in a high temperature environment; rated up to 400 F [204 C] for continuous duty; tested for operation up to 600 V and breakdown up to 7500 V.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Order Number	Voltage (50/60 Hz)	Pilot Function	Required Components (Order Separately)				
			Flame Detection System		Plug-in Prepurge Timer		Mounting Subbase
			Type	Use with Sensor	Number	sec	
R7795A1001	120	Intermittent	U.V.	C7027A, C7035A, C7044A Minipeeper	ST795A1007	1.5	Q795A1004 (4 sides)
R7795B1009	120		Rectification	Flame rod, rectifying photocells, C7012A,C	ST795A1015	7	
R7795C1007	120	Interrupted	U.V.	C7027A, C7035A, C7044A Minipeeper	ST795A1023	10	Q795A1012 (No sides)
R7795D1005	120		Rectification	Flame rod, rectifying photocell, C7012A,C	ST795A1031	30	
					ST795A1049	60	
					ST795A1056	90	



RA890F Protectorelay Primary Control

Nonprogramming primary control provides solid state, electronic, flame safeguard protection for industrial and commercial single or dual fuel burners.

Uses rectification principle of electronic flame detection. For use with flame rods, rectifying photocells, and C7012A,C Purple Peeper Ultraviolet Flame Detectors. Can be used with R482D Relay for cutoff system. Directly replaces RA890E in most applications; mounts on same Q270A1024 Subbase. Recycles once after flame failure in attempt to re-establish pilot before lockout. Will not start if flame-simulating failure occurs in flame detector circuit. Approximate Dimensions (including subbase): 5 in. [127 mm] high, 5 in. [127 mm] wide, 4-3/4 in. [120.7 mm] deep. Approvals: American Gas Association (A.G.A.) design certified for minus 20 F [minus 20 C] certificate No. 20-AL. Listed by Underwriters Laboratories Inc: File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified: File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2. Factory Mutual approved. Report Nos. 17678, 19417, and 19784.

ELECTRICAL RATINGS:

Controller: Use line (120 V) or low (24 V), automatic or manual (such as S446A). Low Voltage Controller Circuit (T-T): 0.3 A.

Terminal	Typical Load	120 Vac	240 Vac
3	Burner	5.2 A	2.6 A
	Motor	31.2 A	15.6 A
	Full Load Locked Rotor		
	Ignition ^{a,b}	3.0 A	1.5 A
	Pilot Fuel Valve ^b	25.0 VA	25.0 VA
4	Ignition ^a	3.0 A	1.5 A
5	Main gas valve, or second stage oil valve (if used).	125.0 VA pilot duty	125.0 VA pilot duty
	Alternate Rating: 25 VA pilot duty plus 1 or more motorized valves with total rating 400 VA opening, 200 VA holding.		
Isolated Spdt Alarm Terminals	Alarm	3.0 A at 24 Vac, or 1.0 A at 120 Vac in suitable wiring enclosure.	

^aIf ignition and motor are connected to terminal 3, terminal 4 cannot be used. This is to prevent overloading relay 1K.

^bIgnition and/or pilot valve can be transferred to terminal 5 by the R482D or R488F for cutoff service.

POWER RATINGS:

	Watt		VA	
	Maximum	Standby	Maximum	Standby
60 Hz	6.2	1.7	13.5	8.3
50 Hz	8.0	3.0	17.0	13.6

AMBIENT TEMPERATURE RANGE:

	Minimum		Maximum	
	F	C	F	C
60 Hz	-20	-29	115	46
50 Hz	-20	-29	105	41

continued next page

Primary Controls

RA890F continued

REPLACEMENT PART:

131891BA Cover—with reset button affixed.
No other parts replaceable.

ACCESSORIES:

Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.
W136A Test Meter (includes 196146 Meter Connector Plug).
121708 Flame Simulator (rectifying).
FSP1535 Tester—for operational check of all RA890's and R4795's.
S446A1018 Start-Stop Station.
118702B Remote Reset Cover—120 V, 60 Hz.
22042 Ignition Transformer.
Q624A Solid State Ignition Transformer.
132569 Contact Cleaner.

Order Number ^a	Voltage (50/60 Hz)	Safety Switch Timing (sec)	Flame Failure Response Time (sec) ^b	Alarm Contacts spdt
RA890F1270	120	15	0.8	Yes
RA890F1288	120	15	3.0	Yes
RA890F1296	208	15	3.0	Yes
RA890F1304	220	15	0.8	Yes
RA890F1338	120	30	0.8	Yes
RA890F1346	120	30	3.0	Yes
RA890F1353	240	30	0.8	Yes
RA890F1361	240	30	3.0	Yes
RA890F1379	240	15	0.8	Yes
RA890F1387	240	15	3.0	Yes
RA890F1429	220	15	3.0	Yes
RA890F1460	100	15	0.8	Yes
RA890F1478 ^c	120	15	0.8	Yes
RA890F1635	120	15	0.8	Yes
RA890F1676 ^d	120	15	0.8	Yes

^aFor new installation, also specify Q270A1024 base.

^b3 second response is recommended for nonrecycling ignition cutoff service.

^cFast response on controller demand, 60 Hz only.

^dUL and CSA listed to -40 F [-40 C].

RA890G Protectorelay Primary Control

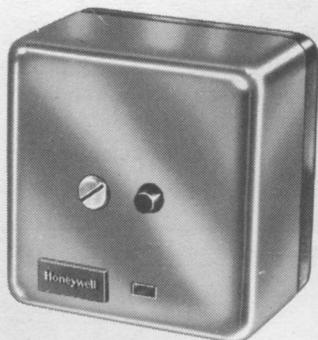
Nonprogramming primary control provides solid state, electronic, flame safeguard protection for industrial and commercial single or dual fuel burners.

Used for interrupted ignition with intermittent pilot on gas burners; interrupted or intermittent ignition on oil burners. Uses C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detector for flame sensing. Mounts on Q270A1024 Subbase (order separately). Recycles once after flame failure in attempt to re-establish pilot before lockout. Ambient Temperature Range: Minus 20 to plus 125 F [minus 29 to plus 52 C]; optional minus 40 F [minus 40 C] rating available. Approximate Dimensions (including subbase): 5 in. [127 mm] high, 5 in. [127 mm] wide, 4-3/4 in. [120.7 mm] deep. Underwriters Laboratories Inc. listed: 120 V models only, File No. MP268, Guide No. MCCZ; Factory Mutual approved: Report No. 22013; American Gas Association design certified for minus 20 F [minus 29 C] No. 20-6B; Canadian Standards Association certified: 120 V models only; File No. LR1620.

ELECTRICAL RATINGS:

Controller: Use line (120 V) or low (24 V).
Low Voltage Controller Circuit (T-T): 0.17 VA.

continued next page



RA890G continued

Terminal	Typical Load		120 Vac	240 Vac
3	Burner Motor	Full Load	5.2 A	2.6 A
		Locked Rotor	31.2 A	15.6 A
	Ignition ^{a,b}		3.0 A	1.5 A
4	Pilot Fuel Valve ^b		25.0 VA	25.0 VA
	Ignition ^a		3.0 A	1.5 A
5	Main gas valve, or second stage oil valve (if used).		125.0 VA pilot duty	125.0 VA pilot duty
	Alternate Rating: 25 VA pilot duty plus 1 or more motorized valves with total rating 400 VA opening, 200 VA holding.			
Isolated Spdt Alarm Terminals	Alarm		3.0 A at 24 Vac, or 1.0 A at 120 Vac in suitable wiring enclosure.	

^aIf ignition and motor are connected to terminal 3, terminal 4 cannot be used. This is to prevent overloading relay 1K.

^bIgnition and/or pilot valve can be transferred to terminal 5 by the R482D or R488F for cutoff service.

POWER RATINGS:

	Watt		VA	
	Maximum	Standby	Maximum	Standby
60 Hz	9.5	3.0	14.0	12.0
50 Hz	10.0	4.0	18.0	17.0

REPLACEMENT PART:

131891AA Cover—with reset button affixed.
No other parts replaceable.

ACCESSORIES:

Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.

W136A Test Meter (includes 196146 Meter Connector Plug).

123514B Minipeeper Flame Simulator.

FSP1535 Tester—for operational check of all RA890's and R4795's.

118702B Remote Reset Cover—120 V, 60 Hz.

22042 Ignition Transformer.

Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Flame Detectors. For use only with gas pilots.

132569 Contact Cleaner.

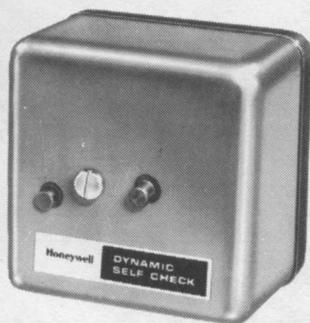
Order Number ^a	Voltage (50/60 Hz)	Safety Switch Timing (sec)	Flame Failure Response Time (sec) ^b	Alarm Contacts spdt
RA890G1229	120	15	0.8	Yes
RA890G1245	220		0.8	Yes
RA890G1260	120		3.0	Yes
RA890G1278	208		3.0	Yes
RA890G1286	240		3.0	Yes
RA890G1294	240		0.8	Yes
RA890G1302	220 ^c		3.0	Yes
RA890G1310 ^d	120		0.8	Yes

^aFor new installation, also specify Q270A1024 base.

^b3 second response is recommended for nonrecycling ignition cutoff service.

^c50 Hz only.

^dCanadian Standards Association, Underwriters Laboratories Inc. listed for use at -40 F [-40 C].



RA890H,J Self-Checking Protectorelay Controls

Nonprogramming, self-checking primary controls provide solid state, electronic, flame safeguard protection for use on industrial and commercial single or dual fuel burners.

Use rectification principle of electronic flame detection. These controls are recommended for use with rectifying flame rod or photocell for Dynamic Self Check systems. They incorporate continuous self-check to detect component failure. Automatic safety shutdown if flame fails on start or during the run cycle (no attempt to relight). Flame Failure Response Time: 2.5 seconds, nominal (time affected by voltage level and ambient temperature). Alarm contacts (isolated spdt) and tamper-resistant covers standard on all models. Approximate Dimensions: 5 in. [127 mm] high, 5 in. [127 mm] wide, 4-3/4 in. [120.7 mm] deep. American Gas Association design certified, Certificate No. 20-6B. RA890H,J for minus 20 F [minus 29 C]; listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620-385; Factory Mutual approved: RA890H; Report Nos. 20864 and 20864.1. RA890H; 24090.

POWER RATINGS:

	Maximum Watts	Maximum VA
50 Hz	9.5	17.0
60 Hz	8.0	15.0

AMBIENT TEMPERATURE RANGE:

	Minimum		Maximum	
	F	C	F	C
50 Hz	-20	-29	115	46
60 Hz	-20	-29	125	52

ELECTRICAL RATINGS:

Terminal	Typical Load		120 Vac	240 Vac
	3	Burner Motor	Full Load	5.2 A	2.6 A
Locked Rotor			31.2 A	15.6 A
Intermittent Ignition ^{a,b}		3.0 A	1.5 A	
	Pilot Fuel Valve or Delayed Oil Valve ^b		25.0 VA	25.0 VA
4	Interrupted Ignition ^a		3.0 A	1.5 A
5	Main gas valve, or second stage oil valve (if used).		125.0 VA pilot duty	125.0 VA pilot duty
	Alternate Rating: 25 VA pilot duty plus 1 or more motorized valves with total rating 400 VA opening, 200 VA holding.			
Isolated Spdt Alarm Terminals	Alarm		3.0 A at 24 Vac, or 1.0 A at 120 Vac in suitable wiring enclosure.	

^aIf ignition and motor are connected to terminal 3, terminal 4 cannot be used. This is to prevent overloading relay 1K. Note that terminal 4 is not used on RA890H (no ignition).

^bRA890H,J incorporate cutoff service.

Controller: Use line (120 V) or low (24 V), automatic or manual (such as S446A).
Low Volt Controller Circuit (T-T): 0.3 A.

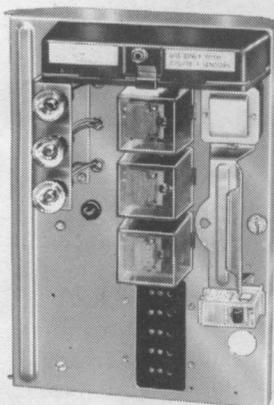
continued next page

RA890H,J continued

ACCESSORIES:

- Q270A1024 Mounting Subbase—serves as junction box for connecting to external circuits. Contains terminal blocks with coded terminals and screws.
- W136A Test Meter (includes 196146 Meter Connector Plug).
- 121708 Flame Simulator (rectifying).
- FSP1535 Tester—for operational check of all RA890's.
- 118702B Remote Reset Cover—120 V, 60 Hz.
- 22042 Ignition Transformer.
- Q624 Solid State Ignition Transformer.
- 132569 Contact Cleaner.
- S446A Start-Stop Station.

Order Number	Application	Voltage (50/60 Hz)
RA890H1052	For intermittent pilot applications. May be used for continuous (standing) pilots only if an automatic (electrically operated) pilot valve is used, and the pilot is shut down and reignited prior to burner start; cannot be used for interrupted pilot applications without external circuitry. Directly replaces most RA890B,C,E,F models; mounts on same Q270A Subbase. Rectifying flame rod is recommended. Can be used with rectifying photocell or C7012A,C Purple Peeper Ultraviolet Flame Detector.	120
RA890J1008	For manually lighted continuous (standing) pilot applications where the pilot is not electronically supervised during the off cycle. Directly replaces most RA890B,C,E,F models; mounts on same Q270A Subbase. Rectifying flame rod is recommended. Can be used with rectifying photocell or C7012A,C Purple Peeper Ultraviolet Flame Detector.	120



R4138C,D Industrial Flame Safeguard Primary Controls

Provide supervision of semiautomatic, industrial single or dual fuel burner.

R4138C,D directly replace all R4138A,B. Delay admission of fuel to combustion chamber until pilot flame has been proven; then monitor flame through run period. Particularly suitable where long periods of burner operation without shutdown are normal, such as in heat-treating ovens and kilns. With plug-in S427D Purge Timer, provide timed purge period prior to manual start. R4138D has override on momentary power interruptions (up to 1 second) to eliminate nuisance shutdowns during power line switchovers. Lockout Switch Timing: 15 sec, nominal. Flame Failure Response Time: 2-4 sec (see page 74 for plug-in amplifiers). Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCC22; Industrial Risk Insurers (formerly FIA) approvable; Canadian Standards Association certified, File No. LR1620, Guide Nos. 140-A-2, 300-1-0.2; Factory Mutual approved, Report No. 26037.

AMBIENT TEMPERATURE RANGE:

	Minimum ^a		Maximum	
	F	C	F	C
50 Hz	-20	-29	+120	+49
60 Hz	-20	-29	+130	+54

^a0 F [-18 C] if using S427D Purge Timer.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 50/60 Hz.

Maximum Power Consumption:

	60 Hz	50 Hz
Standby	13 W	14 W
Running (1 K pulled in)	19 W	21 W

continued next page

Primary Controls

R4138C,D continued

Terminal	Typical Load	Voltage	Pilot Duty Rating
16	Alarm	120 to 240 V	125 VA
16	Alarm	up to 30 V	50 VA
6	Ignition	120 to 240 V	250 VA
19	Pilot Valve, or 1st Stage Oil Valve	120 to 240 V	125 VA
20	Main Fuel Valve(s)	120 to 240 V	250 VA

REPLACEMENT PARTS:

118543A Incandescent Indicator Lamp, 120 V or Sylvania type 120RB.
 122514 Locking Cabinet Latch Assembly (with 2 keys).
 122515 Nonlocking Cabinet Latch Assembly.
 Lenses for FSP1225 NEMA 4 Enclosure (with cover-mounted lights and START-STOP pushbutton):
 FSP1225-2—Red
 FSP1225-3—Green
 FSP1225-4—White

ACCESSORIES:

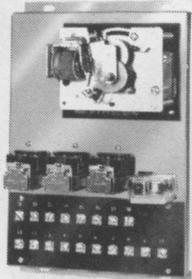
S427D Plug-in Purge Timer. Models with adjustable timing—8 to 60 sec, 2 to 15 min, or 4 to 30 min. Must be mounted vertically; 120 V model required.
 118811A Remote Reset Assembly. 120 V, 60 Hz; provides capability of resetting lockout switch from remote location.
 S445A START-STOP Station—for remote operation.
 W136A Test Meter (includes 196146 Meter Connector Plug).
 196146 Meter Connector Plug (for older W136A models).
 123514A Flame Simulator (for use with R7247A,B Rectification Amplifier).
 123514B Flame Simulator (for use with R7249A Ultraviolet Amplifier).
 R4155A Alarm Silencing Relay.
 Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detectors. For use only with gas pilots.
 22042 Ignition Transformer.
 132569 Contact Cleaner.
 Q478A1015 Cabinet—for flush or surface mounting, without integral START-STOP switch.
 Q478A1031 Cabinet—for flush or surface mounting, with integral START-STOP switch.
 Q477A1009 Panel—for mounting in customer's cabinet.
 FSP1225 NEMA 4 Enclosure, with cover-mounted lights and START-STOP pushbutton.

Available only through Authorized Honeywell Flame Safeguard Distributors.

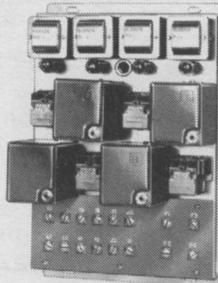
Order Number	Mounting (order separately)	Flame Detection Systems (order separately)	Replaces
R4138C1018	Q477A Subbase for mounting in cabinet.	Plug-in Flame signal amplifier and matching flame detector. See page 76.	R4138A1004
R4138D1016	Q478A Dust-resistant Cabinet, for flush or surface mounting, with locking cover (with or without START-STOP pushbutton station).		R4138A1012
	FSP1225, NEMA 4 Enclosure, with cover-mounted indicator lamps and START-STOP pushbutton.		R4138B1002

Flame Safeguard Multiburner Modules

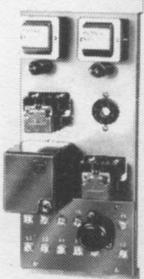
Supervise unison lightoff and running of multiple burners operating from a single fuel line.



W688A



Q518A



Q519A

Flame safeguard system requires one W688 control panel and one or more Q518, Q519 supervisory panel(s). System is easily adapted to any number of burners. "First-out" circuitry and flame failure lamps indicate which burner failed; lamps can be remotely mounted. Selection of solid state, color-coded, interchangeable, plug-in flame signal amplifiers allows use of rectification, ultraviolet, or infrared flame detectors. Lockout occurs on ignition failure or flame failure at any one burner. Flame Failure Response Time: 2-4 sec. Listed by Underwriters Laboratories Inc., File No. MP268, Guide No. MCCZ2; Industrial Risk Insurers (formerly FIA) approvable; Factory Mutual approved, Report No. 22961.

AMBIENT TEMPERATURE RANGE:

	Minimum ^a		Maximum	
	F	C	F	C
50 Hz	-20	-29	+130	+54
60 Hz	-20	-29	+135	+57

^a0 F [-18 C] if using S427D Purge Timer.

ELECTRICAL RATINGS:

Voltage and Frequency—120 Vac (102 V to 132 V), 50/60 Hz. Only one W688 is required for any size system.

Maximum Power Consumption (at 120 V, 60 Hz)—

W688 with S427D Purge Timer ^a	12.0 W
W688 less S427D Purge Timer	8.0 W
Q518A (each)	36.0 W
Q519A (each)	18.0 W

^aCan be used at 50 Hz if timing is multiplied by 1.2.

TERMINAL RATINGS (W688A)—

Terminal	Typical Load	Maximum Rating at 120 Vac, 60 Hz
7 ^a	Ignition Transformer or IR coil ^a	360 VA.
8	Pilot Valve	125 VA pilot duty.
9	Main Fuel Valve(s) (solenoid/motorized)	250 VA pilot duty OR 65 VA pilot duty in parallel with motorized valve or valves, using a total of 1150 VA locked rotor, 460 VA to open, and 250 VA to hold OR motorized valve(s) using a total of 1500 VA locked rotor, 600 VA to open, and 250 VA to hold.
10	Alarm	75 VA pilot duty.

^aWhen external ignition relay (IR) is used, the ignition load rating increases to 30 A per contact, or 60 A total.

REPLACEMENT PART:

106807 Neon Bulb—for local (chassis-mounted) "first-out" indicating lamp.

ACCESSORIES:

125133A Connecting Cable—6 ft [1.8 m] long, for remote "first-out" indicating lamps.

continued next page

Primary Controls

Flame Safeguard Multiburner Models continued

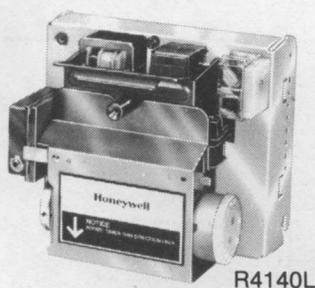
- 125435 Lamp Socket—for remote "first-out" indicating lamp.
- W136A Test Meter (includes 196146 Meter Connector Plug).
- 123514A Flame Simulator (for use with R7257A Rectification Amplifier).
- 123514B Flame Simulator (for use with R7259A Ultraviolet Amplifier).
- R4155A Alarm Silencing Relay.
- R7257A1028 Plug-in Amplifier. Rectification type (green); 3 sec (nominal) flame failure response. For use with C7004, C7005, C7007, C7008, C7009, C7011, or Q179 Rectifying Flame Rods (for gas); C7003, C7010, C7013, or C7014 Rectifying Photocells (for oil); or C7012A or C Ultraviolet Flame Detectors (for gas, oil, or coal).
- R7258A1001 Plug-in Amplifier. Infrared type (red); 3 sec (nominal) flame failure response. For use with C7015 Infrared (lead sulfide) Flame Detector (for gas, oil, or coal).
- R7259A1000 Plug-in Amplifier. Ultraviolet type (violet); 3 sec (nominal) flame failure response. For use with C7027, C7035, or C7044 Ultraviolet Flame Detector (for gas, oil, or coal).
- S427D Purge Timer—8-60 sec or 2-15 min.
- Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Flame Detectors. For use only with gas pilots.
- 22042 Ignition Transformer.
- 132569 Contact Cleaner.

Available only through Authorized Honeywell Flame Safeguard Distributors.

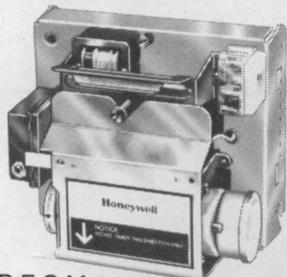
Order Number ^b	Application	Includes	Flame Detection Systems (order separately)
W688A1029 ^a	Control panel for use with Q518, Q519.	30 sec safety switch timing.	R7257, R7258, or R7259 Amplifier (one for each burner). See Accessories listed above for ordering.
W688A1037 ^a		15 sec safety switch timing.	
Q518A1042	4-burner flame amplifier module for use with W688.	Local first-out indication lights.	
Q518A1059		With jumper socket.	
Q518A1067		Socket for remote indicating lights for first-out indication.	
Q519A1040	2-burner flame amplifier module for use with W688.	Local first-out indication lights.	
Q519A1065		Socket for remote indicating lights for first-out indication.	

^aTo provide prepurge timing, order S427D Timer separately.

^bThese components must be mounted in a suitable enclosure supplied by others.



R4140L



R4140D,E,G,M

R4140G,L,M FSG Automatic Programming Controls

Provide flameout protection and automatic sequencing for commercial and industrial single or dual fuel burners.

Directly replace R4150 for most applications; mount on same Q520A Subbase. Sequence burner motor, firing rate motor (L and G only), ignition, pilot valve, and main fuel valve(s). Safe-start check. Safety shutdown on flame failure (lockout). Ten second pilot flame-establishing period. Flame Failure Response Time: 2-4 sec (see page 76 for plug-in amplifiers). Lockout Switch Timing: 30 sec, nominal.

Industrial Risk Insurers (formerly FIA) approvable, and listed by Underwriters Laboratories Inc. All R4140 except R4140G1114, G1122—File No. MP268, Guide Nos. MCCZ2, MCCZ, Canadian Standards Association certified, File No. LR1620, Guide Nos. 140-A-2, 300-I-0-2; Factory Mutual approved: R4140G—Report No. 24180. R4140L—Report No. 24181. R4140M—Report No. 24150.

ELECTRICAL RATINGS:

Voltage and Frequency: 120 Vac (102 V to 132 V), 50/60 Hz.

Power Consumption (with no loads connected to output terminals):

R4140L—18 W max.

R4140G,M—13 W max.

Maximum Total Connected Load: 1800 VA.

ACCESSORIES:

W136A Test Meter (includes 196146 Meter Connector Plug).

123514A Flame Simulator (for use with R7247A,B Rectification Amplifiers).

123514B Flame Simulator (for use with R7249A Ultraviolet Amplifiers).

139695C Cover—with reset button.

Q624A Solid State Ignition Transformer—prevents detection of ignition spark when properly applied with flame detection systems using C7027, C7035, or C7044 Minipeeper Flame Detectors. For use only with gas pilots.

22042 Ignition Transformer.

132569 Contact Cleaner.

FSP5004 Tester (120 V only).

118760B Remote Reset Cover.

Q520A1089 Subbase (3-sided)—for mounting inside a suitable enclosure, 20 terminals.

Q520A1121 Subbase (4-sided)—serves as suitable wiring enclosure, 20 terminals.

Available only through Authorized Honeywell Flame Safeguard Distributors.

*TRADELINE models.

Order Number ^f	Prepurge (sec)	Main Burner Flame Establishing Period (sec)	Early Spark Termination (sec)	With Cover	Postpurge (sec)	Use With (order separately)
R4140G1007	60	10 or 30	—	Yes	15	R7247, R7248, or R7249 amplifier and rectification, infrared, or ultraviolet flame detector and Q520A Mounting Subbase.
R4140G1015	60	10 or 30	—	No	15	
R4140G1049	60	10 or 30	5	No	15	
R4140G1056	60	10 ^a	5	Yes	15	
R4140G1064	60	10 ^a	5	No	15	
R4140G1106	60	10 or 15	—	No	15	
*R4140G1114 ^d	70	10, 30 or 60	5	No	25	
*R4140G1122 ^e	70	10, 30 or 60	5	No	25	
R4140G1148	60	10 or 15	5	No	15	
*R4140G1171	70	10, 30 or 60	5	No	25	
R4140L1006	60	10 or 15	—	Yes	15	
R4140L1014	60	10 or 15	—	No	15	
R4140L1030 ^b	60	10 or 15	—	No	15	
R4140L1097	60	10 or 15	5	Yes	15	

continued next page

Programming Controls

R4140G,L,M continued

Order Number ^f	Prepurge (sec)	Main Burner Flame Establishing Period (sec)	Early Spark Termination (sec)	With Cover	Postpurge (sec)	Use With (order separately)
R4140L1105	60	10 or 15	5	No	15	R7247, R7248, or R7249 amplifier and rectification, infrared, or ultraviolet flame detector and Q520A Mounting Subbase.
*R4140L1147	60	10, 15 or 30	5	No	15	
R4140M1004	30	10 ^a	—	Yes	15	
R4140M1012	30	10 ^a	—	No	15	
R4140M1020 ^c	42	10 ^a	5	Yes	15	
R4140M1038 ^c	42	10 ^a	5	No	15	
R4140M1046 ^c	90	10 ^a	5	Yes	25	
R4140M1053 ^c	90	10 ^a	5	No	25	
R4140M1103	30	10 or 30	—	Yes	15	
R4140M1152 ^c	42	10 ^a	5	No	15	
R4140M1178 ^c	96	10 ^a	5	No	25	

^aIntermittent pilot terminal also available.

^bTimer cannot be rotated manually.

^cOpen Damper Prepurge; Low Fire Interlock; Isolated Damper Motor Contact.

^d240 V, 60 Hz.

^e208 V, 60 Hz.

^fAll models 120 V, 60 Hz except R4140G1114 and R4140G1122. All models can be operated at 50 Hz; however, timings noted must be multiplied by 1.2.



R7247B,C;
R7248A,B,
R7476A



R7247A
R7249A

R7247, R7248, R7249, R7476 Flame Safeguard Amplifiers

Solid state plug-in units respond to flame detector signal and indicate presence of flame.

Used with BC7000; R4140; R4075C,D,E; R4138C,D flame safeguard controls and appropriate flame detector. Refer to ordering table for application and specifications. Listed by Underwriters Laboratories Inc., File No. MP268, Guide Nos. MCCZ2; Industrial Risk Insurers (formerly FIA) approved; Canadian Standards Association certified, File No. LR1620, Guide Nos. 140-A-2, 300-I-0.2; Factory Mutual approved: Report No. 24181.01.

Available only through Authorized Honeywell Flame Safeguard Distributors.

Plug-in Flame Signal Amplifiers					Applicable Flame Detectors					
Order Number	Type	Device Color	Self-Checking	Flame Failure Response Time	Fuel	Type	Models			
R7247A1005 R7247A1021	Rectification	Green	No	2 to 4 sec	Gas	Rectifying Flame Rods	Holders ^c : C7004, C7007, C7011 Complete Assemblies: C7005, C7008, C7009, Q179.			
1 sec max.				Oil				Rectifying Photocells	C7003, C7010, C7013, C7014	
										Gas, oil, coal	Ultraviolet (Purple Peeper)	C7012A or C
R7247B1003 ^d			Dynamic Self Check ^a	2 to 4 sec	Gas	Rectifying Flame Rods	Holders ^c : C7004, C7007, C7011 Complete Assemblies: C7005, C7008, C7009, Q179.			
R7247C1001				2 to 4 sec				Gas, oil, coal	Ultraviolet (Purple Peeper)	C7012E or F
R7248A1004 R7248B1028				Infrared				Red	No	2 to 4 sec	Gas, oil, coal	Infrared (lead sulfide)	C7015
	Dynamic Ampli-check ^b	2 to 4 sec								

continued next page

R7247, R7248, R7249, R7476 continued

Plug-in Flame Signal Amplifiers					Applicable Flame Detectors		
Order Number	Type	Device Color	Self-Checking	Flame Failure Response Time	Fuel	Type	Models
R7249A1003	Ultraviolet	Purple	No	2 to 4 sec	Gas, oil, coal	Ultraviolet (Minipeeper)	C7027, C7035, C7044
R7476A1007	Ultraviolet	Blue	Dynamic Self Check ^a	2 to 4 sec	Gas, oil, coal	Ultraviolet	C7076

^aDynamic Self Check circuitry tests all electronic components in flame detection system (amplifier and detector) 60 to 240 times a minute during burner operation and shuts down burner if detection system fails.

^bCircuitry tests only flame signal amplifier during burner operation and shuts down burner if amplifier fails.

^cOrder flame rod separately; see instruction sheet for holder.

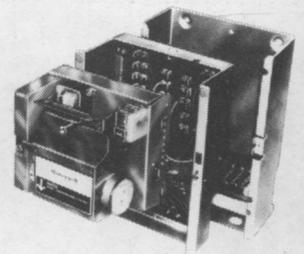
^dCan also be used with rectifying photocells and C7012A or C ultraviolet flame detectors, but then circuitry tests only flame signal amplifier during burner operation and shuts down burner if amplifier fails.

Y593 Replacement Packages

HONEYWELL OFFERS CONTROL PACKAGES LIKE THE Y593 FOR THE MOST UNIVERSAL REPLACEMENT EVER!



Y593 replacement pack contains everything you need to replace most Fireye "P" series programmers, right in the field! Each Y593 pack contains an R4140 Programming Control, a prewired Q520C Adapter Base, a Plug-in Flame Signal Amplifier and accessories and instructions for in-the-field replacement. See pages 59 and 60.

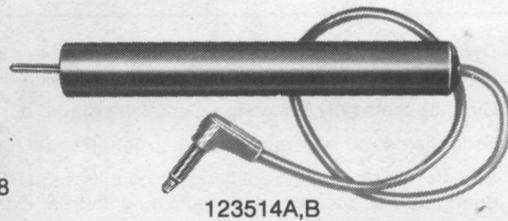
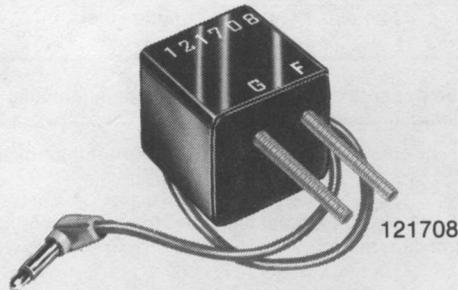


Test Equipment

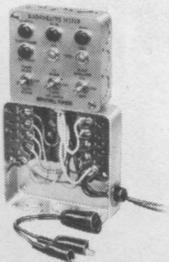
121708; 123514A,B Flame Simulators

Provide quick method of checking flame detection function of flame safeguard controls.

See ordering table for application.



Flame Simulator Model	Type of Flame Detection System	Plug-in Amplifier Model	Use With
			Flame Safeguard Control(s)
121708 (black)	Rectification (no test jack, or test jack in F circuit)	—	R177, R180, R187, R190, R485A, R887, R890, R7023A, RA190, and RA890E without test jack
		—	R485B, R7023B, RA190B, RA890E with test jack, and RA890F,H,J,K
		R7289A (green)	R4795
123514A (brown)	Rectification (test jack in G circuit)	—	R4075B; R4181A
		—	R4138A,B
		R7253A (green)	R4126, R4127
			R8169B
		R7257A (green)	R4150
		R7247A (green)	Q518A, Q519A Multiburner Modules
123514B (purple)	Ultraviolet (Minipeeper flame detectors)	—	R4075C,D,E; R4138C,D
			R4140; BC7000
			RA890G
		R7290A (purple)	R4795
		R7255A (purple)	R4126, R4127
		R7259A (purple)	R4150
	Q518A, Q519A Multiburner Modules		
	R4075C,D,E; R4138C,D		
	R4140; BC7000		

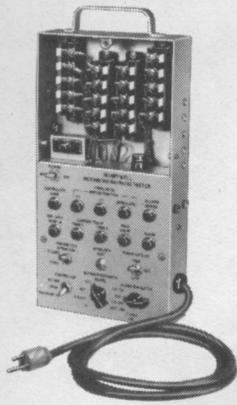


FSP1535 Tester

Provides quick operational check of Honeywell RA890 or R4795 nonprogramming primary controls.

Indicator lights visually represent functions of ignition, pilot, and main valve as unit simulates system operation. Eliminates need to operate entire system. Units with rated voltage from 100 to 240, 50/60 Hz can be tested by connecting line cord to that rated voltage.

Order Number	For Device
FSP1535	RA890, R4795



FSP5004 Flame Safeguard Programmer Tester

Provides quick operational check of most Honeywell BC7000, R4140, and R4150 programmers.

Indicator lights visually represent control functions of programmer as unit simulates system operation. Voltage: 120 V, 60 Hz. Some R4140 and R4150 models cannot be tested due to design or wiring differences. These models must be checked out using the instructions provided in their respective Honeywell instruction manuals.

Order Number	Application
FSP5004 Tester	For testing most BC7000, R4140, R4150 Programmers.

DO NOT USE FSP5004 WITH THE FOLLOWING MODELS:

BC7000L1018	R4150A1049	R4150G1160
BC7000L1034	R4150A1072	R4150H1010
BC7000L1063	R4150A1205	R4150H1028
R4140D1004	R4150A1213	R4140H1036
R4140E1001	R4150A1221	R4150J
R4140G1023	R4150A1262	(all models)
R4140G1098	R4150A1296	R4150K
R4149G1189	R4150B1013	(all models)
R4140L1022	R4150C1011	R4150L1029
R4140L1041	R4150F	R4150L1052
R4140L1063	(all models)	R4150L1060
R4140L1071	R4150G1012	R4150L1078
R4140L1089	R4150G1038	R4150M1019
R4140M1061	R4150G1053	R4150M1092
R4140M1079	R4150G1061	R4150M1175
(plus R4140	R4150G1079	R4150X
models	R4150G1087	(all models)
other than	R4150G1129	
120 Vac)		

FSP1975 Tester Panel; FSP1976, 1977, 1978, 1992 Subbases

Designed to check out or demonstrate operation of Honeywell R4126, R4127, R4138, R4140, R4150, R4181 programmers, and BC7000 Micro-computer Burner Control Systems.

Also used to check out 120 V, 60 Hz programmers, and 120/208/240 V, 60 Hz multivoltage Honeywell programmers. Some models cannot be tested due to design or wiring differences. These models must be checked out using the instructions provided in their respective Honeywell instruction manuals.

DO NOT USE FSP1975, 1976, 1977, 1978, 1992 WITH THE FOLLOWING MODELS:

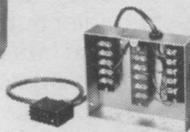
- BC7000L1018
- R178 (all models)
- R478 (all models)



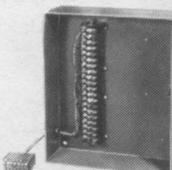
FSP1977



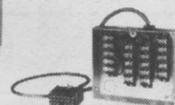
FSP1975



FSP1976



FSP1978



FSP1992

continued next page

Test Equipment

FSP1975; FSP1976, 1977, 1978, 1992 continued

R4074 (all models)
 R4075 (all models)
 R4127B1039, 1047, 1054
 R4138A1012, 1038
 R4140D1004
 R4140E1001
 R4140G1023, 1189
 R4140L1022, 1030, 1063, 1089
 R4140M1079, 1145, 1152, 1160, 1178
 R4150E1008
 R4150G1053, 1061
 R4150M1019
 R4181A1010, 1036

Supply Voltage: 120 Vac, 60 Hz. Ambient Operating Temperature Range: 0 F to 120 F [minus 18 C to plus 49 C]. Indicator Lights (on panel): 10—designated POWER ON, CALL FOR HEAT, BURNER MOTOR, LOW FIRE, HIGH FIRE, IGNITION, PILOT, MAIN VALVE, RELEASE TO MODULATE, and ALARM.

Order Number	Application
FSP1975 Tester	Checks most R4126, R4127, R4138, R4140, R4150, and R4181 Flame Safeguard Controls; 120 Vac, 60 Hz only.
FSP1976 Subbase	For testing some R4140M models; R4150A,B,C,H, and some R4150G models.
FSP1977 Subbase	For testing most R4126, R4127 models.
FSP1978 Subbase	For testing most R4138, R4181 models.
FSP1992 Subbase	For testing most R4140G,L, and M models; R4150L,M, and G models; BC7000L/PM720G,L,M models.

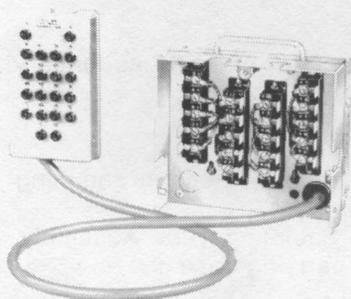


W136A Test Meter

Combination ac/dc voltmeter and dc microammeter used to test all flame safeguard controls and associated burner equipment.

Also used to verify that signal from flame detector is sufficient to operate flame relay. Four-position selector switches: 300 Vac (checks line voltage and other voltages), 150 Vdc (checks dc voltage such as flame relay voltage) 25 μ A (checks flame signal current on systems using rectifying flame rod, photocell, infrared or ultraviolet flame detectors) and SPL (checks flame signal current on systems with Dynamic Self Check amplifier). Protective circuit prevents meter burnout on 25 μ A or SPL settings. Black leather carrying case holds meter, and has compartment for storing test leads and accessories. Includes two push-on alligator clips which fit over probes and 196146 Meter Connector Plug to plug into flame signal meter jack. Test Leads: Two color-coded, 30 in. [762 mm], pinjack probe terminals. Case Dimensions: 6-1/4 in. [158.8 mm] long, 4-1/4 in. [108 mm] wide, 2-3/8 in. [60.3 mm] deep (cover closed).

Order Number	Sensitivity (ohm volt)		Accuracy (full scale)
	0-300 Vac	0-150 Vdc	
W136A1045	20,000	40,000	2%



Q520E1002 Service Tool

Used to test most R4140 flame safeguard programming controls and BC7000 Microcomputer Burner Control Systems. Can also be used to test some R4150 programming controls. Allows any of the programmer terminals to be monitored while programmer is operating.

Q520E mounts on wiring subbase; programmer mounts on Q520E. External terminal box, connected to Q520E by 3 ft [0.9 m] cable, has pin jacks corresponding to terminals on programmer. Test meter is connected to terminal box to monitor programmer operation.

Order Number	Application
Q520E1002	For testing most R4140, BC7000 controls.



In Just 30 Minutes the Combustion Efficiency Analyzer Could Help You Save Fuel Dollars!

The A7001 Combustion Efficiency Analyzer is used to sample and analyze flue gas from industrial, commercial and residential furnaces, heat treating ovens, and boilers.

Parameters measured include: percent of oxygen concentration in flue gas, flue gas temperature rise, and smoke spot number. Meter also displays combustion efficiency based on flue gas oxygen content, temperature rise, and fuel properties.

The standard 16 in. [40.6 cm] sampling tube is designed for use in flues with temperatures up to 900 F [482 C]. Optional 41-1/4 in. (104.8 cm) sampling tube available for use with stack temperatures up to 2200 F [1200 C]. The sensor probe assembly may be hand held or it may be secured in the flue with the 1/2 in. NPT male conical adapter.

Ambient Temperature Limits: Storage—minus 30 F to plus 150 F [minus 35 C to plus 65 C]; Operating—32 F to 125 F [0 C to 52 C]. Maximum Flue Gas Temperature: 16 in. [40.6 cm] probe—900 F [482 C]; 41-1/4 in. [104.8 cm] probe—2200 F [1200 C]. Relative Humidity: 10 to 90%. System Warmup Time: Less than 10 min. from cold start. Accuracy (under all rated temperature and voltage extremes): Oxygen reading—plus or minus 10% of reading; Flue temperature rise—plus or minus 1.8% of full scale; Efficiency reading—plus or minus 3% of full scale; Smoke spot measurement—plus or minus one smoke spot number.

Available only through Flame Safeguard Focus Distributors.

Model	Voltage (+ 10%, - 15%)
A7001A1009	120 V, 60 Hz only
A7001A1017 ^a	100 V, 50/60 Hz
A7001A1025 ^a	220 V, 50/60 Hz
A7001A1033 ^a	240 V, 50/60 Hz

^aMetric meter scales.

ACCESSORIES AND REPLACEMENT PARTS

193989A Smoke Spot Filter Discs; 200 pieces.

193989E Bag Assembly (220 V and 240 V models); contains: fuses (2), secondary filter and gasket, and filter block assembly screw (1 each).

continued next page

Test Equipment

Combustion Efficiency Analyzer continued

- 193989F Bag Assembly (100 V and 120 V models); contains fuses (2), secondary filter and gasket, and filter block assembly screw (1 each).
- 195183A 30 ft [9.1 m] Electrical Interconnect Cable.
- 195397A Heat Radiation Shield.
- 195450A 16 in. [40.7 cm] Standard Sampling Tube Assembly; includes sampling tube and thermocouple.
- 195451A 41-1/4 in. [104.8 cm] High Temperature Sampling Tube Assembly; includes sampling tube, thermocouple, and steel carrying case.
- 195447 Replacement Meter Case.
- 195605 Smoke Spot Chart.
- 196582A Primary Filters and Gaskets; 4 each. (For secondary filters see bag assemblies.)
- 195811A Replacement Meter Light Bulbs; contains 3 bulbs.
- 195920 Conical Fitting.
- 196589A Primary Filter Block Assembly.
- 196591 Adapter for 100, 200 and 240 V models.
- C7001A1007 Sensor Probe Assembly.
- W7001A1004 Meter Assembly; 120 V, 60 Hz.
- W7001A1012 Meter Assembly; 100 V, 50/60 Hz (metric scale).
- W7001A1020 Meter Assembly; 220 V, 50/60 Hz (metric scale).
- W7001A1038 Meter Assembly; 240 V, 50/60 Hz (metric scale).
- 65-0016 A7001 User Manual.

SAVINGS IN FUEL COSTS (per \$100) THROUGH INCREASED COMBUSTION EFFICIENCY

Efficiency Before Tuneup	Combustion Efficiency (%) After Tuneup								
	55	60	65	70	75	80	85	90	95
%									
50	\$9.10	16.70	23.10	28.60	33.30	37.50	41.20	44.40	47.40
55		8.30	15.40	21.50	26.70	31.20	35.30	38.90	42.10
60			7.70	14.30	20.00	25.00	29.40	33.30	37.80
65				7.10	13.30	18.80	23.50	27.80	31.60
70					6.70	12.50	17.60	22.20	26.30
75						6.30	11.80	16.70	21.10
80							5.90	11.10	15.80
85								5.60	10.50
90									5.30

REPLACEMENT PARTS AND ACCESSORIES ARE LISTED THROUGHOUT THIS CATALOG WITH DEVICES FOR WHICH THEY ARE INTENDED.

THIS LISTING CONTAINS DESCRIPTIONS OF SOME COMMONLY USED PARTS AND ACCESSORIES.

Order Number	Description	Use With
R1298020	Cable, high temp. (125 F [52 C]). Flame rod lead, rated at 400 F [204 C].	All flame rods.
R1239001	Cable, high tension ignition, No. 16 wire.	Ignition transformers.
R1061012	Cable, high temp. (125 F [52 C]). Lead rated at 350 F [177 C].	Ignition systems of 6000, 10,000, or 12,000 V.
132569	Contact cleaner.	All relays, programmers, A7001.
102988	Tube, vacuum.	RA190B; R478A,B; RA890E; R4074A; R4074B1008; B1032; R4074A,B; R4181A C7012
 102988		
113236 (See 102988 picture)	Tube, vacuum.	
115330 (See 102988 picture)	Tube, vacuum.	C7012, C7020
38305 (See 102988 picture)	Tube, vacuum.	R178A,B; R187; R190; R485A; R887; R890; R7009; R7023; W124 C7003A, C7010A, C7013A, C7014
38316	Rectifying photocell.	
 38316		
104662A (red)	Lead sulfide photocell, lowest sensitivity.	C7015A
104662B (yellow)	Lead sulfide photocell, medium sensitivity.	C7015A
104662C (green)	Lead sulfide photocell, high sensitivity.	C7015A
104662D (white)	Lead sulfide photocell, highest sensitivity.	C7015A

General Information

HONEYWELL'S FIRING LINE . . .

A 4-inch thick flame safeguard encyclopedia packed with essential modernization information for the combustion industry. The Firing Line is a working handbook, designed to handle day-to-day, actual field modernization situations. Here's part of what you get:

HOW TO SELL COMPLETE SYSTEM MODERNIZATION

The Firing Line will help contractors/ reps/agents/dealers estimate and sell equipment, complete with all related flame safeguard controls. In fact, there's an entire section on selling modernization equipment and burners.

HOW TO SELL CONTROL MODERNIZATION

An exciting new business opportunity for contractors. This book shows you how to enter the profitable flame safeguard control modernization market without increasing your operating costs.

HOW TO SELL REPLACEMENT

An industry first! By simply following the comprehensive cross-reference charts, you can replace virtually every high-use flame safeguard control plus the majority of the low-runners too.

CONVERSION WIRING? WE SIMPLIFY IT!

The Firing Line simplifies conversion wiring procedures with charts that help you modernize the majority of the standard flame safeguard programmers normally found in the field. A tremendous time-saver!

YOU CAN BE AN EXPERT . . . THE EASY WAY

With *The Firing Line* you can answer over 95 percent of the flame safeguard control questions you'll get in the field (excluding information normally found in standard technical publications).

CODES AND REGULATIONS AT YOUR FINGERTIPS

You get relevant quotes and excerpts from 12 national governing bodies and insurance groups with full specifics on current flame safeguard codes.

PROFESSIONAL SURVEY GUIDES AND WORK SHEETS

How would you like to be able to survey a complete flame safeguard control modernization job and select the equipment needed to bring it up to code . . . then fill out your complete quote; all in less than an hour, normally. This section shows you how, and gives you the tools to do it.

WE EVEN HELP YOU SELL BURNERS/EQUIPMENT

Knowing the advantages of modernization is one thing; getting your customer really interested in the idea is another matter. *The Firing Line* helps you here, too. Honeywell has developed a list of 25 specific safety benefits (written in the vernacular) that your customer can understand and identify with.

AUDIOVISUAL SCRIPTS AND TEACHING AIDS

There's a section on how to train your people in flame safeguard sales and technology. Use *The Firing Line* as a springboard for your own training program!

PRICE SHEETS AND CURRENT INFORMATION

The Firing Line is a loose-leaf format for good reason: It's a living, growing program; revised, expanded, updated to meet current flame safeguard techniques and regulations. When you get your handbook, you're getting today's news! And it will stay today's news, BECAUSE . . .

YOU ALSO GET AN UPDATE SERVICE

Periodically, you will get a personal mailing from Honeywell, bringing *The Firing Line* up to the most recent flame safeguard state-of-the-art.

HONEYWELL'S MARKETING AND SALES FLAME SAFEGUARD MODERNIZATION MANUAL



Along with *The Firing Line* manual, you get a full personal instruction session conducted by your local Honeywell representative, showing you how to use every page in the book. Remember, this handbook is not just a compilation of existing information . . . it's the core of a very specialized program, designed and developed to cover the full spectrum of flame safeguard.

Honeywell has spent thousands of hours and dollars compiling this book. AND YOU CAN GET IT FOR THE PRINTING AND HANDLING COSTS! Only \$80.00 for:

**The Firing Line* flame safeguard handbook; assembled, collated, and bound in a heavy-duty 4-inch vinyl binder and complete with a special storage box . . .

*PLUS a complete, personalized training seminar, with an intensified instruction session on using the handbook.

To get your personal copy of *The Firing Line*, hand-delivered to you . . . PLUS the training seminar and automatic service, just fill out the order form below or on page 72.

MAIL TO: HONEYWELL INC.

THE
FIRING
LINE

Training Administrator
MN10-2401
1985 Douglas Drive North
Minneapolis, Minnesota 55422

INCLUDED IS MY CHECK FOR \$80.00.
IN RETURN, SEND ME:

The Firing Line handbook, form 70-8900, with a personalized local training session arranged for me.

PLEASE TYPE OR PRINT ALL INFORMATION

COMPANY NAME

COMPANY ADDRESS

CITY

STATE

ZIP

INDIVIDUAL'S NAME FOR UPDATING SERVICE

FLAME SAFEGUARD REFERENCE MANUAL (66-1004 Volumes One & Two)



If you sell, install, or service Honeywell Flame Safeguard systems, you'll want this Controls Reference Manual. Two permanent poly binders contain information about controls and systems manufactured by Flame Safeguard, as well as some other Residential Division products.

Specification sheets, selection guides, summaries of national codes and standards, guide specifications—all this and more. Plus, Honeywell will mail you current information to update your FSG Controls Reference Manual for a \$20 annual subscription charge.

Honeywell

FLAME SAFEGUARD Reference Manual Order Form



AMOUNT ENCLOSED \$ _____

Please send my Flame Safeguard Controls Reference Manual(s) in the following quantities and options:

- | | |
|--|--|
| Standard _____ @ \$75 ea. | With Steel Stand _____ @ \$85 ea. |
| Without Binders _____ @ \$60 ea. | With Expandable Steel Stand _____ @ \$95 ea. |
| 2 Binder Set with Slip Cover _____ @ \$25 set. | With Leather Carrying Case _____ @ \$105 ea. |
| Microfiche _____ @ \$25 ea. | |

Manual Holder's Name: _____

Company: _____

Address: _____ City, State: _____ Zip: _____

Orders must include a check or money order (for each two-volume manual) payable to Honeywell Inc. First update is included in initial order price. An annual subscription charge of \$20 will be made to you for maintaining regular yearly updates.

Please mail to: HONEYWELL INC.
Flame Safeguard
Training Administrator — MN10-2401
1985 Douglas Drive North
Minneapolis, MN 55422-3992

General Information

FLAME SAFEGUARD TRAINING SEMINARS

Honeywell conducts Flame Safeguard control seminars both in Minneapolis and at selected locations around the country. You are invited to take advantage of this training to improve your own skills and update yourself on the latest developments in flame safety controls.

The Minneapolis and field seminars are intended for anyone interested in learning more about the application and technical aspects of flame safeguard controls.

A significant portion of the training consists of "hands-on" work with operating control systems in the laboratory. You'll perform hookup, checkout, and troubleshooting on major Honeywell primary and programming controls.

At least one Minneapolis seminar and 5 field seminars are conducted each year.

For more information on Honeywell Flame Safeguard control training, contact your local Honeywell Authorized Flame Safeguard Distributor or nearest Honeywell sales office. See page 96 in this catalog for a list of Honeywell Authorized Flame Safeguard Distributors and page 95 for a list of Honeywell Sales Offices.

TRAINING MATERIALS

Honeywell has a complete line of training materials ranging from Service Handbooks and Training Kits to Audiovisual Programs and Demonstrators. To order the flame safeguard training materials listed below (to order demonstrators, see instructions below), use the order form on page 89.

SERVICE HANDBOOK

Used by working technicians throughout the flame safeguard control industry. Valuable as a teaching tool or for reference. An important part of every student's permanent library.

70-8610 RA890/R4795 Service

Handbook..... \$0.50 ea.
(Also part of Student Packet for Flame Safeguard Controls Training Kits. See below.)

BURNERS AND BOILERS REFERENCE MATERIAL

A description of various types of commercial and industrial gas, oil, and coal burners and their operation. Also boilers classified by construction and size. A comprehensive and understandable introduction to the subject; 68 pages.

70-8107 Burners and Boilers..... \$1.00 ea.

FLAME SAFEGUARD CONTROLS TRAINING KIT



Coordinated materials provide complete instructional support for your flame safeguard control and control system training programs. Major emphasis is on specialized control systems for programmed supervision of large commercial and industrial types of gas and oil burners. Prepares the instructor for 6 to 8 hours of classroom instruction. Subject coverage may be condensed or varied to give emphasis to selected topics or to fit your specific teaching objectives. Organized in a convenient 3-ring, hardcover binder. Materials can be ordered as a set or separately to give you complete flexibility for your training programs.

Flame Safeguard Training Kit includes:

- Instructor's Reference Manual (81 pages)—flame safeguard principles, operation and application of flamerod, photocell, infrared and ultraviolet flame detectors, flame safeguard controls and typical operating sequences (RA890F, R4126, R4140).
- Vugraph Slides (68 slides).
- Student Notebook (21 pages).
- Answers to Workbook Problems (17 pages).
- Wall Charts.
- RA890/R4795 Service Handbook (39 pages).
- Glossary of Terms (21 pages).
- Troubleshooting Guide (12 pages).
- Student Materials Order Form.

K-6 Flame Safeguard Controls..... \$50.00 ea.

Order Additional Training Kits without Vugraph Slides

The price for each additional kit is \$5.00 when ordered with a complete program and \$7.50 when ordered without a complete program.

71-97234 Flame Safeguard Controls..... \$5.00/\$7.50 ea.

Reference Manual (for use as a student text)

71-97235 Flame Safeguard Controls

1-9, \$2.00 ea; 10-24, \$1.50 ea; 25 or more, \$1.00 ea.

Student Material Packet Flame Safeguard Controls.

Includes:

—70-8610 RA890/R4795 Handbook

—70-8110 Glossary

—70-8626 Troubleshooting Guide

71-97238 Flame Safeguard Controls

Student Packet..... \$1.00 ea.

AUDIOVISUAL PROGRAMS

Honeywell Audiovisual Programs provide effective and authoritative training with the double impact of sight and sound. Programs are available in two formats.

1. LA BELLE FORMAT

A continuous loop of synchronized sight and sound programming in one cartridge. Slip the cartridge into your LaBelle projector and it's ready to show.

2. STANDARD FORMAT

Regular 35mm slides with separate cassette soundtrack may be played back in two ways:

—On a standard 35mm slide projector and cassette recorder. The slides may be advanced manually and used with or without soundtrack. A copy of the script is included with each program.

—On a self-contained playback unit such as the Singer Caramate. The soundtrack is electronically pulsed to automatically synchronize the slides and tape.

NOTE: The slides for these programs are shipped in envelopes, not in trays.

AV21 Flame Safeguard Controls: The Self-Checking Primary —Describes the results of component failure in a conventional primary control. Shows how a self-checking primary prevents a hazardous situation. Describes the operation of RA890H. Suggested audience: service technicians, sales personnel, building owners and managers.

AV21 (L) LaBelle..... \$25.00

AV21 (35) 35mm slides/tape..... \$35.00

AV26 Flame Safeguard Controls: The Gas Valve Train —The requirements for controlling gas flow to large burners and the hardware to meet these requirements. Suggested audience: service technicians, counter and sales personnel, technical students.

AV26 (L) LaBelle..... \$25.00

AV26 (35) 35mm slides/tape..... \$35.00

71-7413 Student Workbook..... \$0.50

AV-36 Modernizing Power Gas Burner Control Systems to Meet UL795 —Presents the need for control system modernization resulting from recently revised standards of safety for gas burners. Suggested audience: service technicians, sales personnel.

AV36 (L) LaBelle..... \$25.00

AV36 (35) 35mm slide/tape..... \$35.00

AV-41 Modernizing Flame Safeguard Control Systems —A new business opportunity for contractors—suggestions to help you and your customers take advantage of the business opportunities available through modernizing older flame safeguard control systems. Suggested audience: service technicians, sales personnel.

AV41 (L) LaBelle..... \$25.00

AV41 (35) 35mm slide/tape..... \$35.00

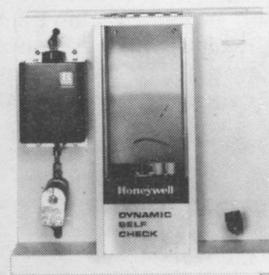
AV-62 The Guard Ring Low Water Cutoff Control —A three part program discussing boiler basics including design and capabilities of typical boiler problems associated with low water cutoff controls and operation and installation of Honeywell's Guard Ring low water cutoff control. Suggested audience: distributors, users, dealers, design engineers and anyone involved with the design and installation of flame safeguard systems.

AV62 (L) LaBelle..... \$25.00

AV62 (35) 35mm slide/tape..... \$35.00

DEMONSTRATORS

DSP 1568 "PLAYING WITH FIRE" DEMONSTRATOR



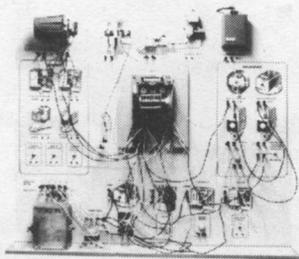
"Playing With Fire" demonstrator shows the operation of the RA890E,F,H Primary Controls and helps demonstrate the safety features of the Dynamic Self Check primary.

General Information

DSP 2002, 2010 DEMONSTRATORS

The Flame Safeguard Trainer/Simulator comes in two versions: stationary or countertop (DSP 2002) and carry-case or portable (DSP 2010). For current pricing, please contact the Energy Products Training Department.

These trainers come with 10 student "lab" manuals (form 71-97774) and one copy of the instructor's manual.



DSP 2002—Flame Safeguard Controls Trainer/Simulator, Countertop Version (pictured above)

Originally designed for Honeywell employee and customer training programs, this 42 in. x 48 in. trainer/simulator can handle all the auxiliary controls typically used in flame safeguard systems. With this trainer/simulator you can wire up the same circuits that are used on commercial and industrial burners. Realistically demonstrates principles of flame safety controls, including flame rectification, ultraviolet flame detection and various types of primary controls. Permanently mounted controls include spark generator, pilot burner, main burner, main valve, trouble switches and jumper wires with plugs for connecting controls.

A series of "trouble" switches on the trainer simulate a variety of system defects, ranging from a burned out pilot valve to a faulty detector or inoperative firing rate motor. The key to what each trouble switch does is contained only in the instructor's manual.

The trainer includes a provision for mounting either an RA890, R4795 type primary, or a full programming control such as the R4140 or BC7000. The permanently-mounted pilot flame and main burner (LP gas) permit use of a flame rod or various optical detectors. Programming controls and primary controls are NOT included with the trainer (purchased separately by user), allowing the user to select or "customize" the capabilities desired, without paying for unnecessary components.

DSP 2010—Flame Safeguard Controls Trainer/Simulator, Carry-Case Version

This trainer has exactly the same functions and capabilities as DSP 2002, except that it comes in a handy self-container carrying case. Cost of carrying-case unit is slightly higher than stationary model.

The DSP 2002,2010 Demonstrators accommodate the following primary and programming controls: RA890F Rectification Primary Control, RA890G Ultraviolet Primary Control, RA890H Self-Checking Primary Control, R4795 Primary with prepurge and recycle feature, R4140M On-Off Programming Control, R4140G Modulating Programming Control, R4140L Programming Control (to meet insurance company requirements and BC7000 Microcomputer Burner Control Systems).

DSP 2018—BC7000 Microcomputer Burner Control System Demonstrator (countertop version)

This demonstrator displays the BC7000 capabilities: Switches on the demonstrator allow fault codes to be produced on the BC7000 to demonstrate its actual operation.

An attractive and attention-getting design make DSP 2018 suitable for trade shows, sales presentations, and customer meetings. DSP 2018 provides a method of quickly demonstrating and main features of the BC7000. A switch allows the demonstrator to be placed on "automatic" or "manual." In "continuous" mode, the demonstrator automatically recycles the BC7000 to illustrate sequential operation without attendant assistance. In "manual" mode, the attendant can demonstrate the different control system malfunctions and their corresponding fault codes.

This demo is available completely assembled and wired, assembled but unwired, or as a completely disassembled kit (all parts and components included) to be assembled and wired by the user/purchaser.

How to order Honeywell Residential Division demonstrators.

Because of occasional changes in the cost of production, shipping and handling, we are unable to quote exact prices on Honeywell demonstrators for your instructional use. Most of these demonstrators are not stocked but are built to order. If you are interested in buying a demonstrator, contact us and we will get a firm price from our vendor.

Submit your order on your letterhead or standard purchase order. We will fill your order in Minneapolis and bill you directly. To order, or for more information, contact:

**Training Coordinator MN10-2523
1985 Douglas Drive North
Minneapolis, MN 55422-3992**

Honeywell Residential Division has a number of training aids on other control subjects too. For a copy of our catalog describing all available training materials, write us. Ask for "Training Materials Catalog," form 50-0882.

General Information

Instructional Materials Order Form

Ship to:

School or Company Name _____

Attention _____

Address _____

City _____ State _____ Zip _____

Bill to:

School or Company Name _____

Address _____

City _____ State _____ Zip _____

Authorized Signature _____

Customer P.O. No. _____ Order Date _____

Qty.	Catalog No.	Description	Unit Price	Subtotal

Please send me a copy of the "Training Materials Catalog," form 50-0882.

Send to:

Honeywell Inc.

1985 Douglas Drive North

Minneapolis, MN 55422-3992

Attn: Training Coordinator MN10-2523

Total order \$ _____

State Sales Tax* \$ _____

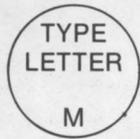
Total amount of entire order \$ _____

*Tax exempt institutions must include a copy of tax exempt certificate.

Please send payment with your order unless otherwise noted. Allow 3 to 6 weeks for delivery.

General Information

ORDER SPECIFICATION NUMBER SYSTEM



TYPE
NUMBER

941

SUFFIX
LETTER

A

OS
NUMBER

1008

The type letter is the single letter, or two-letter group, which begins the model number. This letter indicates the general type of control involved. A list of type letters used is shown below (some controls may fit in more than one category):

AT	—Transformer (accessory, transformer).	Q	—Accessories.
C	—Combustion controls.	R or RA	—Relays.
D	—Dampers.	S	—Switches.
F	—Filters, electronic air cleaners.	T, TA, TM, or TS	—Thermostats and remote bulb temperature controllers.
H	—Humidity controls, including combination temperature and humidity controllers.	V or VS	—Valves.
L or LA	—Limit controllers.	W	—Accessories of certain types.
M	—Motors.	Y	—Package sets.
P	—Pressure controllers.		

DATE CODE

A date code is stamped on each device to identify the date of manufacture.

In October 1975, Honeywell adopted the industry standard date code system of a 4-digit code. The first 2 digits indicate the year—the second 2 digits indicate the week of the year. EXAMPLE: 7612—the last week of March 1976.

For devices manufactured before October 1975, the following date code was used. If the letter "R" is added as a third letter, it indicates a repair date.

A January	G July	H 1962	Z 1970
B February	H August	G 1963	Y 1971
C March	I September	F 1964	X 1972
D April	J October	E 1965	W 1973
E May	K November	D 1966	V 1974
F June	L December		

NEMA STANDARD CLASSIFICATION CODE FOR FLAME SAFEGUARD ENCLOSURES

NEMA 1—General Purpose. For indoor protection, where conditions are not unusually severe.

NEMA 2—Driptight. Designed to exclude falling moisture or dirt. Particularly applicable to cooling rooms, laundries, etc., where condensation is prevalent. For indoor use.

NEMA 3—Weather Resistant (weatherproof). For outdoor use; designed to withstand all normal exposure to natural elements. Controls mounted on pull-out racks for easy access. With rain hood and weather seals.

NEMA 4—Watertight. Withstands water pressure from 1 inch hose nozzle, 65 gallons per minute, from distance of not less than 10 feet for five minutes. Suitable for maritime applications, breweries, etc.

NEMA 5—Dust-tight. Equipped with dust-tight gaskets. Suitable for mills and other high-dust atmospheres.

NEMA 6—Submersible. For submerged operation under specified pressures and time.

NEMA 7—Hazardous Locations, National Electrical Code Class 1 (circuit breaks in air).

NEMA 8—Hazardous Locations, National Electrical Code Class 1 (circuit breaks immersed in oil).

NEMA 9—Hazardous Locations, National Electrical Code Class 2.

NEMA 10—Explosion-proof. Meets U.S. Bureau of Mines requirements for explosive atmospheres.

NEMA 11—Acid or Fume Resistant. Provides for immersion of enclosed equipment in oil.

NEMA 12—Industrial Use. Excludes oils, dust, moisture, to satisfy individual requirements.

APPROVAL BODIES

Most of the devices described in this catalog have been approved or listed by one or more of the approval bodies listed below.

Underwriters Laboratories Inc.

UNDERWRITERS LABORATORIES INC. is a nonprofit organization which examines and tests devices, systems, and materials. Its membership represents a broad cross section of industry, education, and government.

Field inspectors for Underwriters Laboratories Inc. do not normally inspect equipment installed on job sites, but restrict their activities entirely to periodic inspections of products coming off manufacturers' assembly lines.

The three general categories of acceptance of a product by Underwriters Laboratories Inc. are:

1. General listing.
2. Component recognized.
3. Classification.

General listed devices are structurally and functionally complete and suitable for field installation.

Component recognized devices are incomplete in some way that makes them unsuitable for general field installation. They are intended to be factory installed as part of some other piece of equipment.

Classified devices or products have been evaluated as to specific hazards only.

Industrial Risk Insurers

INDUSTRIAL RISK INSURERS (formerly FIA) is composed of member stock insurance companies, concerned with all phases of fire protection and other perils insured against by its members.

Generally, Industrial Risk Insurers accepts Underwriters Laboratories Inc. listing as evidence of device acceptability, but approves or disapproves each job on its own merits including:

1. Oven, dryer, furnace, or boiler construction.
2. Flame safeguard control systems.
3. Fire protection equipment, sprinkler and alarm systems, etc.

Inspectors are located in field offices in major cities.

The home office is in Hartford, Connecticut, where a laboratory is maintained.

Canadian Standards Association

The CANADIAN STANDARDS ASSOCIATION is a nonprofit, nongovernmental organization which provides a national standardizing body for Canada.

The Canadian Standards Association Testing Laboratories, inaugurated in May 1940, is a division of the Canadian Standards Association, and is recognized as a testing and investigating agency by Inspection Authorities and by Fire Marshalls and Fire Commissioners throughout Canada.

The Canadian Standards Association Laboratories test and examine electrical products submitted for approval in compliance with pertinent Canadian Standards Association codes and standards.

The Laboratories provide a Certification Service for other types of products.

Factory Mutual

FACTORY MUTUAL is an association of mutual insurance companies dedicated to loss prevention. Through its research arm, the Factory Mutual Research Corporation, it investigates means of preventing and minimizing fire and other losses. Factory Mutual Laboratories test and approve two broad categories of devices and materials:

1. Those used for the control or prevention of property damage.
2. Those that in themselves would present serious hazards if not properly designed.

Factory Mutual Acceptance refers to a specific installation or arrangement of equipment. Installations using approved devices, if found satisfactory following review of plans and inspection of completed work, are "accepted."

A continuing follow-up program is carried out through periodic plant inspections and reports of performance in actual use.

American Gas Association

The AMERICAN GAS ASSOCIATION is the testing organization of the American gas industry with laboratories in Cleveland, Ohio, and Los Angeles, California. The American Gas Association sponsors the American National Standards Institute Z21 and Z83 Committees on standards for gas-fired equipment.

Any manufacturer of gas appliances or gas appliance accessories may submit his products to the Laboratories and secure certification of his designs upon compliance with the appropriate national standards. Upon such compliance, the manufacturer is granted an Appliance Certificate or an Accessory Certificate and is permitted to display the trademarked Laboratories' Certification Seal or trademarked Laboratories' Certification Symbol on the appliance or accessory. Certification is renewed annually.

General Information

SI METRIC UNITS AND CONVERSION FACTORS

IMPORTANT

The specifications given in this catalog do not include normal manufacturing tolerances. Therefore, the units may not match the listed specifications exactly. Also, the products are tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.

In this catalog, we've included dual dimensions—standard and metric—wherever applicable. We have used conversions from the Systeme International d'Unites or International System of Units (SI).

Some measurements are nominal and are not converted. EXAMPLE: 4 x 4 in. junction box; 1/2 NPT.

The table below lists the units used for conversion, and the conversion factors.

Where SI metric units are listed for temperature and other controls, it is *not* meant to indicate that the scaleplates on these controls are in standard and SI metric units. Unless otherwise indicated, SI metric units are listed for reference only.

Quantity	Standard Unit	SI Unit	SI Symbol	Multiplier to Convert from Standard Unit to SI Unit
Temperature	Degrees Fahrenheit	Degrees Celsius	C	5/9 (F-32)
Length	Inches/feet	Millimetres/metres	mm/m	25.4/0.304.8
Capacity—Gas Valves	Cubic feet per hour	Cubic metres per hour	m ³ /hr	0.0283168
Control Valve Coefficient	Cv ^a	kv ^b	kv	0.857
Fluid Capacity	Gallons per hour	Litres per second	L/S	0.001052
Heat	Btu per cubic foot	Megajoules per cubic metre	MJ/m ³	0.0671
Pressure Drop	Inch of water column	Kilopascals	kPa	0.2486
Pressure	Inch of mercury	Kilopascals	kPa	3.3741
Pressure	Pounds per square inch	Kilopascals	kPa	6.8948
Power (electric)	Horsepower	Watts/kilowatts	W/kW	746/0.746
Weight	Pounds	Kilograms	kg	0.4536

^aCv of 1 is defined as 1 USGPM water flowing through valve with pressure drop of 1 psig.

^bkv of 1 is defined as 1 m³/h water flowing through valve with pressure drop of 1 atmosphere (101.325 kPa).

CONVERSION OF PRESSURE UNITS

(Convert by multiplying value in known pressure units by factor listed under required pressure unit.)

Known Pressure Unit	Required Pressure Unit								
	Kilo-pascals	Pounds per Sq. In.	Ounces per Sq. In.	Millimetres of Mercury	Kilograms per Sq. Cm	Inches of Water	Inches of Mercury	Feet of Water	Centimetres of Water
Centimetres of Water	0.0981	0.0142	0.227	0.735	0.000999	0.394	0.0289	0.0328	—
Feet of Water	2.99	0.433	6.94	22.4	0.0305	12.0	0.883	—	30.5
Inches of Mercury	3.39	0.491	7.86	25.4	0.0345	13.6	—	1.13	34.6
Inches of Water	0.249	0.0361	0.578	1.87	0.00254	—	0.0735	0.0833	2.54
Kilograms per Sq. Cm.	98.1	14.2	228.0	735.0	—	394.0	29.0	32.8	1000.0
Millimetres of Mercury	0.133	0.0193	0.308	—	0.00136	0.535	0.0394	0.0446	1.36
Ounces per Sq. In.	0.431	0.0625	—	8.24	0.00439	1.73	0.128	0.144	4.40
Pounds per Sq. In.	6.89	—	16.0	51.7	0.0703	27.7	2.04	2.31	70.4
Kilopascals	—	0.145	2.32	7.52	0.010	4.02	0.295	0.334	10.2

Absolute Pressure=Gauge Pressure + 14.74 psi.

WEIGHT & VOLUME

1 gal (U.S.).....	231 cu. in.	1 cu ft water	
	0.13368 cu ft	—at 60 F.....	62.37 lb
1 barrel (petroleum).....	42 gal (U.S.)	—at 212 F.....	59.82 lb
	9702 cu. in.	1 lb avdp.....	16 oz
1 cu ft.....	7.4805 gal		7000 grains (gr)
	1728 cu. in.	1 gram.....	453.59 grams (g)
			0.035274 oz

CAPACITIES

Most gas capacities listed in this catalog are stated for natural gas, based on 1,000 Btu per cu ft, 0.64 sp gr Nat. gas, at a pressure drop of 1.0 in. wc [37.3 MJ/m³, 0.64 sp gr at a pressure drop of 0.25 kPa].

To calculate the Btuh capacity for other gases, multiply the listed Btuh capacity by the conversion factor.

Total Heating Value for Gas X		At sp gr	Conversion Factor (multiply)
Btu/cu ft	MJ/m ³		
500 to 800	18.7 to 29.8	0.60	0.516 ^a
800 to 950	29.8 to 35.4	0.70	0.765 ^a
2500	93.3	1.53 [LP gas]	1.62

^aNominal conversion factor for range of total heat value.

For gases not listed in table, use one of the following formulas:

$$\left(\begin{array}{l} \text{Listed—Btuh Capacity} \\ \text{(0.64 sp gr)} \end{array} \right) \sqrt{\frac{0.64}{\text{sp gr Gas X}}} \left(\frac{\text{Btu/cu ft [MJ/m}^3\text{] gas X}}{1000 \text{ Btu/cu ft [37.3 MJ/m}^3\text{]}} \right) = \text{Btuh Capacity gas X}$$

or

$$\left(\begin{array}{l} \text{Btuh Capacity} \\ \text{(Gas A)} \end{array} \right) \sqrt{\frac{\text{sp gr Gas A}}{\text{sp gr Gas B}}} \left(\frac{\text{Btu/cu ft [MJ/m}^3\text{] gas B}}{\text{Btu/cu ft [MJ/m}^3\text{] gas A}} \right) = \text{Btuh Capacity gas B}$$

POWER & HEAT

1 Btu.....	776 ft-lb
	0.293 Watt-hr
	252 cal
1 cal.....	0.003968 Btu
	0.0011619 Watt-hr
1 Btuh.....	0.293 Watt
	4.2 cal/min
1 Watt.....	3.413 Btuh
1 Watt-hr.....	3.413 Btu
1 kW (1000 Watts).....	3413 Btuh
1 kW-hr.....	3413 Btu
1 hp.....	0.746 kW
	2544.65 Btuh
	33,000 ft-lb/min
1 Bohp ^a	9.809 kW
	33,479 Btuh
	34.5 lb. of steam per hour

^aBoiler Output Horsepower is the equivalent of the heat required to evaporate 34.5 lb. of water per hour into dry, saturated steam at 212 F.

Btu CONTENT OF FUELS

Grade or Type	Unit	Btu
No. 1 Oil	Gallon	137,400
No. 2 Oil	Gallon	139,600
No. 3 Oil	Gallon	141,800
No. 4 Oil	Gallon	145,100
No. 5 Oil	Gallon	148,800
No. 6 Oil	Gallon	152,400
Nat. Gas	Cu ft	950 to 1,150
Propane	Cu ft	2,550
Butane	Cu ft	3,200

HORSEPOWER RATINGS

Ratings of Honeywell controls herein listed are in amperes, and correspond generally to the values for various horsepowers as shown in this chart. Full load ratings are taken from the National Electrical Code, 1978 edition; locked motor ratings are 6 times full load rating (ac) or 10 times full load rating (dc).

All motors do not necessarily come within the maximum ampere ratings shown in the table, and control devices must be used which have a rating equal to, or greater than, the actual motor running and starting currents.

Approximate Horsepower	120 V		240 V	
	Full Load	Locked Rotor	Full Load	Locked Rotor
1/6	ac	4.4	26.4	13.2
	dc	—	—	—
1/4	ac	5.8	34.8	17.4
	dc	3.1	31.0	16.0
1/3	ac	7.2	43.2	21.6
	dc	4.1	41.0	20.0
1/2	ac	9.8	58.8	29.4
	dc	5.4	54.0	27.0
3/4	ac	13.8	82.8	41.4
	dc	7.6	76.0	38.0
1	ac	16.0	96.0	48.0
	dc	9.5	95.0	47.0
1-1/2	ac	20.0	120.0	60.0
	dc	13.2	132.0	66.0
2	ac	24.0	144.0	72.0
	dc	17.0	170.0	85.0
3	ac	34.0	204.0	102.0
	dc	25.0	250.0	122.0

General Information

FLAME SAFEGUARD CONVERSION FACTORS

SIMPLIFIED METHOD OF DETERMINING COMBUSTION AIR REQUIRED TO COMPLETELY BURN A GIVEN AMOUNT OF FUEL.

$$\text{CFH Air} = \frac{\text{Btu/hr input}}{100}$$

TO CORRECT GAS VOLUME FROM ONE SET OF CONDITIONS TO ANOTHER

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

- P = absolute pressure.
= 14.7 + gauge psi.
- T = absolute temperature in °R = °F + 460.
- V = Volume in any consistent terms.

Normally useful for determining standard cubic feet of fuel consumed when metering pressure is other than standard; e.g., gas passing through a volumetric gas meter at 5 psig. (The heating value of fuel gases is based on Btu/CF at standard gas conditions.)

TURNDOWN RATIO OF FIXED AREA BURNER.

$$\text{T.D.} = \sqrt{\frac{\text{Maximum Pressure Drop across Burner}}{\text{Minimum Pressure Drop across Burner}}} = \frac{\text{Maximum Firing Rate}}{\text{Minimum Firing Rate}}$$

Where pressure drops are expressed in the same units.

RELATIONSHIP BETWEEN FLOW CAPACITY AT A SPECIFIED PRESSURE DROP AND Cv FACTOR.

Cv = Flow Factor. Defined as the amount of water @ 60 F in gallons per minute which will flow through a valve in the open position with a pressure drop through the valve of 1 pound per square inch.

For capacity conversion to gases the following formula may be used *for pressure ratios less than critical ratios.*

$$Q = 1360 C_v \sqrt{\frac{(P_1 - P_2) P_2}{GT}}$$

- Q = Standard cubic feet per hour @ 14.7 psia and 60 F.
- P1 = Inlet pressure, psia.
- P2 = Outlet pressure, psia.
- T = Absolute temperature in °R = °F + 460.
- G = Specific gravity of the gas.

The following cities have sales branches only. Check your local telephone directory for phone number and address. Factory shipments should be sent to Honeywell, 1885 Douglas Drive North, Minneapolis, Minnesota 55422. For international sales branches not listed below call (612) 542-3357 or 542-7223.

At Your Service—

from Coast to Coast

ALABAMA—Contact Atlanta, Georgia
ALASKA
 Anchorage—Contact Bellevue, Washington
ARKANSAS—Contact Memphis, Tennessee
ARIZONA
 Phoenix
CALIFORNIA
 Los Angeles
 Walnut Creek (San Francisco area)
COLORADO
 Englewood
CONNECTICUT
 Hartford
DELAWARE—Contact Bala Cynwyd, Pennsylvania
DISTRICT OF COLUMBIA—Contact Bala Cynwyd, Pennsylvania
FLORIDA
 Miami
 Orlando
GEORGIA
 Atlanta
HAWAII—Contact Walnut Creek, California
IDAHO—Contact Salt Lake City, Utah
ILLINOIS
 Bensenville
INDIANA
 Evansville
 Indianapolis
IOWA
 Des Moines
KANSAS—Contact Kansas City, Missouri
KENTUCKY
 Louisville
LOUISIANA
 Metairie (New Orleans area)
MAINE—Contact Newton Highlands, Massachusetts
MARYLAND
 Dorsey (Washington, DC area)
MASSACHUSETTS
 Newton Highlands (Boston area)
MICHIGAN
 Grand Rapids
 Southfield
MINNESOTA
 Edina (Twin City Branch)
 Edina (Minneapolis/St. Paul area)
MISSISSIPPI—Contact Memphis, Tennessee
MISSOURI
 Kansas City
 St. Louis
MONTANA—Contact Salt Lake City, Utah
NEBRASKA
 Omaha

NEVADA
 Las Vegas area—Contact Phoenix, Arizona
 Reno area—Contact Walnut Creek, California
NEW HAMPSHIRE—Contact Newton Highlands, Massachusetts
NEW JERSEY
 Westfield
NEW MEXICO—Contact Phoenix, Arizona
NEW YORK
 Amherst (Buffalo area)
 Liverpool (Syracuse area)
 Manhasset (New York area)
NORTH CAROLINA
 Charlotte
NORTH DAKOTA—Contact Edina, Minnesota
OHIO
 Cleveland
 Columbus
 Dayton
OKLAHOMA
 Oklahoma City
OREGON
 Portland
PENNSYLVANIA
 Bala Cynwyd (Philadelphia area)
 Harrisburg
 Pittsburgh
RHODE ISLAND—Contact Newton Highlands, Massachusetts
SOUTH CAROLINA—Contact Atlanta, Georgia
SOUTH DAKOTA—Contact Edina, Minnesota
TENNESSEE
 Memphis
 Nashville
TEXAS
 Dallas
 Houston
UTAH
 Salt Lake City
VERMONT—Contact Newton Highlands, Massachusetts
VIRGINIA
 Richmond
WASHINGTON
 Bellevue (Seattle area)
WEST VIRGINIA
 Charleston
WISCONSIN
 Brookfield (Milwaukee area)
WYOMING—Contact Englewood, Colorado

Across Canada, and Internationally:

ALBERTA
 Calgary
 Edmonton
BRITISH COLUMBIA
 Vancouver
MANITOBA
 Winnipeg
NEW BRUNSWICK
 Moncton, NB
NEWFOUNDLAND
 St. John's Newfoundland
NOVA SCOTIA
 Halifax
ONTARIO
 Hamilton
 London
 Ottawa
 Sudbury—Contact Toronto Sales Office
 Toronto (Sales Office)
PRINCE EDWARD ISLAND—Contact Halifax, Nova Scotia
QUEBEC
 Montreal
 Quebec City
SASKATCHEWAN
 Regina—Contact Winnipeg Office
 Saskatoon—Contact Edmonton Office
INTERNATIONAL—Contact Honeywell (612) 542-3357 or 542-7223

Centratherm Controls



The Centratherm Universal Weather Responsive product line is a modular system of controls which regulates heating supply and boiler temperature as a function of outdoor conditions. These systems can be applied to:

- Single boiler hydronic systems
- Multiple boiler systems
- One- and two-pipe steam systems
- Hot air systems

These systems provide on-off control of burners, on-off control of circulators and proportional plus integral (P+I) control of 3-way and 4-way mixing valves. Energy savings in excess of 30% and reduced heating system maintenance costs can be achieved without sacrificing occupant comfort levels.

Modular System

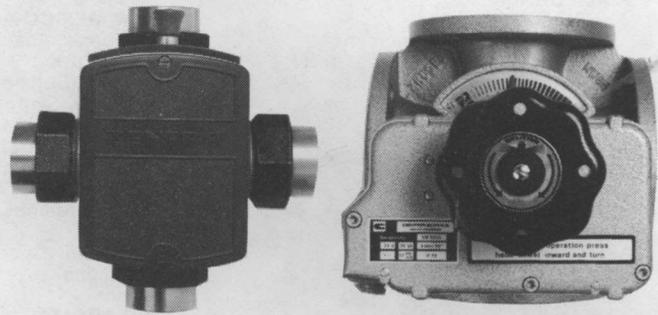
Simple-to-install modules enable each system to be customized for the application. The modular construction of the Centratherm system enhances serviceability, facilitates installation and simplifies system expansion.

Modular System Models	On/Off Burner Control	On/Off Circ. Control	P+I Valve Control	Multi-Boiler Control	Options Available				
					Programmer	Room Limit	Solar & Wind Comp.	Domestic Hot Water	Heat Optim.
ZG52		X	X		X	X	X	X	X
ZG52E	X	X			X	X	X	X	X
ZG52K	X				X	X	X	X	X
ZG53E3		X		X	X	X	X	X	X
ZG55	X	X	X		X	X	X	X	X

For more information on centra controls contact your local Honeywell Flame Safeguard Distributor listed in the back of this catalog or call 800/328-5111 ext. 7533 (in Minnesota call collect 612/870-2142 ext. 7533).

System Options

- Programmer (clock) provides automatic changeover between normal operation and reduced temperature operation.
- Room temperature limit control ensures that room overheating (by sun, people, etc.) is prevented.
- Sensors and controls compensate for wind and solar effects.
- Domestic hot water module provides prioritized and night setback control of domestic water supply.
- Boiler supply and return water temperature control reduce the potential for corrosion and thermal shocking within the boiler.
- Heating optimization modules maximize system energy efficiency.
- Meters and modules enable remote indication and recording of vital temperature readings.



Three- and Four-Way Mixing Valves

Centra rotary mixing valves are specifically designed to mix hot water from the boiler with the cold water returning from the radiator or heating coil. These mixing valves offer significant benefits:

- A lower cost alternative to stem and seat valves because they are designed specifically for low differential pressure mixing applications.
- Durable, proven cast iron design provides reliable performance at static pressures up to 125 psi and hot water temperatures as high as 260°F.
- 3-way mixing valves available from 3/4 in. up to 5 in. Can be used in mixing or diverting applications.
- Unique 4-way mixing valves available from 3/4 in. up to 8 in. Provide accurate discharge temperature control and protect boiler from thermal shock.
- All valves can be operated manually or automated with Centra actuators.

NOTES

NOTES

Honeywell

RESIDENTIAL DIVISION WARRANTY POLICY

Honeywell warrants its Residential Division products (except those parts designated on Honeywell's price lists as not covered by this warranty) to be free from defects due to workmanship or materials, under normal use and service, for twelve (12) months from date of installation. If a product is defective due to workmanship or materials, is removed within twelve (12) months after installation, and is returned to Honeywell in accordance with the procedure described below, Honeywell will, at its option, either repair, replace or credit the customer for the purchase price of the product, in accordance with the procedure described below. This warranty extends only to persons or organizations who purchase Honeywell's Residential Division products for resale.

The express warranty above constitutes the entire warranty of Honeywell with respect to Residential Division products and IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL HONEYWELL BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

INSTRUCTIONS—INSTALLING OR SERVICING CONTRACTOR OR DEALER

When replacing a Honeywell product under warranty, including those products furnished on original heating and/or cooling equipment, you should rely on your local Honeywell Wholesaler or Distributor for prompt and efficient product replacement service.

A Honeywell Returned Goods Identification Tag (form 81-2586-060) must be completed and signed by the servicing dealer/contractor prior to submitting the product to the Honeywell Wholesaler or Distributor. (Tags may be obtained from the Wholesaler or Distributor in advance.) No warranty claim for product replacement or credit will be honored by the Wholesaler/Distributor without a completed warranty tag attached.

INSTRUCTIONS—WHOLESALE OR DISTRIBUTOR

The following will apply to the return of any product to Honeywell under this warranty:

Any products which are:

- (i) identified with Honeywell's Returned Goods Identification Tag (form 81-2586-060);
- (ii) are listed individually with Returned Goods ID Tag numbers and date codes listed on Honeywell's Returned Goods Order (form 71-96024) or a similar form;

SPECIAL MESSAGE TO INDUSTRIAL USERS AND BUILDING OWNERS

Thank you for using Honeywell products.

As a user, when you purchase a Honeywell Residential Division product, you should expect performance from the product and, if it fails, replacement of the product from the installing dealer.

Typically, you will have purchased a Honeywell product under the following circumstances:

1. To modernize or refurbish your existing commercial and/or process control system.
2. You have purchased new commercial and/or process heating, cooling, air

(iii) are protected from shipping damage;

(iv) have certification by the installer or servicing dealer that the product was removed, due to failure, within twelve (12) months after date of installation;

(v) are received transportation prepaid at:

Honeywell Inc.
Decatur Warehouse
8941 Tenth Avenue North
Golden Valley, MN 55427-4375

(vi) and are found by Honeywell's inspection to be defective in workmanship or materials under normal use and service

will be handled in accordance with one of the two following procedures, as specified by the customer making the return:

1. **CREDIT PROCEDURE.** Honeywell will issue credit, at Honeywell's lowest wholesaler net price in effect at the time of the return (as set forth on Honeywell's then current price sheet) within ten (10) working days from receipt by Honeywell of the return. (TRADELINE Replacement Exchange Products will be credited at Honeywell's lowest replacement exchange net price in effect at the time of such return, as shown on Honeywell's then current price sheet, and the Wholesaler's Salvage Value balance will be adjusted to reflect the return.) Honeywell reserves the right to disallow this credit option in cases

cleaning or humidification equipment that is furnished with Honeywell controls or components (refer to your owner's manual furnished with the equipment).

3. A control has failed on your existing commercial and/or process heating and/or cooling equipment and is replaced by a Honeywell TRADELINE product.

With few exceptions, you utilize the services of a competent plumbing, heating and/or cooling dealer/contractor for new or replacement work performed.

Although our warranty does not extend to you, Honeywell protects your supplier with a one (1) year product warranty.

of warranty abuse. Credit will not be given on returns of the A7001 Combustion Efficiency Analyzer and its components (C7001 and W7001), or the BC7000 Microcomputer Burner Control.

2. **REPAIR OR REPLACEMENT PROCEDURE.** Honeywell will, at its option, either repair or replace the product free of charge and return it or its replacement lowest cost transportation prepaid. The replacement will be, at Honeywell's option, either a functionally equivalent new or replacement exchange product or an equivalent TRADELINE product. Premium transportation will be used at customer's request and expense.

Final disposition of any warranty claim will be determined solely by Honeywell.

If inspection by Honeywell does not disclose any defect covered by the warranty, the product will be returned, scrapped, repaired, or replaced as instructed by the customer and Honeywell's regular service charges will apply. Products returned to the customer will be sent shipping charges collect.

If you have any questions relative to product returns to Honeywell, call or write:

Honeywell Inc.
Warranty Account Manager
8941 Tenth Avenue North
Golden Valley, MN 55427-4375
(612)542-7649

Your supplier can rely on its local Honeywell Wholesaler/Distributor or Honeywell for prompt replacement.

If you have any questions, need additional information or would like to comment on Honeywell's products or services, please write or phone:

Honeywell Inc.
Customer Service MN10-1872
1885 Douglas Drive North
Minneapolis, MN 55422-4386
(612)542-7500

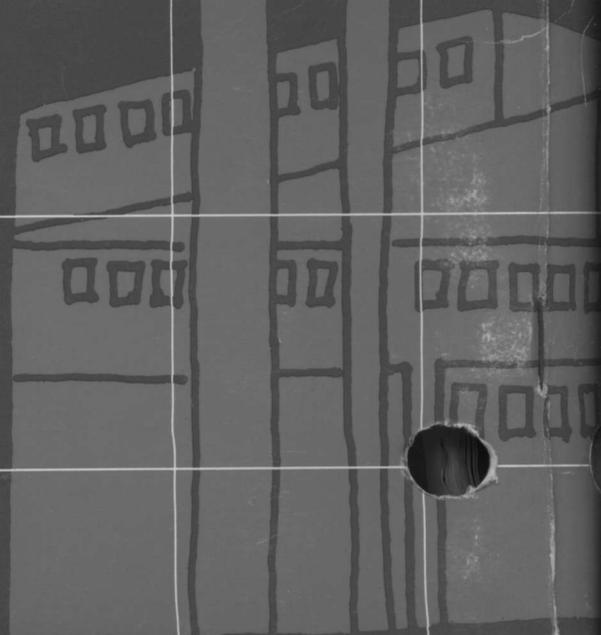
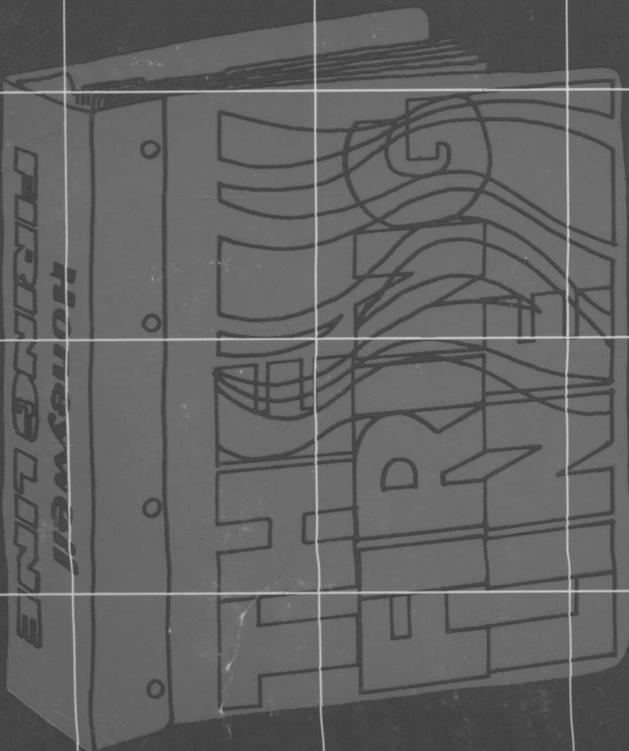
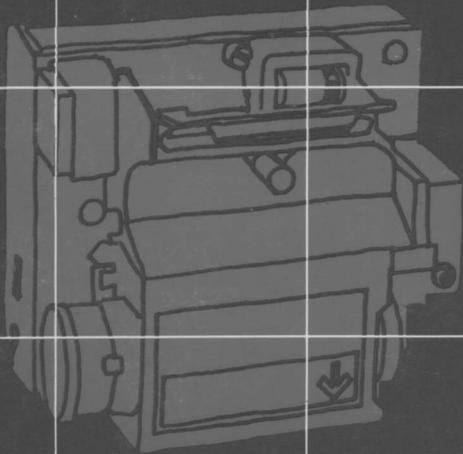
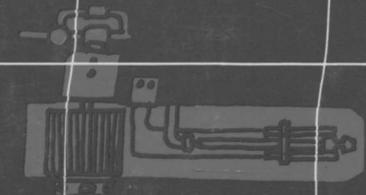
or check your telephone directory (white pages) for one of many Honeywell field sales offices (ask for the Residential Division).

Manufacturer's Representatives and Distributors



MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073





Manufacturer's Representatives and Distributors

MATT MARSHALL & COMPANY

Industrial Equipment & Supplies

Boiler & Burner—Sales & Service

Interstate Hwy. 85-S-~~27407-9799~~

Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274

GREENSBORO, NORTH CAROLINA 27407-9799

Honeywell

Residential Group

**Residential Controls Center
Energy Products Center
1982-83 Catalog**

TRADELINE

Today, energy conservation is serious business, an important factor in reducing total energy consumption. And reducing energy consumption means saving money. Honeywell leads the industry in providing controls and systems designed to conserve energy—from a complete range of Fuel Saver Thermostats and energy-efficient furnace controls for the home to the latest in energy management systems for commercial applications.

ABOUT THE COVER

Our cover is a color-coded thermogram that shows radiant heat from the same buildings shown in the line drawing below. The thermogram and the line drawing, although not the same size, are both from the same perspective. The large red area on the thermogram represents the heat emanating through the store front windows. The orange area to the left represents a slightly lesser amount of heat loss through the windows in the store's sidewall. Loss of heat from the houses in the background is shown graphically, if less dramatically, by the yellow and green areas that represent the windows, and by the blue and green areas that correspond to the roof lines and sidewalls of the houses. The yellow and green spot in the sky is the infrared radiation from the street light. HINT: If you can't make out the store and the houses on the cover, stand back about 15 feet.

WHAT IS A THERMOGRAM?

A thermogram is a picture of radiant heat which is taken as follows. A portable infrared camera detects infrared radiation from an object, converts it into a video signal, and reproduces it as a black and white image on a monitor screen. This image is then photographed with a special Polaroid camera, resulting in a black and white photograph that shows heat loss.

The thermogram can then be colored, as we did for the catalog cover, using a special computer application. The brighter colors (red, yellow) depict the warmer area; the darker colors (green, blue, purple) depict cooler areas. The colors are arranged in the same sequence as the color spectrum.

Each color represents a 2 F [1.1 C] temperature range. Since there are 10 colors in the thermogram, there's a total of 20 F (11 C) temperature difference from the warmest to the coolest areas. (The system was calibrated to the warmer temperatures; any temperatures cooler than the purple base color are also depicted as purple.)



THANKS

Our thanks to Ray Slomkowski of Thermal Sense, Inc. in St. Paul, Minnesota for providing us with the explanation above and with the original black and white thermogram, and to Philip Lane of Lane Comput-IR-vision in North Wales, Pennsylvania for coloring the thermogram.

LOOKING FOR FLAME SAFEGUARD CONTROLS ?

The Commercial/Industrial Flame Safeguard Controls Catalog, form 70-8911, provides a reference to Honeywell modernization and replacement controls and devices for use in flame safeguard systems. These include controllers, limits and interlocks, fuel valves and actuators, firing rate controls, primary and programming controls, flame amplifiers and flame detectors, and auxiliary and test equipment.

table of contents

TABLE OF CONTENTS	i	Chiller Controls	130
METRIC STATEMENT	i	Dampers	131 to 134
SUBJECT INDEX	ii to iii	Parts and Accessories	134
MODEL NUMBER INDEX	iv to v	Economizers	135 to 136
GENERAL INFORMATION	vi to viii	Environmental Control Systems	138 to 165
Order Specification Number System, Summary of Honeywell Control Series Designations, Approval Bodies, Cross Reference and Price Reference Guides, Date Code, International Controls, Taxes, Terms of Payment and Prices		Hydronic Zone Controls	166 to 173
RESIDENTIAL CONTROLS	1 to 120	Line Voltage and Proportional Thermostats	174 to 184
Electric Heating Controls	2 to 5	Parts and Accessories	184
Electronic Air Cleaners	7 to 16	Load Control Systems	185 to 190
Parts and Accessories	16	Motors	191 to 205
Gas Burner Controls	17 to 49	Parts and Accessories	242
Parts and Accessories	49	Outdoor Reset Controls	206 to 209
Humidity Controllers	51 to 53	PLC System	210 to 212
Parts and Accessories	53	Refrigeration	213 to 214
Hydronic Controls	54 to 61	Remote Bulb Temperature Controls	216 to 227
Parts and Accessories	60 to 61	Parts and Accessories	225 to 227
Oil Burner Controls	62 to 71	Step Controllers	228 to 230
Parts and Accessories	71	Timers	231 to 232
Pressure Controllers	72	Valves	233 to 241
Relays and Contactors	73 to 89	Parts and Accessories	241
Parts and Accessories	88 to 89	AUTHORIZED ENERGY MANAGEMENT	
Special Switches	90 to 91	DISTRIBUTORS	243 to 246
Parts and Accessories	91	REFERENCE	247 to 248
Stoker Controls	92 to 93	SI Metric Units, Conversion of Pressure Units, Capacities, Weight & Volume, Power & Heat, Btu Content of Fuels, Horsepower Ratings	
Test Instruments	94 to 95	RCC REFERENCE MANUAL	249
Thermostat Guards	96 to 97	EPC REFERENCE MANUAL	251
Thermostats	98 to 112	EPC SPECIFYING ENGINEER'S MANUAL	253
Parts and Accessories	112	TRAINING MATERIALS	255 to 259
Transformers	113 to 115	HONEYWELL SALES OFFICES	261
Warm Air Controls	116 to 120	SERVICE CENTER FOR TRADELINE PARTS	262
ENERGY PRODUCTS	121 to 242	USER REPLY FORM	263
Auxiliary Equipment	122 to 129	HONEYWELL WARRANTY	Inside Back Cover
Parts and Accessories	129		

TROUBLE WITH METRICATION? Honeywell can help. Metrication is not the problem many people think it is. For many years Honeywell has designed metric products for both overseas and American customers. For the convenience of those considering metric conversion, all pertinent data in this catalog is shown in both customary and metric units.

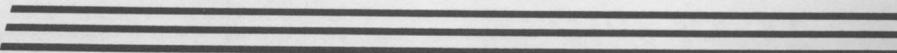
Fahrenheit temperature scales are standard on all products shown unless otherwise indicated. However, Celsius (or in some cases dual) scales are available, as requested, on a Special Order basis. In-depth metrication of Honeywell products will proceed on a deliberate basis in harmony with business trends.

Call or visit your nearest Honeywell Branch office for specific product information, or write the Metric Committee Chairman, Honeywell Inc., MN52-2240, Parkdale Plaza, 1660 S. Highway 100, Minneapolis, MN 55416.

70-6910

© Honeywell Inc. 1982

Contents of this catalog may be reproduced without the written consent of Honeywell provided that a credit line is included.

TRADELIN 

subject index

- A**
- Adapter, Junction Block45
 - Adapter, Power Unit44
 - Adapter, Thermocouple45
 - Air Control Controls,
 - Gas25-27,32-34,36,41
 - Agricultural
 - Controls176,178,219,223,225
 - Air CleanersSee ELECTRONIC AIR CLEANERS
 - Airswitch Controller177
 - Anticondensate Heater
 - Controller213
 - Aquastat Controllers54-61
 - AUXILIARY EQUIPMENT122-129
 - Auxiliary Potentiometers199,200
 - Auxiliary Switches202
- B**
- Balancing Relay193
 - Bulb and Bellows, Replacement26
 - Bulk Tank Cooling Controls219,223
- C**
- Changeover Controls123,124,128
 - CHILLER CONTROLS130
 - Combination Gas
 - ControlsSee Gas Combination Controls
 - Comfort Control Center110
 - Compression Fitting44
 - Contactors81-86
 - Compressor81
 - Definite Purpose82,85
 - Electric Heat4
 - Load Shed86
 - Crop Dryer Control225
 - Current Transformers189
- D**
- DAMPERS131-134
 - Automatic Vent49
 - Linkages133
 - Motors191-199, 203-205
 - Demonstrators, Air Cleaner16
 - Dew-point Controller213
 - Direct Spark Ignition Kit45
 - Display, Thermostat102
- E**
- ECONOMIZERS135,136
 - ELECTRIC HEATING CONTROLS2-5
 - ELECTRONIC AIR CLEANERS7-16
 - Automatic Wash9
 - Console15
 - Duct Mounted7
 - Return Grille13
 - Test Meter16
 - Wash Control Center11,12
 - Electronic Controls
 - Motors197-199,206
 - Outdoor Reset206-209
 - Panels142,144
 - Sensors122,124,144,147,160,161,165
 - Sequencers146,158,165
 - Thermostats100-102,159,183
 - Thermostat Simulator126,147,162
- F**
- Fan and Limit Controls116-120
 - Fan Controls78,80,119,120,125,175,176
 - Filter Flag Indicator91
 - Flame Detectors
 - Cadmium Sulfide68
 - Rectification46
- G**
- GAS BURNER CONTROLS17-49
 - Gas Combination Controls
 - 80 cfh Capacity29,30
 - 86.2 cfh Capacity32
 - 205,225 cfh Capacity
 - Dual Valve22
 - 250,335 cfh Capacity18,21
 - 290 cfh Capacity Dual Valve24
 - 600 cfh Capacity19
 - Selection Chart,
 - Central Heating17
 - Selection Chart,
 - Heating Appliance28
 - Selection Chart, Heating Appliance Dual Valve22
 - Gas DSI Control46
 - Gas DSI Kit45
 - Gas IP Control48
 - Gas IP Ignition System47
 - Gas LP Regulator Conversion Kit27
 - Gas Operators25,26,32,34,36,41
 - Gas Pilot Burner Generators42
 - Gas Pilot Burners40,42
 - Gas Pilot Safety Systems38
 - Gas Power Unit Replacements41
 - Gas Pressure Regulators27
 - Gas Replacement Bulb and Bellows26
 - Gas Replacement Insert Orifices43
 - Gas Replacement Thermopile Generators44
 - Gas Thermocouples39
 - Gas Thermopile40
 - Gas ValvesSee Valves, Gas
 - GENERAL INFORMATIONvi-viii
- H**
- HUMIDITY CONTROLLERS51-53
 - Combination Temperature and Humidity Control110
 - HYDRONIC CONTROLS54-61
 - Combination Oil Burner and Hydronic Controller66
- HYDRONIC ZONE CONTROLS**166-173
- Changeover Controller123
 - Hydronic Zone Systems166
- I**
- Igniter, Spark46
 - Ignition System
 - Direct Spark45
 - Intermittent Pilot47
- K**
- Kits:
 - Zone Control Builder Pak173
- L**
- Limit Controls
 - Hydronic54-61
 - Pressure72
 - Warm Air116-120
 - Linkage, Damper133
 - Linkage, Valve191,201,202
 - Limit Controls:
 - Hydronic219
 - Room Temperature220
 - LOAD CONTROL SYSTEMS185-190
 - Communication Module188
 - Communication Y-Pak189
 - Current Transformers189
 - Data Access Arrangement188
 - Load Control Systems185
 - Photo Control190
 - Watt Transducer189
 - Wind-up Timer190
 - LP Regulator Conversion Kit27
- M**
- Millivoltmeter94
 - MOTORS191-205
 - Damper203,205
 - Electronic199,206
 - Heat Actuated198
 - Linkages, Valve201,202
 - Linkages, Damper133
 - Modutrol193,194,196-198,206
 - Potentiometers199-201
 - Reversing191-194,196-199
 - Super Modutrol192
 - Switch, Auxiliary202
 - Valve237
 - Zone204
 - Motor/Valve Selection Guide191
 - Multizone Control System148-162
- O**
- OIL BURNER CONTROLS62-71
 - Cadmium Sulfide
 - Flame Detector68
 - Combination Oil Burner and Hydronic Controller66
 - Magnetic Valve70
 - Service Packs71
 - Stack Mounted68
 - Testers94
 - Operators, Gas25,26,32,34,36,41
 - Orifices, Replacement43
 - Outdoor Thermistor110

subject index

- P**
- Panel, Status144
 - Parts and Accessories
 - Auxiliary Equipment129
 - Dampers134
 - Electronic Air Cleaners16
 - Gas Burner Controls49
 - Humidity Controllers53
 - Hydronic Controls60
 - Motors242
 - Oil Burner Controls71
 - Relays and Contactors88
 - Remote Bulb Temperature Controls225-227
 - Special Switches91
 - Thermostats112,184
 - Valves241
 - Photocell, Cadmium Sulfide68
 - Pilot Burners, Gas40,42
 - Pilot Safety Controls34,36,38
 - Potentiometers
 - Auxiliary199,200
 - Manual126,200,201
 - POWER LINE CARRIER SYSTEM**210
 - Multiplexer211
 - Receiver Relay212
 - Repeater212
 - Transmitter211
 - Powerpile Controls
 - Combination Gas Valves18,19,30
 - Gas Operators34,41
 - Millivoltmeter94
 - Pilot Burner Generators42
 - Single Function Gas Valve37
 - Thermostats98,105,106,111
 - Power Unit Replacements41
 - PRESSURE CONTROLLERS**72
 - Pressure Regulators, Gas27
 - Protectorelay Oil Burner Controls62-68
- R**
- RACPAKS87
 - RAMP (Remote Access Monitoring Program)137,215
 - REFRIGERATION CONTROLS**213,214
 - RELAYS AND CONTACTORS**73-89
 - Relays
 - Aquastat56,58
 - Balancing193
 - Electric Heating2,4
 - Fan78,80
 - Heating (add-on)80
 - Heavy Duty75,76
 - Impedance75
 - Intermediate73-75
 - Load Shed86
 - Stokerelay92
 - Thermal80
 - Time Delay70,80
 - Relay Receptacle79
 - Remote Bulb Controller, Aquastat .60
 - REMOTE BULB TEMPERATURE CONTROLS**216-227
 - Two Position Temp. Controller Guide216
 - RESIDENTIAL CONTROLS SECTION**1-120
- S**
- Sail Switch90
 - SALES OFFICES**261
 - Sensors
 - Averaging Temperature161
 - Cadmium Sulfide68
 - Discharge Air144,161
 - Outdoor Air124
 - Rectification46
 - Return Air144,161
 - Space122,147,183
 - Sequencers146,158,165
 - Simulator,
 - Thermostat126,147,160,162
 - Singlezone Control System138-147
 - Spark Igniter46
 - SPECIAL SWITCHES**90-91
 - STEP CONTROLLERS**228-230
 - STOKER CONTROLS**92-93
 - SubbasesSee Thermostats, Subbases
 - Switches
 - Air Flow91
 - Auxiliary202
 - Changeover128
 - Fan Control119
 - Freeze Warning90
 - Sail90,127
 - System Selector127
- T**
- Temperature and Humidity Control110
 - Temperature Controllers:
 - Agricultural176,178,219,223
 - Air Conditioning220
 - Hydronic219
 - Ice-Trol223
 - Indoor-Outdoor208
 - Industrial219
 - Modulating180,182,183,223
 - Outdoor Reset206-209
 - Refrigeration213,214,218,224
 - Remote Bulb216-227
 - Return Air Limit220
 - Temperature Reset206-220
 - TEST INSTRUMENTS**94-95
 - Test Meters16,94,95
 - Tester, Cad Cell Primary94
 - Tester, Thermocouple95
 - Thermocouples39
 - Thermometers128
 - Thermopile40
 - Thermostat Display102
 - THERMOSTAT GUARDS**96-97
 - THERMOSTATS**98-112,174-184
 - Bulk Tank219,223
 - Changeover123,124
 - Chronotherm98,100-102,111
 - Comfort Control Center110
 - Corrosion Resistant177,178
 - DoD111
 - Duct220
 - Electric Heating3,6
 - Electronic100-103,147,159,183
 - Fan Coil175,176
 - Heavy Duty178
- V**
- Valve Motors191-199
 - Valves
 - Butterfly233
 - Cage Type, Single Seated239
 - Diverting238
 - Gas, Combination18-24,29,30,32
 - Gas, Single Function35,37
 - Gas, Thermostatic37
 - Globe, Double Seated237
 - Hydronic166-173
 - Linkages201,202
 - Mixing238
 - Motorized, Zone166
 - Oil70
 - Radiator170-172
 - Single Seated233
 - Steam233-241
 - Thermostatic Radiator170-172
 - Three Way238
 - Two Way233
 - Zone, Hydronic166-173
 - VAV (Variable Air Volume) Control**162
 - Vent Damper49
 - Ventilating Controls131-136
- W**
- WARM AIR CONTROLS**116-120
 - Combination Fan and Limit Controls116,118
 - Fan Controls119,120
 - High Limit Controls118
 - Watt Transducer189
 - Winter Watchman90
- Z**
- Zone Control Systems
 - Hydronic166-173
 - Multizone, Electronic150-162
 - Zone Control Builder Pak189
 - Zone Dampers131
 - Zone Motors155
- Key Lock Cover**96,97
- Line Voltage**174-184
- Low Voltage**98-112
- Modulating**146,159,208,223
- Multistage**108-111,181
- Outdoor**124
- Powerpile**98,105,106,111
- Refrigeration**213,214,218,224
- Remote Bulb**216-227
- Round**103,111
- Subbases**99,101,104,107,109,147,175,180
- Two-Stage**220
- Thermostat Simulators**126,147,162
- TIMERS**93,190
- Time Delay, Oil**70
- TRAINING MATERIALS**255-259
- TRANSFORMERS**113-115
- Cover Mounted**195
- Electronic Air Cleaner**113
- General Purpose**113,122
- Heavy Duty**114,122
- Motor Mounted**195
- Multimount Step-down**115
- Plug-in**114
- Universal Stripped Down**114

model number index

MODEL	FORM NUMBERS	PAGE	MODEL	FORM	PAGE	MODEL	FORM	PAGE
105049	60-0941	195	H609A	60-2425	213	Q539	60-2246	104
130810	95-6974	195	H69A	60-2100	52	Q6000A,B	68-0007	101
386449-1	60-2377	44	H808A		53	Q6000C		101
390012C	60-2377	44	H808B	60-2439	53	Q601E,F,J,K, L,M,N	60-2136	201
391477B	60-2377	41	H915A		125	Q605A,B,D,E	60-2003	133
391479B	60-2377	41		L		Q607A,B	95-6648	202
391487	60-2377	41	L4006A,B,E	60-2104	54	Q618A	60-2039	202
391937		27	L4008A,B,E	60-2104	60	Q6300		102
392393B	60-2377	41	L4017B	60-2259	118	Q633A	60-2023	79
392394B	60-2377	41	L4029E	60-2263	118	Q634A,G	71-92245	107
394268-1,6		26	L4064B,D,J,T	60-2258	116	Q651A,B,C	60-2016	180
394530		95	L4064K	63-2091	125	Q667A,B,C	60-2422	147
	AT		L4068E,F	60-2260	119	Q674	60-2485	109
AT20A	60-2251	114	L4069A	95-5955C	120	Q68B	60-2125	199
AT40A	60-2251	114	L480B,G	60-2203	224	Q682B,L		99
AT72D	60-2251	113	L6006A,C	60-2104	54	Q7000	60-2495	188
AT72F		113	L6008A	60-2104	60			
AT74A,B,C	71-92252	122	L6008C	95-2757	219		R	
AT86A,B	71-92255	114	L6068A	60-2260	119	R182A,C	60-2481	73
AT87A	60-2254	115	L6076B	60-2208	123	R4212	60-2426	82
AT88A	60-2254	115	L6081A	60-2105	55	R4212Q	60-1128	86
AT92A,B,C	60-2257	114	L8124A,B,C, E,G,L	60-2061	58	R4214	60-2426	82
	C		L8148A,J	60-2278	56	R4220	60-2426	82
C434A	60-2073	36		M		R4222	60-2056	76
C5001A,B	60-2454	189	Motor/Valve Selection Guide		191	R4225A	60-2165	78
C5281		34	M436A	60-2119	203	R4228	60-2056	76
C5290E		32	M445A,C,D	60-2037	197	R4228E	60-1128	86
C554A	60-2148	68	M644A-F	60-2038	194	R4230F	60-2048	76
C580B		18	M7044B,C	60-2036	206	R4234	60-2269	85
C591A	60-2072	36	M7045A,B	60-2036	206	R4236	60-2269	85
C7031B,C,D, E,F,G,J,K	60-2217	122	M734H,J	60-2370	197	R4242B	60-2325	81
C7046A	60-2350	144	M744A	60-2327	198	R4242E	60-1128	86
C7046B	60-2350	161	M744D	60-0877	198	R4243B	60-2325	81
C7100A	60-2521	165	M745G,J,K, L,M,P	60-2369	199	R4243C	60-2325	81
C7100B	60-2539	161	M833A	95-5205	198	R482A-C	60-2481	73
C815A	60-2516	110	M835A	60-2120	204	R720B	63-2105	212
	CR		M836A,B	60-2119	203	R7207A	60-2532	212
CR42A	60-2551	190	M845A,B,C,E	60-2037	197	R8093A	71-92167	80
CR71B	60-2064	130	M847A		205	R8146A	60-2168	80
	CS		M934A,D	60-2110	196	R8182D,H	60-2142	66
CS5281		34	M944A-G,J,S	60-2292	193	R8183A,B	60-2477	88
CS82A	60-2076	42	M945A-H,L, M,Y	60-2002	194	R8184G,K,L	60-2071	62
CS894D	60-2076	42	M954A,D	60-2413	192	R8184M	60-2143	63
CS897A	60-2076	42	M955A,C	60-2414	192	R8185E	60-2138	64
	D			PA		R8212	60-2426	82
D640, D641	60-2000	131	PA404A,B	60-2341	72	R8212Q	60-1128	86
D80B	60-2523	49		Q		R8214	60-2426	82
	DSP					R8220	60-2426	82
DSP1544		94	Q100A	60-2135	202	R8222	60-2056	76
DSP1552		16	Q181A	60-2124	200	R8225A-D	60-2165	78
DSP1938		102	Q209A,B	60-2121	200	R8228	60-2056	76
	F		Q298B	95-6297	133	R8228E	60-1128	86
F50A	60-2067	7	Q302A	60-2087	40	R8229A	60-2396	4
F51A	60-2069	9	Q303B,C	60-2075	40	R8229E	60-1128	86
F52C,D	60-2407	13	Q308A	60-2075	40	R8230A,C,F	60-2048	76
F56A	60-2384	15	Q310A,B	60-2087	44	R8231C	71-92010	75
	H		Q313A,B	60-2087	44	R8234	60-2269	85
H205A	60-2031	136	Q314A	60-2075	40	R8236	60-2269	85
H403A	60-2096	51	Q327A	60-2075	42	R8239A,B,D, G,H	60-2023	78
H409A	60-2395	213	Q330E,F	60-2053	46	R8242B	60-2325	81
H46C-F	60-2097	51	Q340A,B	60-2087	39	R8242E	60-1128	86
H49A,B,X	60-2100	52	Q354A	60-2053	46	R8243B	60-2325	81
H600A	60-2089	52	Q356A1005	60-2377	45	R8246A	60-2396	4
			Q357A	60-2377	45	R8404A	60-2415	65
			Q473A,B	60-2244	175	R841C-E	60-2004	2
						R845A	60-2481	74
						R847A	60-2481	75
						R856B	60-2171	80
						R882A-C,F	60-2481	73

continued next page

TRADELIN

model number index

Model Number Index continued

MODEL	FORM	PAGE
R883B	60-2184	92
R9107A	60-0071	193
R927C	60-0071	193
Remote Bulb Selection Guide		216
RA		
RA116A	60-2137	68
RA117A	60-2137	68
RA19A	60-2481	74
RA832A	60-2481	74
RA89A	60-2481	74
S		
S400B	60-2185	93
S405A	60-2552	190
S437A	95-2777	127
S443A	60-2122	201
S483B		90
S547A,B	95-6282	128
S566A,B,C	60-2271	127
S637A	95-2777	127
S684D,F	60-2277	228
S688A	60-2103	90
S7002A	60-2541	188
S7080A	60-2526	162
S830A	60-2022	91
S86E,G,H	68-0008	49
S87C,D	69-0007	46
S876A	71-92261	120
S963A	60-2122	126
S963B	60-2122	126
S963C	60-2389	126
S963D	60-2463	147
S984D,F,K,P	60-2277	228
ST		
ST70A	60-2146	70
ST720B	63-2008	211
ST721A	63-2003	211
T		
T238A	60-2218	124
T42A,B,G,H,J, K,L,M,N,P	60-2229	181
T4031A	60-2177	218
T4039A,B,D-F, K-M	60-2241	176
T440A	95-2175	223
T445B	95-2654	223
T451A	60-2234	174
T475A	60-2219	208
T498A,B	95C-10199	3
T5001A		41
T5068A-C	60-0757	170
T5266A		32
T5298B		32
T6031A	60-2177	218
T6051A,B	60-0008	178
T6052A,B	60-0008	178
T6054A	60-0181	219
T6054B	60-2435	220
T6064A	60-2406	220
T631A,B	60-2214	176
T631C	60-2214	177
T631F,G	60-2509	178
T636A	60-2213	225
T651A	60-2234	174
T675A,B	60-0017	220
T678A	95-6365	220

MODEL	FORM	PAGE
T678B	60-2207	208
T694A,B,D,F	60-2235	175
T7001F	60-2216	124
T7022A	60-0247	144
T7047A,C	60-2174	183
T7047C1025	60-2174	147
T7047C1082	60-2174	160
T7067A,B	60-2421	146
T7080A,B	60-2527	159
T8082A	60-2416	98, 111
T8085A	69-0033	98
T8085B,C,R		98
T8100A	60-2535	100
T8200A	60-2536	101
T822C,D	60-2224	106, 111
T8300		102
T834A,C	60-2226	107
T87F	60-2222	103, 111
T87F2998,		
T87F3004	60-2410	96
T874	60-2485	108, 111
T915	60-2201	223
T92B,D,E	60-2243	180
T921A-E	60-2242	182
T991A	60-2196	222
T991B	95-6374	208
TA		
TA420A	60-2206	214
TC		
TC720B	60-2557	211
TG		
TG500	60-2498	96
TG501	60-2498	96
TG503	60-2498	97
TG504		97
TS		
TS8085A	69-0033	98
TS822A	60-2224	106, 111
TS86A	71-92223	105
V		
V2045A	60-2131	237
V400A	60-2019	18, 19
V404B	60-2094	25
V4043A,B,E,J	60-2133	166
V4044A,B,C	60-2133	166
V4046A,B	60-2145	70
V4202A	60-2084	35
V5011A,B,C	60-2126	233
V5013A,B,C	60-2129	238
V504	60-2094	26
V5045A	60-2131	240
V5047A	71-92128	237
V5051A	60-2130	239
V5076A,B	60-2065	170
V51B	60-2134	233
V5155A	60-2032	37
V5267E		29
V5269J		29
V5274A	60-2265	45
V5306	60-2090	27
V5307	60-2090	27

MODEL	FORM	PAGE
V5308	60-2090	27
V5309	60-2090	27
V800A,C	60-2019	18, 19
V804B	60-2094	25
V8043A,B,E, F,J	60-2133	166
V8044A,B,E	60-2133	166
V8202A	60-2084	35
V8254A		36
V8277E		30
V8294A		36
V850A	60-2095	21
VR		
VR800	60-2448	22
VR8440A	68-0015	24
VS		
VS8002A		41
VS8187A	71-92081	37
VS8194E		30
VS820A,C	60-2019	18, 19
VS824B	60-2094	26
VS8299A		34
W		
W129	60-2181	94
W136A	60-2179	94
W7010/20C	60-1060	185
W7010/20E	60-1062	185
W7010/20F	60-1063	185
W7010/20G	60-1064	185
W7080A	60-2526	156
W7081A	60-2512	157
W7083A	60-2526	158
W7084A	60-2526	159
W7100A-E	60-2507	162
W7101A		165
W720B	60-2178	95
W859C,D	60-2288	135
W869A		16
W884B	60-2289	110
W899G	60-2086	135
W902A	60-2220	206
W903A	60-2220	206
W9076	63-2093	128
W922A	60-2069	11
W922B	60-2069	12
W927C,F,J	60-2409	229
W950A,C,G	60-2351	144
W972B	60-2455	189
W973A,B,D,E, F,G,H,J	60-2428	142
W974A,B	60-2424	143
W975A,B	60-2423	146
Y		
Y343B		45
Y496A	71-92374	173
Y499A		87
Y517B		71
Y594		110
Y7002A		188
Y8183B		88
Y86E	68-0009	47
Y86G	68-0013	47
Z		
ZA7000		137, 215

general information

ORDER SPECIFICATION NUMBER SYSTEM

TYPE LETTER	TYPE NUMBER	SUFFIX LETTER	OS NUMBER
T	8200	A	1004

The type letter is the single letter, or two letter group, which begins the model number. This letter indicates the general type of device involved. A list of type letters used is shown below (some may fit in more than one category):

AT	—Transformers.	Q	—Accessories.
C or CS	—Combustion controls.	R or RA	—Relays.
D	—Dampers.	S	—Switches and ignition modules.
F	—Electronic air cleaners.	T, TA, or TS	—Thermostats and remote bulb temperature controllers.
H	—Humidity controls, including combination temperature and humidity controllers.	TG	—Thermostat guards.
L, LA, or LS	—Limit controllers.	V, VR, or VS	—Valves.
M	—Motors.	W	—Load control panels, accessories.
P	—Pressure controllers.	Y	—Package sets.

SUMMARY OF HONEYWELL CONTROL SERIES DESIGNATIONS

Series Designation	Controller Type	Controller Action	Relay or Valve Type	Motor Action	Example
Series 20	3-wire, low voltage (2-position)	Makes circuit to start; makes second circuit to stop.	—	Low voltage; rotates 180° to open, continues 180° to close; stops on power interruption.	V2045
Series 40	2-wire, line voltage (2-position)	Makes circuit to start; breaks it to stop.	Line voltage coil circuit; makes (opens) when powered; breaks (closes) when power interrupted.	Line voltage; motor drives open when powered; spring returns closed on power interruption.	T42, L4064, L4008
Series 50	Mechanical (nonelectrical) series.				V5269
Series 60	3-wire, line voltage (2-position)	Makes circuit to start; makes second circuit to stop.	—	Old style—line voltage equivalent of series 20. New style—line or low voltage drives open when powered open; reverses and drives close when powered closed; stops on power interruption.	M644
Series 70	Electronic series.				M7044, C7031
Series 80	2-wire, low voltage (2-position)	Makes circuit to start; breaks it to stop.	Low voltage coil circuit; makes (opens) when powered; breaks (closes) when power interrupted.	Low voltage; motor drives open when powered; spring return closed on power interruption.	T87, L8124
Series 90	3-wire, low voltage (modulating)	Varies resistance between common terminal and two end terminals in response to controlled variable.	—	Low voltage; motor modulates position in response to changes in controlled variable signaled by controller.	T921, M945, W902

TRADELINE

general information

IMPORTANT

THE SPECIFICATIONS GIVEN IN THIS PUBLICATION DO NOT INCLUDE NORMAL MANUFACTURING TOLERANCES. THEREFORE, THE DEVICES LISTED MAY NOT MATCH THE LISTED SPECIFICATIONS EXACTLY. ALSO, THESE PRODUCTS ARE TESTED AND CALIBRATED UNDER CLOSELY CONTROLLED CONDITIONS, AND SOME MINOR DIFFERENCES IN PERFORMANCE CAN BE EXPECTED IF THOSE CONDITIONS ARE CHANGED.

APPROVAL BODIES

Most of the devices described in this catalog have been approved or listed by one or more of the approval bodies listed below.

Underwriters Laboratories Inc.

UNDERWRITERS LABORATORIES INC. is a nonprofit organization which examines and tests devices, systems, and materials. Its membership represents a broad cross section of industry, education, and government.

Field inspectors for Underwriters Laboratories Inc. do not normally inspect equipment installed on job sites, but restrict their activities entirely to periodic inspections of products coming off manufacturers' assembly lines.

The three general categories of acceptance of a product by Underwriters Laboratories Inc. are:

1. General listing.
2. Component recognized.
3. Classification.

General listed devices are structurally and functionally complete and suitable for field installation.

Component recognized devices are incomplete in some way that makes them unsuitable for general field installation. They are intended to be factory-installed as part of some other piece of equipment.

Classified devices or products have been evaluated as to specific hazards only.

Canadian Standards Association

The CANADIAN STANDARDS ASSOCIATION is a nonprofit, nongovernmental organization which provides a national standardizing body for Canada.

The Canadian Standards Association Testing Laboratories, inaugurated in May 1940, is a division of the Canadian Standards Association, and is recognized as a testing and investigating agency by Inspection Authorities and by Fire Marshalls and Fire Commissioners throughout Canada.

The Canadian Standards Association Laboratories test and examine electrical products submitted for approval in compliance with pertinent Canadian Standards Association codes and standards.

The laboratories provide a Certification Service for other types of products.

American Gas Association

The AMERICAN GAS ASSOCIATION is the testing organization of the American gas industry with laboratories in Cleveland, Ohio, and Los Angeles, California. The American Gas Association sponsors the American National Standards Institute Z21 and Z83 Committees on standards for gas-fired equipment.

Any manufacturer of gas appliances or gas appliance accessories may submit his products to the Laboratories and secure certification of his designs upon compliance with the appropriate national standards. Upon such compliance, the manufacturer is granted an Appliance Certificate or an Accessory Certificate and is permitted to display the trade-marked Laboratories' Certification Seal or trade-marked Laboratories' Certification Symbol on the appliance or accessory. Certification is renewed annually.

TRADELINE

general information

CROSS REFERENCE AND PRICE REFERENCE GUIDES

The Cross Reference, form 71-96022, and the Price Reference Guide, form 70-0076, are available as separate publications. The Cross Reference lists more than 25,000 old and new, Honeywell and competitive product replacements by complete OS number. The Price Reference Guide contains pricing information and special instructions for the Programmer Exchange Program (PEP); new controls; TRADELINE Replacement Exchange controls; accessories and replacement parts. Both forms can be obtained from your local Honeywell Sales Representative or your Wholesaler/Distributor. Single copy requests can be sent to Honeywell Inc., Inquiries, MN12-4118, Honeywell Plaza, Minneapolis, MN 55408.

DATE CODE

A date code is stamped on each device to identify the date of manufacture.

In October 1975, Honeywell adopted the industry standard date code system of a 4-digit code. The first 2 digits indicate the year; the second 2 digits indicate the week of the year. EXAMPLE: 7812—the last week of March 1978.

For devices manufactured before October 1975, the following date code was used. If the letter "R" is added as a third letter, it indicates a repair date.

A January	G July	H 1962	Z 1970
B February	H August	G 1963	Y 1971
C March	I September	F 1964	X 1972
D April	J October	E 1965	W 1973
E May	K November	D 1966	V 1974
F June	L December	C 1967	U 1975
		B 1968	T 1976
		A 1969	

INTERNATIONAL CONTROLS

Some Honeywell controls are available with Celsius scales and/or at 110/220V, 50 Hz. For information on the availability of these devices, contact:

International Marketing
Residential Controls Center
Honeywell Inc.
10400 Yellow Circle Drive
Minnetonka, MN 55343

or

International Marketing
Energy Products Center
Honeywell Inc.
10400 Yellow Circle Drive
Minnetonka, MN 55343

TAXES

The amount of any and all present or future taxes or other government charges upon the production, shipment, installation or sale of the equipment covered hereby, including use or occupation taxes, shall be added to the price and paid by the Purchaser; or in lieu thereof, the Purchaser shall furnish the Company with tax-exemption certificate acceptable to the taxing authorities.

TERMS OF PAYMENT AND PRICES

Contact your local Honeywell TRADELINE Wholesaler or Authorized Distributor for your discount and terms of payment.

TRADELINE

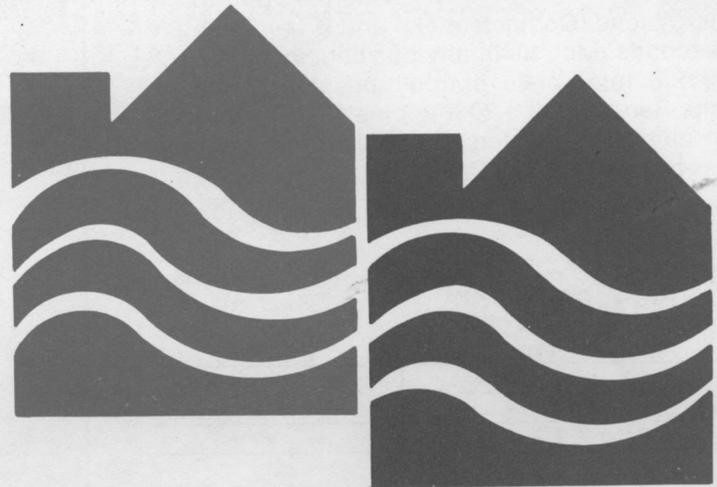
Honeywell

Residential Group

RESIDENTIAL CONTROLS CENTER

The next 120 pages feature Honeywell Residential Controls:

- Electric Heating Controls
- Electronic Air Cleaners
- Gas Burner Controls
- Humidity Controllers
- Hydronic Controls
- Oil Burner Controls
- Pressure Controllers
- Relays and Contactors
- Special Switches
- Stoker Controls
- Test Instruments
- Thermostat Guards
- Thermostats (Chronotherm, single-stage, multistage, and DoD)
- Transformers
- Warm Air Controls



RESIDENTIAL CONTROLS AND SYSTEMS THAT CONSERVE ENERGY AND SAVE MONEY

- Five new Chronotherm Thermostats provide energy savings for every home and every life-style. See pages 98 to 102 for more information on the T8100, T8200, T8082, T8085, and T8300 Chronotherm Thermostats.
- The safe, reliable, energy efficient Automatic Vent Damper traps heat left inside the furnace or boiler when the burner shuts off—heat that can be distributed throughout the home instead of lost through an open chimney. The D80B can be found on page 49.
- A new and improved family of retrofit electronic ignition devices conserves energy and provides increased safety, as well as easy installation. You can find a listing of the new Y86E and Y86G Intermittent Pilot Gas Burner Ignition Systems on pages 47 and 48.
- The controls mentioned above—the Chronotherm Thermostat, the Automatic Vent Damper, and the Intermittent Pilot System—make up the Honeywell Home Energy Conservation System. Turn to page 50 for more information on the SYSTEM.

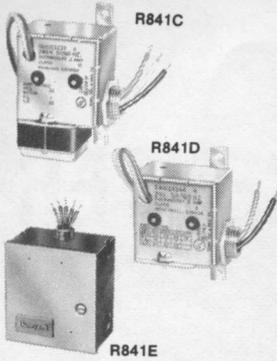
THE RESIDENTIAL CONTROLS REFERENCE MANUAL

The Residential Controls Reference Manual contains specification sheets for most of the controls manufactured by the Residential Controls Center, as well as some products built by other Centers—making it an invaluable reference source for anyone who sells, installs, or services Residential controls. For more information and ordering options see page 249.



electric heating controls

R841C-E ELECTRIC HEATING RELAYS



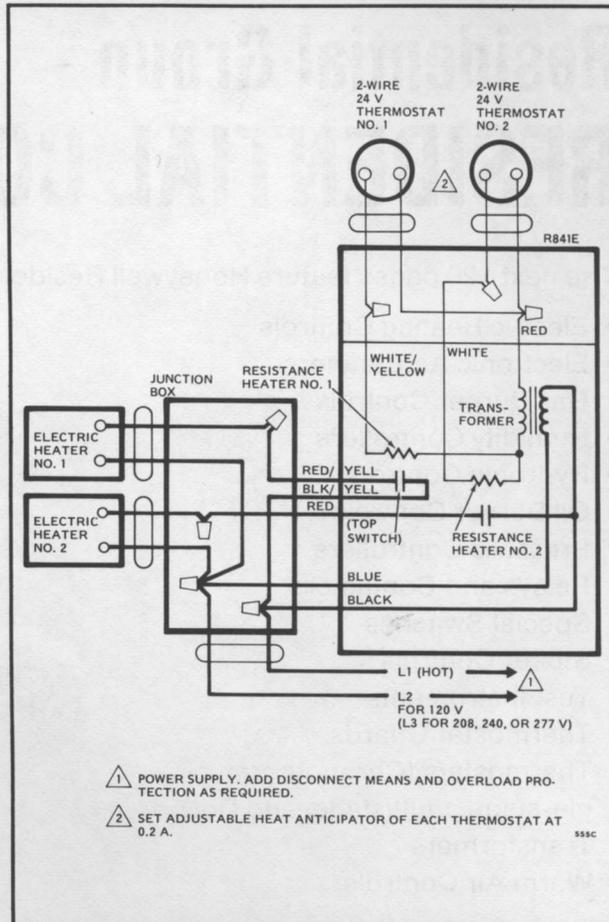
CONTROLS ELECTRIC HEATING EQUIPMENT SUCH AS BASEBOARD, CEILING CABLE, AND DUCT HEATERS. USE WITH A 2-WIRE, 24 V THERMOSTAT.

Operates with each cycle of the thermostat (4 to 6 cycles per hour). Each relay switches up to a 5,000 W load. Contacts make and break in about 75 seconds. Mounts in any position. Includes 1/2 in. [12.7 mm] male conduit bushing. Ambient Temp. Range: Minus 20 F to plus 150 F [minus 29 C to plus 66 C]. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A): Switch Contacts—

	120 Vac	208/240/277 Vac
Full Load	14	7
Locked Rotor	84	42

Resistive—22 A at 120/208/240 Vac; 19 A at 277 Vac.



Typical wiring hookup for R841E with two thermostats, each with its own load.

TRADELINE models.

Order Number	Application/Description	Voltage/Frequency	No. of Switches	Heat Anticipator Current	Leadwire Length		Overall Dimensions
					Line	Low	
R841C1193	Controls one load. With integral transformer.	240 V, 60 Hz	1 spst	0.2 A	18 in. [457.2 mm]	7-1/2 in. [190.5 mm]	3-7/8 in. [98.4 mm] high including bracket; 2-13/16 in. [71.4 mm] wide; 1-1/2 in. [38.1 mm] deep.
R841C1201		208 V, 60 Hz					
R841C1219		277 V, 60 Hz					
R841C1227		240 V, 60 Hz					
R841D1044	Controls one load. Requires remote transformer.	24 V, 60 Hz					
R841E1043	Used with 1 thermostat to control 2 loads simultaneously, or 2 thermostats to control 2 independent loads. With integral transformer.	120 V, 50/60 Hz	2 spst	0.2 A (one switch); 0.4 A (two switches).	8 in. [203.2 mm]	4 in. [101.6 mm]	4-13/16 in. [122.2 mm] high; 3-15/16 in. [100.0 mm] wide; 2-1/2 in. [63.5 mm] deep.
R841E1050		208 V, 50/60 Hz					
R841E1068		240 V, 50/60 Hz					
R841E1076		277 V, 50/60 Hz					

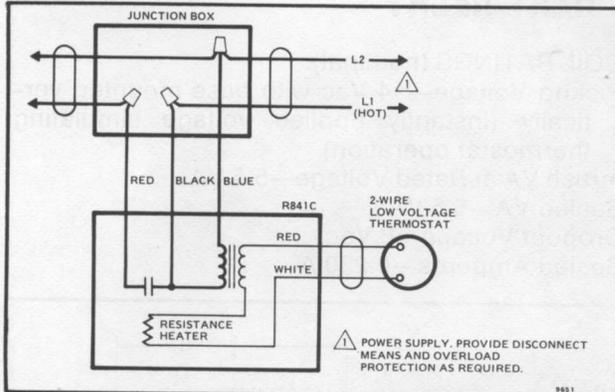
continued next page

TRADELINE

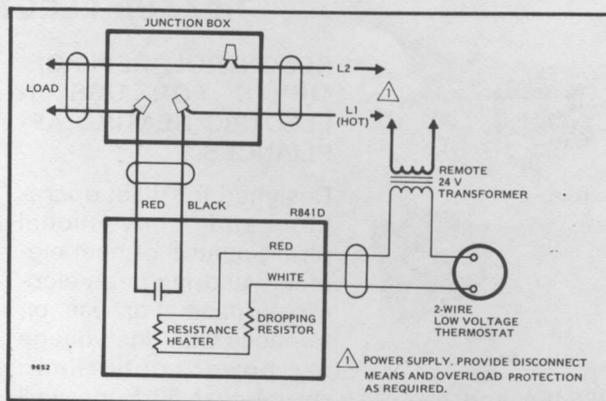
electric heating controls



R841C-E continued



R841C internal schematic and connection diagram for one relay.



R841D internal schematic and connection diagram for one relay.

T498A,B ELECTRIC HEATING THERMOSTATS



FOR LINE VOLTAGE CONTROL OF ELECTRIC HEATING SYSTEMS.

Includes thermometer and 6 in. [152.4 mm] lead-wires. Temp. Setting Range: 40 F to 80 F [4 C to 27 C]. Fixed Differential: 3 F [1.7 C]. Mounts on standard outlet box or 4 x 4 in. junction box. Dimensions:

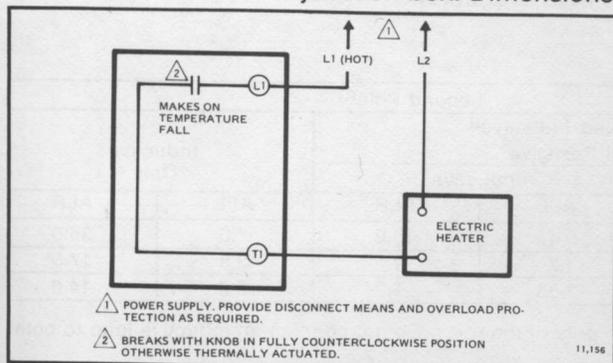
4-9/16 in. [115.9 mm] high, 2-7/8 in. [73 mm] wide, 1-15/16 in. [33.3 mm] deep above mounting plate, 15/16 in. [23.8 mm] deep below mounting plate. Listed by Underwriters Laboratories Inc.

ELECTRICAL RATING (Resistive): 22 A at 120/208/240 Vac; 19 A at 277 Vac.

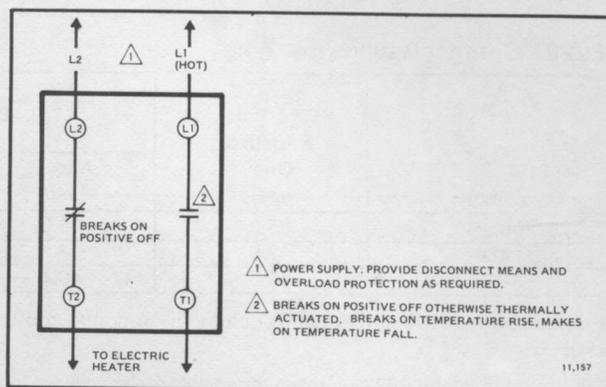
ACCESSORIES:

272566ACARD Range Stop Assembly and Locking Cover.

272568ACARD Locking Cover Assembly.



Typical hookup for T498A.



Typical hookup for T498B.

TRADELINE model. • SUPER TRADELINE model.

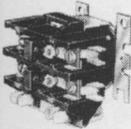
Order Number	Operation	Remarks
T498A1778	Makes heating circuit on temperature fall. With setting knob in extreme anticlockwise position it provides single line break (spst).	With thermometer.
T498A1810		Without thermometer.
T498A1844		Without thermometer. With range stops and locking cover.
•T498B1512	Makes heating circuit on temperature fall. With setting knob at OFF position it provides double line break (dpst).	With thermometer.
T498B1553		Without thermometer.
T498B1595		Without thermometer. With range stops and locking cover.

TRADELINE

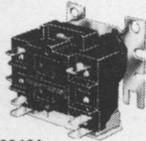


electric heating controls

R8246A ELECTRIC HEAT CONTACTOR R8229A ELECTRIC HEAT RELAY



R8229A



R8246A

RECONTROL REPLACEMENTS FOR USE IN ELECTRIC HEATING APPLIANCES.

Designed for quiet operation and conventional on-off control of heat elements and fan in an electric furnace. For use on furnaces with line voltage or power duty limit.

R8246A and R8229A replace over 50 Honeywell and competitive electric heat primaries, including the Honeywell R8330 Electric Furnace Sequencer. Underwriters Laboratories Inc. component recognized; CSA component recognized.

NOTE: An R8229E normally closed relay for use in load control systems is also available. See page 86 for specifications and ordering information.

ELECTRICAL RATINGS:

Switching—dpst.
Control Voltage—24 Vac.
Current Draw—0.23 A.

COIL RATINGS (nominal):

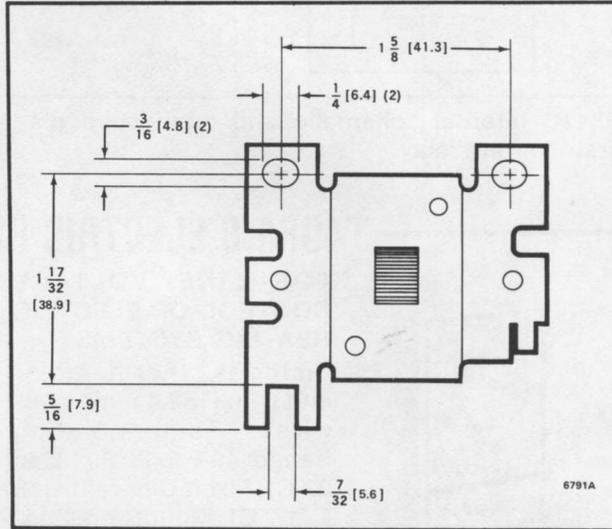
Pickup Voltage—14 Vac with base mounted vertically (instantly applied voltage simulating thermostat operation).

Inrush VA at Rated Voltage—5.5 VA.

Sealed VA—5.5 VA.

Dropout Voltage—6 Vac.

Sealed Amperes—0.230 A.



Dimensions of relay and contactor base in in. [mm in brackets].

R8229A Contact Ratings Per Pole—

Voltage	First Pole Resistive Only Amperes	Second Pole ^a				
		Combined Inductive ^a and Resistive			Inductive Only	
		Max. ^b Load	Inductive		AFL	ALR
120, 208, 240, 277	25.0	26.0	6.4	18.0	7.0	35.0
480	12.5	13.6	3.2	9.0	3.5	17.5
600	10.0	10.4	2.56	7.2	2.8	14.0

^aA combined resistive and inductive load can be connected to either pole of the relay. Do not connect an inductive load to both poles.

^bEither contact of the R8229 is rated for a 5 kW resistive load, in combination with the motor load as shown in the table.

R8246 Contact Ratings Per Pole—

Voltage	First Pole Resistive Only Amperes	Second Pole ^a				
		Combined Inductive ^a and Resistive			Inductive Only	
		Max. ^b Load	Inductive		AFL	ALR
120, 208, 240, 277	48.0	48.0	7.0	42.0	12.0	72.0
480	24.0	24.0	3.5	21.0	6.0	36.0
600	19.2	18.5	2.8	16.8	4.8	28.8

^aA combined resistive and inductive load can be connected to either pole of the contactor. Do not connect an inductive load to both poles.

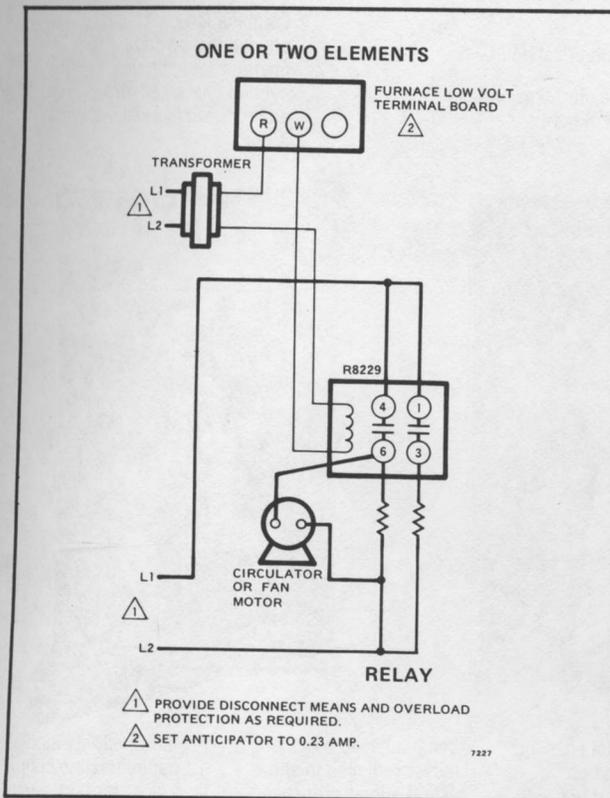
^bEither contact of the R8246 is rated for a 10 kW resistive load, in combination with the motor load as shown in the table.

continued next page

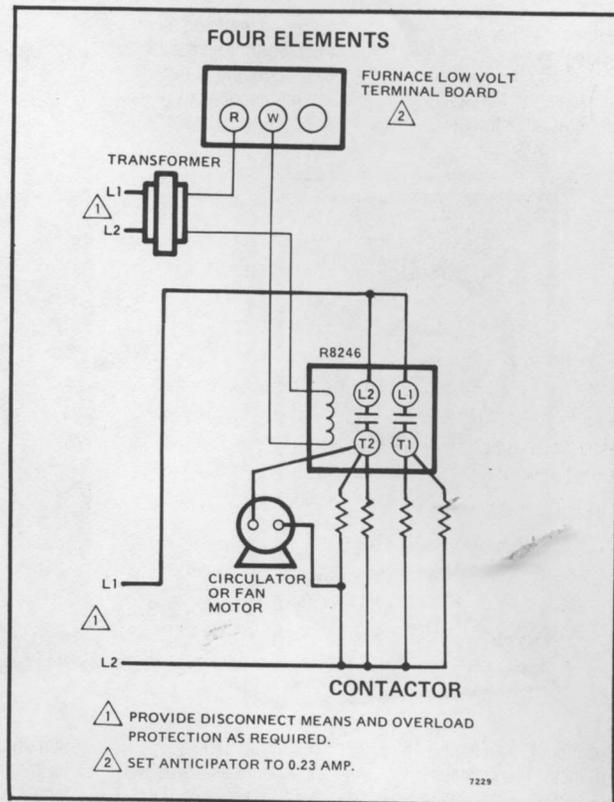
electric heating controls



R8246A, R8229A continued



One- or two-element wiring with R8229A relay.



Four-element wiring with one R8246A contactor, single-stage thermostat only.

- SUPER TRADELINE models.

Order Number	Application	Includes	Mounting	Terminals	Max. Ambient Temp.	Overall Dimensions
•R8229A1021 Electric Heat Relay	Switches up to two 5 kW electric heat elements, plus 6.4 A fan motor at 240 Vac. Several can be used together to control more than two heating elements. Replace sequenced controls which are no longer required by industry standards.	Universal mtg. plate with mtg. screws, two 12 in. [304.8 mm] coil leads, ^a two wire nuts, six 1/4 in. [6.4 mm] female quick-connects.	2 screws (up to No. 10 size) through holes in base, or one screw and a shear-formed tab in panel.	Male 1/4 in. [6.4 mm] quick-connects. ^b	165 F [74 C]	2-1/4 in. [57.2 mm] high, 2-3/16 in. [55.6 mm] wide, 2-3/32 in. [53.2 mm] deep.
R8246A1004 Contactor •R8246A1038 Contactor	Switches up to four 5 kW electric heat elements, plus 7.0 A fan motor at 240 Vac. Several can be used together to control more than four heating elements. Replace sequenced controls which are no longer required by industry standards.	Universal mtg. plate w/mtg. screws, two 12 in. [304.8 mm] coil leads, ^a two wire nuts, six 1/4 in. [6.4 mm] female quick-connects.		Male 1/4 in. [6.4 mm] quick-connects ^b plus terminal clamp screws.			2-3/16 in. [55.6 mm] high, 2-1/4 in. [57.2 mm] wide, 3-5/16 in. [84.1 mm] deep.

^a 1/4 in. [6.4 mm] quick-connect on one end; stripped on opposite end.

^b Select female quick-connects with care. The use of a premium grade quick-connect, such as the AMP Premier Faston "250" series, or equivalent, is recommended.

TRADELIN

T498 High Performance Line Voltage Thermostats

Optional tamper-proof locking cover.

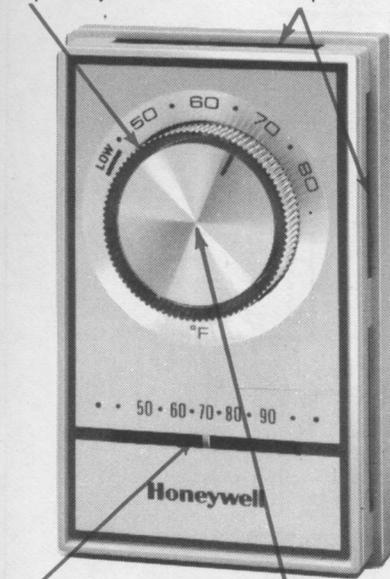
Knurled knob for easy set point adjustment.

Molded-in vents on all sides for improved air circulation and faster bimetal response to temperature changes.

Optional locking set point.

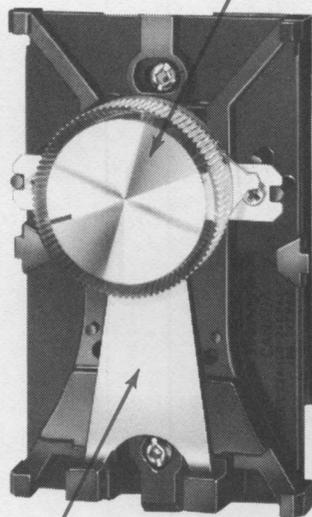
Adjustable calibration screw (under knob).

Combination heat anticipator/ switch operator for improved cycling characteristics and reduced thermal droop.

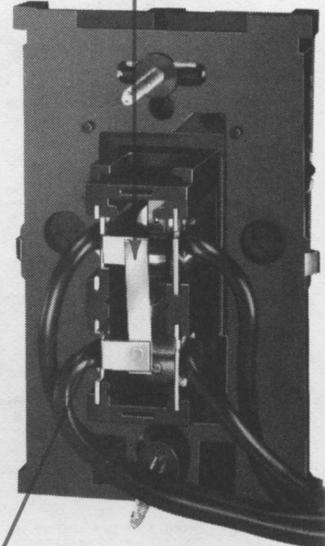


Optional room temperature bimetal thermometer.

Distinguished appearance—brushed gold faceplate and set point dial.



Sensitive bimetal element for fast response to temperature changes.



Compact switch housing (cover removed to show detail) allows proper positioning on junction box.

Pre-stripped, six inch, 12-gauge flexible copper leadwires for fast, easy installation.

Why You Should Specify "High Performance" Thermostats

High performance thermostats (those with precise temperature control like the T498 and all Honeywell low voltage thermostats) **SAVE ENERGY**. They do this because of their high cycling rate and lower droop characteristics.

Cycling rate is the average number of times each hour that the heating equipment must turn on to keep the room at the set point under specified, stable operating conditions.

Droop is the deviation in average control point that is the result of a change in the heating or cooling load on the system. On a moderate day, the thermostat controls the room temperature very closely because the internal heat of the thermostat has a chance to dissipate during the long off cycle. On a colder day, the heating system is turned on for longer periods of time, so the internal heat (switch heat and anticipator heat) of the thermostat builds up. This excess heat affects the bimetal sensing element and, in effect, **fools** the thermostat into thinking that the room is warmer than it really

is. The amount of this internal heat and its effect on the control point result in room temperature droop.

A faster cycling rate saves energy because the room temperature swings are smaller. This allows the homeowner to set the thermostat setpoint closer to the minimum acceptable temperature. Consequently, the average room temperature is lower and the energy consumption smaller.

Low droop thermostats reduce energy consumption because homeowners set a drooping thermostat upward to maintain some minimum temperature, but not downward until the temperature exceeds some maximum.

More information on this subject may be found in a free, copyrighted report "Energy Savings of High Performance Thermostats in Residential Electric Heating Systems," form number 70-5103. Write: Inquiries, Honeywell Plaza, Minneapolis, MN 55408.

electronic air cleaners



F50A STANDARD ELECTRONIC AIR CLEANER PACKAGE



CONTAINS ALL COMPONENTS NECESSARY TO ADD ELECTRONIC AIR CLEANING TO A FORCED AIR HEATING OR COOLING SYSTEM.

Removes airborne particles such as dust, lint, pollen, soot, tobacco, and cooking smoke from air circulating through cells.

Mounts in return air duct. Cells can be washed in automatic dishwasher, laundry tub, or utility tub. Cells can be installed for airflow in either direction. Listed by Underwriters Laboratories Inc; certified by CSA.

ELECTRICAL RATINGS:
Max. Power Consumption—
50 W for 2-cell models.
30 W for 1-cell models.

Current Rating (A)—

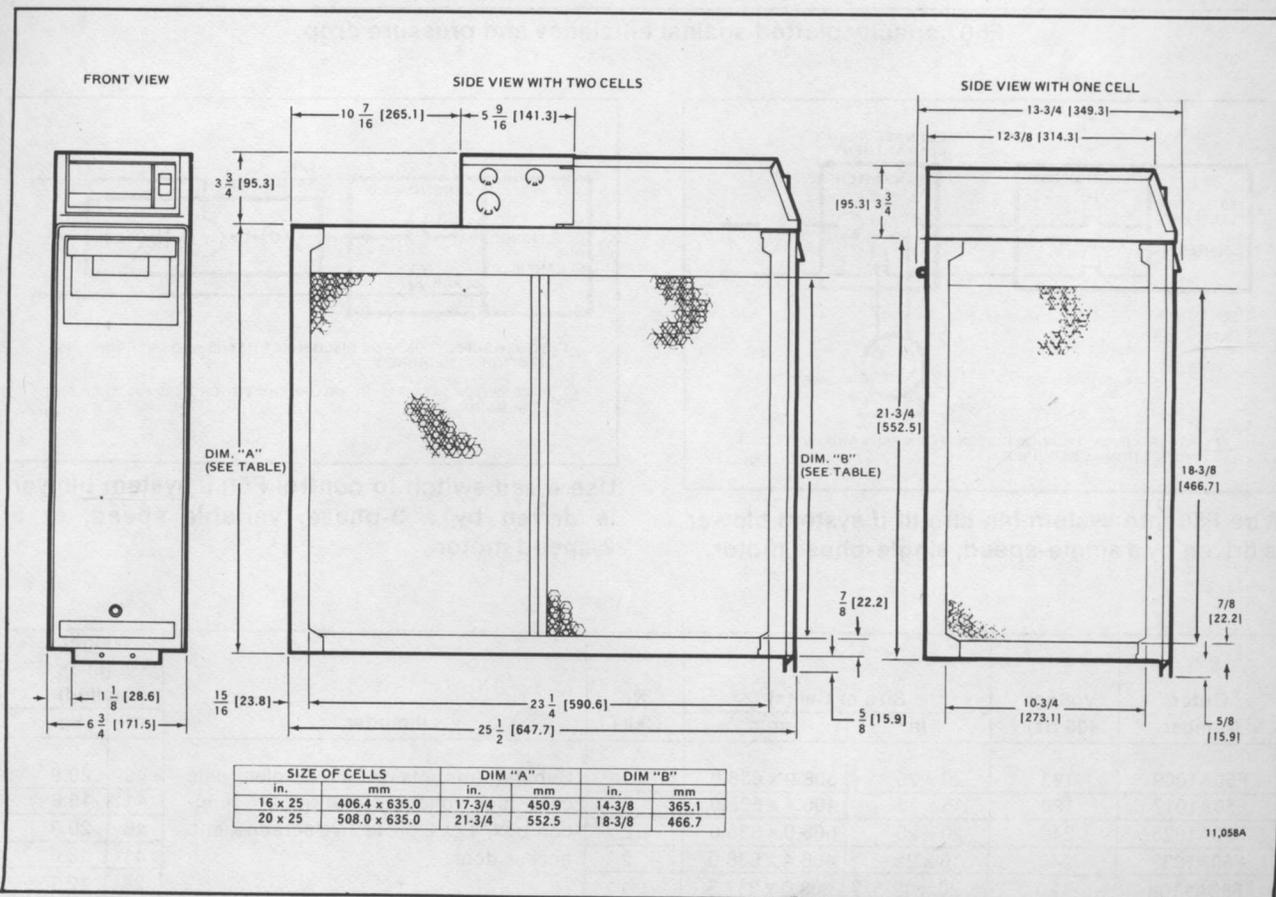
	120 V, 60 Hz	240 V, 60 Hz
2-cell models	0.4	0.2
1-cell models	0.2	0.1

TEMPERATURE RATINGS:

Operating Ambient—40 F to 125 F [4 C to 52 C].
Max. Cell Washing Temp.—220 F [104 C].

ACCESSORIES:

- 115525C Cell Wash/Rinse Hose.
- 124503D Cell Washing Container.
- 126850 Liquid Detergent—1 gal. [3.8 litres] (order in cases of 4 only).
- 136377A Remote Mount Kit.
- 136434AA Ionizing Wire—20 in. [508.0 mm] (order in multiples of 5 or 25 only).
- 136434BA Ionizing Wire—16 in. [406.4 mm] (order in multiples of 5 or 25 only).
- 137799AA Preinstallation Boot (blank)—20 in. [508.0 mm] for 2-cell model only.
- 137800AA Preinstallation Boot (blank)—16 in. [406.4 mm].
- S688A1007 Sail Switch.
- S830A Filter Flag Indicator.



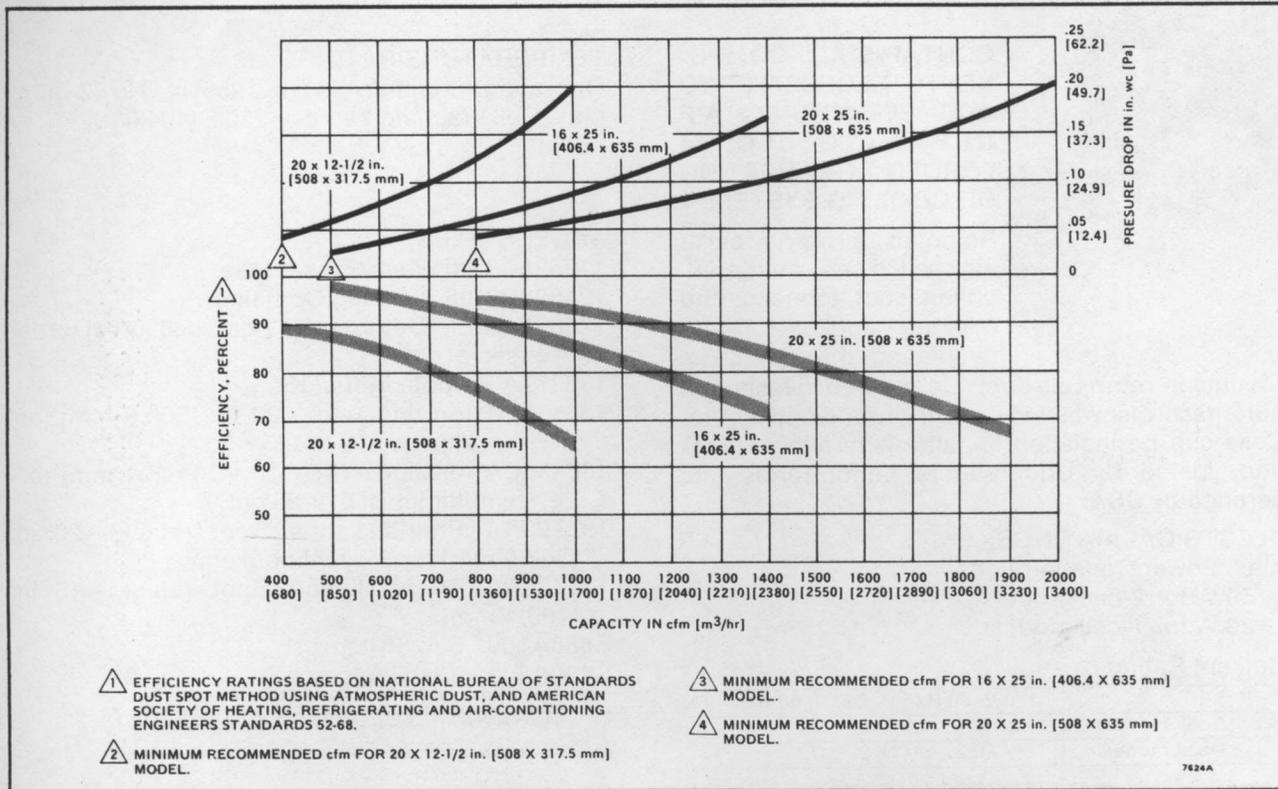
Installation dimensions in in. [mm in brackets] of F50 EAC with 1 or 2 cells.

continued next page

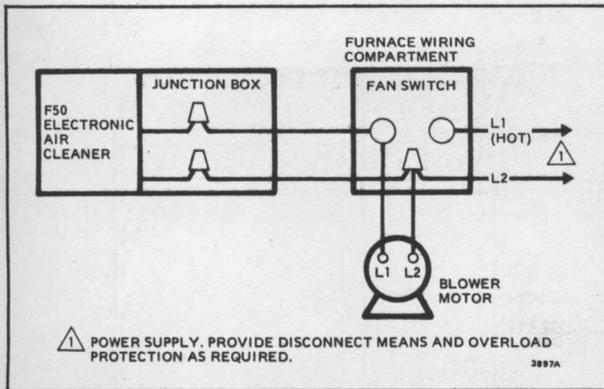


electronic air cleaners

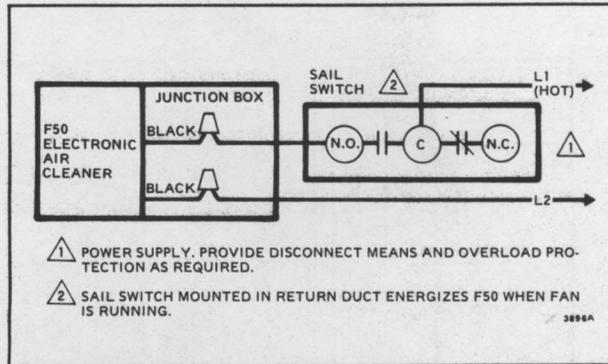
F50A continued



F50 capacity plotted against efficiency and pressure drop.



Wire F50 into system fan circuit if system blower is driven by a single-speed, single-phase motor.



Use a sail switch to control F50 if system blower is driven by a 3-phase, variable speed, or a 2-speed motor.

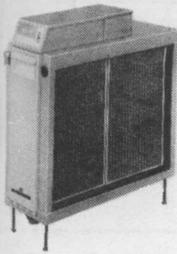
Order Number	Voltage (60 Hz)	Size of Cell(s)		No. Cells	Includes	Weight (in-stalled)	
		in.	mm			lb	kg
F50A1009	120	20 x 25	508.0 x 635.0	2	Cabinet (mounts in duct), electronic cells, high voltage power supply, junction box, 1 or 2 protective screens, and access door.	46	20.9
F50A1017	120	16 x 25	406.4 x 635.0	2		41	18.6
F50A1025	240	20 x 25	508.0 x 635.0	2		46	20.9
F50A1033	240	16 x 25	406.4 x 635.0	2		41	18.6
F50A1108	120	20 x 12-1/2	508.0 x 317.5	1		28	12.7
F50A1116	240	20 x 12-1/2	508.0 x 317.5	1		28	12.7

TRADELINE

electronic air cleaners



F51A IN-PLACE WASH ELECTRONIC AIR CLEANER



USED WITH W922A,B WASH CONTROL CENTER TO ADD ELECTRONIC AIR CLEANING AND IN-PLACE WASHING TO A FORCED AIR FURNACE OR CENTRAL AIR CONDITIONING SYSTEM.

Order W922 separately (pages 10-11). F51 removes airborne particles such as dust, lint, pollen, soot, tobacco and cooking smoke from air circulating through cells. Accumulated dirt can be washed from cells without removing them from the air cleaner cabinet. Mounts in return air duct. Install cabinet in an upright position to allow proper water drainage. Cells are installed for airflow in either direction. Six in. [152.4 mm] minimum clearance is required between floor and duct opening. Listed by Underwriters Laboratories Inc; certified by CSA.

ELECTRICAL RATINGS:

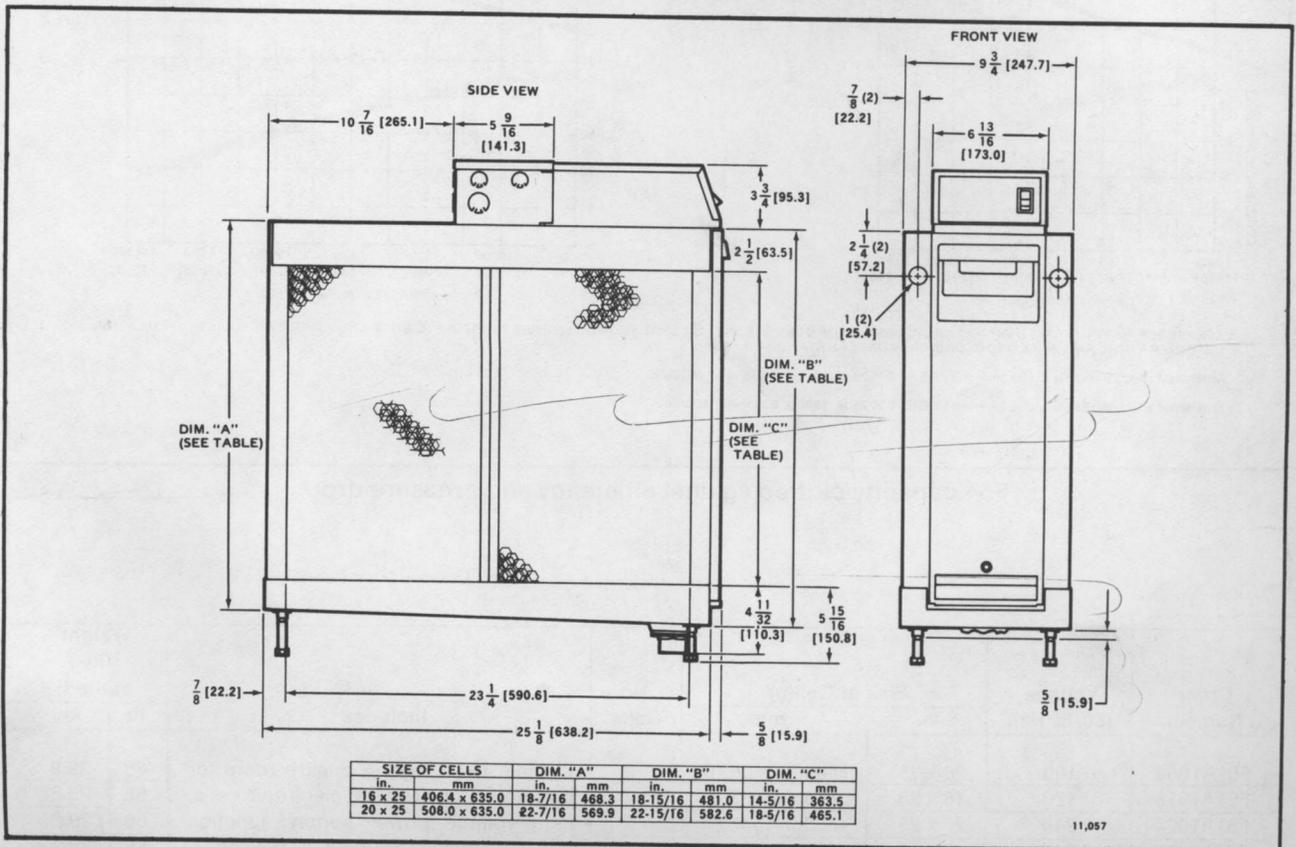
Max. Power Consumption—50 W.
Current Rating—0.4 A at 120 V, 60 Hz; 0.2 A at 240 V, 60 Hz.

TEMPERATURE RATINGS:

Operating Ambient—40 F to 125 F [4 C to 52 C].
Wash Water Temp. (in-place wash)—125 F to 180 F [52 C to 82 C].
Max. Cell Washing Temp. (manual wash)—220 F [104 C].

ACCESSORIES:

- 125364 14-Day Remote Timer—120 V, 60 Hz.
- 125365 14-Day Remote Timer—240 V, 60 Hz.
- 125703 Manual Timer Switch.
- 126850 Liquid Detergent—1 gal. [3.8 litres].
- 127282 Liquid Detergent—5 gal. [19 litres].
- 136377A Remote Mount Kit.
- 136434AA Ionizing Wire—20 in. [508.0 mm] (order in multiples of 5 only).
- 136434BA Ionizing Wire—16 in. [406.4 mm] (order in multiples of 5 only).
- 137005A Splash Barrier—20 in. [508.0 mm].
- 137005B Splash Barrier—16 in. [406.4 mm].
- 138148 Drain Hose—30 ft. [9 m].
- 138150 Drain Hose Clamp.
- 138151A Water Strainer.
- S830A Filter Flag Indicator.



Installation dimensions in in. [mm in brackets] of F51 EAC.

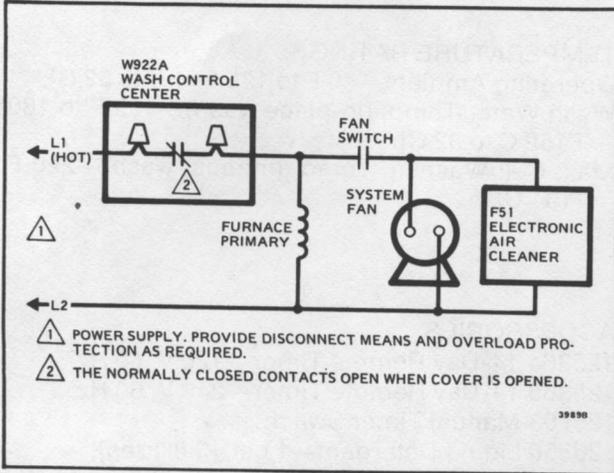
continued next page

TRADELINE

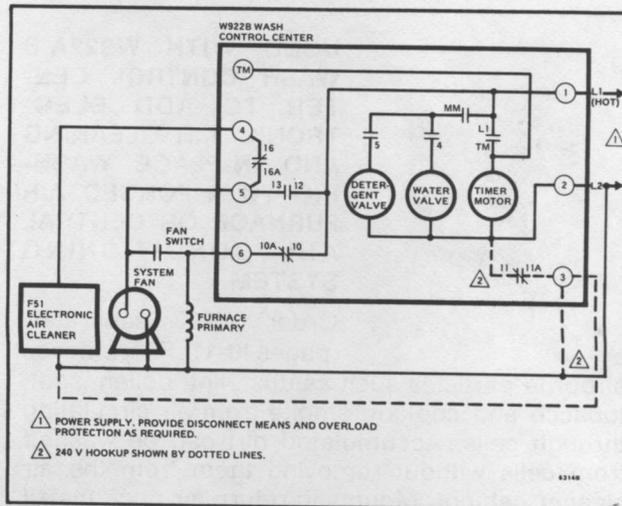


electronic air cleaners

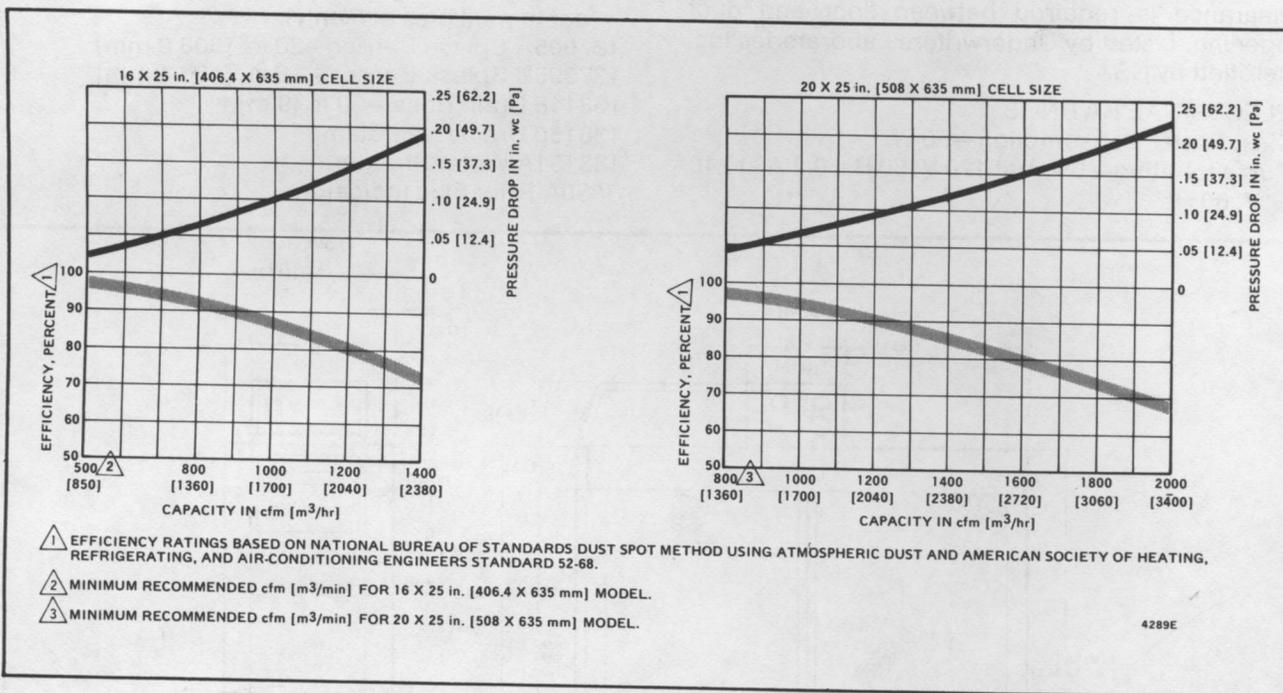
F51A continued



Typical hookup for F51 EAC (120 Vac model) and W922A.



Typical hookup for F51 EAC and W922B.



F51 capacity plotted against efficiency and pressure drop.

Order Number	Voltage (50/60 Hz)	Size of Cell(s)		No. Cells	Includes	Weight (installed)	
		in.	mm			lb	kg
F51A1008	120	20 x 25	508.0 x 635.0	2	Cabinet (with legs to ensure room for bottom water drain), 2 electronic cells, high voltage power supply, junction box, 2 protective screens, access door, spray shield, and spray manifold.	66	29.9
F51A1016	120	16 x 25	406.4 x 635.0	2		58	26.3
F51A1024	240	20 x 25	508.0 x 635.0	2		66	29.9
F51A1032	240	16 x 25	406.4 x 635.0	2		58	26.3

TRADELINE

electronic air cleaners



W922A SEMIAUTOMATIC WASH CONTROL CENTER

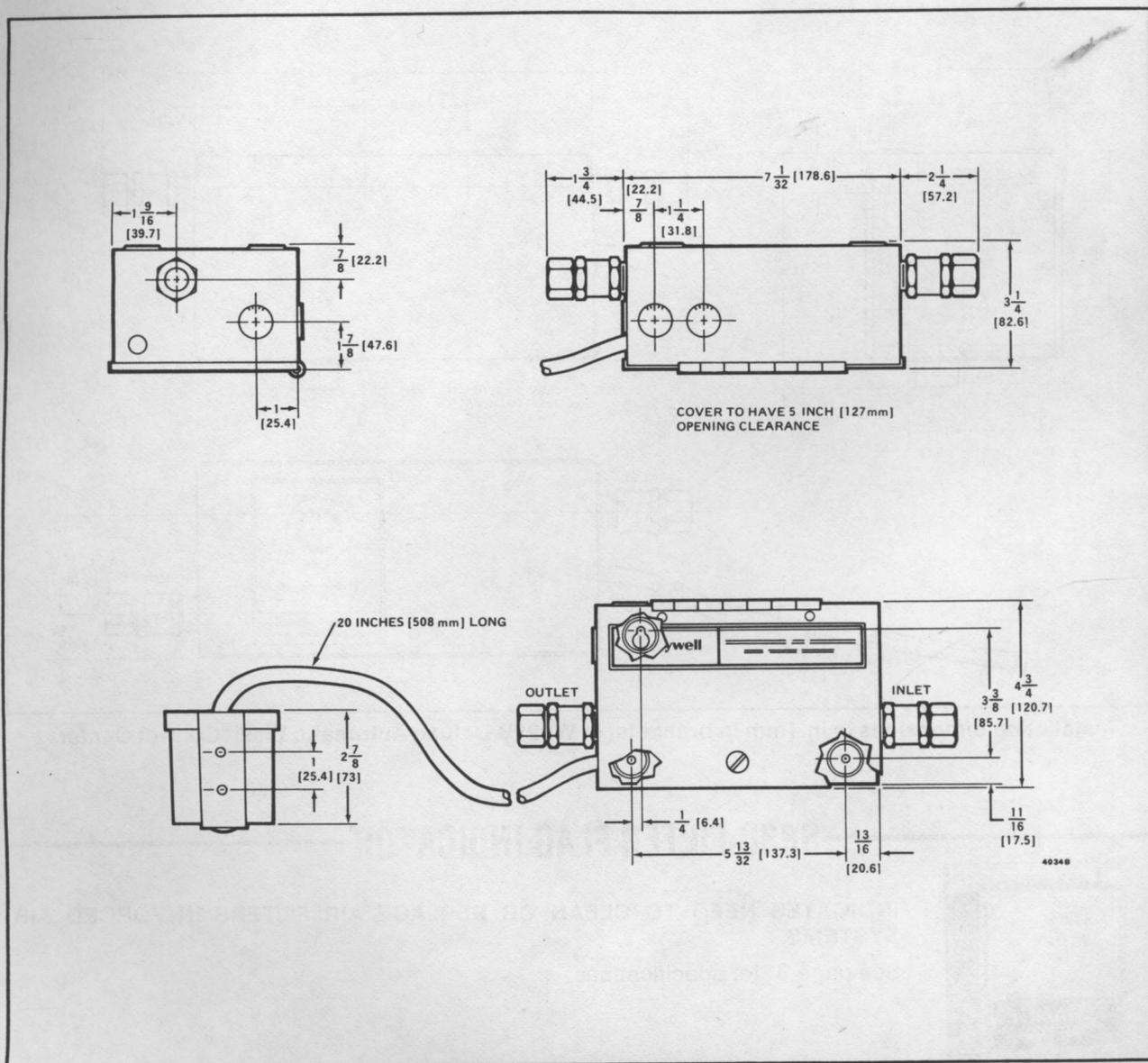


USED WITH F51 IN-PLACE WASH ELECTRONIC AIR CLEANER. MANUAL VALVE CONTROLS WATER AND DETERGENT FLOW.

W922A is installed between water source and F51 spray manifold. Detergent cup must be filled at the start of each wash cycle. Interlock Switch Rating: 3/4 hp [0.56 kW], 120 V. Switch Action: spst. Max. Water Temp: 180

F [82 C]. Detergent Consumption: 5 oz. [148 ml] per wash. Weight (installed): 5 lb. [2.3 kg]. With three raised mounting holes in back of case; compression fittings for 5/8 in. OD tubing. See page 10 for typical hookup with F51.

Order Number	Voltage (50/60 Hz)	Includes
W922A1006	120	Manual valve to control water and detergent flow, detergent aspirator, detergent container, and fan interlock switch to shut off system fan during wash cycle.



Installation dimensions in in. [mm in brackets] of W922A Semiautomatic Wash Control Center.



electronic air cleaners

W922B DELUXE AUTOMATIC WASH CONTROL CENTER

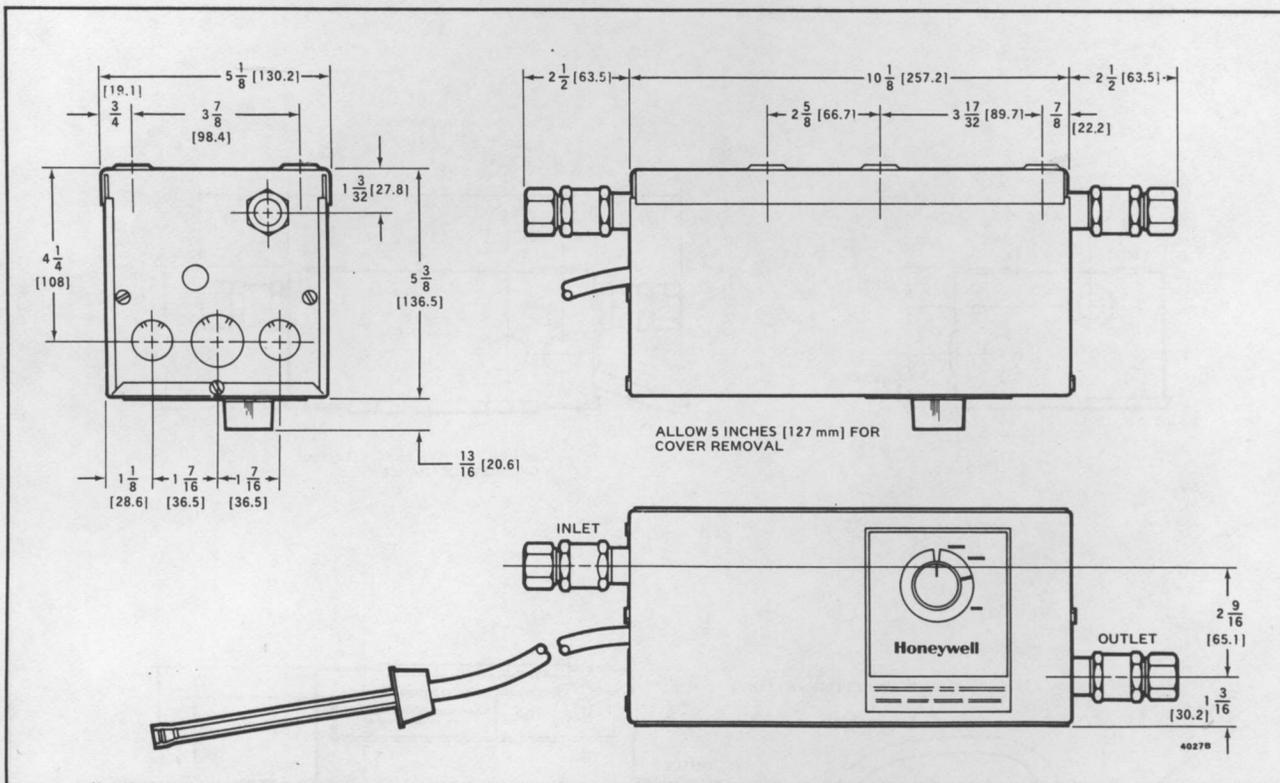


USED WITH F51 IN-PLACE WASH ELECTRONIC AIR CLEANER. TIMER CONTROLS INTERNAL WATER AND DETERGENT VALVES FOR AUTOMATIC WASH AND RINSE OF ELECTRONIC CELLS.

W922B is installed between water source and F51 spray manifold. Detergent is drawn directly from original container. Can be used with 14-day remote timer. Interlock Switch Rating: 3/4 hp

[0.56 kW]. Max. Water Temp: 180 F [82 C]. Detergent Consumption: 10 oz. [296 ml] per wash. Weight (installed): 8 lb. [3.6 kg]. With three raised mounting holes in back of case; compression fittings for 5/8 in. OD tubing. See page 10 for typical hookup with F51.

Order Number	Voltage (50/60 Hz)	Includes
W922B1005	120	Sequencing timer, valves, detergent aspirator, and fan interlock switch to control system fan during wash cycle.
W922B1013	240	



Installation dimensions in in. [mm in brackets] of W922B Deluxe Automatic Wash Control Center.

S830 FILTER FLAG INDICATOR



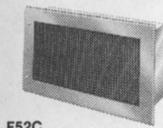
INDICATES NEED TO CLEAN OR REPLACE AIR FILTERS IN FORCED AIR SYSTEMS.

See page 91 for specifications.

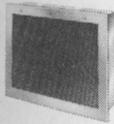
electronic air cleaners



F52C,D RETURN GRILLE ELECTRONIC AIR CLEANER



F52C



F52D

FOR WALL OR CEILING MOUNTING IN RETURN AIR DUCT OF A CENTRAL FORCED AIR HEATING, COOLING, OR VENTILATING SYSTEM.

Removes airborne particles such as dust, lint, pollen, soot, tobacco, and cooking smoke from air circulating through cells.

Electronic cells fit into home dishwasher for washing. Indicator light, visible through grille, shows that power supply is working properly. Automatic interlock switch disconnects power when unit is opened. Wiring consists of simply connecting air cleaner to power source. Sail switch energizes air

cleaner only when system blower is operating. Bezel provides finished trim edge around air cleaner door. Listed by Underwriters Laboratories Inc; listed by CSA.

ELECTRICAL RATINGS (at 120 V, 60 Hz):

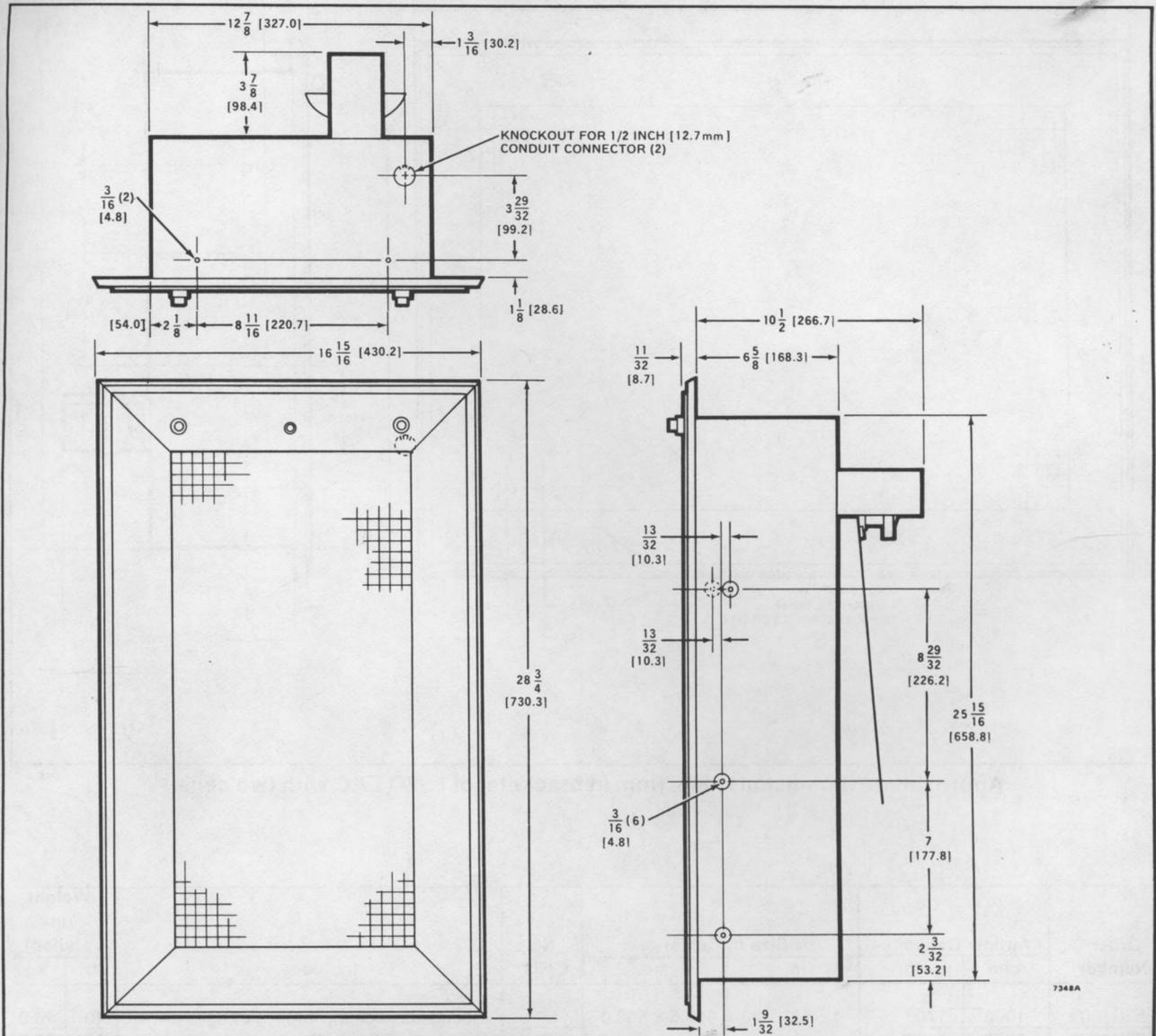
Model	Power Consumption	Current
F52C	25 W	0.2 A
F52D	50 W	0.4 A

TEMPERATURE RATINGS:

Operating Ambient—40 F to 125 F [4 C to 52 C].
Max. Cell Washing Temp.—220 F [104 C].

REPLACEMENT PARTS:

193414A Bezel for F52D.
193414B Bezel for F52C.
S688A1007 Sail Switch.



Approximate dimensions in in. [mm in brackets] of F52C EAC with one cell.

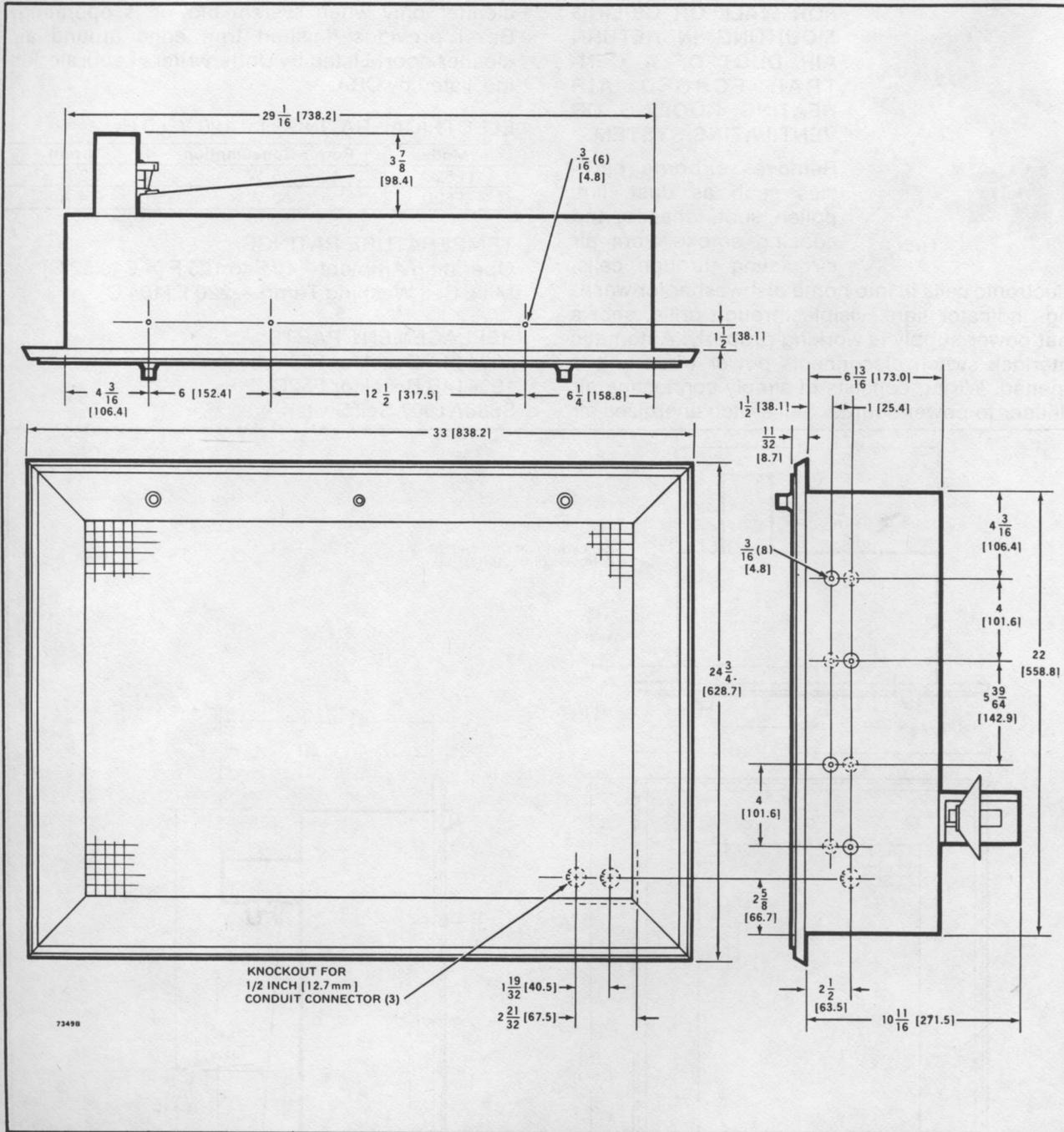
continued next page

TRADELINE



electronic air cleaners

F52C,D continued



Approximate dimensions in in. [mm in brackets] of F52D EAC with two cells.

Order Number	Airflow Capacity		Size of Cell(s)		No. Cells	Includes	Weight (in-stalled)	
	cfm	m ³ /hr	in.	mm			lb	kg
F52C1003	1000	1700	12-1/2 x 20	317.5 x 508.0	1	Electronic cell(s), high voltage power supply, prefilter, grille, and sail switch.	40	18.0
F52D1001	2000	3400			2		66	29.7

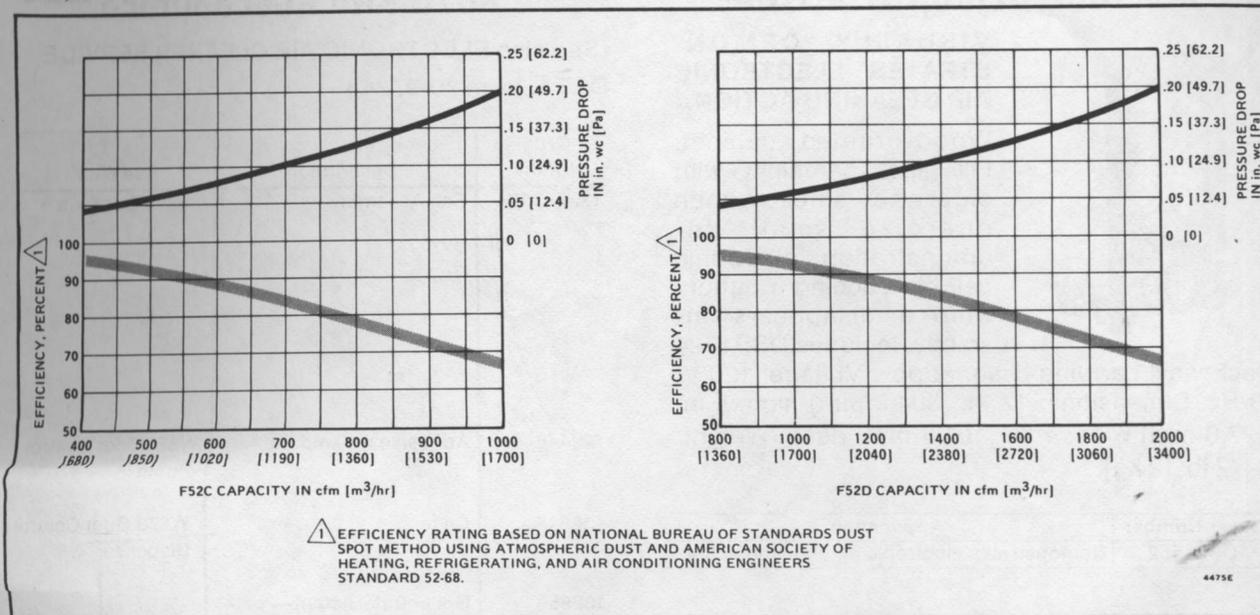
continued next page

TRADELIN

electronic air cleaners

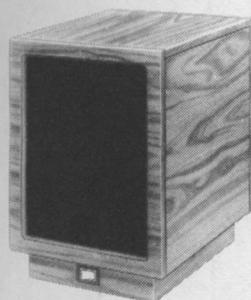


F52C,D continued



F52 capacity plotted against efficiency and pressure drop.

F56A CONSOLE ELECTRONIC AIR CLEANER



CLEANS AIR IN ENCLOSED SPACES SUCH AS HOMES OR OFFICES.

Furniture styled wood-grained cabinet. Built-in fan draws room air through an electronic cell and activated carbon filter. Circulates and cleans approximately

2500 ft³ [71 m³] of air 4-1/2 times an hour (equivalent to a 17 x 18 ft. [5.2 x 5.5 m] room). Powered from a standard grounded outlet. Cell

can be washed in automatic dishwasher or laundry tub. Ambient Temp. Range: 40 F to 100 F [5 C to 38 C]. Listed by Underwriters Laboratories Inc; listed by CSA.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 60 Hz.
Max. Power Consumption—0.7 A at 120 Vac.
Max. Current Draw—50 W at 120 Vac.

ACCESSORY:

190364A Casters. Package of four caster wheels and mounting hardware.

Order Number	Includes	Efficiency	Dimensions			
			Cabinet	Cell	Prefilter Screen	Activated Carbon Filter
F56A1003	Cabinet, 1 electronic cell, single-speed propeller fan, 1 activated carbon filter, 2 prefilter screens, high voltage power supply.	90 percent ^a	19-1/2 x 13-7/8 x 17-1/8 in. [495.3 x 352.4 x 435 mm]	12-1/2 in. x 16 [317.5 x 406.4 mm]	12-7/8 x 16-1/4 in. [327 x 412.8 mm]	12-3/4 x 16-1/8 in. [323.9 x 409.6 mm]

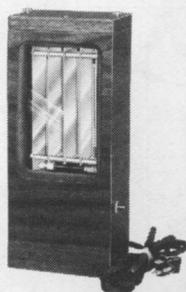
^aEfficiency as measured according to the National Bureau of Standards Dust Spot Method using atmospheric dust, and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers Standard 52-68.

TRADELIN



electronic air cleaners

DSP1552 DEMONSTRATOR



VISUALLY DEMONSTRATES ELECTRONIC AIR CLEANING ACTION.

Wood-grained cabinet. Fill glass container with cigarette smoke, then energize small demonstration electronic cell by touching a button. Smoke disappears instantly. Includes DSP1624

black vinyl carrying case. Supply Voltage: 120 V, 60 Hz. Dimensions: 12 in. [304.8 mm] high, 5 in. [127.0 mm] wide, 4 in. [101.6 mm] deep. Weight: 4-1/2 lb. [2 kg].

Order Number	Application
DSP1552	Demonstrates electronic air cleaning action.

W869A ELECTRONIC AIR CLEANER TEST METER



PORTABLE TEST METER FOR TESTING ELECTRONIC AIR CLEANER POWER PACKS.

Includes leatherette carrying case and high voltage test probes. Case Dimensions: 8-3/8 in. [212.7 mm] high, 9-1/4 in. [235.0 mm] wide, 4-5/8 in. [117.5 mm] deep.

Order Number	Meter Range
W869A1009	0 to 7,500 Vac 0 to 15,000 Vdc

S688A SAIL SWITCH



COMPLETES CIRCUIT POWER TO AUXILIARY EQUIPMENT IN FORCED AIR SYSTEM ON AN INCREASE IN DUCT AIR VELOCITY.

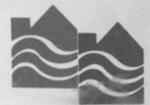
See page 90 for specifications.

PARTS AND ACCESSORIES

(See also ELECTRONIC AIR CLEANER SERVICE DATA, form 70-9724.)

Order Number	Description	Use With
123773A	Sail Assembly 	S688A Sail Switch
129446	Adhesive wall mount.	W874 Odor Control Panel
132645A	Cover.	W873 Odor Control Dispenser
132659	Gel counteractant—Spring.	↓
132664	Fan motor (less blade).	
132665	Fan blade.	Electronic air cleaners
132668AA	Cover lifter and terminal board assembly.	
136434AA	Ionizer wire 20 x 25 in. cell. 	Electronic air cleaners
136434BA (See 136434AA picture)	Ionizer wire 16 x 25 in. cell.	
137866A (See 137866D picture)	Gel counteractant—Cinnamon and Spice.	Y495 Odor Control System
137866B (See 137866D picture)	Gel counteractant—Orange Blossom.	
137866C (See 137866D picture)	Gel counteractant—Mint.	↓
137866D	Gel counteractant—Mountain Air. 	

gas burner controls

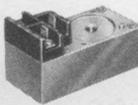
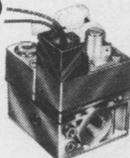
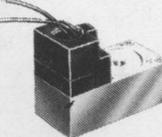
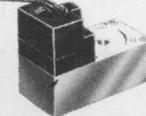
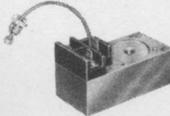
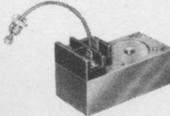
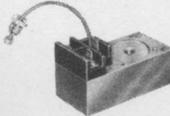
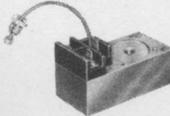


— V800 FAMILY COMBINATION GAS CONTROLS FOR CENTRAL HEATING — QUICK SELECTION CHART

The V800 family controls gas furnaces, boilers, unit heaters, outdoor units, duct furnaces, and swimming pool heaters. TRADELINE valve assemblies in the chart below can be bought as a unit, completely assembled. Or, you can "build" a combination gas control to fit any application by starting with a Pilotstat power unit manifold (right column) and adding a regulator and an operator. Refer to the page indicated for complete ordering information.

TRADELINE models.

• SUPER TRADELINE models.

Valve Capacity ^a	Voltage	TRADELINE V800 Combination Gas Control	Operators	Regulators	Pilotstat Power Unit Manifold
225 cfh [6.4 m ³ /hr]— 1/2 in. inlet, 1/2 in. outlet ^{b,c} ;	24 V	V800A1070 (with PRV) (1/2 x 3/4) • V800A1088 (with PRV) (3/4 x 3/4) (page 18) 	 V804B1022 24 V magnetic, fast-acting. (page 25)	 STANDARD V5306B1009 —Nat. Gas V5306B1017 —LP Gas (page 27)	 C580B1012 (3/4 x 3/4) (page 18)
	120 V	V400A1046 (with PRV) (1/2 x 3/4) V400A1095 (with PRV) (3/4 x 3/4) (page 18) 	 V404B1021 120 V magnetic, fast-acting, (page 25)	 STEP-OPENING V5307A1018—Nat. Gas V5307A1026—LP Gas (page 27)	 CS580B ^d
335 cfh [9.5 m ³ /hr]— 3/4 in. inlet, 3/4 in. outlet ^{b,c} ;	mV	VS820A1047 (with PRV) (1/2 x 3/4) VS820A1054 (with PRV) (3/4 x 3/4) (page 18) 	 V804B1021 120 V magnetic, fast-acting, (page 25)	 HI-LO FLAME V5308A ^d (page 27)	 C580 ^d High Capacity
	24 V	V800A5006 (with PRV) (1 x 1) (page 19) 	 VS824B1009 750 mV dc Powerpile Gas Control (page 26)	 LP-NAT. GAS CHANGEOVER V5309A ^d (page 27) 	 CS580 ^d High Capacity
450 cfh [12.7 m ³ /hr]— 3/4 in. inlet, 3/4 in. outlet;	24 V	V800A5006 (with PRV) (1 x 1) (page 19) 	 VS824B1009 750 mV dc Powerpile Gas Control (page 26)	 LP-NAT. GAS CHANGEOVER V5309A ^d (page 27) 	 C580 ^d High Capacity
503 cfh [14.2 m ³ /hr]— 3/4 in. inlet, 1 in. outlet;	120 V	V400A5005 (with PRV) (1 x 1) (page 19) 	 VS824B1009 750 mV dc Powerpile Gas Control (page 26)	 LP-NAT. GAS CHANGEOVER V5309A ^d (page 27) 	 CS580 ^d High Capacity
600 cfh [17 m ³ /hr]— 1 in. inlet, 1 in. outlet	mV	VS820A5006 (with PRV) (1 x 1) (page 19) 	 VS824B1009 750 mV dc Powerpile Gas Control (page 26)	 LP-NAT. GAS CHANGEOVER V5309A ^d (page 27) 	 CS580 ^d High Capacity

^aThe capacities listed are based on 1,000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc pressure drop [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa pressure drop]. Gas capacities are listed in cu ft per hour [m³/hr] to indicate gas flow through the valve.

^bTRADELINE packs include reducer bushings for this size pipe.

^c1/2 in. right and left outlets plugged.

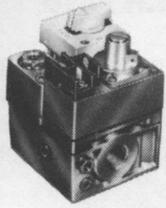
^dTo order, contact your Honeywell representative.

TRADELINE

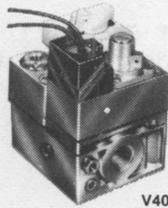


gas burner controls

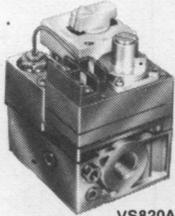
V800 FAMILY COMBINATION GAS CONTROLS



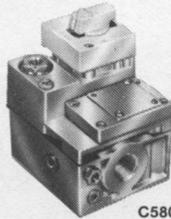
V800A,C



V400A



VS820A,C



C580B

PROVIDES COMPLETE CONTROL OF GAS-FIRED CENTRAL FURNACES AND BOILERS.

These combination gas controls are easy to install, adjust, and service. Gas cock knob, wiring connections, pressure regulator, pilot gas adjustments, and thermocouple connection are all on top of control for easy access. Valve operators and pressure regulators are easily replaced with a screwdriver. Refer to Quick Selection Chart, page 17, and order table, page 19, for application/description.

INCLUDES: Externally removable Pilotstat power unit; pilot flow adjustment screw.

COMPLETE SAFETY SHUTOFF on pilot flame failure.

LITE-RITE (OFF-PILOT-ON) lighting sequence.

MOUNTING: 0 to 90 degrees in any direction from the upright position of the gas cock knob.

BODY PATTERN: Straight-through. All models listed are multitapped with 1/2 in. right and left outlets plugged.

PRESSURE TAPPING: 1/8 in. NPT with plug.

PILOT GAS OUTLET: Compression fitting for 1/4 in. OD tubing.

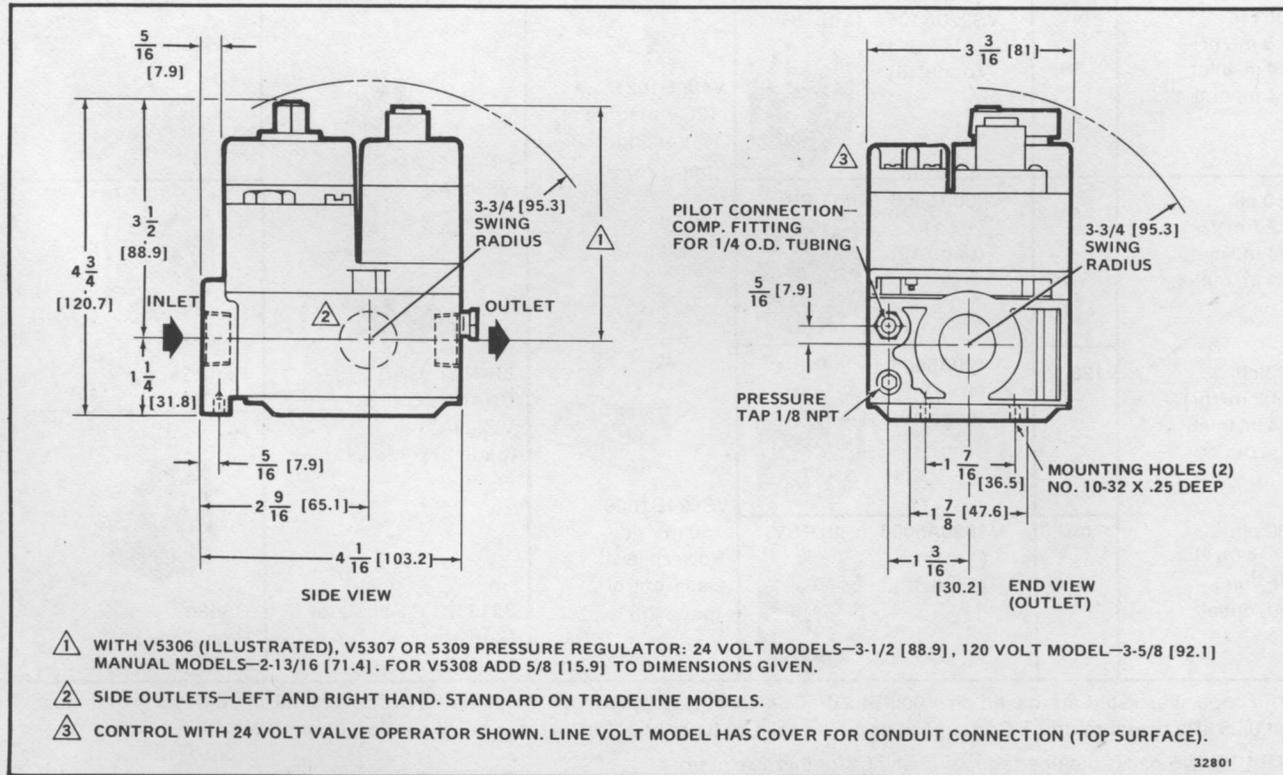
REPLACEMENT PARTS:

390800 Gas Cock Knob for remote rod.

392393B Power Unit for "C" and "V" prefix controls.

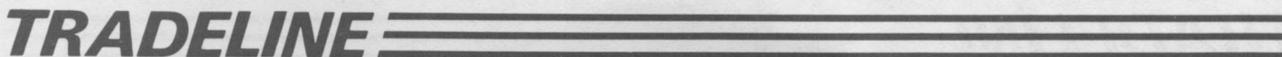
392394B Power Unit for "CS" and "VS" prefix controls.

394073 Gas Cock Knob and Shroud.



Dimensions in in. [mm in brackets] of V800 family of combination gas controls.

continued next page



gas burner controls



V800 Family continued

TRADELINE models.

• SUPER TRADELINE models.

Order Number	Application	Description	Inlet-Outlet Size (in.)	Capacity ^{c,d}		Pressure Regulator Setting		Kind of Gas	Includes Reducer Bushings/ Adapters
				cfh	m ³ /hr	in. wc	kPa		
C580B1012	Manual control.	Pilotstat manifold.	3/4 x 3/4	335	9.5	No reg.		Nat. or LP	Two 3/4 x 1/2 in.; One 1/2 x 3/8 in.
V400A1046 ^a	Automatic 120 V control.	Color-coded black to identify 120 V operation. 36 in. [914.4 mm] lead-wires.	1/2 x 3/4	250	7.1	3.5	0.87	Nat. or LP	One 3/4 x 1/2 in.; one 1/2 x 3/8 in.
V400A1095 ^a			3/4 x 3/4	335	9.5	3.5	0.87	Nat. or LP	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.
V800A1070 ^a	Automatic 24 V control.	Color-coded blue to identify 24 V operation. Terminal block has 3 combination screw and 1/4 in. [6.4 mm] quick-connect terminals. Current Draw: 0.2 A.	1/2 x 3/4	250	7.1	3.5	0.87	Nat. or LP	One 3/4 x 1/2 in.; one 1/2 x 3/8 in.
•V800A1088 ^a			3/4 x 3/4	335	9.5	3.5	0.87	Nat. or LP	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.
V800C1052			3/4 x 3/4	335	9.5	0.9 Step ^b ; 3.5 full rate	0.22 Step ^b ; 0.87 full rate	Nat.	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.
VS820A1047 ^a	Self-powered automatic control. Use with 750 mV pilot generator.	Color-coded red to identify Powerpile operation. Red pigtail power unit lead. Terminal block has 3 combination screw and 1/4 in. [6.4 mm] quick-connect terminals.	1/2 x 3/4	250	7.1	3.5	0.87	Nat. or LP	One 3/4 x 1/2 in.; one 1/2 x 3/8 in.
•VS820A1054 ^a			3/4 x 3/4	335	9.5	3.5	0.87	Nat. or LP	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.
VS820C1100			3/4 x 3/4	335	9.5	0.9 Step ^b ; 3.5 full rate	0.22 Step ^b ; 0.87 full rate	Nat.	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.

^aShipped from factory with Nat. gas regulator; includes 391937 LP Regulator Conversion Kit. See page 27.

^b50 percent of full rate.

^c1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^dUse of reducer bushings resulting in 3/4 x 1/2 in. inlet-outlet size reduces capacity to 225 cfh [6.4 m³/hr]; use of reducer bushings resulting in 1/2 x 3/8 in. inlet-outlet size reduces capacity to 110 cfh [3.1 m³/hr].

V800 FAMILY HIGH CAPACITY COMBINATION GAS CONTROLS



PROVIDES COMPLETE CONTROL OF HIGH CAPACITY GAS-FIRED CENTRAL FURNACES AND LARGE HEATING EQUIPMENT.

These high capacity combination gas controls feature the same versatility and ease of installation as standard capacity models. Gas cock knob, wiring connections, pressure regulator, pilot gas adjustments, and thermocouple connection are all on top of control for easy access. All models listed include a 391937 LP

Regulator Conversion Kit for converting to regulated LP gas. Refer to Quick Selection Chart, page 17, and order table, page 20, for application/description.

INCLUDES: Externally removable Pilotstat power unit; pilot flow adjustment screw.

COMPLETE SAFETY SHUTOFF on pilot flame failure.

LITE-RITE (OFF-PILOT-ON) lighting sequence.
MOUNTING: 0 to 90 degrees in any direction from the upright position of the gas cock knob.

BODY PATTERN: Straight-through.

PRESSURE TAPPING: 1/8 in. NPT with plug.

PILOT GAS OUTLET: Compression fitting for 1/4 in. OD tubing.

continued next page

TRADELINE



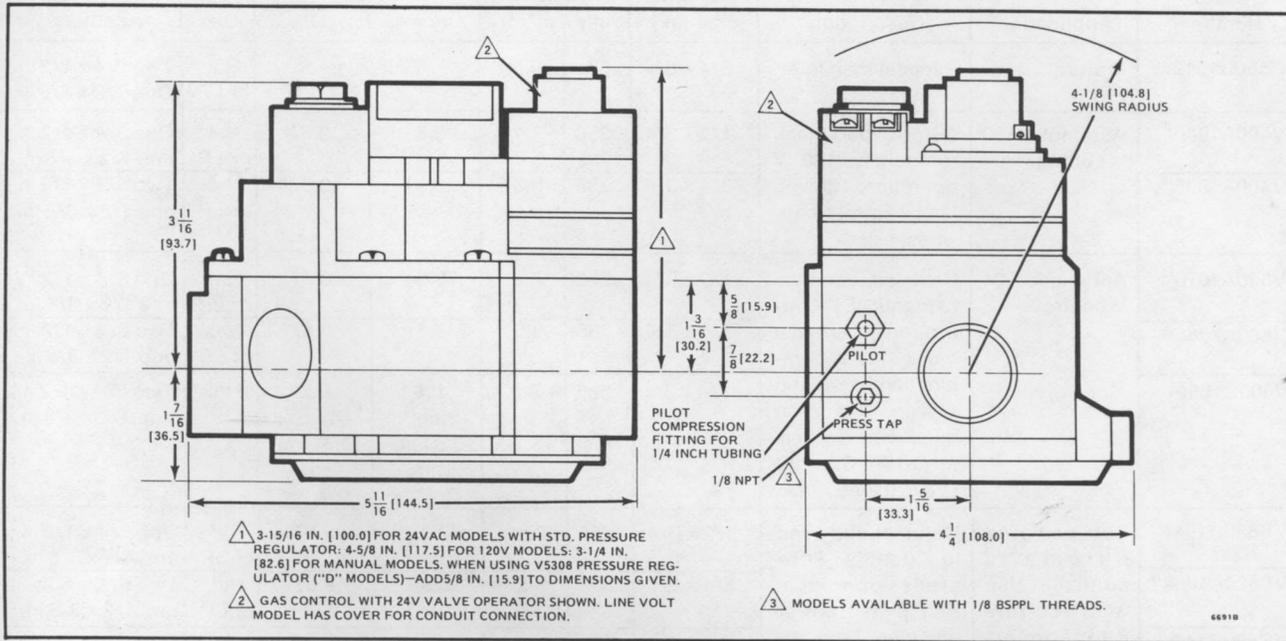
gas burner controls

V800 Family High Capacity continued

REPLACEMENT PARTS:

- 390800 Gas Cock Knob for remote rod.
- 392393B Power Unit for "C" and "V" prefix controls.

- 392394B Power Unit for "CS" and "VS" prefix controls.
- 394073 Gas Cock Knob and Shroud.



Dimensions in in. [mm in brackets] of V800 family of high capacity combination gas controls.

TRADELINE models.

Order Number	Application	Description	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Includes Reducer Bushings
				cfh	m ³ /hr	in. wc	kPa		
V400A5005	Automatic 120 V control.	Color-coded black to identify 120 V operation. 36 in. [914.4 mm] lead-wires.	1 x 1	600	17	3.5	0.87	Nat.	Two 1 x 3/4 in.
V800A5006	Automatic 24 V control.	Color-coded blue to identify 24 V operation. Terminal block has 3 combination screw and 1/4 in. [6.4 mm] quick-connect terminals. Current Draw: 0.2 A.	1 x 1	600	17	3.5	0.87	Nat.	Two 1 x 3/4 in.
VS820A5006	Self-powered automatic control. Use with 750 mV pilot generator.	Color-coded red to identify Powerpile gas control operation. Red pigtail power unit lead. Terminal block has 3 combination screw and 1/4 in. [6.4 mm] quick-connect terminals.	1 x 1	600	17	3.5	0.87	Nat.	Two 1 x 3/4 in.

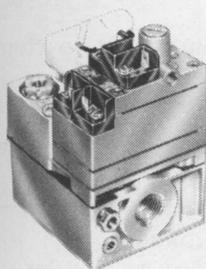
^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

TRADELINE

gas burner controls



V850A TWO-STAGE COMBINATION GAS CONTROL



PROVIDES HIGH-LOW FIRE OPERATION OF MAIN BURNER.

Combines Lite-Rite manual gas cock, safety shutoff pilotstat control, and valve operator-regulator. Two operators for either reduced or full-rated gas flow. First stage magnetic operator

turns on burner when thermostat calls for heat. A bimetal operator increases pressure to full rate in about 60 seconds on a call for heat at high stage.

MOUNTING: 0 to 90 degrees in any direction from the upright position of the gas cock knob.

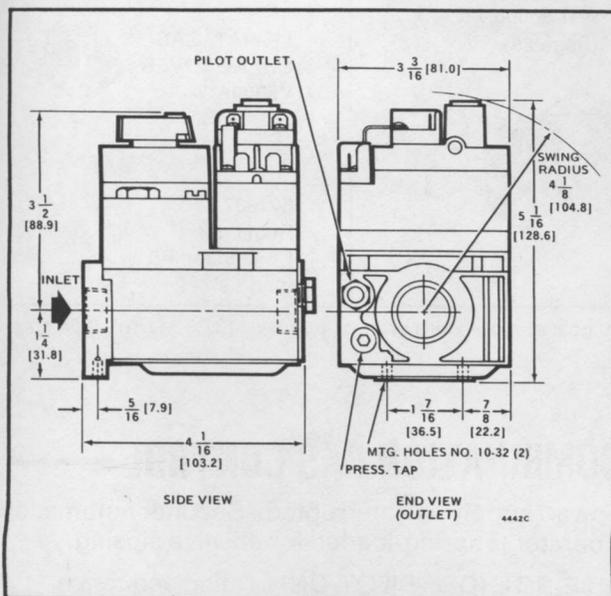
BODY PATTERN: Straight-through.

OUTLET PRESSURE to burner in second stage is field adjustable: Nat. Gas—3 to 5 in. wc [0.8 to 1.2 kPa]; LP Gas—8 to 12 in. wc [2.0 to 3.0 kPa].

PRESSURE TAPPING: 1/8 in. NPT with plug.

PILOT GAS OUTLET: Compression fitting for 1/4 in. OD tubing.

AMBIENT TEMP. RANGE: 32 F to 175 F [0 C to 79 C].



Dimensions in in. [mm in brackets] for V850.

ELECTRICAL DATA:

Voltage and Frequency—24 V, 50/60 Hz.

Current Draw—first stage 0.20 A; second stage 0.24 A.

Wiring Connections—four combination screw and 1/4 in. [6.4 mm] male quick-connect terminals.

RECOMMENDED THERMOSTAT: T874C two-stage thermostat with Q674B subbase.

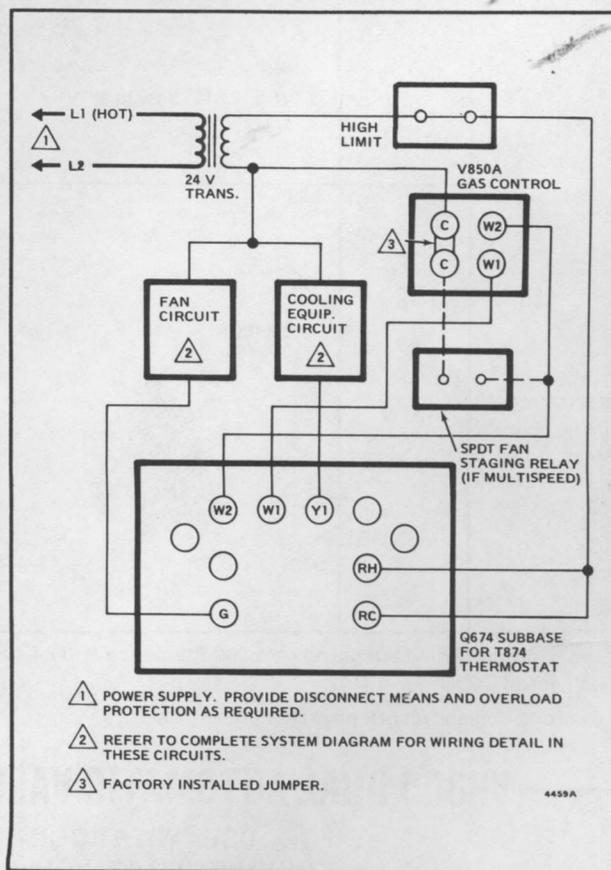
REPLACEMENT PARTS:

386449 Compression Fitting for pilot tubing connection.

392393B Pilotstat Power Unit (30 mV).

V8324 Valve Operator-Regulator Assembly.

When ordering specify voltage, frequency, and pressure setting for low fire and high fire.



T874-Q674 system showing typical connections to the V850 and to 24 V relays controlling the fan and cooling equipment.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas
		cfh	m ³ /hr	in. wc	kPa	
V850A1075	12 x 3/4	250	7.1	3.5 full rate; 1.8 low	0.87 full rate; 0.44 low	Nat.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.]

TRADELINE



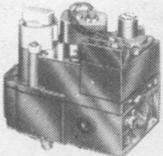
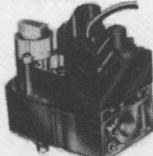
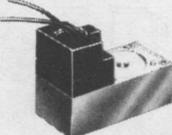
gas burner controls

VR800 FAMILY COMBINATION GAS CONTROLS FOR HEATING EQUIPMENT QUICK SELECTION CHART

The VR800 family are dual automatic valve combination gas controls for continuous pilot ignition systems in gas heating appliances. Refer to page indicated for complete ordering information.

TRADELINE models.

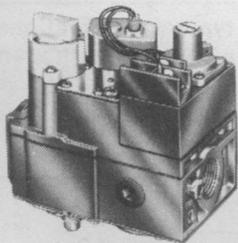
• SUPER TRADELINE model.

Valve Capacity ^a	Voltage	VR800 Combination Gas Control	Operators	Regulators
205 cfh [6.2 m ³ /hr] 1/2 in. inlet 3/4 in. outlet	24 V	VR800A1061 (with PRV) (1/2 x 3/4)  • VR800A1079 (with PRV) (3/4 x 3/4) (page 22)	V804B1022 24 V magnetic, fast-acting. (page 25) 	STANDARD V5306B1009—Nat. Gas V5306B1017—LP Gas (page 27)  STEP-OPEN V5307A1018—Nat. Gas V5307A1026—LP Gas (page 27) 
225 cfh [6.4 m ³ /hr] 3/4 in. inlet 3/4 in. outlet	120 V	VR400A ^b 	V404B1021 120 V magnetic, fast-acting. (page 25) 	HI-LO V5308A ^b  LP-NAT. GAS CHANGEOVER V5309A ^b  391937 LP Regulator Conversion Kit (page 27) 

^aThe capacities listed are based on 1,000 Btu per cu ft, 0.64 sp gr Nat. gas, at a pressure drop of 1.0 in. wc [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bTo order, contact your Honeywell representative.

VR800 DUAL AUTOMATIC VALVE COMBINATION GAS CONTROL



FOR USE WITH CONTINUOUS PILOT IGNITION SYSTEMS IN GAS HEATING APPLIANCES.

Easy to install, adjust, and service. Second automatic valve operator and pressure regulator are easily replaced with a screwdriver. Dual-seated safety shutoff valve as-

ures positive closing. Diaphragm type operator requires gas pressure to open; closes if gas or

power supply is interrupted. Second automatic operator is spring-loaded for positive closing.

LITE-RITE (OFF-PILOT-ON) lighting sequence.
MOUNTING: 0 to 90 degrees in any direction from the upright position of the gas cock knob.

BODY PATTERN: Straight-through. TRADELINE models are multitapped with 1/2 in. right and left outlets plugged.

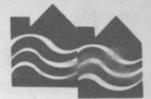
PRESSURE TAPPING: 1/8 in. NPT with plug.

PILOT GAS OUTLET: Compression fitting for 1/4 in. OD tubing.

continued next page

TRADELINE

gas burner controls



VR800 Dual Automatic Valve continued

ELECTRICAL DATA:

Voltage and Frequency—24 V, 50/60 Hz.

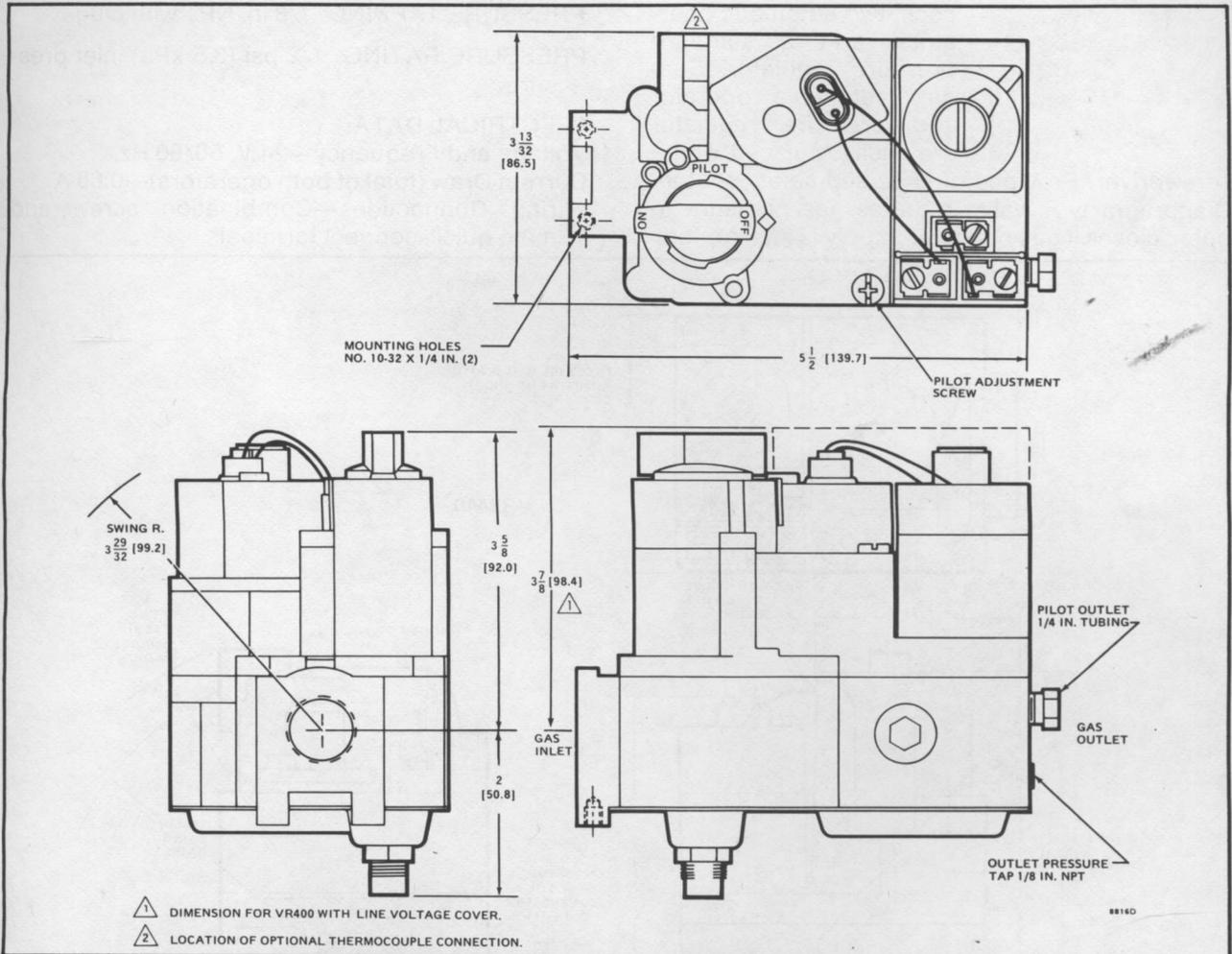
Current Draw—0.6 A.

Wiring Connections—four combination screw and 1/4 in. [6.4 mm] male quick-connect terminals.

REPLACEMENT PARTS:

386449 Compression Fitting for pilot tubing connection.

392147 Pilotstat Power Unit Replacement Kit (30 mV).



Dimensions in in. [mm in brackets] of VR800.

TRADELINE model.

• SUPER TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^{a,c}		Pressure Regulator Setting		Includes
		cfh	m ³ /hr	in. wc	kPa	
VR800A1061 ^b	12 x 3/4	205	6.2	3.5	0.87	One 3/4 x 1/2 in. and one 1/2 x 3/8 in. reducer bushings; 391937 LP Regulator Conversion Kit.
• VR800A1079 ^b	3/4 x 3/4	225	6.4	3.5	0.87	Two 3/4 x 1/2 in. and one 1/2 x 3/8 in. reducer bushings; 391937 LP Regulator Conversion Kit.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^b1/2 in. right and left outlets plugged.

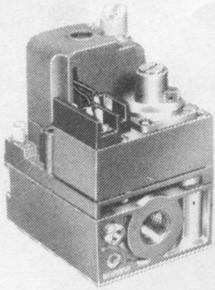
^cUse of reducer bushings resulting in 1/2 x 1/2 in. inlet-outlet size reduces capacity to 180 cfh [5.0 m³/hr]; use of reducer bushings resulting in 1/2 x 3/8 in. inlet-outlet size reduces capacity to 110 cfh [3.1 m³/hr].

TRADELINE



gas burner controls

VR8440A INTERMITTENT PILOT DUAL VALVE COMBINATION GAS CONTROL



COMBINATION GAS CONTROL FOR USE IN GAS BURNER IGNITION SYSTEMS.

Combines manual gas cock, two automatic operators, and a standard pressure regulator. Second automatic operator and pressure regulator are easily replaced with a screwdriver. Provides dual-seated safety shutoff. Diaphragm type valve requires gas pressure to open; closes if gas or power supply is interrupted.

ON-OFF lighting sequence.

MOUNTING: 0 to 90 degrees in any direction from the upright position of the gas clock knob.

BODY PATTERN: Straight-through.

PRESSURE TAPPING: 1/8 in. NPT with plug.

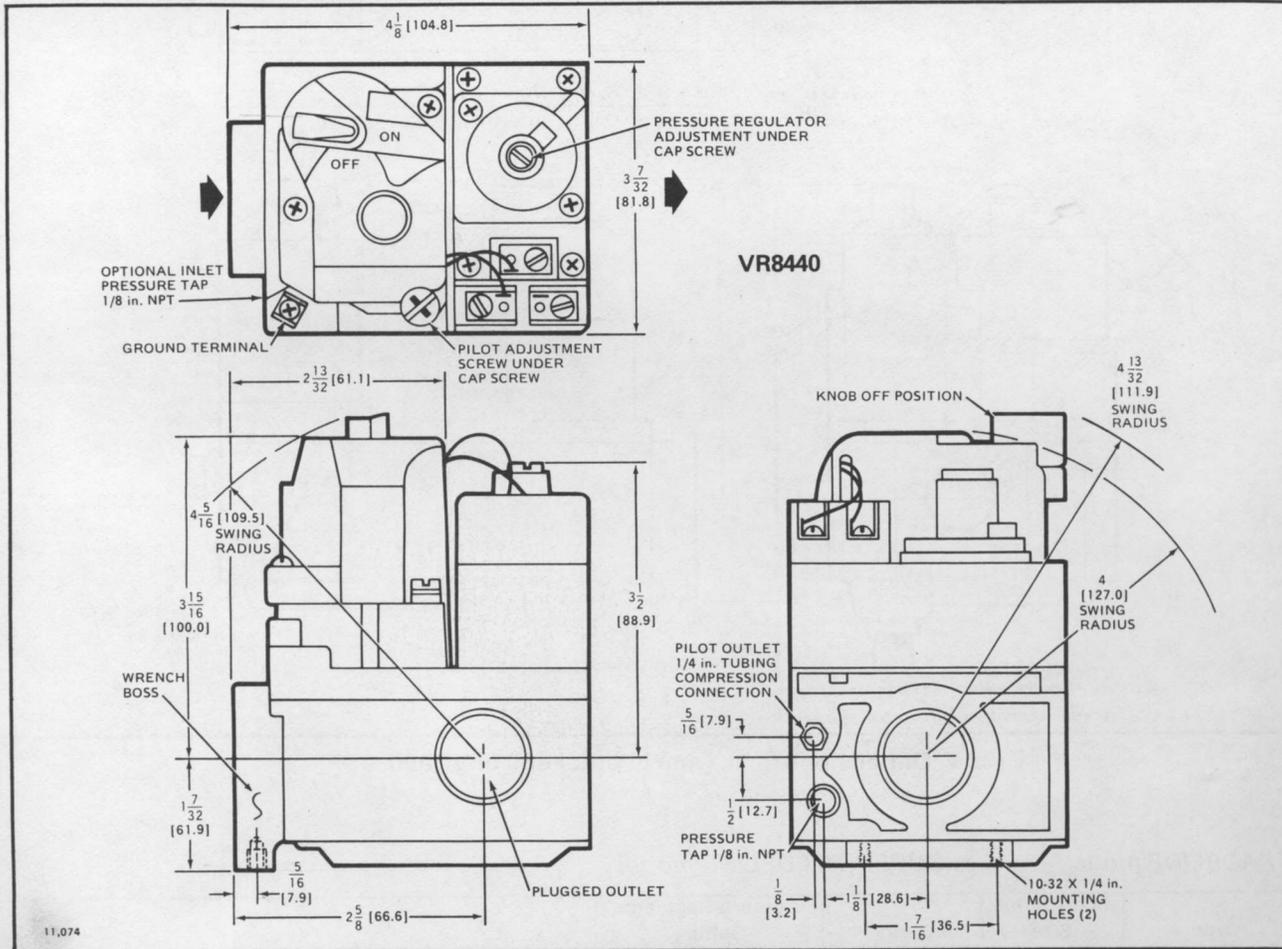
PRESSURE RATING: 1/2 psi [3.5 kPa] inlet pressure.

ELECTRICAL DATA:

Voltage and Frequency—24 V. 50/60 Hz.

Current Draw (total of both operators)—0.65 A.

Wiring Connections—Combination screw and male quick-connect terminals.



Dimensions in in. [mm in brackets] of VR8440.

TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Includes
		cfh	m ³ /hr	in. wc	kPa	
VR8440A6028 ^b	3/4 x 3/4	290	8.2	3.5	0.87	Two 3/4 x 1/2 in. and one 1/2 x 3/8 in. reducer bushings; 391937 LP Regulator Conversion Kit.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

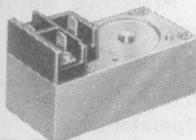
^b1/2 in. right and left outlets plugged.

TRADELINE

gas burner controls



V804B ADATROL CONTROL OPERATOR



24 V MAGNETIC FAST-ACTING OPERATOR FOR ADATROL CONTROL OR REPLACEMENT USE ON V800 OR VR800 COMBINATION GAS CONTROLS.

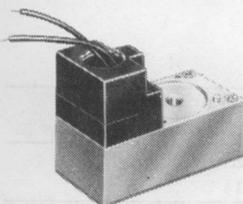
Requires separate 24 V transformer. Current Draw: 0.2 A. Wiring Connections: Three combina-

tion screw and 1/4 in. [6.4 mm] quick-connect terminals. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Ambient Temp. Range: Minus 40 F to plus 175 F [minus 40 C to plus 79 C].

TRADELINE model.

Order Number	Add-on or Replacement Operator for
V804B1022	C580, C581, V800, V801, V804, V814 on V810 and V811, VR800, VR8440, VR8450

V404B ADATROL CONTROL OPERATOR



120 V MAGNETIC FAST-ACTING OPERATOR FOR ADATROL CONTROL OR REPLACEMENT USE ON V400 OR VR400 COMBINATION GAS CONTROLS.

Current Draw: 0.04 A. Wiring Connections: Two 36 in. [914.4 mm] leadwires.

Max. Pressure Rating: 1/2 psi [3.5 kPa]. Ambient Temp. Range: Minus 40 F to plus 175 F [minus 40 C to plus 79 C].

Order Number	Add-on or Replacement Operator for
V404B1021	C580; C581; V400; V401; V404A,B; VR400; VR4440; VR4450

Honeywell Tradeline and Super Tradeline Controls

Honeywell **TRADELINE** and **SUPER TRADELINE** controls eliminate unnecessary inventory duplication and save you money. These controls are specifically designed and equipped with accessories to meet all your replacement needs. You get maximum controlability with a minimum number of devices. Fewer replacement controls to learn and stock means faster on-the-job replacement, and more jobs completed effectively and quickly.

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value.

SUPER TRADELINE controls offer features not available on **TRADELINE** or standard models. Added features and installation accessories such as special adapters, universal mounting, and extra-wide control ranges, give Honeywell **SUPER TRADELINE** controls a built-in versatility—one **SUPER TRADELINE** model can quickly and easily replace a wide range of Honeywell and competitive controls.

Both **SUPER TRADELINE** and **TRADELINE** models provide a picture of the control, critical specifications, and cross-reference information **on the box label** where it is highly visible. This enables the service technician to quickly and accurately choose and install the correct replacement control.

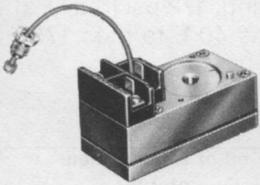
TRADELINE and **SUPER TRADELINE** controls are shown in color in the RCC section of this catalog.

TRADELINE



gas burner controls

VS824B ADATROL POWERPILE OPERATOR



THERMOSTATICALLY CONTROLLED POWERPILE OPERATOR FOR ADATROL CONTROL OR REPLACEMENT USE ON VS820 COMBINATION GAS CONTROLS.

Requires 750 mV pilot generator. Electrical Rat-

ing: 750 mV dc. Wiring Connections: Three combination screw and 1/4 in. [6.4 mm] quick-connect terminals. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Ambient Temp. Range: Minus 40 F to plus 175 F [minus 40 C to plus 79 C].

Order Number	Add-on or Replacement Operator for
VS824B1009	CS580, CS581, VS820, VS821, VS824

V504 OPERATOR



MODUSNAP OPERATOR FOR ADATROL CONTROL OR REPLACEMENT USE ON V500 COMBINATION GAS CONTROLS.

Use with temperature sensing bulb and bellows (see page 26). Operator can be replaced without replacing bulb and

bellows assembly. Includes black locking stop and cover for remote dial use (V511). Max. Pressure Rating: 1/2 psi [3.5 kPa]. Pressure Regulator Setting (full rate): 3.5 in. wc [0.87 kPa]. For natural gas applications.

TRADELINE model.

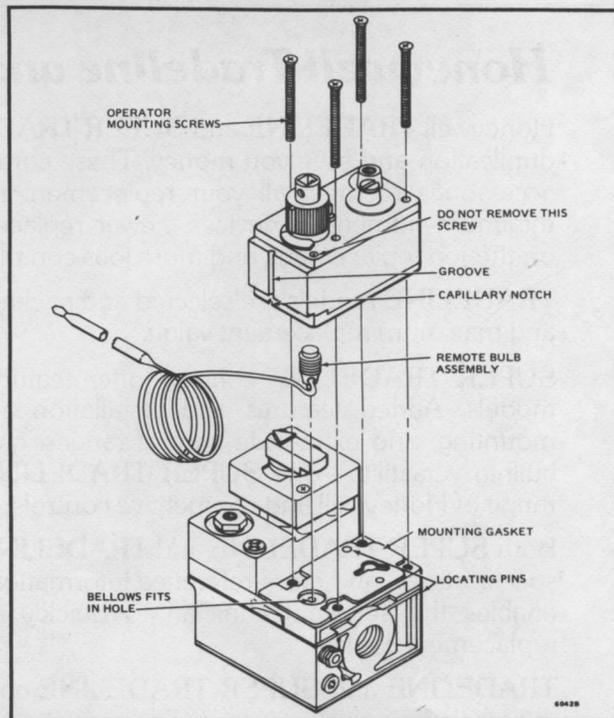
Order Number	Add-on or Replacement Operator for
V504A1003	C580, C581, V500, V501, V510, V511

REPLACEMENT BULB AND BELLOWS ASSEMBLIES

FIELD-ADDABLE ASSEMBLIES FOR V500 COMBINATION GAS CONTROLS.

Bulb and bellows assembly can be replaced without having to replace operator. Ambient Temp. Range: 50 F to 90 F [10 C to 32 C].

Order Number	Description	Use With
394268-1	Remote Bulb and Bellows; one 36 in. [914.4 mm] capillary.	V500, V501, V520, V521
394268-6	Remote Bulb, Bellows and Remote Dial (replaces self-index or concealed dial); two 36 in. [914.4 mm] capillaries.	V510, V511, V530, V531



Mounting bulb and bellows assembly and operator on a standard capacity gas control.

TRADELINE

gas burner controls



391937 LP REGULATOR CONVERSION KIT



CONVERTS REGULATED NATURAL GAS V800 AND VR800 COMBINATION GAS CONTROLS TO LP USE.

Consists of regulator spring, screw, and cap. Can be used with any

combination gas control supplied with a V5306 PRV.

Order Number	Converts Pressure Regulator on
391937	V400, V401, V444, V445, V800, V801, V810, V811, V844, V845, VR400, VR800, VR844, VR845, VR8440, VR8445, VS820, VS821

V5306, V5307, V5308, V5309 PRESSURE REGULATORS

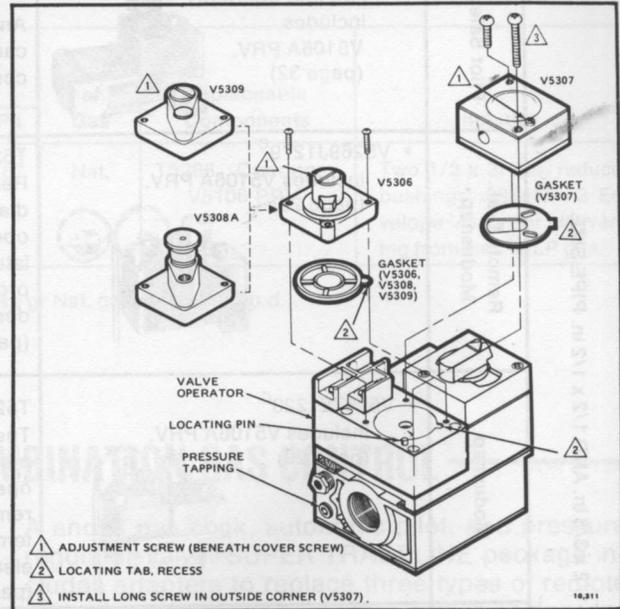


SERVO GAS PRESSURE REGULATORS FOR ADATROL CONTROL OR REPLACEMENT USE ON V800 OR VR800 COMBINATION GAS CONTROLS.

Controls burner manifold pressure by repositioning the main valve diaphragm. For use with automatic or manual controls. See order table for application. Regulators are interchangeable and adapt to all pipe sizes and capacities. Easy installation; regulators mount on top surface of control.

ACCESSORY:

394074 Operator-regulator Cover Plate Assembly for addition of regulator to C580, C581, CS580, or CS581 when valve operator is not required. Includes 2 gaskets, 6 screws, adapter casting, and blank regulator cover plate.



Servo pressure regulator installation on combination gas control equipped with valve operator.

TRADELINE models.

Order Number	Regulator Type	Use with		Pressure Regulator Setting		Kind of Gas	Ambient Temp. Range	
		Control	Suffix ^a	in. wc	kPa		F	C
V5306B1009 ^b	Standard	C580, C581, CS580, CS581, V400, V401, V800, V801, VS820, VS821, VR800	A	3.5 (3 to 5 adj.)	0.87 (0.7 to 1.2 adj.)	Nat.	Minus 40 to plus 175	Minus 40 to plus 79
V5306B1017 ^b	Standard		A	11.0 (8 to 12 adj.)	2.7 (2 to 3 adj.)	LP		
V5307A1018	Step	V400, V401, V800, V801, VS820, VS821, VR400, VR800, VR844, VR845, VR8440, VR8445	C	3.5 (3 to 5 adj.) full rate; 0.9 step	0.87 (0.7 to 1.2 adj.) full rate; 0.2 step	Nat.	32 to 175	0 to 79
V5307A1026	Step		C	11.0 (8 to 12 adj.) full rate; 2.2 step	2.7 (2 to 3 adj.) full rate; 0.5 step	LP		

V5308
V5309

To order, contact your Honeywell representative.

^aExample of suffix letter on combination gas control: V800A, V400C. Combination controls with "B" suffix letter are without a pressure regulator.

^bReplaces either V5306A or V5306B.

TRADELINE



gas burner controls

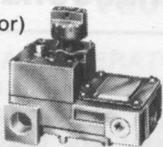
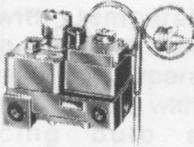
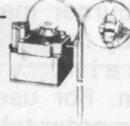
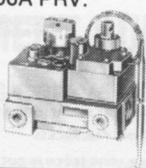
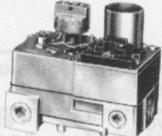
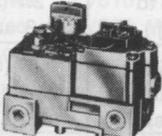
COMBINATION GAS CONTROLS FOR HEATING APPLIANCES

QUICK SELECTION CHART

The 80 cfh [2.3 m³/hr] series combination gas controls are for use on gas heating appliances. TRADELINE and SUPER TRADELINE valve assemblies (left column) can be bought as a unit, completely assembled. Replacement components appear in the last three columns. Refer to the page indicated for complete ordering information.

TRADELINE models.

• SUPER TRADELINE models.

	Complete ^b Combination Gas Control	Replacement Components ^d		
		Operator	Pilotstat Power Unit	Pressure Regulator
80 cfh [2.3 m ³ /hr] ^a - 1/2 x 3/8 in. AND 1/2 x 1/2 in. PIPE SIZE	Pilot Safety C5290E1085 (without operator) includes V5106A PRV. (page 32) 	None supplied. Any operator listed below can be added for thermostatic control.		
	Remote Dial Modusnap • V5269J1279 ^C includes V5106A PRV. (page 29) 	T5298B1084 Remote hydraulic dial Modusnap operator. Modu- lates gas flow in proportion to demand. (page 32) 		
	Modusnap • V5267E1223 ^C includes V5106A PRV. (page 29) 	T5266A1027 Thermostatic modulating valve operator with remote bulb temp. sensing element. (page 32) 	C5281B1000 Used with 30 mV thermocouple. (page 34)	CONVERSION KITS 393453—3 Nat. to LP gas. 390182—2 LP to Nat. gas.
	24 Volt • V8277E1084 ^C includes V5106A PRV. (page 30) 	—		
	Milli- voltage • VS8194E1304 ^C includes V5106A PRV. (page 30) 	VS8299A1008 750 mV diaphragm- type Powerpile operator. Re- quires bleed gas tubing to pilot burner. (page 34) 	CS5281B1000 Used with 750 mV generator. (page 34) 	

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bPRV stands for Pressure Regulator Valve.

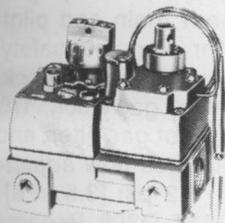
^cSUPER TRADELINE control. Includes two 1/2 x 3/8 in. reducer bushings and other accessories specified in order table.

^dThese components are not compatible with complete combination gas controls having suffix letter "A" or "B". "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

TRADELINE



V5267E MODUSNAP GAS VALVE



THERMOSTATICALLY CONTROLLED COMBINATION GAS CONTROL WITH REMOTE TEMPERATURE SENSING BULB.

Provides on-off minimum flame with modulating control on increased heating demand. Programmed safe-lighting,

3-position (ON-PILOT-OFF) gas cock provides manual control of main burner and pilot gas.

In-line pilot safety valve for complete safety shutoff on pilot flame failure. Mechanical interlock prevents accidental movement of gas cock. 1/8 in. NPT pressure tap with plug; pilot gas filter; and 1/4 cc pilot gas outlet with pilot gas flow adjustment screw. Suitable for all heating gases. Valve Pattern: Straight-through. Pressure Rating: 1/2 psi [3.5 kPa]. Recommended Pilot Burner: Q314, Q308. Recommended Thermocouple: Q340, 30 mV. Control Temp. Range: 60 F to 100 F [16 C to 38 C]. Remote Bulb: 7-5/8 in. [193.7 mm] bulb with 36 in. [914.4 mm] capillary. Max. Ambient Temp: 125 F [52 C].

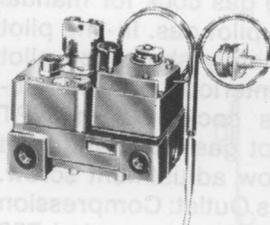
- SUPER TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Replaceable Components	Includes
		cfh	m ³ /hr	in. wc	kPa			
• V5267E1223 ^b	1/2 x 1/2	80	2.3	3.5	0.87	Nat.	T5266 Operator, V5106 PRV	Two 1/2 x 3/8 in. reducer bushings; 393453—3 Envelope Assy. for converting from Nat. to LP gas.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bMultitapped; 3/8 in. NPT side inlet and/or outlet plugged.

V5269J REMOTE DIAL COMBINATION GAS CONTROL



THERMOSTATICALLY CONTROLLED, SELF-CONTAINED MODULATING VALVE WITH REMOTE DIAL AND TEMPERATURE SENSING BULB.

Provides on-off minimum flame with modulating control on increased heating demand. With integral

A and B gas cock, automatic pilot, and pressure regulator valve. SUPER TRADELINE package includes adapters to replace three types of remote dial mounting—concealed, self-indexing, or threaded shaft. Use with 30 mV thermocouple. Control Temp. Range: 50 F to 90 F [10 C to 32 C]. Bulb Length: 7 in. [177.8 mm]. Capillary: 36 in. [914.4 mm] from element to control; 48 in. [1219.2 mm] from element to dial. Pressure Rating: 1/2 psi [3.5 kPa]. Max. Ambient Temp: 125 F [52 C].

- SUPER TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Replaceable Components	Includes
		cfh	m ³ /hr	in. wc	kPa			
• V5269J1279 ^b	1/2 x 1/2	80.0	2.3	3.5	0.87	Nat.	T5298 Operator, V5106 PRV	Two 1/2 x 3/8 in. reducer bushings; adapters for remote dial mounting; 393453—3 Envelope Assy. for converting from Nat. to LP gas.

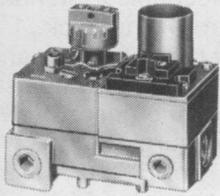
^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bMultitapped; 3/8 in. NPT side inlet and/or outlet plugged.



gas burner controls

V8277E ADATROL COMBINATION GAS CONTROL



WALL THERMOSTAT (24 V) CONTROLLED COMBINATION GAS CONTROL.

Use with appropriate thermostat, transformer, and limit control (if required) for complete automatic temperature control of domestic gas heating appliances. Programmed

safe-lighting, 3-position (ON-PILOT-OFF) gas cock for manual control of both main and pilot gas. In-line pilot safety valve for complete safety shutoff on pilot flame failure. Mechanical interlock prevents accidental movement of gas cock. 1/8 in. NPT pressure tap with plug, pilot gas filter, and 1/4 cc pilot gas outlet with pilot gas flow adjustment screw. Pressure Rating: 1/2 psi [3.5 kPa]. Recommended Pilot Burner: Q314, Q308. Recommended Thermocouple: Q340, 30 mV. Recommended Transformer: AT72D. Recommended Thermostat: T87, T882. Current Rating: 0.4 A at 24 Vac.

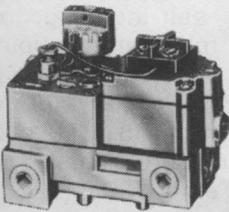
• SUPER TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Includes
		cfh	m ³ /hr	in. wc	kPa		
• V8277E1084 ^b	1/2 x 1/2	80.0	2.3	3.5	0.87	Nat.	Two 1/2 x 3/8 in. reducer bushings; 393453—3 Envelope Assy. for converting from Nat. to LP gas

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bMultitapped; 3/8 in. NPT side inlet and/or outlet plugged.

VS8194E POWERPILE COMBINATION GAS CONTROL



COMPLETE MANIFOLD TYPE VALVE FOR CONTROL OF DOMESTIC GAS HEATING APPLIANCES.

Use with 750 mV Powerpile generator and Powerpile thermostat for complete automatic gas system control. Programmed safe-lighting,

3-position (ON-PILOT-OFF) gas cock for manual control of main burner and pilot gas. In-line pilot safety valve for complete safety shutoff on pilot flame failure. Mechanical interlock prevents accidental movement of gas cock. 1/8 in. NPT pressure tap with plug, pilot gas filter, and pilot gas outlet with pilot gas flow adjustment screw. 1/8 in. bleed fitting. Pilot Gas Outlet: Compression fitting for 1/4 in. OD tubing. Recommended 750 mV Powerpile Generator: Q313-Q314 (order separately). Pressure Rating: 1/2 psi [3.5 kPa]. Max. Ambient Temp: 175 F [79 C].

• SUPER TRADELINE model.

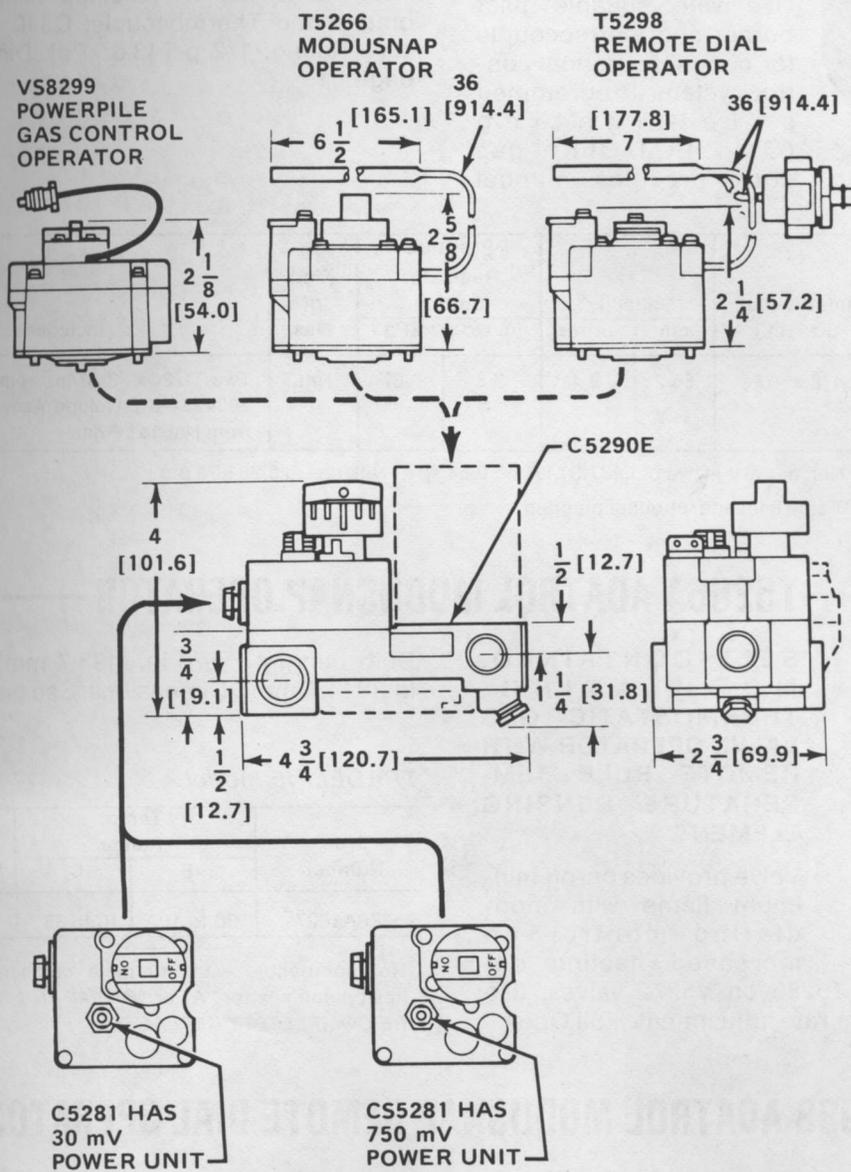
Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Includes
		cfh	m ³ /hr	in. wc	kPa		
• VS8194E1304 ^b	1/2 x 1/2	80.0	2.3	3.5	0.87	Nat.	Two 1/2 x 3/8 in. reducer bushings; 393453—3 Envelope Assy. for converting from Nat. to LP gas.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bMultitapped; 3/8 in. NPT side inlet and/or outlet plugged.

TRADELINE

gas burner controls



NOTE: THESE COMPONENTS ARE NOT COMPATIBLE WITH COMPLETE COMBINATION GAS CONTROLS HAVING SUFFIX LETTER "A" OR "B." "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

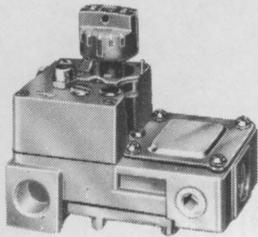
1749F

Dimensions in in. [mm in brackets] for devices shown on pages 32-34.



gas burner controls

C5290E ADATROL COMBINATION GAS CONTROL



BASIC MANUAL GAS CONTROL FOR ALL DOMESTIC GAS HEATING APPLIANCES.

Use with suitable pilot burner and thermocouple for complete manual control system. Programmed safe-lighting (ON-PILOT-OFF) gas cock provides manual

control of both main burner and pilot gas. For automatic temperature control, add V8285 (24 V) operator, T5266 (modulating, remote bulb) operator, or T5298 (modulating, remote dial) operator. Pilot Gas Outlet: 1/4 in. compression fitting. Recommended Thermocouple: Q340, 30 mV. Pressure Rating: 1/2 psi [3.5 kPa]. Dimensions: See page 31.

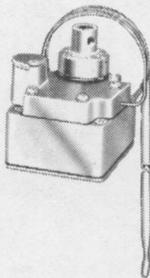
TRADELINE model.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Pressure Regulator Setting		Kind of Gas	Includes
		cfh	m ³ /hr	in. wc	kPa		
C5290E1085 ^b	1/2 x 1/2	86.2	2.4	3.5	0.87	Nat.	Two 1/2 x 3/8 in. reducer bushings; 393453—3 Envelope Assy. for converting from Nat. to LP gas.

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bMultitapped; 3/8 in. NPT side inlet and/or outlet plugged.

T5266A ADATROL MODUSNAP OPERATOR



SELF-CONTAINED, MODULATING, THERMOSTATIC GAS VALVE OPERATOR WITH REMOTE BULB TEMPERATURE SENSING ELEMENT.

Valve provides on-off minimum flame with modulating control on increased heating demand. To replace T5286 on V5272 valves, use T5266 with minimum rate adjustment "Full Open."

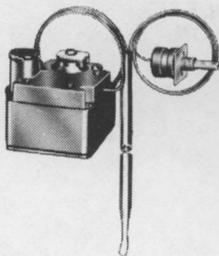
Bulb Length: 7-5/8 in. [193.7 mm]. Capillary: 36 in. [914.4 mm]. Dimensions: See page 31.

TRADELINE model.

Order Number	Temp. Range		Replacement Operator for
	F	C	
T5266A1027 ^a	60 to 100	16 to 38	V5267, V5272

^aNot compatible with complete combination gas controls having suffix letter "A" or "B". "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

T5298B ADATROL MODUSNAP REMOTE DIAL OPERATOR



REPLACEMENT OPERATOR.

Hydraulic dial permits heater cabinet mounting for remote valve control. Valve provides on-off minimum flame with modulating control on increased heating demand. Includes adapters for concealed dial, self-indexing dial, or dial with hex mounting nut.

Bulb Length: 7 in. [177.8 mm]. Capillary: 36 in.

[914.4 mm] from element to control; 48 in. [1219.2 mm] from element to dia. Max. Ambient Temp: 125 F [52 C]. Dimensions: See page 31.

TRADELINE model.

Order Number	Temp. Range		Replacement Operator for
	F	C	
T5298B1084 ^b	50 to 90	10 to 32	V5269

^aNot compatible with complete combination gas controls having suffix letter "A" or "B". "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

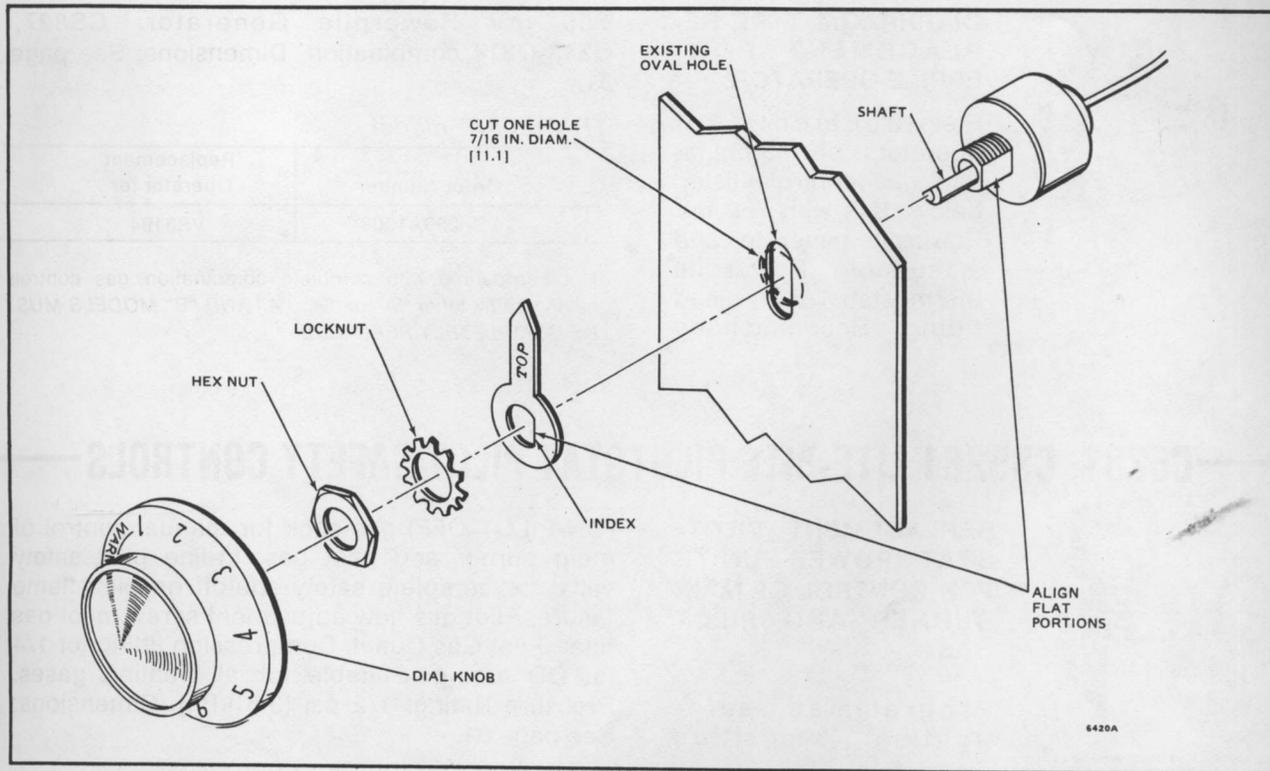
continued next page

TRADELINE

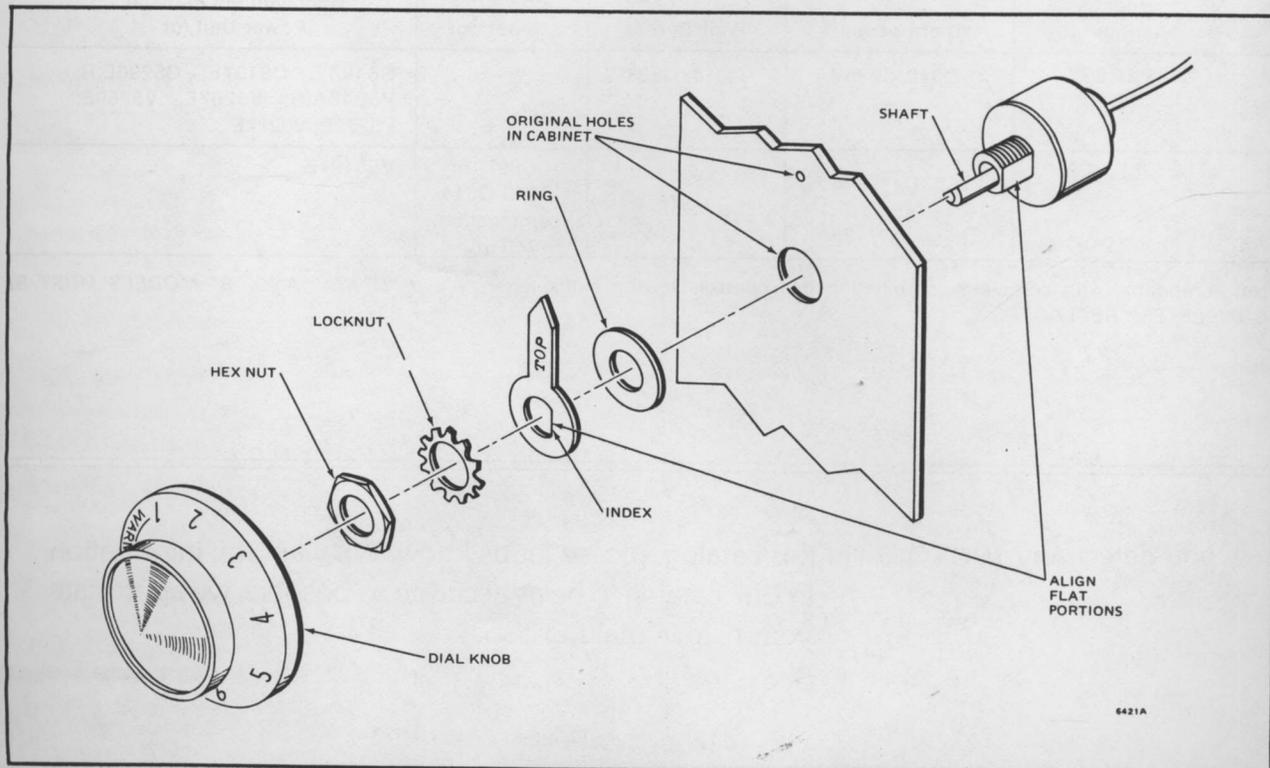
gas burner controls



T5298B continued



T5298B1084 operator replacing the concealed remote dial and dial with hex mounting nut.



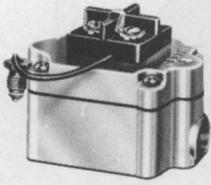
T5298B1084 operator replacing the self-indexing remote dial.

TRADELINE



gas burner controls

VS8299A ADATROL POWERPILE OPERATOR



DIAPHRAGM TYPE REPLACEMENT POWERPILE OPERATOR.

Replacement for operators on combination gas controls listed below. Use with 750 mV Powerpile generator and a suitable Powerpile thermostat. 1/8 in. bleed fitting. Recommended

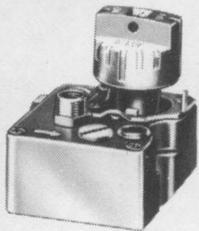
750 mV Powerpile Generator: CS897, Q313-Q314 combination. Dimensions: See page 31.

TRADELINE model.

Order Number	Replacement Operator for
VS8299A1008 ^a	VS8194

^aNot compatible with complete combination gas controls having suffix letter "A" or "B". "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

C5281, CS5281 LITE-RITE PILOTSTAT PILOT SAFETY CONTROLS



REPLACEMENT PILOT-STAT POWER UNITS FOR CONTROL OF MAIN BURNER AND PILOT GAS.

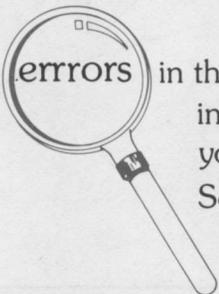
Programmed safe-lighting, 3-position

(ON-PILOT-OFF) gas cock for manual control of main burner and pilot gas. In-line pilot safety valve for complete safety shutoff on pilot flame failure. Pilot gas flow adjustment screw, pilot gas filter. Pilot Gas Outlet: Compression fitting for 1/4 in. OD tubing. Suitable for all heating gases. Pressure Rating: 1/2 psi [3.5 kPa]. Dimensions: See page 31.

TRADELINE models.

Order Number	Recommended			Replacement Pilotstat Power Unit for
	Thermocouple	Pilot Burner	Powerpile Generator	
C5281B1000 ^a	Q340, 30 mV	Q314, Q308	—	C5193E; C5197E; C5290E,R; V5245A,B; V5267E; V5269E; V5272E; V8277E
CS5281B1000 ^a	—	—	CS897, or Q313-Q314 combination, 750 mV	VS8194E

^aNot compatible with complete combination gas controls having suffix letter "A" or "B". "A" AND "B" MODELS MUST BE COMPLETELY REPLACED.

If you detect any  errors in this catalog, please let us know. We want the information in our catalog to be as accurate as possible; we appreciate your help in making it so.

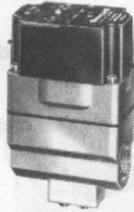
See page 263.

TRADELINE

gas burner controls

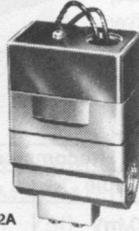
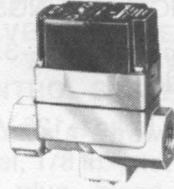


V8202A, V4202A SINGLE FUNCTION GAS VALVES



V8202A
(1/2 in.)

V8202A
(3/4 in.)



V4202A
(1/2 in.)

V4202A
(3/4 in.)



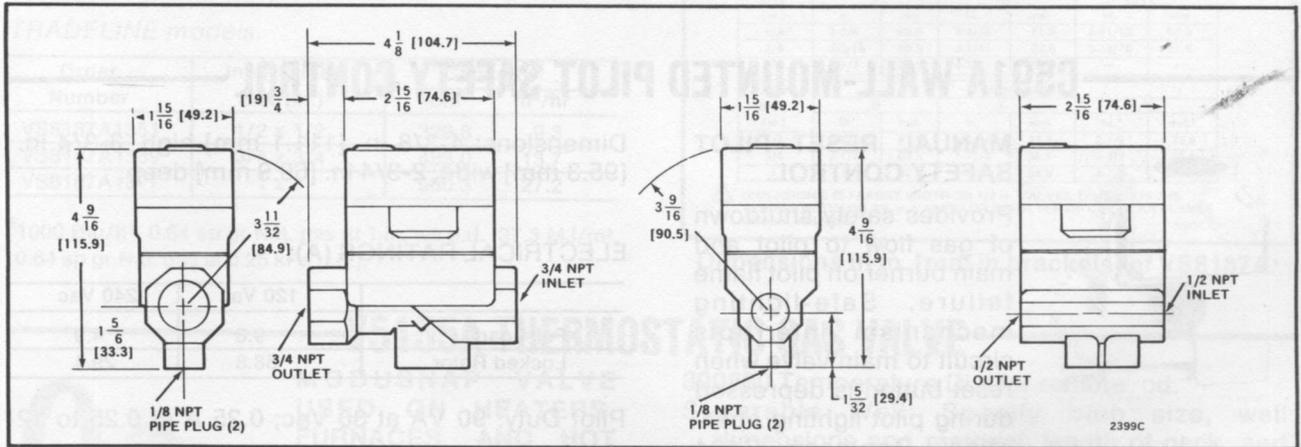
FOR AUTOMATIC CONTROL OF MAIN BURNER ON GAS-FIRED APPLIANCES.

Oil-filled operator. Valve Pattern: Straight-through. Pressure Rating: 1/2 psi [3.5 kPa]. Pressure Tapping: 1/8 in. NPT with plug. Pilot Gas Outlet: 1/8 in. NPT with plug. Suitable for all heating gases. Mounts in any position. Ambient Temp. Range: 32 F to 150 F [0 C to 66 C].

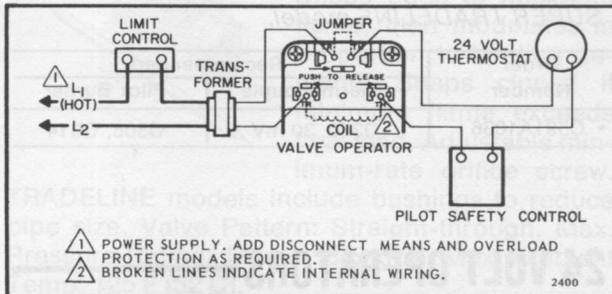
REPLACEMENT PARTS:

V4294A Operator for V4202A.

V8294A Operator for V8202A.

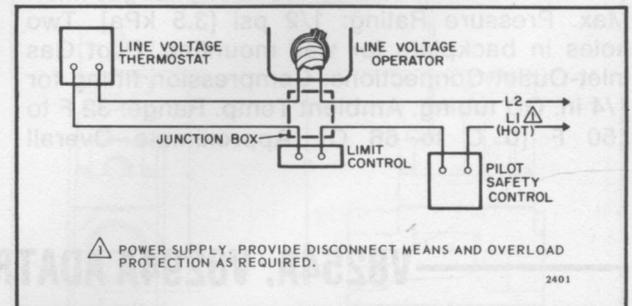


Dimensions in in. [mm in brackets] of V8202 and V4202 gas valves.



Typical wiring diagram for V8202A. Set thermostat heat anticipator at 0.4 A.

TRADELINE models.



Typical wiring diagram for V4202A.

Order Number	Operating Voltage (50/60 Hz)	Inlet-Outlet Size (in.)	Capacity ^a		Wiring
			cfh	m ³ /hr	
V4202A1017	120	1/2 x 1/2	330	9.3	Conduit cover with two 18 in. [457.2 mm] integral leadwires.
V4202A1033	120	3/4 x 3/4	485	13.7	
V8202A1018	24	1/2 x 1/2	330	9.3	Push-in terminals.
V8202A1034	24	3/4 x 3/4	485	13.7	

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

^bIncludes two 3/4 x 1/2 in. and one 1/2 x 3/8 in. reducer bushings.

^cOrder AT72D Transformer separately.



gas burner controls

C434A ELECTRIC PILOTSTAT PILOT SAFETY CONTROL



MANUAL RESET ELECTRIC SWITCH TYPE CONTROL.

Breaks circuit to close main automatic gas valve on pilot flame failure. Safe-lighting mechanism holds contacts open when reset button is depressed during pilot lighting operation. Max. Ambient

Temp: 225 F [107 C]. Three holes in backplate for wall mounting. Approximate Case Dimensions: 3-3/8 in. [85.7 mm] high, 2-1/2 in. [63.5 mm] wide.

ELECTRICAL RATINGS:

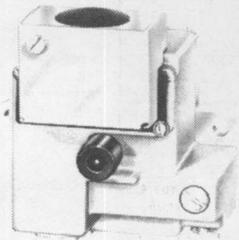
Noninductive Load—3.0 A at 240 Vac, 0.06 A at 240 Vdc.

Pilot Duty Load—125 VA at 120/240 Vac, 90 VA at 30 Vdc.

TRADELINE model.

Order Number	Recommended	
	Thermocouple	Pilot Burner
C434A1013	Q340, 30 mV	Q308, Q314

C591A WALL-MOUNTED PILOT SAFETY CONTROL



MANUAL RESET PILOT SAFETY CONTROL.

Provides safety shutdown of gas flow to pilot and main burner on pilot flame failure. Safe-lighting mechanism interrupts circuit to main valve when reset button is depressed during pilot lighting operation. Replaces C434

switch type pilot safety controls by using electrical connections to C591 only. Includes pilot gas filter. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Two holes in backplate for wall mounting. Pilot Gas Inlet-Outlet Connections: Compression fitting for 1/4 in. OD tubing. Ambient Temp. Range: 32 F to 150 F [0 C to 66 C]. Approximate Overall

Dimensions: 4-3/8 in. [111.1 mm] high, 3-3/4 in. [95.3 mm] wide, 2-3/4 in. [69.9 mm] deep.

ELECTRICAL RATINGS (A):

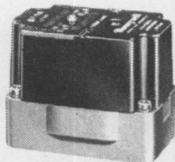
	120 Vac	240 Vac
Full Load	9.8	4.9
Locked Rotor	58.8	29.4

Pilot Duty: 90 VA at 30 Vac; 0.25 A at 0.25 to 12 Vdc.

• *SUPER TRADELINE model.*

Order Number	Recommended	
	Thermocouple	Pilot Burner
• C591A1036	Q340, 30 mV	Q308, Q314

V8254A, V8294A ADATROL 24 VOLT OPERATORS



QUICK-ACTING, OIL-FILLED, FIELD ADJUSTABLE, AUTOMATIC OPERATORS WITH FOUR PUSH-IN TERMINALS.

Use with a 24 V thermostat and transformer for thermostatic control of combination gas controls listed below. Recommended Trans-

former (order separately): AT72D, 24 V. Recommended Thermostat: T87, T8082.

Thermostat Heat Anticipator Setting: 0.4 A. Electrical Rating: 0.4 A at 24 Vac. Max. Ambient Temp: 200 F [93 C].

TRADELINE models.

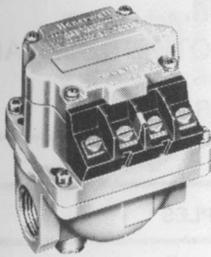
Order Number	Replacement Operator for Use on	Seat
V8254A1023	V8168, V8186, V8170, V8226, V8235, V8240, V8243, V8257, V8265, V8280	Saddle
V8294A1017	V8202, V8292	Inclined

TRADELINE

gas burner controls



VS8187A SINGLE FUNCTION POWERPILE GAS VALVE



DIAPHRAGM TYPE VALVE FOR USE IN 750 mV SELF-POWERED CONTROL SYSTEMS.

Includes 4-screw terminal panel, 1/8 in. pilot tapping with plug, bleed tapping with 1/8 in. tubing connector and 20 in. [508.0 mm] tubing. Suitable for all heating gases. Body Pattern: Straight-through. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Max. Ambient Temp: 125 F [52 C]. Recommended 750 mV Powerpile Generator: Q313-Q314.

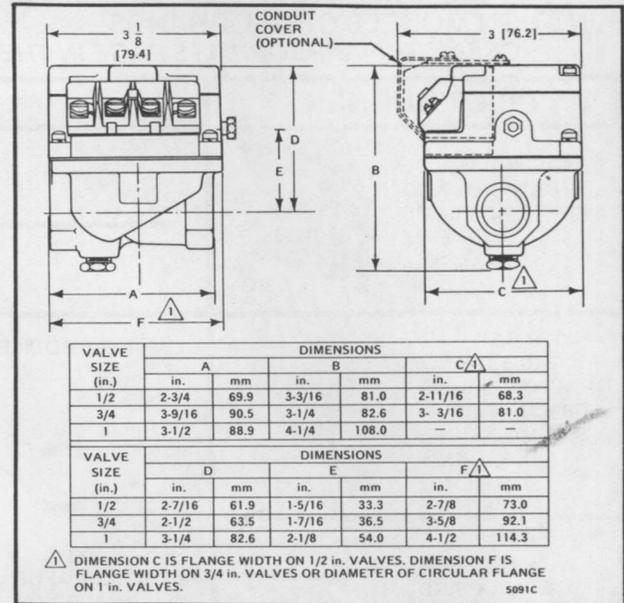
TRADELINE models.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a	
		cfh	m ³ /hr
VS8187A1351	1/2 x 1/2	329.8	9.3
VS8187A1369	3/4 x 3/4	485.0	13.7
VS8187A1377	1 x 1	960.3	27.2

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas at 0.25 kPa p.d.].

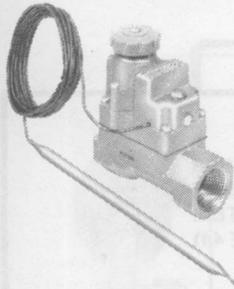
ACCESSORIES:

- 388119A Conduit Cover Assembly.
- 390711 Bleed Tube Fitting—1/8 in.



Dimensions in in. [mm in brackets] of VS8187A.

V5155A THERMOSTATIC GAS VALVE



MODUSNAP VALVE USED ON HEATERS, FURNACES, AND HOT WATER BOILERS.

Snaps open to minimum flame, then modulates in proportion to heating demand. Snaps closed if minimum flame exceeds heat load. Adjustable minimum-rate orifice screw.

TRADELINE models include bushings to reduce pipe size. Valve Pattern: Straight-through. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Max. Ambient Temp: 125 F [52 C].

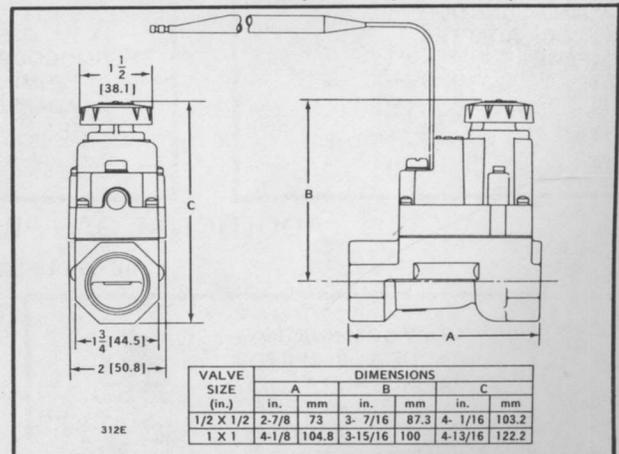
ACCESSORIES:

- 104484C Compression Fitting for 3/32 in. dia. capillary tubing (for 3/4 in. tapping).
- 387511 Plastic Control Knob.

TRADELINE models.

390890 Temperature Dial for remote rod.

Separable Well: Specify bulb size, well dimensions and material, length of neck, and heat-conductive compound (if desired).



Dimensions in in. [mm in brackets] of V5155A.

Order Number	Inlet-Outlet Size (in.)	Capacity ^a		Capillary Length		Temp. Range		Includes
		cfh	m ³ /hr	in.	m	F	C	
V5155A1110	1/2 x 1/2	252.39	7.1	54	1.4	120 to 240	49 to 116	—
V5155A1482	1/2 x 1/2	252.39	7.1	36	0.9	60 to 100	16 to 38	Two 1/2 x 3/8 in. reducer bushings.
V5155A2217	1 x 1	485.00	13.7	138	3.5	60 to 100	16 to 38	Two 1 x 3/4 in. reducer bushings.
V5155A2225	1 x 1	485.00	13.7	138	3.5	75 to 200	24 to 93	
V5155A2233	1 x 1	485.00	13.7	138	3.5	120 to 240	49 to 116	

^a1000 Btu/ft³, 0.64 sp gr Nat. gas at 1 in. wc p.d. [37.3 MJ/m³, 0.64 sp gr Nat. gas to 0.25 kPa p.d.].

TRADELINE



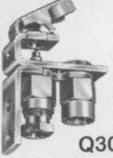
gas burner controls

GAS PILOT SAFETY SYSTEMS

PILOT BURNERS, THERMOCOUPLES, THERMOPILES AND ACCESSORIES IN THE VARIOUS COMBINATIONS SHOWN BELOW MAKE A COMPLETE PILOT BURNER GENERATOR.

HONEYWELL DESIGNS THESE UNITS FOR EASY REPLACEMENT OF OTHER SIMILAR FUNCTION MODELS OF ALL BRANDS.

CHECK THE APPROPRIATE PAGE IN THE CATALOG FOR ORDERING INFORMATION.

PILOT BURNERS		USE WITH	
TRADELINE MODEL HAS RIGHT- AND LEFT-HAND FLAME PATTERN. (PAGE 40)  Q308		THERMOCOUPLES	
WITH NAT. GAS ORIFICE AND OPTIONAL LP GAS ORIFICE. UNIVERSAL MOUNTING BRACKET. (PAGE 40)  Q314	THERMOPILE  Q313 750 mV FOR UNIVERSAL SCREW-IN MOUNTING. (PAGE 44)	 Q340 30 mV FOR SCREW-IN, PUSH-IN, AND CLAMP TYPES OF PILOT BURNERS, PRE-INSTALLED ADAPTER AND AN ADDITIONAL CLIP. (PAGE 39)	 Q310 250 mV PREINSTALLED MOUNTING CLIP. TERMINAL BLOCK ASSEMBLY ON TRADELINE MODELS. (PAGE 44)
WITH NAT. GAS ORIFICE AND OPTIONAL LP GAS ORIFICE. (PAGE 42)  Q327			

Q356A JUNCTION BLOCK ADAPTER. (PAGE 45)



Q357A THERMOCOUPLE TERMINAL ADAPTER. (PAGE 45)



390012C POWER UNIT FEMALE ADAPTER. (PAGE 44)



ADDITIONAL GAS PILOT SAFETY SYSTEMS

PILOT BURNER GENERATORS

750 mV COMBINATION OF A Q314 PILOT BURNER AND A Q313 THERMOPILE. (PAGE 42)



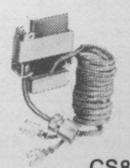
CS897

COMBINES A Q324 AND A Q313. UNIVERSAL MOUNTING HOLES WITH NAT. GAS ORIFICE, AND OPTIONAL LP GAS ORIFICE. (PAGE 42)



CS894

PRIMARY AERATED PILOT BURNER GENERATOR. 750 mV. SPECIAL PILOT BURNER AND MATCHING THERMOCOUPLE. TWO MOUNTING BRACKET ADAPTERS. (PAGE 42)



CS82

750 mV REPLACEMENT THERMOCOUPLE FOR CS82. (PAGE 40)

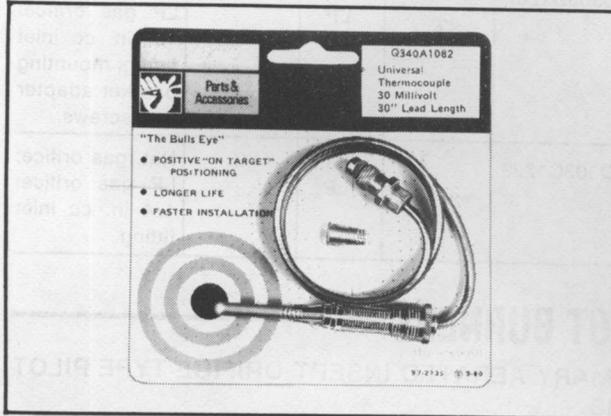


Q302

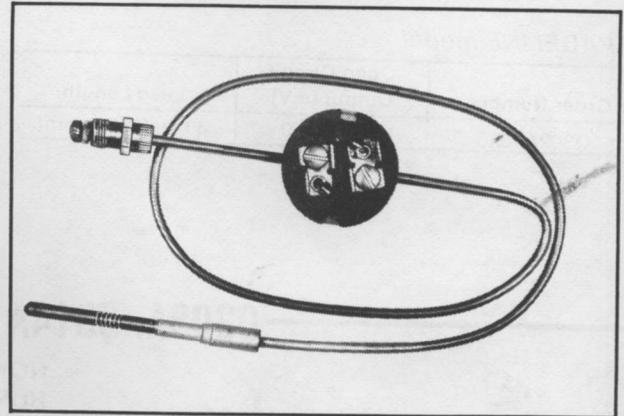


Q340A,B UNIVERSAL REPLACEMENT THERMOCOUPLES

30 Millivolt Thermocouples with Adapters for Universal Mounting



Q340A Thermocouple.



Q340B Thermocouple.

INSTRUCTIONS

SCREW-IN TYPE

Insert thermocouple in pilot

Tighten nut

CLAMP TYPE

Slip nut off adapter and clamp thermocouple in pilot with shoulder above clamp, as shown

PUSH-IN TYPE

Remove adapter, insert thermocouple

CONNECT OTHER END TO SAFETY CONTROL. (CONNECTION MUST BE DRY AND CLEAN.) TIGHTEN 1/4 TURN PAST "FINGER TIGHT".

THE Q340 REPLACES ALL OF THE FOLLOWING:

HONEYWELL Q326 Q309	ROBERTSHAW T46 T45 A1970	PENN-BASO K15 K16	ITT GENERAL K18 2500 SERIES K16 88D 2600 SERIES	WHITE ROGERS HO SERIES TK4	JADE
---------------------	--------------------------	-------------------	---	----------------------------	------

Mounting options for Q340 Thermocouple.

- Easy installation from beneath the pilot burner.
- Mounting options include:
 - Screw-in type.
 - Clamp type.
 - Push-in type.
- Special shoulders on adapter and thermocouple place the tip in the right position with respect to the pilot flame.
- Threaded nut on adapter is spring-loaded, so it can be repositioned for almost all pilot burner models.

TRADELINE models.

- SUPER TRADELINE models.

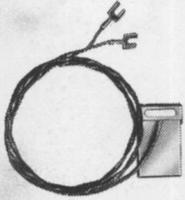
Order Number	Lead Length	
	in.	m
Q304A1066	18	0.5
•Q340A1074	24	0.6
Q340A1082	30	0.8
•Q340A1090	36	0.9
Q340A1108	48	1.2
Q340A1116	72	1.8
Q340B1024 ^a	24	0.6

^aWith junction box for series hookup of a high limit switch.



gas burner controls

— Q302A CARTRIDGE THERMOPILE —



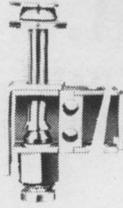
REPLACEMENT THERMOPILE FOR 750 mV CS82 PILOT GENERATOR.

Each Q302 is individually skin-packed. Each unit ordered represents one cartridge replacement. SHIPPED IN MULTIPLES OF TEN.

TRADELINE model.

Order Number	Open Circuit Output (mV)	Lead Length
Q302A1025	600 to 750	33 in. [838.2 mm]

— Q303B,C PILOT BURNERS —



PRIMARY-AERATED SPUD ORIFICE TYPE PILOT BURNER.

Use for main burner ignition with Q340 Thermocouple for Pilotstat safety control operation.

TRADELINE models.

Order Number	Tip Style	Type of Gas	Mounting Bracket	Includes
Q303B1287		Nat., LP	B	Nat. gas orifice; LP gas orifice; 1/4 in. cc inlet fitting; mounting bracket adapter with screws.
Q303C1229		Nat., LP	C	Nat. gas orifice; LP gas orifice; 1/4 in. cc inlet fitting.

— Q308A, Q314A PILOT BURNERS —

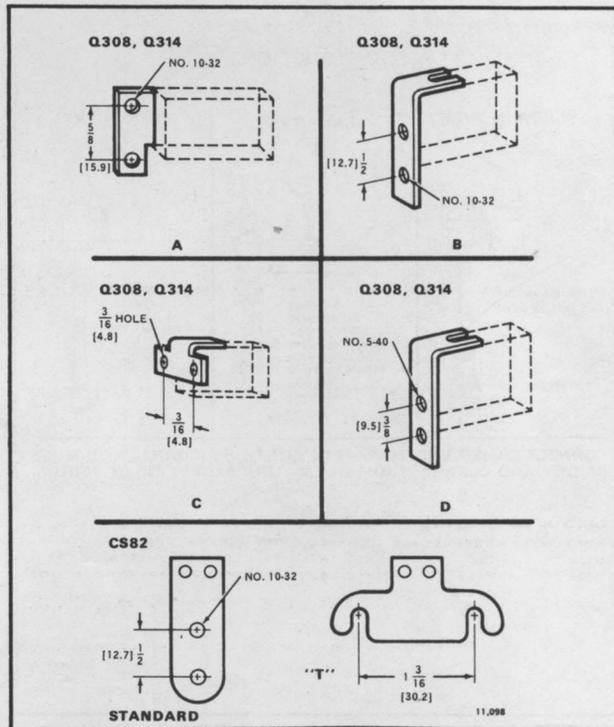


NONPRIMARY AERATED INSERT ORIFICE TYPE PILOT BURNERS.

Use Q308 or Q314 for main burner ignition with Q340 Thermocouple for Pilotstat safety control operation. For 750 mV Powerpile application, use Q314 with Q313 Generator.

TRADELINE models. • SUPER TRADELINE model.

Order Number	Tip Style	Type of Gas	Mounting Bracket	Includes
Q308A1386		Nat., Mixed	A	—
Q308A1626		Nat., Mixed	B	—
Q308A1881		Nat., LP	B	Nat. Gas orifice; LP gas orifice; 1/4 in. cc inlet fitting; special mounting bracket with screws for converting B Bracket.
•Q314A4586		Nat., LP	B	
Q314A6094		Nat., LP	B	—
Q314A6102		Nat., LP	B	—



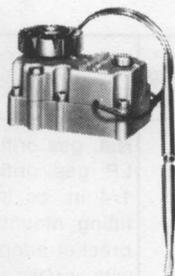
Mounting bracket styles.

TRADELINE

gas burner controls



T5001A ADATROL REMOTE BULB MODUSNAP OPERATOR



SELF-CONTAINED OPERATOR FOR AUTOMATIC ROOM TEMPERATURE CONTROL OF AN ADATROL GAS COCK MANIFOLD.

Valve provides on-off minimum flame with modulating control on increased heating demands. To replace T5000

operator, use T5001 with minimum rate adjustment "Full Open". Use as replacement only on

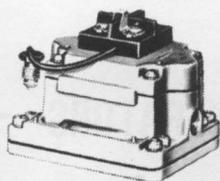
valves 1/2 x 1/2 in. or smaller. Temp. Range: 60 F to 100 F [16 C to 38 C]. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Bulb Length: 10-3/4 in. [273.1 mm]. Capillary Length: 36 in. [914.4 mm].

REPLACEMENT PART:
387511 Plastic Control Knob.

TRADELINE model.

Order Number	Operator for	Replacement Operator for
T5001A1118	C5230, C5231	V5155, V5157, V5166, V5236, V5260, V5261

VS8002A ADATROL POWERPILE OPERATOR



DIAPHRAGM TYPE, FIELD-ADDABLE GAS VALVE OPERATOR.

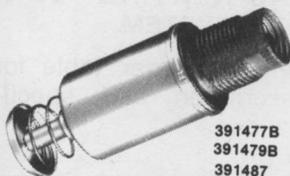
Use with a Powerpile thermostat and 750 mV Powerpile generator for thermostatic control of combination gas controls listed below. Max. Pres-

sure Rating: 1/2 psi [3.5 kPa]. Max. Ambient Temp: 125 F [52 C].

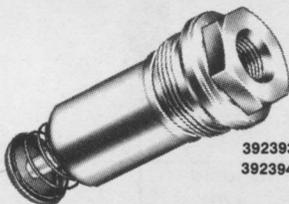
TRADELINE model.

Order Number	Operator Unit for	Seat
VS8002A1055	VS8167, VS8233, VS8238, VS8262, VS8279	Saddle

REPLACEMENT POWER UNITS



391477B
391479B
391487



392393B
392394B

SEE ORDER TABLE FOR APPLICATION. POWER UNIT AND FITTINGS ARE INDIVIDUALLY SKIN-PACKED.

TRADELINE models.

Order ^a Number	Power Unit for	
391477B Powerpile	Pilot Safety Controls	CS5281
	Man. Comb. Gas Controls	CS5290
	Powerpile Comb. Gas Controls	VS8194
391479B 30 mV	Pilot Safety Controls	C5281
	Man. Comb. Gas Controls	C5193, C5290
	Bulb Type Comb. Gas Controls	V5267, V5269, V5272
	Low Volt Comb. Gas Controls	V8277

Order ^a Number	Power Unit for	
391487 30 mV	Pilot Safety Controls	C591A
	Man. Comb. Gas Controls	C580, C581
392393B 30 mV	Automatic Comb. Gas Controls	V800, V801, V400, V401, V811, VR800
	Man. Comb. Gas Controls	CS580, CS581
392394B Powerpile	Automatic Comb. Gas Controls	VS820, VS821

^aOnly last 4 digits appear on power unit body.

TRADELINE



gas burner controls

Q327A PILOT BURNER



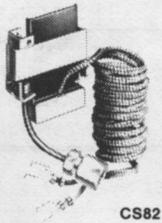
NONPRIMARY-AERATED SPUD ORIFICE TYPE PILOT BURNER.

Use for main burner ignition with Q340 Thermocouple for Pilotstat safety control operation. For 750 mV Powerpile application, use Q327 with Q313 Generator. Target Span: 1 in. [25.4 mm].

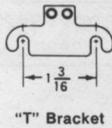
TRADELINE model.

Order Number	Tip Style	Type of Gas	Mounting Bracket	Includes
Q327A1626	 1 in. [25.4 mm] span	Nat., LP	B	Nat. gas orifice; LP gas orifice; 1/4 in. cc inlet fitting; mounting bracket adapter with screws.

CS82A, CS894D, CS897A POWERPILE PILOT BURNER GENERATORS



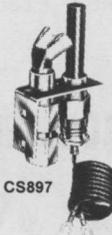
CS82



"T" Bracket



CS894



CS897

PROVIDE PILOT FOR IGNITION OF MAIN BURNER AND GENERATE 750 mV TO OPERATE POWERPILE, SELF-POWERED, GAS-HEATING CONTROL SYSTEM.

Refer to order table for description and specifications.

TRADELINE models.

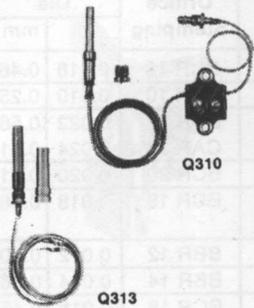
Order Number	Description	Tip Style	Type of Gas	Standard Lead Length		Mounting Bracket	Includes
				in.	m		
CS82A1131	Nonprimary-aerated		Nat., LP	45	1.1	Standard	LP gas orifice fitting; bleed tube kit, T type mounting bracket.
CS894D1101	Spud type, Primary-aerated.		Nat., LP	32	0.8	D	LP gas orifice fitting; special adapter to convert to A bracket; 1/8 NPT to 1/4 OD tube adapter.
CS894D1127	Spud type, primary-aerated.		Nat., LP	32	0.8	D	
CS897A1039	Insert orifice type, nonprimary-aerated.		Nat., LP	32	0.8	D	1/8 NPT female fitting adapter.

TRADELINE



gas burner controls

Q310A,B; Q313A,B REPLACEMENT THERMOPILE GENERATORS



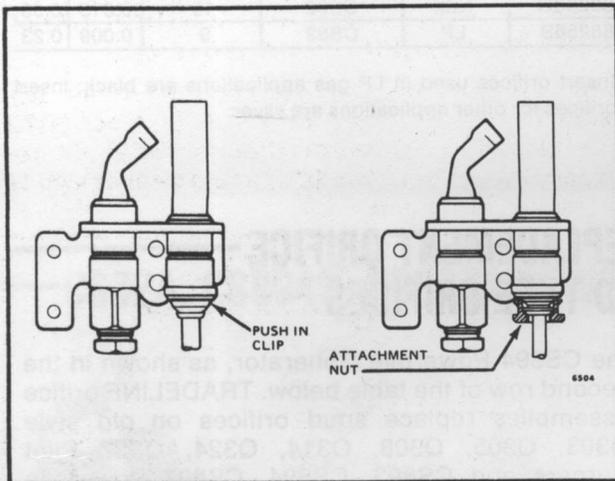
PROVIDES POWER FOR A MILLIVOLTAGE, SELF-POWERED CONTROL SYSTEM.

Eliminates the need for an outside power source. Easy push-in installation. Individually skinpacked. Each unit ordered represents one thermopile generator.

TRADELINE models.

- SUPER TRADELINE model.

Order Number	Open Circuit Output (mV)	Includes	Used with Pilot Burner
Q310A1044	270-350	39 in. [990.6 mm] leads, spade terminals.	Q303, Q305, Q308, Q314, Q324, Q327
Q310B1043		Term. block, push-in clip, 39 in. [990.6 mm] leads, special power unit nut.	
Q313A1055	600-750	47 in. [1193.8 mm] leads, 1/2 in. -27 split nut.	Q305, Q314, Q324, Q327, CS 893, CS 894, CS897
Q313A1105		75 in. [1905 mm] leads, 1/2 in. -27 split nut.	
Q313A1139		35 in. [889 mm] leads, push-in clip.	
•Q313A1170		35 in. [889 mm] leads, PG9 adapter.	
Q313A1188		35 in. [889 mm] leads, push-in clip, 1/2 in. -27 split nut.	
Q313B1005		35 in. [889 mm] leads, spade terminals, and terminal block.	



Install new style Q313 or Q310 using push-in clip or attachment nut.

386449-1

COMPRESSION FITTING



CONNECTS PILOT GAS SUPPLY TUBING TO GAS VALVE PILOT OUTLET.

Order Number	Used on
386449-1	All valves with pilot outlet requiring 1/4 in. OD tubing.

390012C POWER UNIT FEMALE ADAPTER



ADAPTER NUT.

Used to assemble thermocouple to power unit with male thread connector.

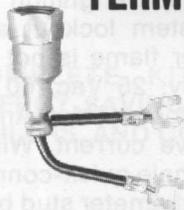
TRADELINE model.

Order Number	Units in Pack
390012C	5 to a display card

TRADELINE



Q357A THERMOCOUPLE TERMINAL ADAPTER



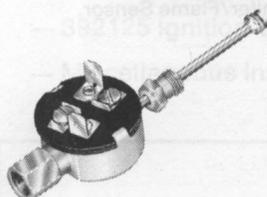
FOR USE WHEN REPLACING TERMINAL CONNECTION TYPE THERMOCOUPLES.

Permits leadwire connection to Q309, Q340, or similar thermocouples with male thread connector.

TRADELINE model.

Order Number	Units in Pack
Q357A1003	1 to a display card

Q356A1005 JUNCTION BLOCK ADAPTER



USED TO CONVERT ANY HONEYWELL THERMOCOUPLE LEAD TO A JUNCTION BLOCK (SERIES CONNECTION OF SPECIAL SECONDARY HIGH LIMIT).

TRADELINE model.

Order Number	Units in Pack
Q356A1005	1 to a display card

V5274A PILOT PRESSURE REDUCER



FOR AUTOMATIC REDUCTION OF PILOT GAS PRESSURE.

Maintains stable pilot performance under fluctuating or high gas supply pressures. Body Shape:

Hexagonal. Includes 392558A coupling to permit direct mounting on "B" cock. Max. Pressure Rating: 1/2 psi [3.5 kPa]. Connections: 1/4 male cc inlet, 1/4 female cc outlet. Dimensions: 1-7/16 in. [36.5 mm] long, 11/16 in. [17.5 mm] dia. SHIPPED IN MULTIPLES OF TEN.

TRADELINE model.

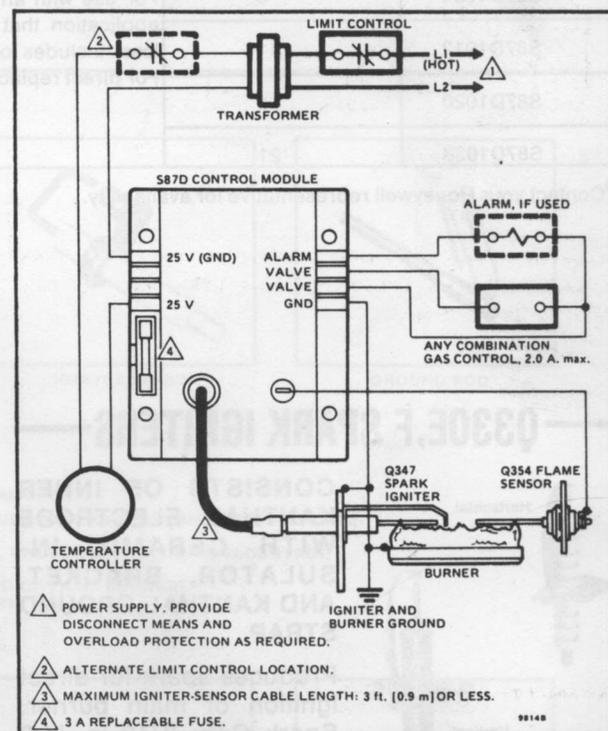
	Nominal Pressure Reduction
V5274A1009	3-1/2 in. wc [0.87 kPa] outlet at 7 in. wc [1.7 kPa] inlet; 8 in. wc [2.0 kPa] max. outlet at 21 in. wc [5.2 kPa] inlet.

Y343B DIRECT SPARK IGNITION KIT



INCLUDES S87D DIRECT SPARK IGNITION CONTROL MODULE, Q354A FLAME SENSOR, Q347 SPARK IGNITER, AND IGNITION CABLE FOR REPLACEMENT IN DSI SYSTEMS.

For use with any gas valve designed for DSI systems that is rated at 2.0 A or less. S87D includes optional alarm circuit. Y343B Kit replaces earlier Honeywell DSI equipment as well as competitive systems.



Y343B system hookup in a typical DSI system.

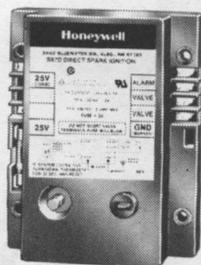
• SUPER TRADELINE model.

Order Number	Contains	
•Y343B1002	S87D1012	Direct Spark Ignition Control Module
	Q354A1000	Flame Rectification Sensor
	Q347A1012	Spark Igniter
	392286-1	Ignition Cable



gas burner controls

S87C,D DIRECT SPARK IGNITION CONTROL MODULES



SOLID STATE, LOW VOLTAGE DSI CONTROL MODULES FOR USE ON GAS-FIRED FURNACES, BOILERS, AND HEATING APPLIANCES.

S87 controls the gas valve, monitors the main burner flame and generates a high voltage potential for spark ignition.

Uses separate electrodes for spark ignition and flame sensing. Automatic system lockout after trial for ignition if main burner flame is not detected. Voltage and Frequency: 25 Vac, 60 Hz. Current Rating: 0.2 A. Thermostat Heat Anticipator Setting: 0.2 A plus valve current. Wiring Connections: 1/4 in. [6.4 mm] male quick-connect terminals and 1/4 in. [6.4 mm] diameter stud base for ignition cable. Flame Failure Reignition Time: 0.8 sec., max. Spark Generator Voltage: 30,000 V open circuit. Ambient Temp. Range: Minus 40 F to plus 175 F [minus 40 C to plus 79 C].

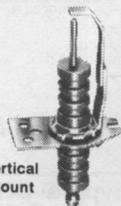
Order Number	Locking Timing (sec)	Application	Use With
S87C1006	6	For use only with Honeywell gas controls for DSI application such as V845, V854, VR845, VR854, VR8450, VR8540. For direct replacement of S825C.	Q347 ^a , Q330 Spark Igniter and Q354A Flame Sensor or Q342 ^a Spark Igniter/Flame Sensor or Q361 ^a Spark Igniter/Flame Sensor.
S87C1014	11		
S87C1022	4		
S87C1030	21		
S87D1004	6	For use with any gas control for DSI application that is rated at 2.0 A or less. includes optional alarm circuit. For direct replacement of S825D.	
S87D1012	11		
S87D1020	4		
S87D1038	21		

^aContact your Honeywell representative for availability.

Q330E,F SPARK IGNITERS



Horizontal Mount



Vertical Mount

CONSISTS OF INNER KANTHAL ELECTRODE WITH CERAMIC INSULATOR, BRACKET, AND KANTHAL GROUND STRAP.

Produces spark for direct ignition of main burner. Spark Gap: 3/16 in. [4.8 mm]. Wiring Connection: 1/4 in. stud. Mounting

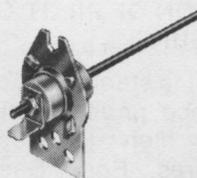
Means: One 3/16 in. [4.8 mm] slot and three 3/16 in. [4.8 mm] untapped screw holes. Max. Temp. Ratings: 1775 F [968 C] at electrode tip; 1250 F [677 C] at ceramic insulator.

Order Number	Mounting Position
Q330E1006	Vertical
Q330F1005	Horizontal

Q354A

FLAME RECTIFICATION SENSOR

A KANTHAL ROD SUPPORTED BY CERAMIC INSULATOR AND MOUNTING BRACKET.



Detects the presence of a main burner flame. Wiring Connection: One 1/4 in. [6.4 mm] quick-connect terminal. Mounting Means: One 3/16 in. [6.4 mm] slot and three 3/16 in. [4.8 mm] untapped screw holes.

Order Number	Flame Rod Length		Maximum Temperature Ratings
	in.	mm	
Q354A1000	2.5	63.5	1775 F [968 C] at electrode tip. 1250 F [677 C] at ceramic insulator.
Q354A1018	6	152.4	

gas burner controls



Y86E,G RETROFIT INTERMITTENT PILOT GAS BURNER

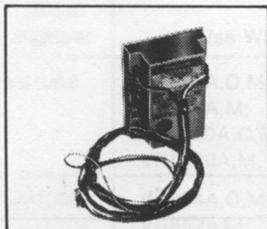
IGNITION SYSTEMS

COMPLETE KITS FOR CONVERTING CONVENTIONAL STANDING PILOT SYSTEMS TO ENERGY-SAVING INTERMITTENT PILOT SYSTEMS. FOR USE ON 25 Vac CENTRAL FURNACES, BOILERS, AND CONTROLLED HEATING EQUIPMENT.

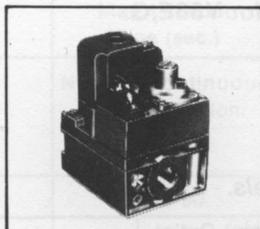
- Y86E for use with Nat. gas.
- Y86G for use with Nat. or LP gas.

Each Y86 system contains:

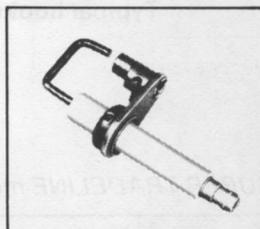
- S86 Intermittent Pilot Control Module with prewired wiring harness with quick-connects and identified leads. Features an externally replaceable fuse.
- VR8440 Intermittent Pilot Dual Valve Combination Gas Control with an ON-OFF manual valve, pressure regulator and two automatic main gas valve operators. Includes reducer bushings.
- Q345 Igniter-Sensor. Ceramic-insulated Kanthal rod attaches to the existing pilot burner in place of the thermocouple.
- 392125 Ignition Cable. 30 in. [0.76 m] cable with connectors.
- Miscellaneous installation hardware.



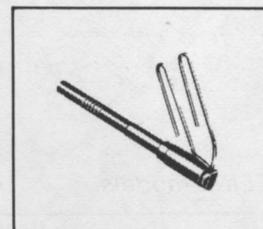
S86E INTERMITTENT PILOT CONTROL MODULE WITH WIRE HARNESS



VR8440 INTERMITTENT PILOT DUAL VALVE COMBINATION GAS CONTROL



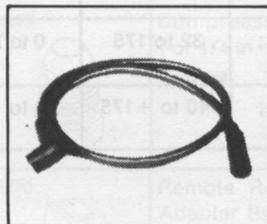
IGNITER-SENSOR



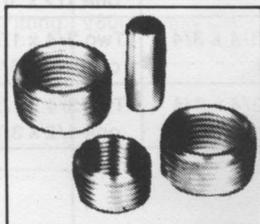
GROUND ROD

RETROFIT INTERMITTENT IGNITION SYSTEM COMPONENTS

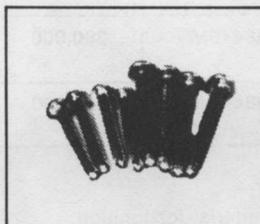
- S86E INTERMITTENT PILOT CONTROL MODULE WITH ADHESIVE MOUNTING AND PREWIRED WIRING HARNESS.
- VR8440A OR M INTERMITTENT PILOT DUAL VALVE COMBINATION GAS CONTROL (INCLUDES REDUCER BUSHINGS).
- IGNITER-SENSOR (MOUNTS TO GROUND ROD ON PILOT BURNER).
- MISCELLANEOUS INSTALLATION HARDWARE.



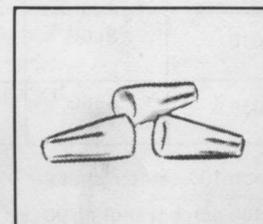
392125 IGNITION CABLE
30 in. [0.76]



REDUCER BUSHINGS FOR GAS CONTROL



SCREWS



WIRE NUTS (3)

11,088

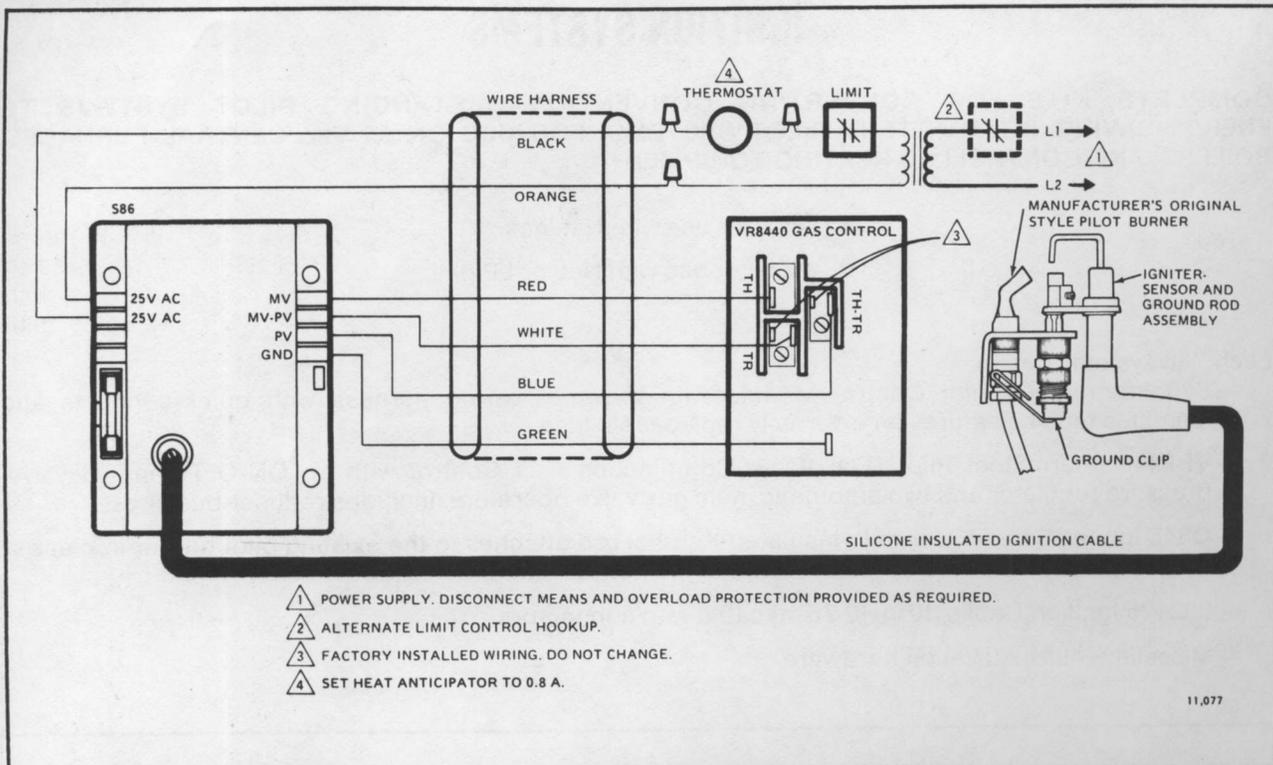
continued next page

TRADELINE



gas burner controls

Y86E,G continued



Typical hookup for Y86E,G.

TRADELINE models.

• SUPER TRADELINE models.

Order Number	Contains		Capacity (Btu)	Inlet-Outlet Size (in.)	Reducer Bushings	Temp. Range	
	Control Module	Combination Gas Valve				F	C
Y86E1006	S86E ^a	VR8440M	250,000	1/2 x 3/4	One 3/4 x 1/2 in.; one 1/2 x 3/8 in.	32 to 175	0 to 79
Y86E1014	S86E ^a	VR8440M	300,000	3/4 x 3/4	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.	32 to 175	0 to 79
Y86E1030	S86E ^a	VR8440A	300,000	3/4 x 3/4	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.	-40 to +175	-40 to +79
•Y86G1002	S86G ^b	VR8440M	250,000	1/2 x 3/4	One 3/4 x 1/2 in.; one 1/2 x 3/8 in.	32 to 175	0 to 79
•Y86G1010	S86G ^b	VR8440M	300,000	3/4 x 3/4	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.	32 to 175	0 to 79
•Y86G1036	S86G ^b	VR8440A	300,000	3/4 x 3/4	Two 3/4 x 1/2 in.; one 1/2 x 3/8 in.	-40 to +175	-40 to +79

^aWith non 100 percent shutoff.

^bWith 100 percent shutoff; 90 sec. timed trial-for-ignition.

TRADELINE

gas burner controls



—S86E,G,H INTERMITTENT PILOT CONTROL MODULES



CONTROL MODULES FOR INTERMITTENT PILOT GAS BURNER IGNITION SYSTEM FOR USE ON CENTRAL HEATING SYSTEMS AND HEATING APPLIANCES. SYSTEM REPLACES CONVENTIONAL CONTINUOUS PILOT (THERMOCOUPLE) SYSTEMS.

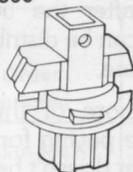
S86 performs safe-start check; opens main valve after pilot flame is proved. S86E provides continuous trial-for-ignition. S86G,H provide safety lockout if pilot fails to ignite within the timed trial-for-ignition period. Voltage and Frequency: 25 Vac, 60 Hz. Ambient Temp. Range: minus 40 F to plus 175 F [minus 40 C to plus 79 C]. Flame Failure Response Time: 0.8 sec., max. Spark Generator Voltage: 15 kV peak (open circuit). Wiring Connections: 1/4 in. [6.4 mm] male quick-connect terminals, and 1/4 in. [6.4 mm] dia. base study for igniter-sensor cable.

ACCESSORY: W136 Test Meter.

Order Number	Use With	Max. Lockout Time (sec.)
S86E1002	VR844A,C,M,P; VR852A,M; VR8440A,C,M,P; VR8520A,M.	None. Continuous trial-for-ignition.
S86G1008	VR844A,C,M,P; VR852A,M; VR8440A,C,M,P; VR8520A,M.	70 or 90
S86H1006	Any intermittent pilot dual valve combination gas control.	70 or 90
S86H1014		15

—PARTS AND ACCESSORIES

Order Number	Description	Use With
386449	Compression Fitting. For 1/4 in. OD Tubing.	V800 Family CGC
390800	Remote Rod Adapter Bag Assembly.	



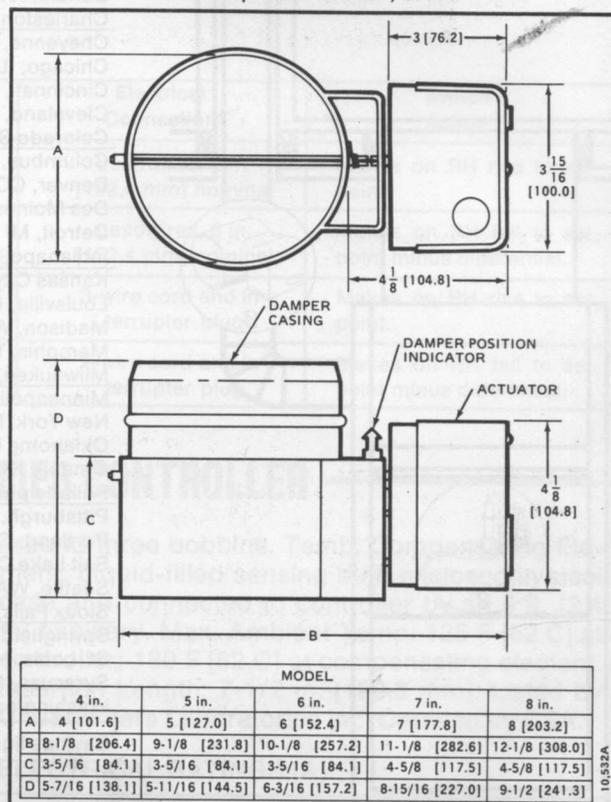
-D80B AUTOMATIC VENT DAMPER-



REDUCES HOME HEATING LOSSES BY CLOSING OFF THE VENT BETWEEN HEAT CYCLES.

Use only on atmospheric type gas-fired furnaces and boilers equipped with draft hoods. For use with DSI, IP, or standing pilot systems that have dual

automatic valve combination gas controls. Interlock switch for safe operation; burner will fire only with damper in open position. Closing Time: 20 sec., nominal. Thermostat Heat Anticipator Setting: 0.2 A. Voltage and Frequency: 24 Vac, 60 Hz. Power Consumption: Motor, 5 W.



Installation dimensions in in. [mm in brackets] of D80B.

TRADELINE models.

Order Number	Damper Size (dia.)	
	in.	mm
D80B1003	4	101.6
D80B1011	5	127.0
D80B1029	6	152.4
D80B1037	7	177.8
D80B1045	8	203.2

TRADELINE

A Total Home Energy Conservation SYSTEM That Fights Rising Fuel Costs 3 Ways

With the Honeywell SYSTEM you can substantially improve the efficiency of your existing gas furnace or boiler, and save a bundle in the process.

In addition, Uncle Sam will allow you a 15 percent tax credit on the installation of your SYSTEM. And check with your state energy office and local utility for additional credits, incentives, and direct rebates.

See What You Save

The savings figures below are estimates for the average home. Your actual savings may vary because homes vary in tightness of construction, type of furnace or boiler, geographic location, and the way in which the occupants use the equipment.

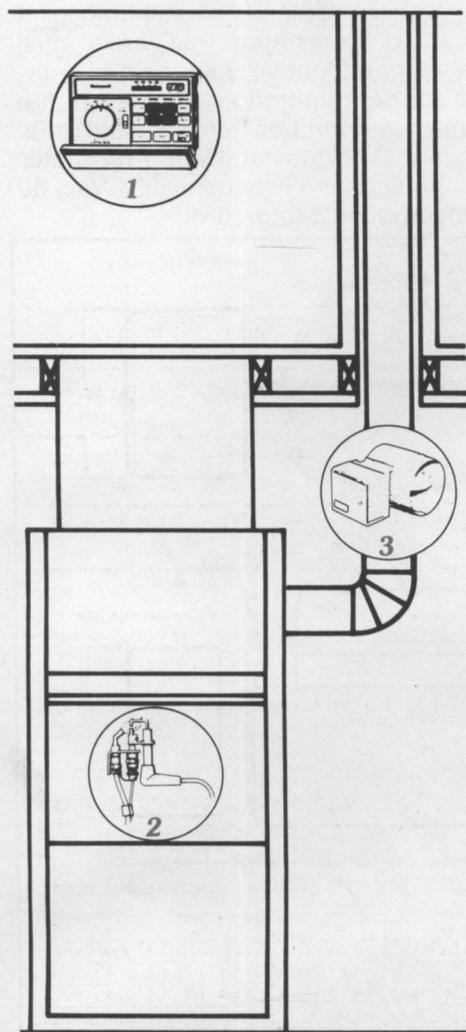
Note that heating savings are based on winter gas heating bills. Cooling savings are based on summer electric bills for central air conditioning.

PERCENT SAVINGS USING TOTAL ENERGY CONSERVATION SYSTEM

	Single Heating Setback (70° to 60° 8 hours/day)	Double Heating Setback (70° to 60° 8 hours twice/day)	Single Cooling Setup 75° to 80° 11 hours/day)	Double Cooling Setup 75° to 80° 9 hours/day 7 hours/night)
Billings, MT	25	34	12	19
Boise, ID	25	34	11	18
Boston, MA	26	35	16	23
Buffalo, NY	25	34	17	25
Charleston, SC	43	51	16	22
Cheyenne, WY	25	34	15	20
Chicago, IL	25	34	16	23
Cincinnati, OH	26	35	15	22
Cleveland, OH	26	35	16	23
Colorado Springs, CO	25	34	14	19
Columbus, OH	26	35	15	22
Denver, CO	26	35	13	20
Des Moines, IA	25	33	15	22
Detroit, MI	25	34	16	25
Indianapolis, IN	26	35	15	22
Kansas City, MO	26	35	13	19
Louisville, KY	26	36	14	21
Madison, WI	25	38	16	22
Memphis, TN	30	40	14	20
Milwaukee, WI	25	33	16	22
Minneapolis, MN	26	33	15	23
New York, NY	26	35	16	23
Oklahoma City, OK	28	38	14	19
Omaha, NB	25	33	15	22
Philadelphia, PA	26	36	16	23
Pittsburgh, PA	26	35	16	23
Portland, OR	31	41	14	23
Salt Lake City, UT	26	35	13	19
Seattle, WA	31	41	19	26
Sioux Falls, SD	25	35	14	21
Springfield, MA	25	34	16	23
St. Louis, MO	26	35	14	21
Syracuse, NY	25	34	16	24
Washington, DC	27	37	16	23

Savings figures apply to Honeywell SYSTEM only.

© Honeywell Inc. 1982



1

2

3

Fuel Saver Thermostat

Automatically lowers and raises the heat to save energy. You sleep refreshingly cool and wake up warm. Saves by setting the heat back while you're at work too! And raising it before you return.

It even helps you save on summer cooling costs by automatically turning the temperature up when you don't need air conditioning.

Electronic Ignition

Replaces your gas-eating standing pilot with a pilot that ignites only when needed to light the furnace. So no fuel is wasted.

Saves even more in summer since there is no pilot flame to fight your air conditioning. And you'll never need to relight a blown-out pilot flame again.

Automatic Vent Damper

Traps the useful heat left inside your furnace or boiler after the burner shuts off. Heat that can be distributed throughout your home.

Result? You get more of the expensive heat you're paying for, and your furnace or boiler doesn't have to run as often to keep your home warm and comfortable.

humidity controllers



H46C-F HUMIDITY CONTROLLERS



PROVIDES AUTOMATIC CONTROL OF A HUMIDIFIER OR DEHUMIDIFIER FOR DEHUMIDIFICATION AND MILDEW CONTROL IN AIR CONDITIONING SYSTEMS.

See order table for application. Positive ON-OFF settings for manual operation.

Wall-mounted. Spst, snap-acting switch. Fixed Differential: 4 to 6 percent RH. Sensing Element: Moisture-sensitive nylon ribbon. Max. Ambient Temp: 125 F [52 C]. Case Dimensions: 4-11/16 in. [119.1 mm] high, 2-15/16 in. [74.6 mm] wide, 2-1/8 in. [54.0 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A):

H46C,E—

	120 Vac	240 Vac (H46C only)
Full Load	7.5	3.8
Locked Rotor	30.0	15.0

H46D,F—

	120 Vac	240 Vac (H46D only)
Full Load	4.4	2.2
Locked Rotor	26.4	13.2
Resistive	12.0 ^a	6.0
Pilot Duty	50 VA at 24 Vac	

^aH46F available with 8 or 12 A resistive rating at 120 Vac.

TRADELINE models.

Order Number	For Use On	Range (percent RH)	Electrical Connection	Switch Action
H46C1000	Dehumidifiers	20 to 80	Leadwires, 6 in. [152.4 mm] nominal	Makes on RH rise to set point.
H46D1032	Humidifiers	10 to 60	Leadwires, 6 in. [152.4 mm] nominal	Makes on RH fall to set point minus differential.
H46E1013	Dehumidifiers	20 to 80	3-wire cord and interrupter plug	Makes on RH rise to set point.
H46F1029	Humidifiers	10 to 60	2-wire cord and interrupter plug	Makes on RH fall to set point minus differential.

H403A RESET HUMIDIFIER CONTROLLER



PROVIDES AUTOMATIC TEMPERATURE-COMPENSATED CONTROL OF A HUMIDIFIER.

Remote temperature compensating element resets RH control point down as furnace load increases, indicating a fall in outdoor temperature.

Mounts in return air duct of a forced air heating system. Spst, snap-acting switch. Fixed Differential: 6 percent RH. Sensing Element: Moisture-sensitive nylon ribbon wound

around three bobbins. Temp. Compensating Element: Liquid-filled sensing bulb enclosed in steel case and connected to controller by an 8 ft. [2.4 m] capillary. Max. Ambient Temp: 125 F [52 C] at controller; 180 F [82 C] at compensating element. Insertion Length: 7-1/2 in. [190.5 mm]. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	7.5	3.8
Locked Rotor	45.0	22.8
Resistive	15.0	7.5

Pilot Duty—1.0 A at 24 Vac.

TRADELINE model.

Order Number	Range (percent RH)	Mounting		Includes
		Humidifier Controller	Temperature Compensating Element	
H403A1047	0 to 60	Mounts in return air duct.	Mounts on outside of warm air plenum.	Push-in wiring terminals, mounting template.

TRADELINE



humidity controllers

H600A HUMIDIFIER CONTROLLER



OPERATES HUMIDIFICATION EQUIPMENT ON RH FALL OR DEHUMIDIFICATION EQUIPMENT ON RH RISE.

Spdt, snap-acting switch. Removable setting knob prevents tampering. Sensing Element: Moisture-sensitive nylon

ribbon wound around three bobbins. Max. Ambient Temp: 125 F [52 C]. Mounts vertically on 2 x 4 in. junction box. Includes alternate scale and faceplate for horizontal mounting. Dimensions: 6-3/16 in. [157.2 mm] high, 3-3/8 in. [85.7 mm]

wide, 2-1/4 in. [57.2 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A):

	Dehumidifier (Red to Yellow)		Humidifier (Red to Blue)	
	120 Vac	240 Vac	120 Vac	240 Vac
Full Load	3.0	1.5	4.4	2.2
Locked Rotor	18.0	9.0	26.4	13.2
Resistive	—	—	8.0	4.0

Pilot Duty—50 VA at 24 V, 120 VA at 120 V or 240 V.

TRADELINE model.

Order Number	Range (percent RH)	Fixed Differential
H600A1014	20 to 80	5 percent RH

H49A,B,X; H69A HUMIDITY CONTROLLERS



ELECTRICAL RATINGS (A):

H49A

	120 Vac	240 Vac
Full Load	7.5	3.8
Locked Rotor	45.0	22.8
Resistive	15.0	7.5

H49B

	120 Vac	240 Vac
Full Load	4.4	2.2
Locked Rotor	26.4	13.2
Resistive	15.0	7.5

H49X

	120 Vac	240 Vac
Full Load	4.4	2.2
Locked Rotor	26.4	13.2
Resistive	7.0	3.5

H69A

	TERMINAL	
	R-W	R-B
	100 Vac (N.C.)	100 Vac (N.O.)
Full Load	7.5	3.0
Locked Rotor	45.0	18.0
Resistive	15.0	3.0

MOUNTS IN RETURN AIR DUCT OF A FORCED AIR HEATING SYSTEM TO CONTROL A CENTRAL HUMIDIFIER OR DEHUMIDIFIER.

See order table for application. External knob on front of case provides control point adjustment. Fixed Differential: 4 to 6 percent RH. Sensing Element: Moisture-sensitive nylon ribbon wound around three bobbins. Ambient Temp. Range: 60 F to 125 F [16 C to 52 C]. Element Insertion Length: 7-1/2 in. [190.5 mm]. Sail Length: 12 in. [190.5 mm]; can be cut to fit 9, 10, or 11 in. [228.6, 254.0, or 279.4 mm] ducts.

TRADELINE models. • SUPER TRADELINE model.

Order Number	Application	Switching	Range (percent RH)	Scaleplate Markings	Wiring Connections
H49A1019	For control of humidification equipment.	Spdt. Contacts break on RH rise to set point; make on fall to set point minus differential.	15 to 50	OFF-20-30-40-50 or OFF-1-2-3-4	Push-in terminals. Three-prong interrupter plug or grounding outlet on case.
H49B1017	For control of humidification equipment.				
H49X1024	With sail switch to provide fan interlock.				
•H69A1014	For control of humidification or dehumidification equipment.	Spdt. Terminals R-W break on RH rise to set point; R-B make at set point. On RH fall, R-B break at set point minus differential.	35 to 65	35-40-45-50-55-60-65	Screw and push-in wire terminals.

TRADELINE

humidity controllers



H808A,B CONVERTIBLE HUMIDISTATS



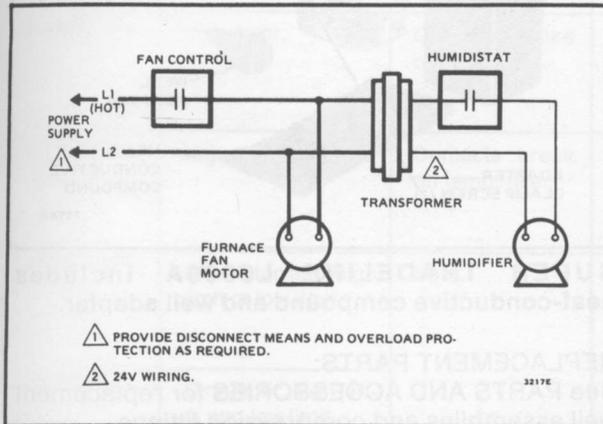
H808A



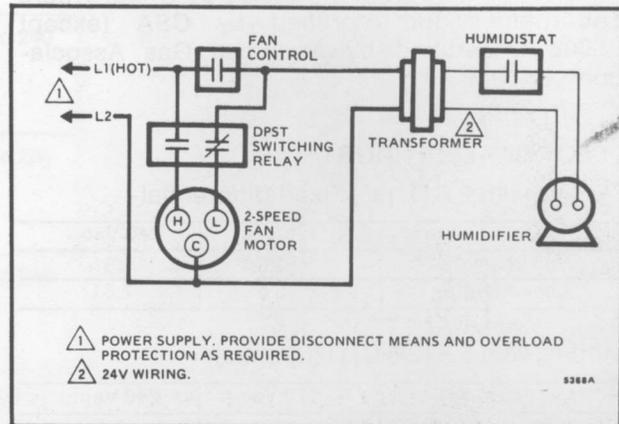
H808B

WALL-OR DUCT-MOUNTED HUMIDISTAT AUTOMATICALLY CONTROLS A HUMIDIFIER IN A FORCED AIR CENTRAL HEATING SYSTEM.

Spst, snap-acting switch. Electrical Rating: 50 VA at 24 Vac. Fixed Switch Differential: 5 percent RH. Sensing element: 12 in. [304.8 mm] moisture-sensitive nylon ribbon wound around three bobbins. Max. Ambient Temp: 125 F [52 C]. Dimensions: 3-3/16 in. [81.0 mm] high, 5 in. [127.0 mm] wide, 2-1/2 in. [63.5 mm] deep.



H808 wiring diagram for system with fan interlock.



H808 wiring diagram for system with 2-speed motor.

TRADELINE models.

Order Number	Set Point Adjustment Range	Includes	Mounting	Wiring Connections
H808A1005	Scale indexed to outdoor temperature, minus 20 to plus 20 F [minus 29 to minus 7 C]. Positive ON and OFF positions.	Built-in hygrometer with range of 10 to 90 percent RH.	Mounts on wall or duct surface with two screws provided. Use self-adhesive mounting label and foam gasket for duct mounting.	Two male quick-connects on device. Two wire leads with female quick-connects and stripped ends plus two wire nuts included.
H808B1012	10 to 60 percent RH. Positive ON and OFF positions.	Outdoor temperatures and corresponding recommended humidity settings on faceplate for reference.		

PARTS AND ACCESSORIES

Order Number	Description	Use With
130224 	Setting knob. Knurled plastic with hexagonal shaft fits into socket in setting dial under thermostat cover.	H400, H600

TRADELINE



hydronic controls

L4006A,B,E; L6006A,C AQUASTAT CONTROLLERS



IMMERSION TYPE CONTROLLERS FOR LIMITING OR REGULATING TEMPERATURES OF LIQUIDS IN BOILERS OR TANKS.

Sensing element actuates enclosed Micro Switch snap-acting switch. TRADELINE models include well adapter and tube of heat-conductive compound. Horizontal or vertical mounting available. Bulb: Copper, 3/8 x 2-7/8 in. [9.5 x 73.0 mm]. Listed by Underwriters Laboratories Inc; certified by CSA (except L6006C); certified by American Gas Association—L4006A.

ELECTRICAL RATINGS (A):

Models with 2 F [1.1 C] Fixed Differential—

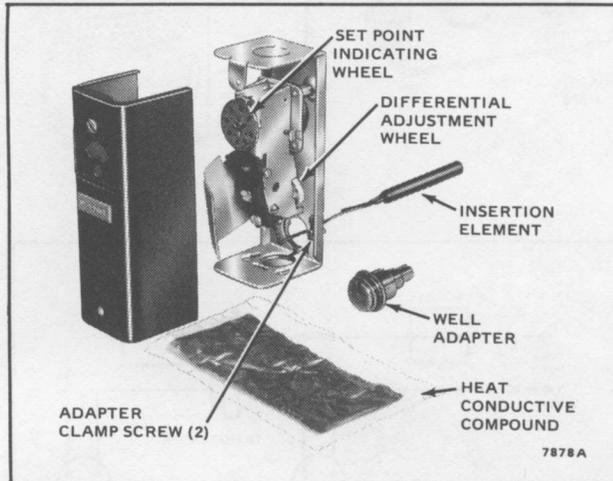
	120 Vac	240 Vac
Full Load	2.6	1.3
Locked Rotor	15.6	7.8

Models with 5 F [2.8 C] Differential—

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25 at 1/4 to 12 Vdc	

CASE DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
All but L6006C	5-5/8	142.9	2	50.8	2-1/8	54.0
L6006C	5-5/8	142.9	2	50.8	2-5/8	66.7



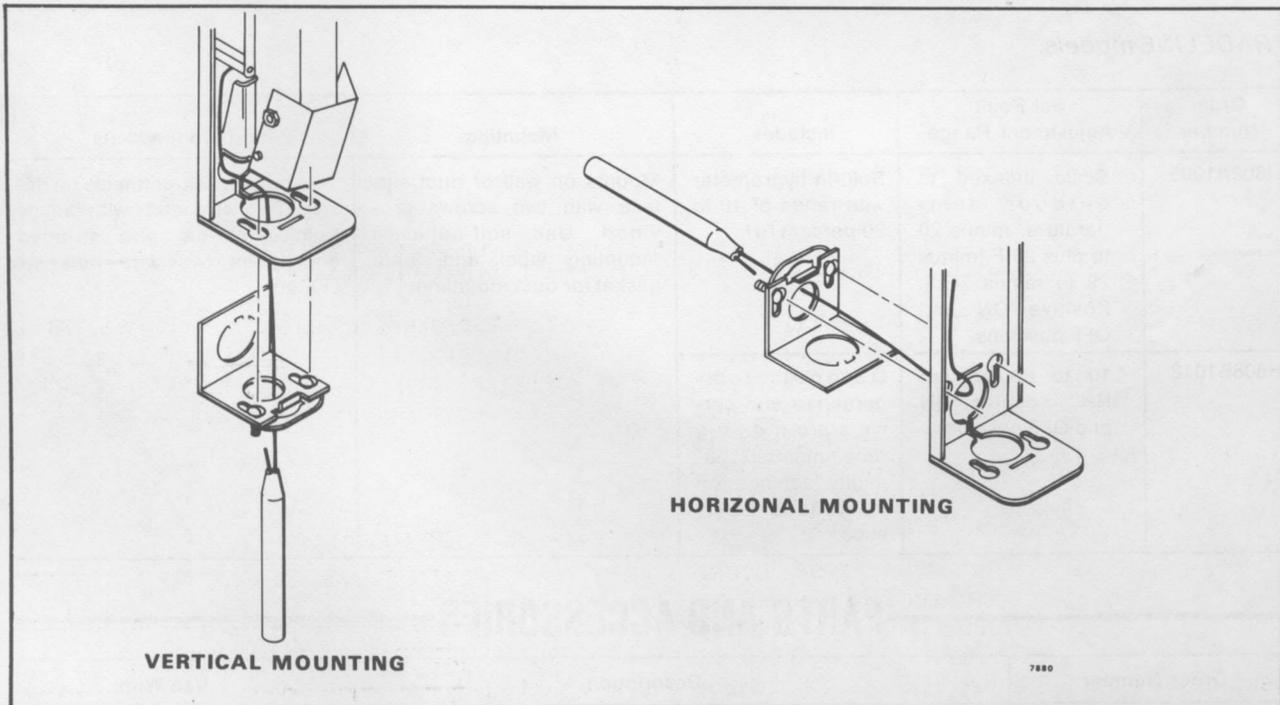
SUPER TRADELINE L6006A includes heat-conductive compound and well adapter.

REPLACEMENT PARTS:

See PARTS AND ACCESSORIES for replacement well assemblies and compression fittings.

ACCESSORIES:

Q615 Weatherproof Enclosure.



SUPER TRADELINE L6006A showing mounting bracket placement for vertical or horizontal mounting.

continued next page

TRADELINE

hydronic controls

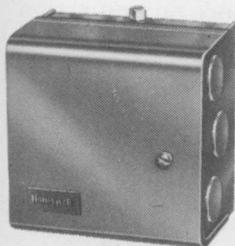


L4006A,B,E; L6006A,C continued
TRADELINE models.

• SUPER TRADELINE model.

Order Number	Application	Switch Action	Range		Midscale Differential		Includes
			F	C	F	C	
L4006A1678	High or low limit.	Contacts break on temp. rise.	100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	3 in. [76.2 mm] insulation, stop factory-set at 240 F [116 C].
L4006A1959			40 to 180	4 to 82	2, fixed	1.1, fixed	1-1/2 in. [38.1 mm] insulation.
L4006A1967			100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	1-1/2 in. [38.1 mm] insulation, stop factory-set at 240 F [116 C].
L4006B1155	Circulator.	Contacts make on temp. rise.	100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	3 in. [76.2 mm] insulation, stop factory-set at 240 F [116 C].
L4006E1067	High limit.	Contacts break on temp. rise.	110 to 290	43 to 143	Manual Reset		3 in. [76.2 mm] insulation, stop factory-set at 250 F [121 C].
•L6006A1145	Circulator and high limit or low limit.	Spdt.	100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	3 in. [76.2 mm] insulation, stop factory-set at 240 F [116 C].
L6006C1018			Circulator, high limit, and low limit.	65 to 200	18 to 93	5 to 30, adj.	2.8 to 16.7, adj.	Bracket for strap on mounting, stop factory-set at 200 F [93 C].

L6081A MULTIPLE AQUASTAT CONTROLLER



CIRCULATOR/LOW LIMIT AND HIGH LIMIT CONTROLLER USED TO REGULATE BOILER WATER TEMPERATURE IN GAS- OR OIL-FIRED HYDRONIC HEATING SYSTEMS.

Immersion type liquid-filled sensing element actuates two snap switches.

Bulb: Copper, 3/8 x 2-7/8 in. [9.5 x 73.0 mm]. Insertion Length: 3-1/2 in. [88.9 mm]. Insulation Depth: 3 in. [76.2 mm]. Max. Ambient Temp: 150 F [66 C] at switches, 265 F [129 C] at sensing

element. Approximate Case Dimensions: 3-7/8 in. [98.4 mm] high, 4-1/8 in. [104.8 mm] wide, 2-3/4 in. [69.9 mm] deep. Listed by Underwriters Laboratories Inc; component recognized by CSA.

TEMPERATURE RATINGS:

	Range		Differential (nominal)	
	F	C	F	C
High Limit	130 to 240	54 to 116	10, fixed	5.6, fixed
Circulator/ Low Limit	110 to 220	43 to 104	10 to 25, adj.	5.6 to 14, adj.

continued next page

TRADELINE



hydronic controls

L6081A continued

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25 at 1/4 to 12 Vdc	

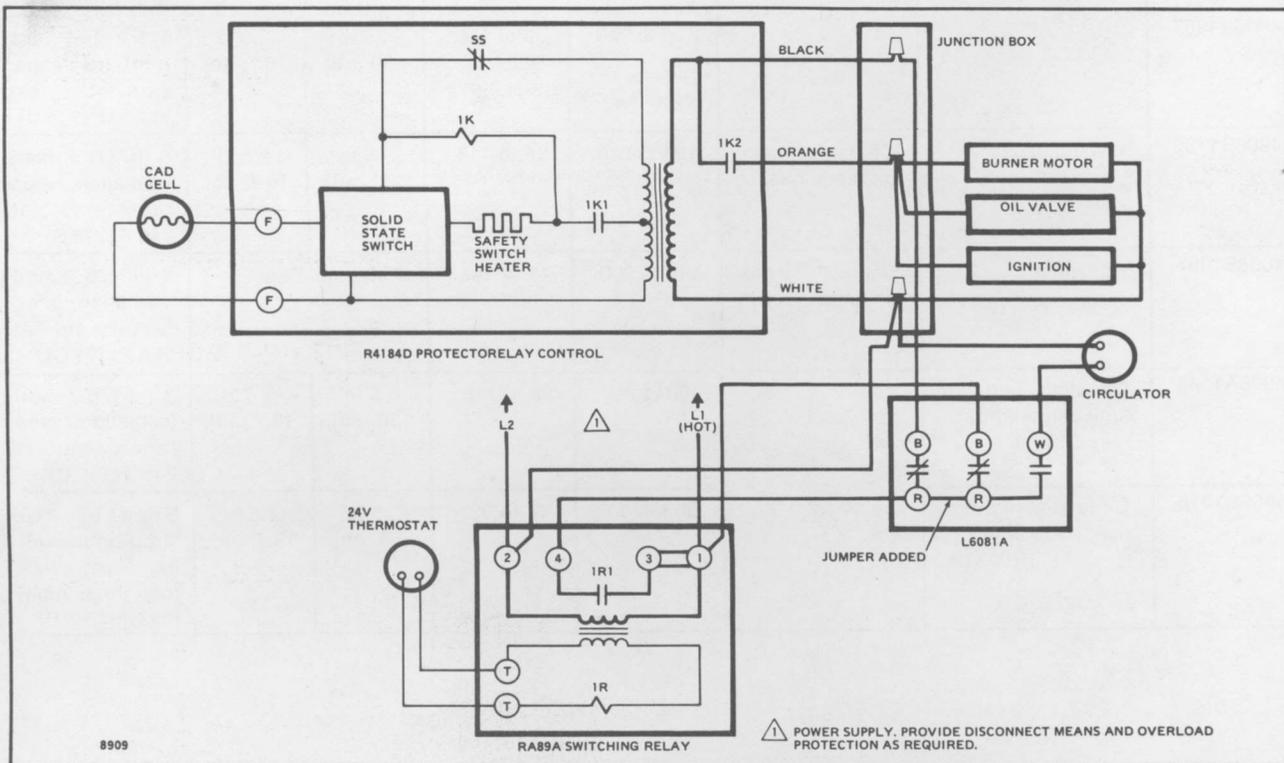
Plus ignition transformer load of 360 VA. Max. connected load 2000 VA.

ACCESSORY:
126580 Dial Stop.

TRADELINE model.

Order Number	Switching Function	Insertion	Includes
L6081A1010	Spst, high limit; spdt, low limit and circulator.	Horizontal	Well adapter, tube of heat-conductive compound, and range stops. ^a

^aSee PARTS AND ACCESSORIES for well assembly part numbers.



L6081A used with oil burner.

L8148A,J AQUASTAT RELAYS



VERTICAL MOUNTING



HORIZONTAL MOUNTING

IMMERSION TYPE CONTROLLERS COMBINE HIGH LIMIT PROTECTION WITH SWITCHING RELAY CONTROL OF BURNER AND CIRCULATOR MOTORS.

High limit opens burner circuit only. Includes transformer and accessory terminals for adding

a remote low limit control. Requires a 24 V thermostat. Thermostat Anticipator Setting: 0.2 A. Fixed Differential: 8 F [4.4 C] nominal. Bulb: Copper, 3/8 x 2-7/8 in. [9.5 x 73.0 mm]. Insertion

Length: 3-3/8 in. [85.7 mm]. Insulation Depth: 1-1/2 in. [38.1 mm]. Max. Pressure on Immersion Well: 255 psi [1758 kPa]. Listed by Underwriters Laboratories Inc; certified by CSA.

ELECTRICAL RATINGS (A):

Circulator Control Circuit—

	120 Vac	240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.7

Burner Control Circuit—

Line Voltage: Same as circulator ratings.

Low Voltage: 1.2 A max. at 24 Vdc.

Millivoltage: 0.25 A at 1/4 to 12 Vdc.

continued next page

TRADELINE

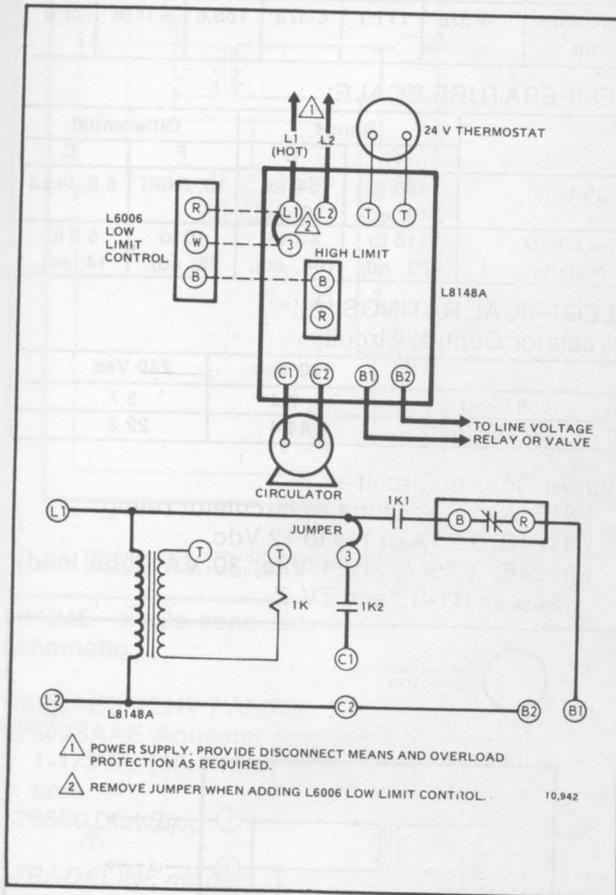
hydronic controls



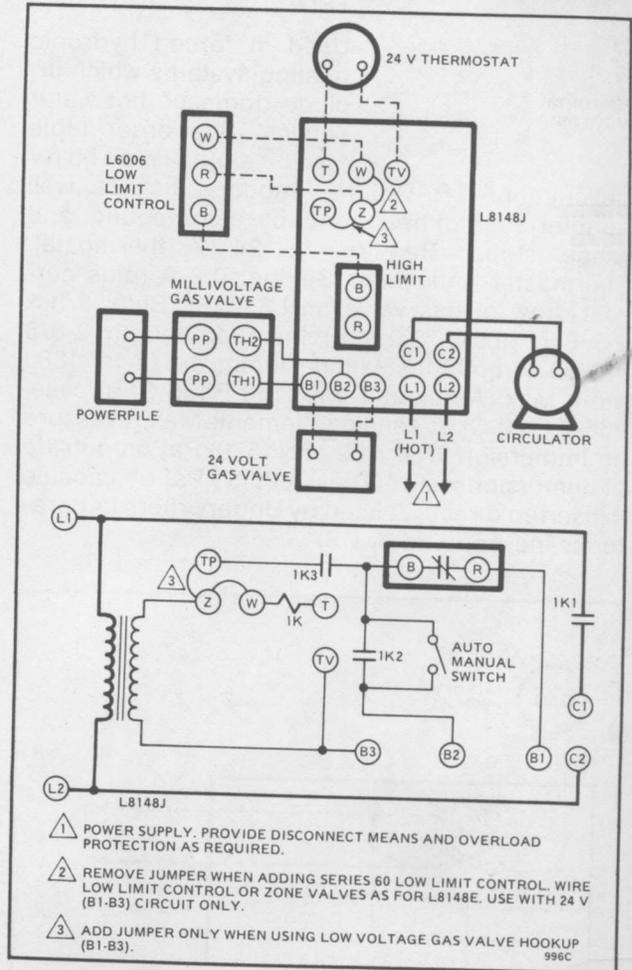
L8148A,J continued

CASE DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
Vertical Mount	6-1/8	155.6	4-3/8	111.1	3-1/8	79.4
Horizontal Mount	4-3/8	111.1	6-1/8	155.6	3-1/8	79.4



External connections and internal schematic for L8148A.



Internal schematic and external connections for L8148J. Wiring shown for either low voltage or millivoltage gas valve. Low limit added in hookup with 24 V gas valve.

TRADELINE models.

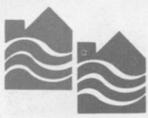
Order Number	Burner Control Circuit	Mounting	High Limit Scale Range		Max. Bulb Temperature		Max. Ambient Temperature		Capillary Length		Includes
			F	C	F	C	F	C	in.	mm	
L8148A1017	Line voltage	Horizontal or vertical	140 to 240	60 to 116	40 deg. over selected set point; up to 265	22 deg. over selected set point; up to 129	150 including zone valves with low voltage loads up to 1.2 A ^a	66, including zone valves with low voltage loads up to 1.2 A ^a	4-1/2	114.3	Well adapter and heat-conductive compound. ^b
L8148J1009 ^c	Millivolt or low voltage										

^aIf up to 1.4 A load is used, ambient temp. must not exceed 77 F [25 C].

^bSee PARTS AND ACCESSORIES for well assembly part numbers.

^cTotal external load powered by L8148J must not exceed 30 VA.

TRADELINE



hydronic controls

L8124A,B,C,E,G,L TRIPLE AQUASTAT RELAYS



VERTICAL MOUNTING



HORIZONTAL MOUNTING

IMMERSION TYPE CONTROLLER COMBINES HIGH LIMIT PROTECTION WITH LOW LIMIT AND CIRCULATOR CONTROL.

Used in forced hydronic heating systems which include domestic hot water service. See order table for application/

description. TRADELINE models include well adapter, tube of heat-conductive compound, and range stops. Requires a 24 V thermostat. Thermostat Anticipator Setting: 0.2 A (plus current draw of gas valve on L8124E). Bulb: 3/8 x 2-7/8 in. [9.5 x 73.0 mm]. Insertion Length: 3-3/8 in. [85.7 mm]. Insulation Depth: 1-1/2 in. [38.1 mm]. Max. Ambient Temp: 150 F [66 C] at case, 265 F [129 C] at sensing element. Max. Pressure on Immersion Well: 200 psi [1379kPa] on outside of immersion well, 100 psi [689.5 kPa] on capsule if inserted directly. Listed by Underwriters Laboratories Inc; certified by CSA.

CASE DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
Vertical Mount	6-1/8	155.6	4-3/8	111.1	3-1/16	77.8
Horizontal Mount	4-3/8	111.1	6-1/8	155.6	3-1/16	77.8

TEMPERATURE SCALE:

	Range		Differential	
	F	C	F	C
High Limit	130 to 240, adj.	54 to 116, adj.	10, fixed	5.6, fixed
Low Limit/Circulator	110 to 220, adj.	43 to 104, adj.	10 to 25, adj.	5.6 to 14, adj.

ELECTRICAL RATINGS (A):

Circulator Control Circuit—

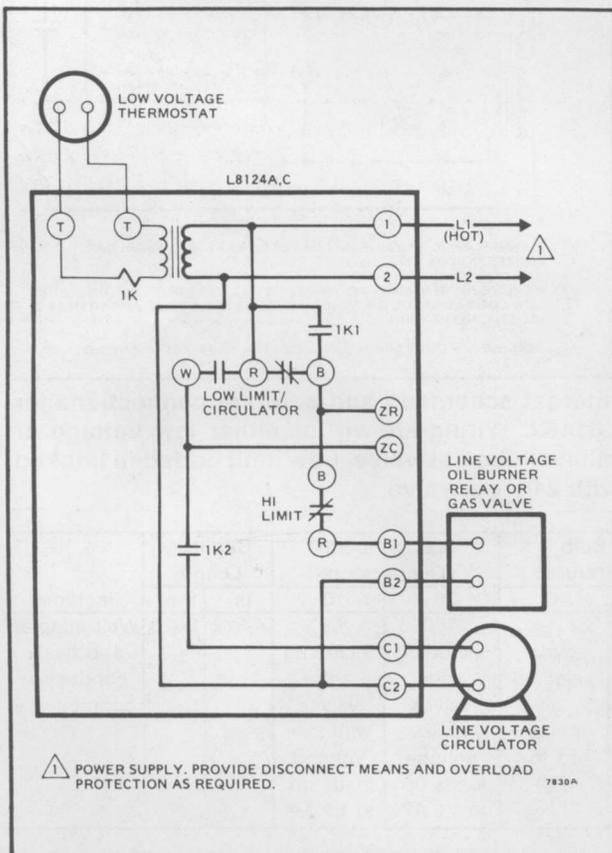
	120 Vac	240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

Burner Control Circuit—

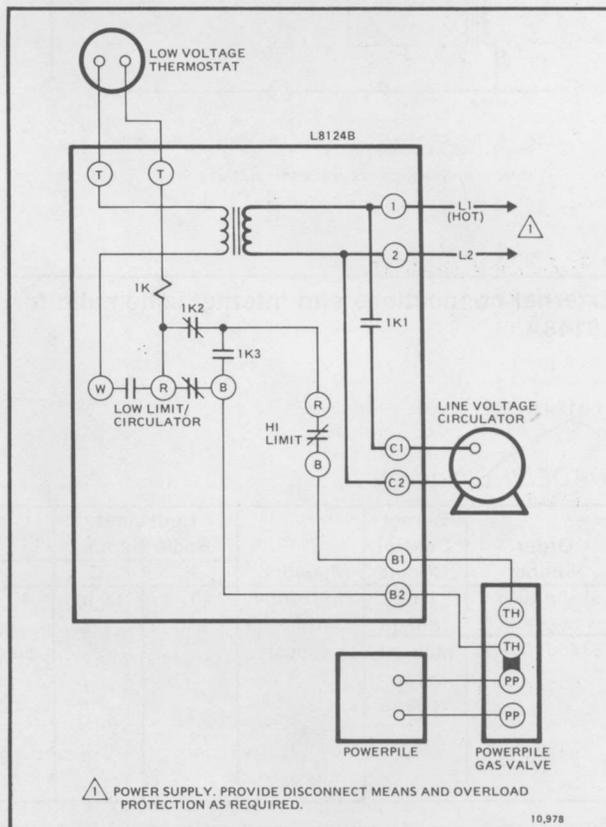
L8124A,C,G,L: Same as circulator rating.

L8124B: 0.25 A at 1/4 to 12 Vdc.

L8124E: 1.25 A at 24 Vac; 30 VA (total load) across B1-B2 and TV-Z.



L8124A,C single-zone connections and internal schematic.



L8124B single-zone connections and internal schematic.

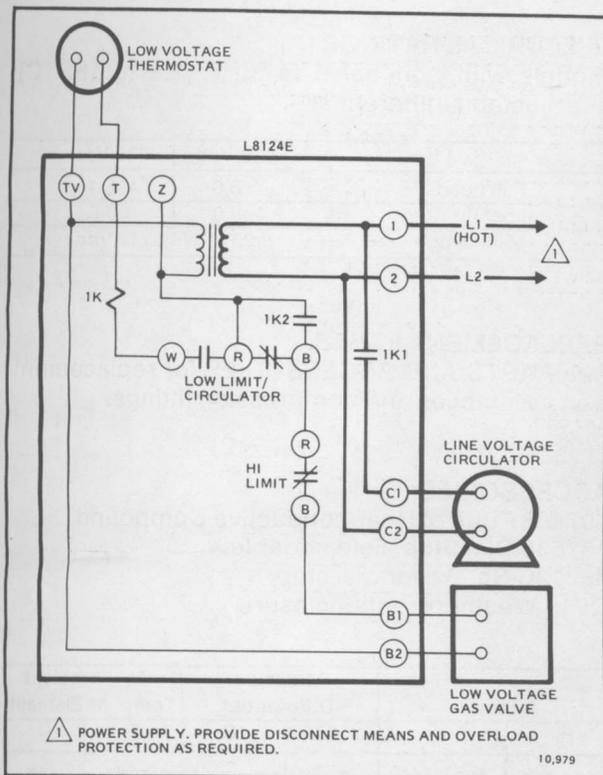
continued next page

TRADELINE

hydronic controls



L8124A,B,C,E,G,L continued



L8124E single-zone connections and internal schematic.

REPLACEMENT PARTS:

125026AAE Aquastat Assembly. For models with 1-1/2 in. [38.1 mm] or 3 in. [76.2 mm] insulation.

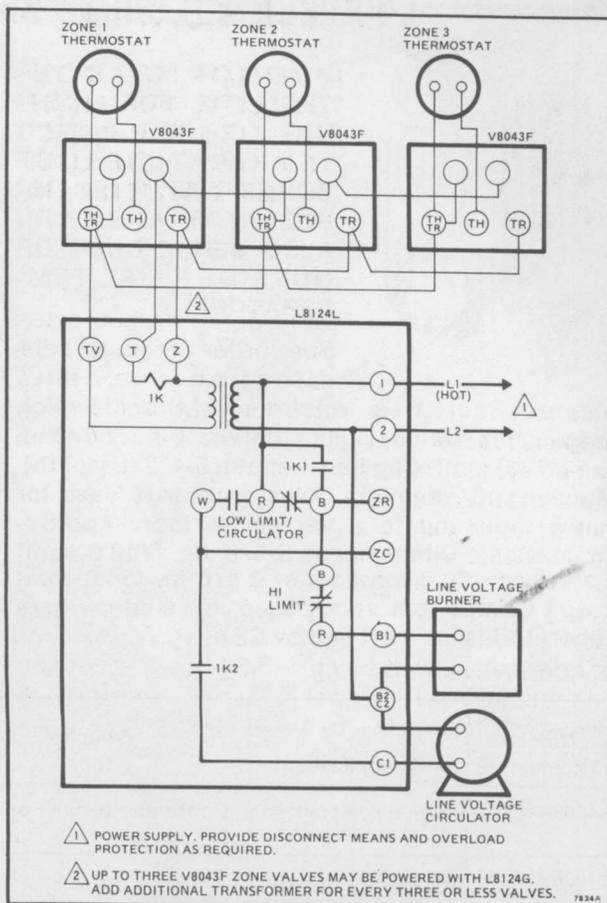
126580 Dial Stop.

TRADELINE models.

Order Number	Application	Burner Control Circuit	Mounting
L8124A1007	Provides multizone control by using a separate circulator and R845 Relay for each zone.	120 V	Vertical
L8124A1015			
L8124B1039	Provides single-zone control.	Millivoltage ^a	Vertical or Horizontal
L8124C1003	Provides multizone control by using a separate circulator and R845 Relay for each zone.	120 V	Horizontal
L8124C1029			
L8124E1016 ^b	Provides multizone control by using a separate circulator and R845 Relay for each zone. With large transformer and extra terminals for supplying power to low voltage zone valves.	24 V	Vertical or Horizontal
L8124G1020 ^b		120 V	
L8124L1011 ^b		Includes ZC-ZR terminals for multizone control using a separate circulator and R845 Relay for each zone. With large transformer and extra terminals for supplying power to low voltage zone valves.	

^aContacts are not powered; rated for switching of millivoltage loads.

^bTotal external load powered by L8124 must not exceed 30 VA.



L8124L multizone system with zone valve connections and internal schematic. L8124G zone valve connections are the same; internal schematic is the same except L8124G does not have ZC-ZR terminals and does have separate B2 and C2 terminals.

TRADELINE



hydronic controls

L4008A,B,E; L6008A REMOTE BULB CONTROLLERS



HYDRONIC CONTROLLERS FOR LIMITING OR REGULATING TEMPERATURES OF BOILER WATER OR LIQUID IN TANKS. CAN ALSO SENSE DUCT OR OUTSIDE AIR TEMPERATURE.

See order table for application. Sensing element actuates enclosed Micro Switch snap-acting switch. Bulb: Copper, 3/8 x 2-7/8 in. [9.5 x 73.0 mm]. Capillary Length: 5-1/2 ft. [1.7 m]. Mounting: 3 mounting holes on rear of case for screw mounting to a vertical surface. Approximate Case Dimensions: 5-5/8 in. [142.9 mm] high, 2 in. [50.8 mm] wide, 2-1/8 in. [54.0 mm] deep. Component recognized by Underwriters Laboratories Inc; certified by CSA.

TRADELINE models.

ELECTRICAL RATINGS (A):

Models with nominal 5 to 30 F [2.8 to 16.7 C] adjustable differential—

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25 at 1/4 to 12 Vdc	

REPLACEMENT PARTS:

See PARTS AND ACCESSORIES for replacement well assemblies and compression fittings.

ACCESSORIES:

- 107408 Tube of Heat-conductive Compound.
- 137536 Dial Stop, field addable.
- 80912C Screw, for dial stop.
- Q615 Weatherproof Enclosure.

Order Number	Application	Switch Action	Range		Midscale Differential		Max. Ambient Temp. at Element	
			F	C	F	C	F	C
L4008A1015	High or low limit.	Contacts break on temp. rise.	100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	265	129
L4008B1013	Circulator.	Contacts make on temp. rise.	100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	265	129
L4008E1156	High limit.	Contacts break on temp. rise.	110 to 290	43 to 143	Manual Reset		345	174
L6008A1093	Circulator and low limit.	Spdt.	-30 to +70	-34 to +21	5 to 30, adj.	2.8 to 16.7, adj.	125	52
L6008A1192			100 to 240	38 to 116	5 to 30, adj.	2.8 to 16.7, adj.	265	129

PARTS AND ACCESSORIES

IMMERSION WELLS:

Bulb Length		Bulb Diameter		Insertion Length		Insulation Length		Well Material				
								Copper		Stainless Steel		Zinc
in.	mm	in.	mm	in.	mm	in.	mm	1/2 NPT	3/4 NPT	1/2 NPT	3/4 NPT	3/4 NPT
3	76.2	3/8	9.5	3-3/8	85.7	1-1/2	38.1	121371A ^a 121371Ga,b	121371Ba	121371Ea	121371Fa	
3	76.2	3/8	9.5	3-3/8	85.7	3	76.2	121371La	121371Ma 121371Na			
3-9/16	90.5	3/8	9.5	3-7/8	98.4	1-1/2	38.1	121371Pa	121371Qa			
3	76.2	5/8	15.9	3-3/8	85.7	1-1/2	38.1	123732A	124299A			
3	76.2	3/8	9.5	3-3/8	85.7	4	101.6	122554A ^c 122554B ^c	122555A ^c			
3	76.2	3/8	9.5	5-3/8	136.5	4	101.6		122555B ^c 122555EC,d			
3-1/8	79.4	7/16	11.1	3-1/8	79.4	2-1/4	57.2					138134C ^d 138134D 138134E ^{c,d}
5-1/8	130.2	7/16	11.1	5-1/8	130.2	2-1/4	57.2					138134B

^aIncludes clamp.

^bBrass.

^cWith plastic sleeve.

^dPregnant.

continued next page

TRADELINE

hydronic controls



Parts and Accessories continued

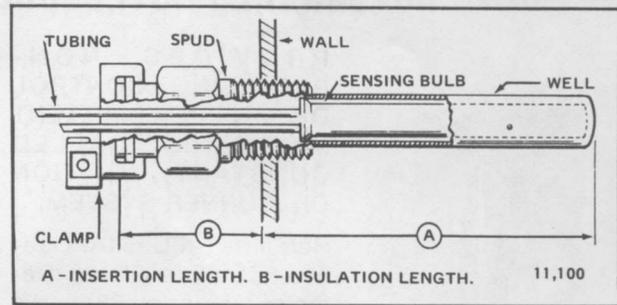
IMMERSION WELL CROSS REFERENCE

123869A is the same as 121371A but without clamp.

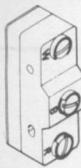
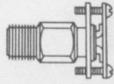
123870A is the same as 121371B but without clamp.

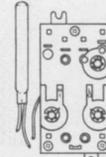
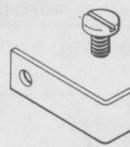
123871A is the same as 121371M but without clamp.

123872A is the same as 121371L but without clamp.



121371 Immersion Well for 1/2 or 3/4 NPT.

Order Number	Description	Use With
103774 	Spdt switch.	L4006A; L6007; L8024C
104484A (Shown with bulb) 	Compression fitting, 1/2 in. NPT. Brass, thread length, 0.62 in.	L4006; L4008; L6006; L6008; L4031; L8051; L8052; T475; T991E,F
104484B	Compression fitting, 3/4 in. NPT. Brass, thread length, 0.62 in.	L4008; L4031; L6008; L8051; L8052; T475; T991E,F
104486B (Shown with clamp) 	Compression fitting, 1/2 in. NPT. Brass.	L4006; L4008; L4031; L6006; L6008; L8051; L8052; T475
104488	Tube clip (stainless steel).	L4008; L4023; L4031; L6008
107408	Heat-conductive compound.	Immersion well assemblies.
112720 	Well clip for 3/4 in. NPT.	112639AB, 112641AA well assemblies.
112721 (Picture same as 112720)	Well clip for 1/2 in. NPT.	112621 through 112637 well assemblies.

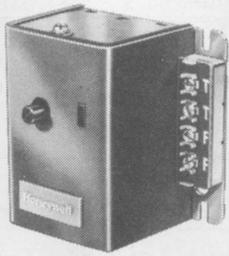
Order Number	Description	Use With
123444 	Well clamp.	L4081; L6081; L8124; L8148; R4166; R8182
125026AAE 	Aquastat assembly.	L8124A-C,E,G; R8182D,F
126580	Dial stop.	L8124E,F; L6081A; L8151A; R8182DH,
129353 	Bag assembly for converting 1/4 in. quick-connect terminal to screw terminal.	L4080A,C
137536	Dial stop.	L4008, L6008
391650	Adjustable range stop.	T5068
4074EBS 	Bag assembly. Field adjustable adjustable dial stop and screw.	LS8008
80912C	Screw for use with 391650 Range Stop.	T5068
Q615A	Weatherproof enclosure.	L4006; L4008; L6006; L6008

TRADELINE



oil burner controls

R8184G,K,L PROTECTORELAY OIL BURNER CONTROLS



PROVIDES NON-RECYCLING CONTROL OF AN INTERMITTENT (FORMERLY CALLED CONSTANT) IGNITION OIL BURNER SYSTEM.

Requires a C554A Cadmium Sulfide Flame Detector (see page 68) and a 24 V thermostat. Switches line voltage burner motor;

includes transformer to supply 24 V power to control circuit. Solid state flame sensing circuit. External button to manually reset safety switch after safety shutdown. Low voltage terminals allow straight-in or curled wiring connections on exposed terminal strip. Mounts on standard 4 x 4 in. junction box. Ambient Temp. Range: 32 F to 115 F [0 C to 46 C]. Approximate Dimensions: 4-1/8 in. [104.8 mm] high, 4-1/8 in. [104.8 mm] wide, 2-1/2

in. [63.5 mm] deep. Component recognized by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 60 Hz.

Load Relay Contacts (A)—

Model	120 Vac		240 Vac	
	Full Load	Locked Rotor	Full Load	Locked Rotor
R8184G (45 sec. model), R8184K and L	7.4	44.4	3.7	22.2
R8184G (15, 30 sec. models)	10.0	60.0	5.0	30.0

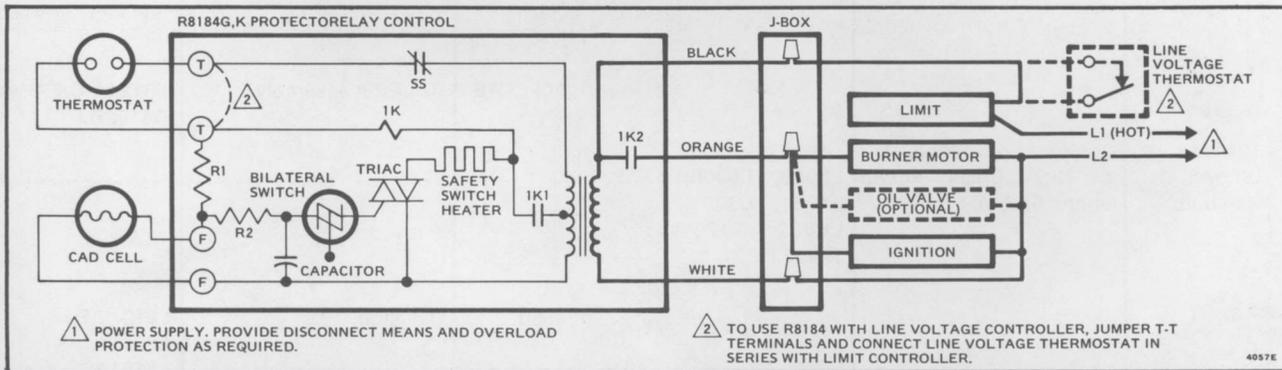
Ignition Rating (in addition to burner motor load)—

R8184G (45 sec. models), R8184K,L: 360 VA.

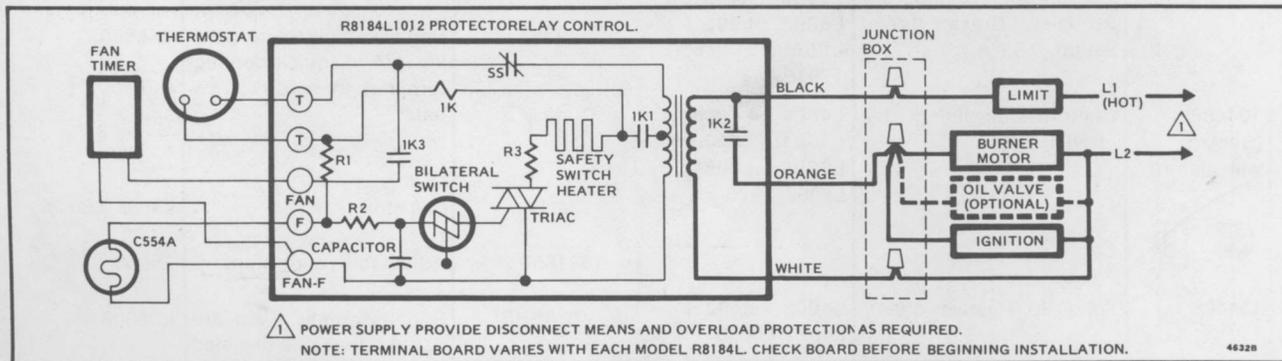
R8184G (15, 30 sec. models): 500 VA.

ACCESSORY:

128732 Terminal Cover.



Internal schematic and typical hookup for R8184G,K.



Internal schematic and typical hookup for R8184L.

TRADELINE model.

Order Number	Safety Switch Timing	Thermostat Anticipator Setting	Includes
R8184G1138	45 sec.	0.2 A	Manual trip lever on safety switch to assure burner shutdown during servicing.
R8184G1161	15 sec.		
R8184G1179	30 sec.		
R8184K1006	45 sec.		
R8184L1012	45 sec.	0.4 A	With separate terminals and switching for fan timer.



oil burner controls



R8184M PROTECTORELAY OIL BURNER CONTROL



PROVIDES CONTROL OF AN INTERMITTENT (FORMERLY CALLED CONSTANT) IGNITION OIL BURNER AND POWER FOR A LOW VOLTAGE COOLING CONTROL CIRCUIT.

Requires a C554A Cadmium Sulfide Flame Detector (see page 68) and a 24 V thermostat. Solid state flame sensing circuit. Safety switch must be manually reset after safety shutdown. External safety reset button. Integral 40 VA transformer with "Y" and "G" terminals for cooling equipment. Mounts on standard 4 x 4 junction box. Ambient Temp. Range: 32 F to 115 F [0 C to 46 C]. Approximate Overall Dimensions: 6 in. [152.4 mm] high, 4-3/4 in. [120.7 mm] wide, 2-1/2 in. [63.5 mm] deep. Component recognized by Underwriters Laboratories Inc.

ELECTRICAL RATINGS:

Transformer—40 VA. Primary voltage—120 V, 60 Hz; secondary voltage (open circuit)—27 V, 60 Hz.

Load Contacts (A)—

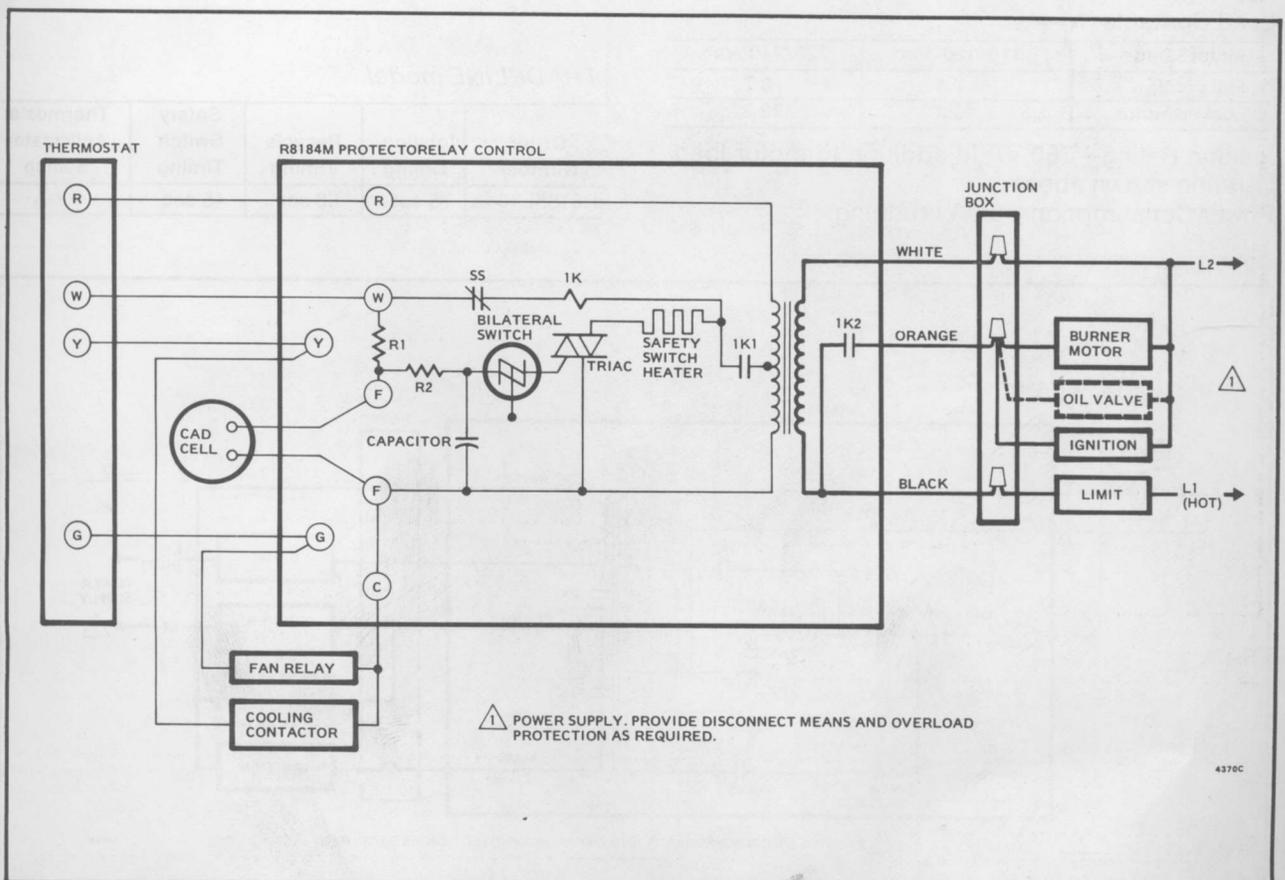
Motor Rating	120 Vac	240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

Ignition Rating—360 VA (in addition to above motor rating).

Power Consumption—6.5 W running.

TRADELINE model.

Order Number	Safety Switch Timing	Thermostat Anticipator Setting
R8184M1051	45 sec.	0.2 A



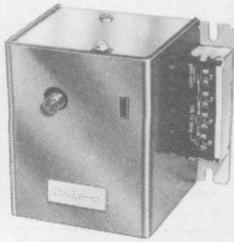
Internal schematic and typical hookup for R8184M.

TRADELINE



oil burner controls

R8185E PROTECTORELAY CONTROL



PROVIDES AUTOMATIC RECYCLING CONTROL OF AN INTERRUPTED (FORMERLY CALLED INTERMITTENT) IGNITION OIL BURNER SYSTEM.

Requires a C554A Cadmium Sulfide Flame Detector (see page 68) and a 24 V thermostat. Switches line voltage burner motor;

includes transformer to supply 24 V power to control circuit. Provides burner shutoff in case of ignition or flame failure. External button to manually reset safety switch after safety shutdown. Push-in terminals for low voltage connections; 8 in. [203.2 mm] leadwires for line voltage wiring. Mounts on standard 4 x 4 in. junction box. Max. Ambient Temp: 115 F [46 C]. Approximate Dimensions: 4-1/4 in. [108.0 mm] high, 4-1/4 in. [108.0 mm] wide, 3-3/16 in. [81.0 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS:

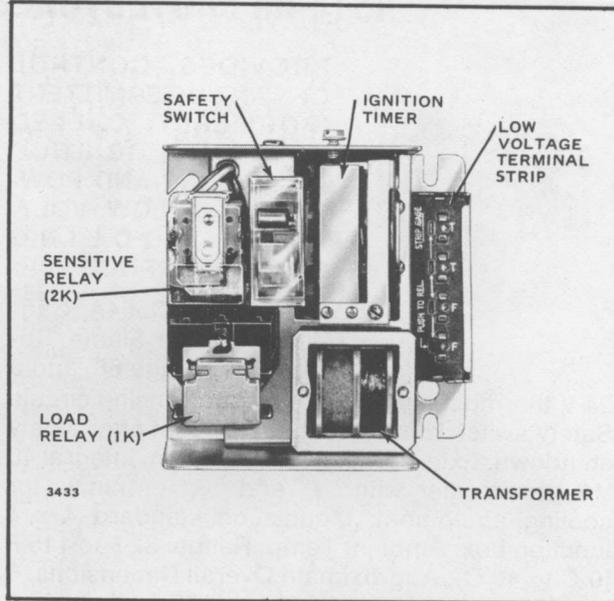
Voltage and Frequency—120 V, 60 Hz; 110 V, 50 Hz.

Load Contacts (A)—

Motor Load	110/120 Vac	220/240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

Ignition Rating—360 VA in addition to motor load rating shown above.

Power Consumption—6.5 W running.



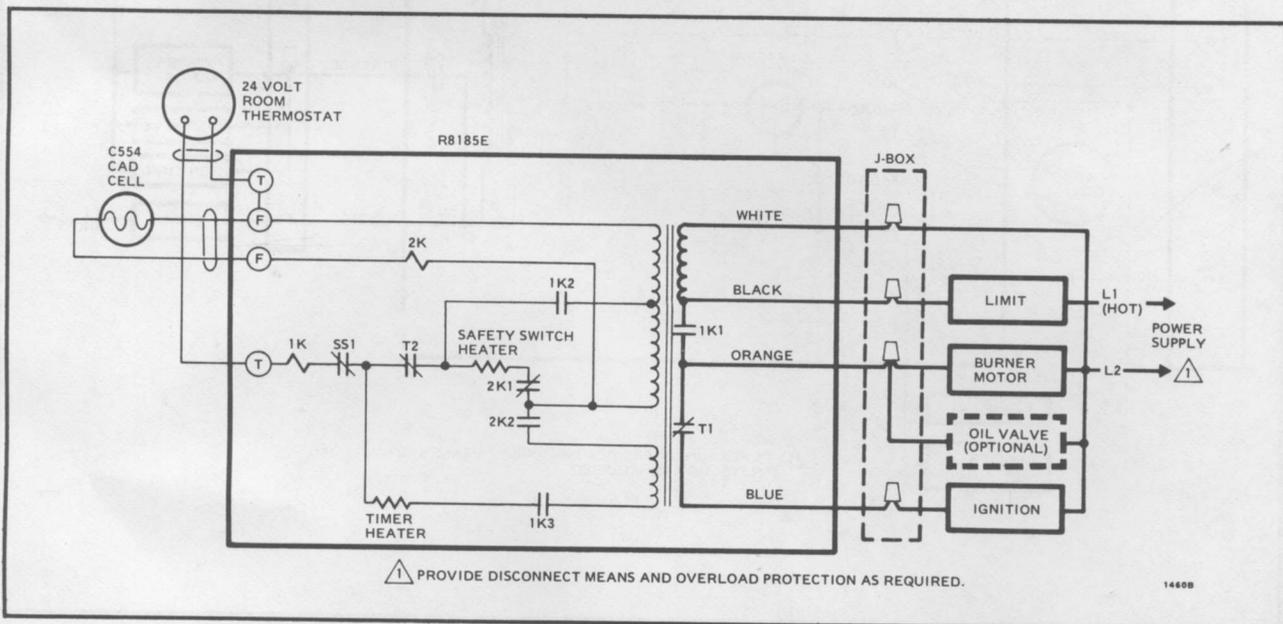
Internal view of R8185E.

ACCESSORY:

128732 Terminal Cover.

TRADELINE model.

Order Number	Ignition Timing	Recycle Timing	Safety Switch Timing	Thermostat Anticipator Setting
R8185E1032	75 sec.	60 sec.	45 sec.	0.2 A



Internal schematic and typical hookup for R8185E.

TRADELINE

oil burner controls



R8404A PROTECTORELAY OIL BURNER CONTROL



PROVIDES AUTOMATIC CONTROL OF INTERRUPTED (FORMERLY CALLED INTERMITTENT) IGNITION OIL BURNER HEATING SYSTEMS.

Requires a C554A Cadmium Sulfide Flame Detector (see page 68) and a 24 V thermostat.

Switches line voltage burner motor; includes transformer to supply 24 V power to control circuit. Solid state flame sensing circuit. External button to manually reset safety switch after safety shutdown. Low voltage terminals allow straight-in or curled wiring connections on exposed terminal strip. Mounts on standard 4 x 4 in. junction box. Ambient Temp. Range: 32 F to 115 F [0 C to 46 C]. Approximate Dimensions: 4-1/8 in. [104.8 mm] high, 4-1/8 in. [104.8 mm] wide, 2-1/2 in. [63.5 mm] deep. Component recognized by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 60 Hz.

Load Contacts (A)—

Motor Rating	120 Vac	240 Vac
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

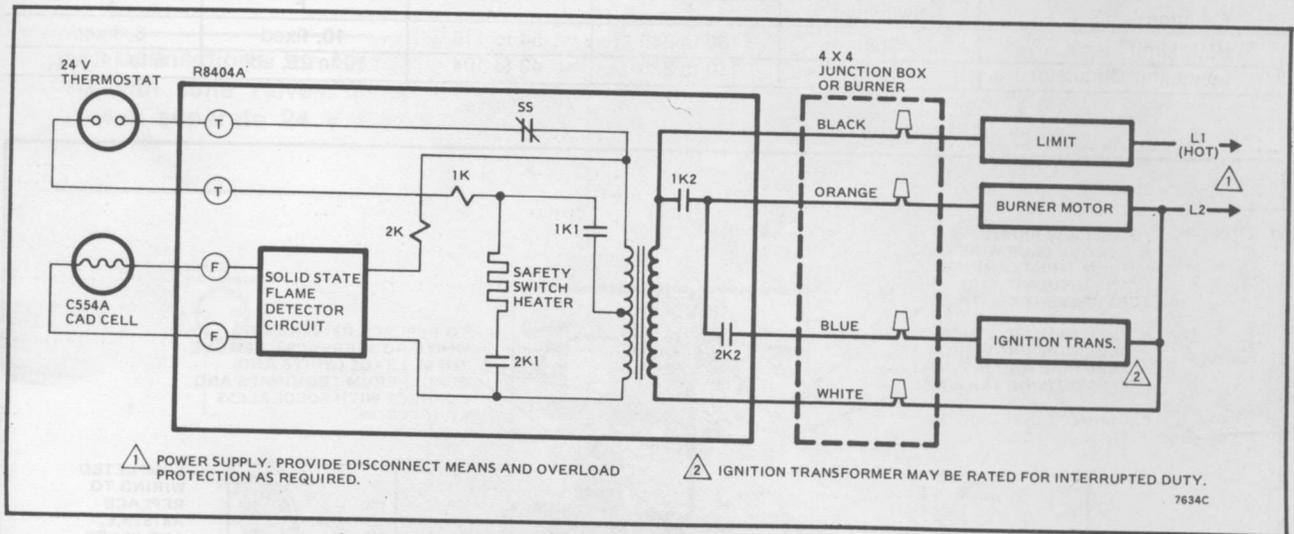
Ignition Rating—360 VA in addition to motor load rating shown above.

Power Consumption—5.5 W max. at rated voltage.

ACCESSORY:

128732 Terminal Cover.

Order Number	Safety Switch Timing	Thermostat Anticipator Setting
R8404A1002	45 sec.	0.2 A



Internal schematic and typical hookup for R8404A.



oil burner controls

R8182D,H COMBINATION PROTECTORELAY AND HYDRONIC HEATING CONTROLLERS



R8182D



R8182H

IMMERSION TYPE AQUASTAT CONTROLLER AND OIL BURNER PRIMARY CONTROL PROVIDES HIGH LIMIT AND LOW LIMIT/CIRCULATOR CONTROL FOR OIL-FIRED HYDRONIC HEATING SYSTEMS.

For intermittent (formerly called constant) ignition. Requires a C554A Cadmium Sulfide Flame Detector (see page 68) and a 24 V thermostat. Max. Ambient Temp: 250 F [121 C] at element. Thermostat Anticipator Setting: 0.2 A. Max. Pressure Rating: 200 psi [1379 kPa] on immersion well; 100 psi [689.5 kPa] direct im-

mersion. Approximate Case Dimensions: 7-1/8 in. [181.0 mm] high, 5-1/4 in. [133.4 mm] wide, 3-7/16 in. [87.3 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 60 Hz.

Burner Circulator Load Contacts (A)—

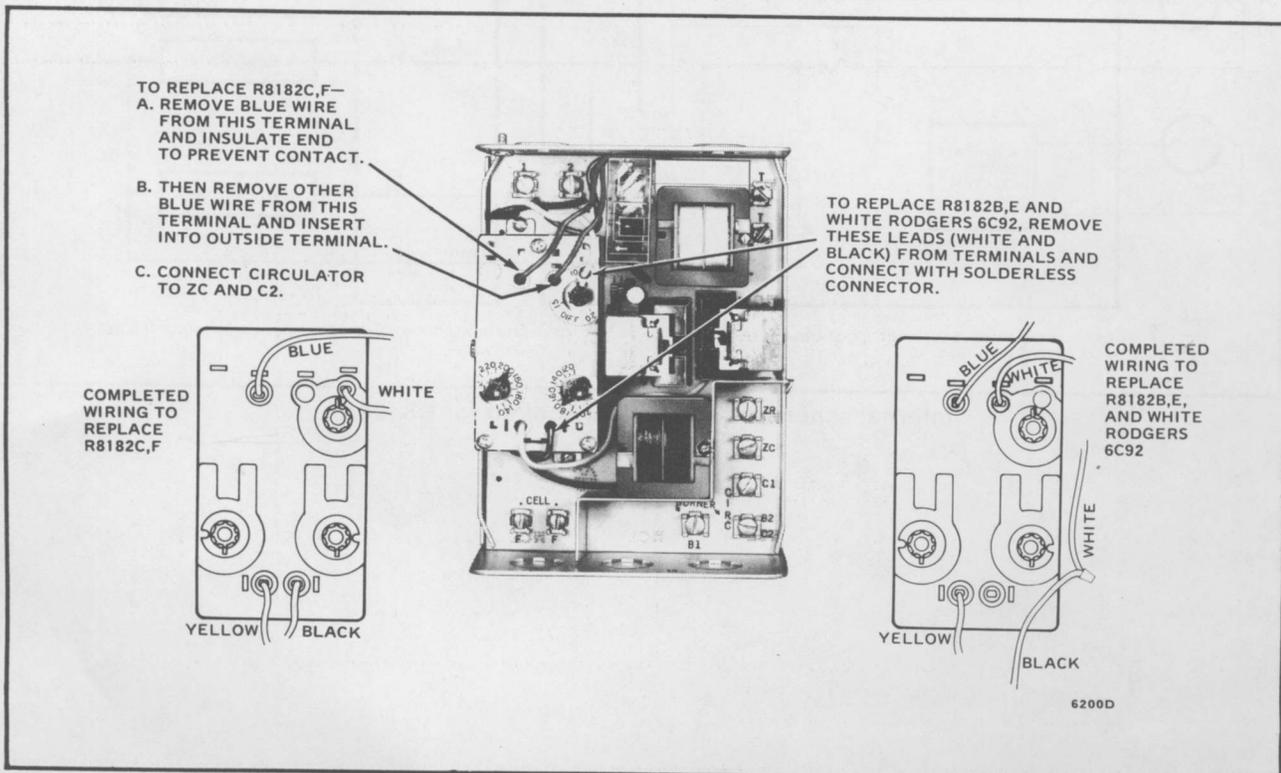
	120 Vac
Full Load	4.4
Locked Rotor	26.4

Ignition Rating—360 VA in addition to load rating shown above.

Max. Power Consumption—9 W.

SWITCHING AND TEMP. RATINGS:

Function	Switching	Adjustable Control Range		Differential	
		F	C	F	C
High Limit	Spst	130 to 240	54 to 116	10, fixed	6, fixed
Low Limit/Circulator	Spdt	110 to 220	43 to 104	10 to 25, adj.	6 to 14, adj.



Conversion of TRADELINE R8182D Aquastat Assembly to replace R8182B,C,E,F and White Rodgers 6C92.

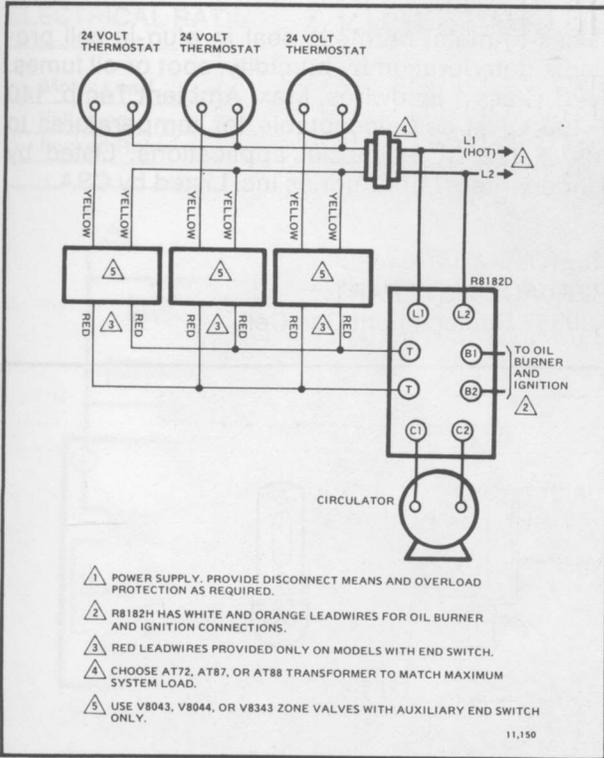
continued next page

TRADELINE

oil burner controls



R8182D,H continued



Typical connections for R8182D,H for multiple zoning with zone valves. Each additional zone requires a separate 24 V thermostat and zone valve.

REPLACEMENT PARTS:

126580 Dial Stop.

Well Assemblies (R8182D only)—

121371A, 1/2 NPT, 1-1/2 in. [38.1 mm] insulation, 3-3/8 in. [85.7 mm] insertion.

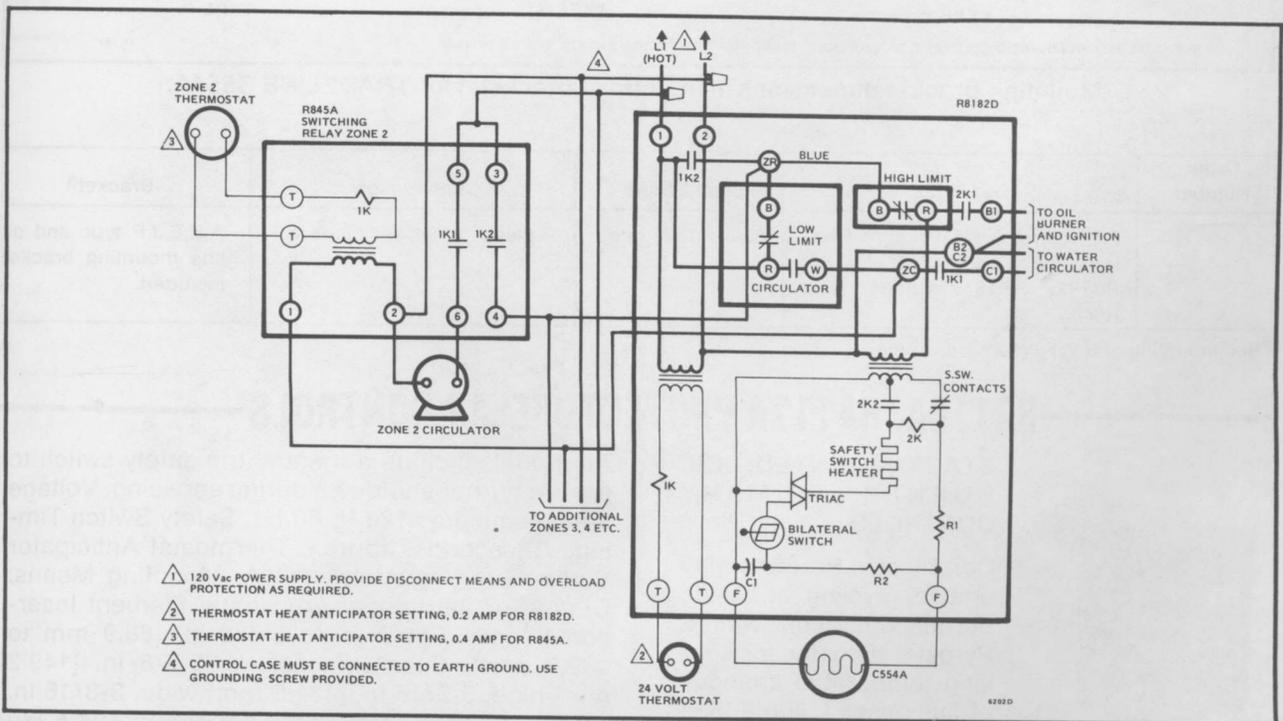
121371B, 3/4 NPT, 1-1/2 in. [38.1 mm] insulation, 3-3/8 in. [85.7 mm] insertion.

121371L, 1/2 NPT, 3 in. [76.2 mm] insulation, 3-3/8 in. [85.7 mm] insertion.

121371M, 3/4 NPT, 3 in. [76.2 mm] insulation, 3-3/8 in. [85.7 mm] insertion.

TRADELINE models.

Order Number	Mounting	Remarks
R8182D1079	Vertical	1-1/2 in. [38.1 mm] insulation, 3/4 in. NPT spud. Less well. With well adapter and heat-conductive compound.
R8182D1111	Horizontal	
R8182H1070	On Burner	1-1/2 in. [38.1 mm] insulation, 3/4 in. NPT spud. Remote bulb, 60 in. [1.5 m] armored capillary.



Internal schematics for R8182D and R845A with typical connections for multiple circulator zoning. R8182H connections from ZC and ZR are identical for multiple circulator zoning application. Each additional zone requires a separate 24 V thermostat and R845 Relay.

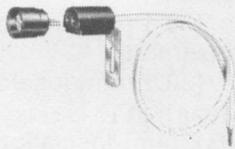
TRADELINE



oil burner controls

C554A CADMIUM SULFIDE FLAME DETECTOR

PHOTOCONDUCTIVE FLAME SENSING DEVICE FOR SEQUENCING OIL BURNER SYSTEMS.

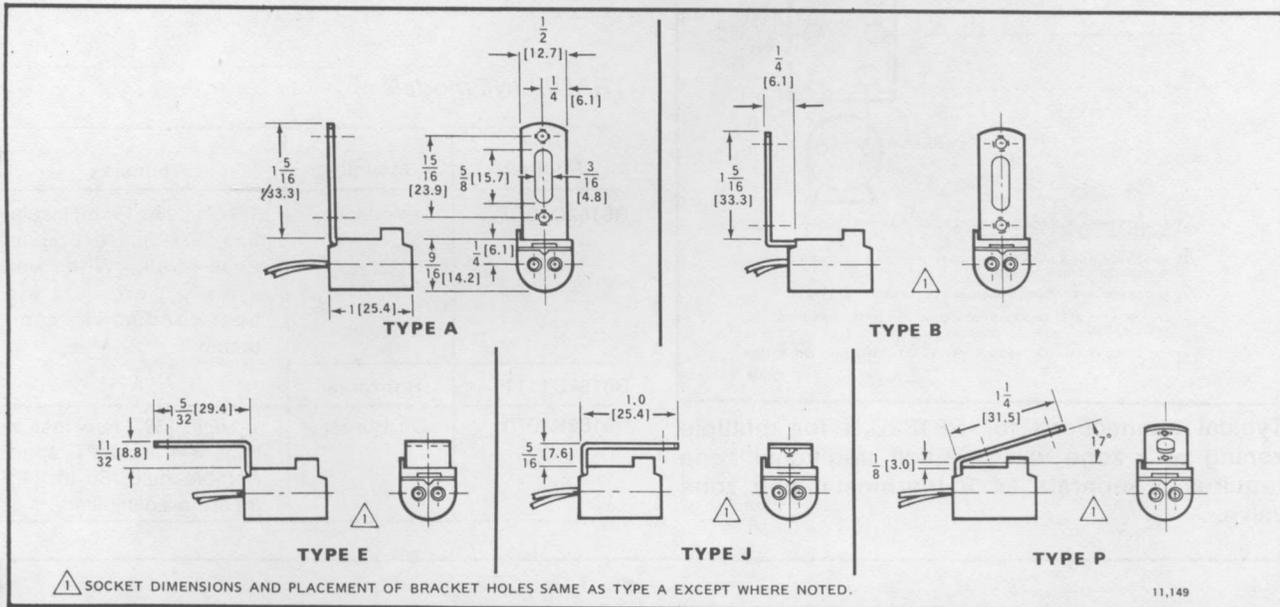


On flame failure, the light sensitive cadmium sulfide cell, in conjunction with flame sensing circuitry, causes the Protectorelay control to shut down the main oil burner.

Glass-to-metal hermetic seal in plug-in cell prevents deterioration by humidity, soot or oil fumes. NEC Class 1 leadwires. Max. Ambient Temp: 140 F [60 C] at cell; acceptable for temperatures to 180 F [82 C] in special applications. Listed by Underwriters Laboratories Inc. Listed by CSA.

REPLACEMENT PART:

130367 Replacement Cad Cell.



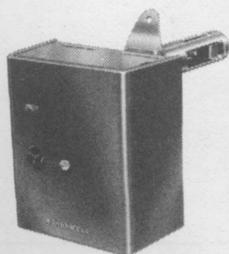
Mounting bracket dimensions in in. [mm in brackets] for TRADELINE C554A.

TRADELINE model.

Order Number	Use With	Lead Length	Construction	Bracket ^a
C554A1463	Protectorelay Oil Primary Controls such as R4166, R4184, R8182, R8184, R8185, and R8404.	60 in. [1524 mm]	2-piece model; cell plugs in.	A,B,E,J,P type and oil line mounting bracket included.

^aSee mounting bracket dimensions above.

RA116A, RA117A PROTECTORELAY CONTROLS



STACK-MOUNTED, OIL BURNER PRIMARY CONTROLS.

Combines a Protectorelay unit for cycling and safe burner operation with a Pyrostat detector for sensing temperature changes of flue gases (1000 F [538 C] max. temp). Safety switch locks out if flame is

not properly established; requires manual reset.

All models include a manual trip safety switch to assure burner shutdown during servicing. Voltage and Frequency: 120 V, 60 Hz. Safety Switch Timing: 70 seconds, approx. Thermostat Anticipator Setting (24 V models): 0.4 A. Mounting Means: Curved or flat flange. Adjustable Element Insertion Length: 3-1/2 in. to 5-1/2 in. [88.9 mm to 139.7 mm]. Case Dimensions: 5-7/8 in. [149.2 mm] high, 5-3/16 in. [131.8 mm] wide, 3-3/16 in. [81.0 mm] deep. Max. Ambient Temp: 104 F [40 C]. Listed by Underwriters Laboratories Inc. Certified by CSA.

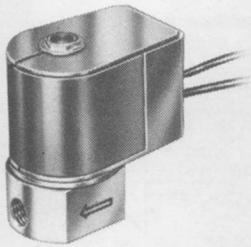
continued next page

TRADELINE



oil burner controls

V4046A,B MAGNETIC VALVES



FOR ON-OFF CONTROL OF OIL FLOW TO DOMESTIC OIL BURNER EQUIPMENT.

See order table for operation. Power interruption closes the valve immediately. Valve Pattern: Straight-through. Wiring Connections: Two 36 in. [914.4 mm] leadwires.

Max. Power Consumption: 8 W. Mounts directly in pipe line or on support bracket. Ambient Temp.

TRADELINE model.

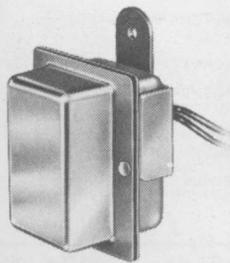
Range: 32 F to 115 F [0 C to 46 C]. Max. Fluid Temp: 125 F [52 C]. Use no heavier than No. 2 oil. Pipe Size: 1/8 in. NPT. Approximate Dimensions: 2-3/4 in. [69.9 mm] high, 1-5/8 in. [41.3 mm] wide, 2-5/8 in. [66.7 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA. Approved by Factory Mutual.

COIL VA RATING:

Model	120 V	240 V
V4046A	13.8	12.0
V4046B	13.8	13.7

Order Number	Operation	Oil Flow Capacity		Voltage (60 Hz)	Operation Pressure		Orifice Size (dia.)	
		gph	l/s		psi	kPa	in.	mm
V4046A1058	With integral thermistor to delay valve opening 3 to 8 seconds to allow burner fan to reach operating speed before discharging oil.	5 to 35	0.005 to 0.04	120	150	1034.2	0.078	2.0
V4046A1074				120	300	2068.4	0.043	1.1
V4046B1007	Provides positive control of oil flow and opens immediately when energized.			120	150	1034.2	0.078	2.0
V4046B1023				240	150	1034.2	0.078	2.0
V4046B1049				120	300	2068.4	0.043	1.1

ST70A ELECTRONIC TIME DELAY



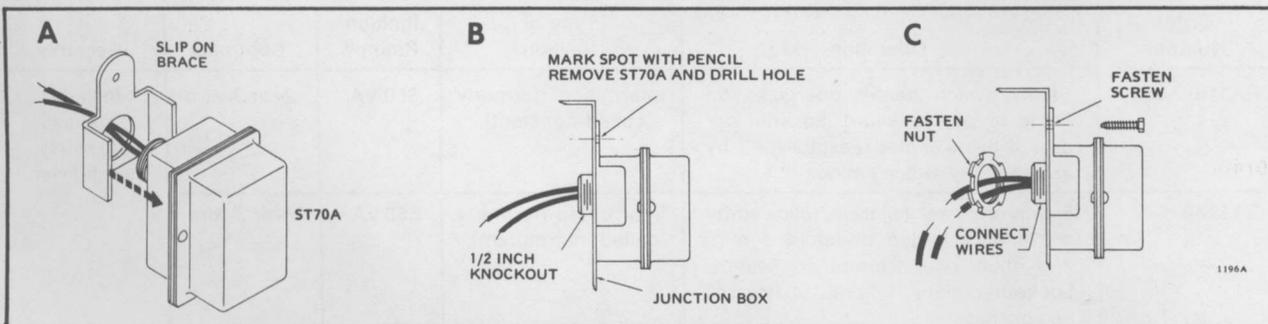
DELAYS OPENING OF FUEL VALVE IN OIL BURNER SYSTEMS.

Delayed opening allows burner motor to establish draft, or allows first-stage flame establishment period on a 2-stage oil burner. Timing is not affected by ambient temperatures. Mounts through 1/2 in.

knockouts on standard junction box. Voltage and

Frequency: 120 Vac, 50/60 Hz. Load Rating (inductive): 50 mA minimum, 0.25 A max. Power Consumption: 0.25 W nominal, 2.0 W max. Ambient Temp. Range: 30 F to 115 F [minus 1 C to plus 46 C]. Must be protected from weather. Dimensions: 1-13/16 in. [46 mm] high, 2-5/8 in. [66.7 mm] wide, 2-13/16 in. [71.4 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

Order Number	Time Delay	Use With
ST70A1002	5 sec. nominal	V4046B



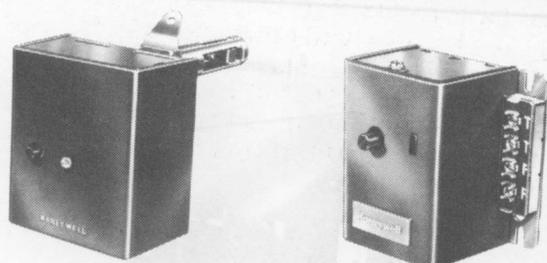
Mounting and wiring procedure.

TRADELINE

oil burner controls

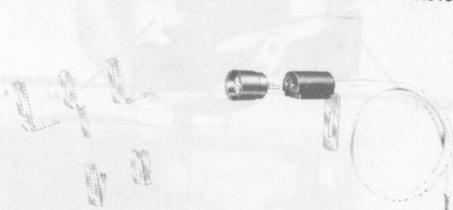


Y517B OIL SERVICE/ENERGY SAVINGS PACKS



RA117A

R8184G



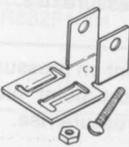
C554A

REPLACES 125 DIFFERENT HONEYWELL AND COMPETITIVE OIL PRIMARIES.

TRADELINE models.

Order Number	Contains
Y517B1001	2-RA117A1047 Protectorelay Oil Burner Controls 1-R8184G1138 Protectorelay Oil Burner Control 1-C554A1463 Cadmium Sulfide Flame Detector
Y517B1019	1-RA117A1047 Protectorelay Oil Burner Control 2-R8184G1138 Protectorelay Oil Burner Controls 2-C554A1463 Cadmium Sulfide Flame Detectors

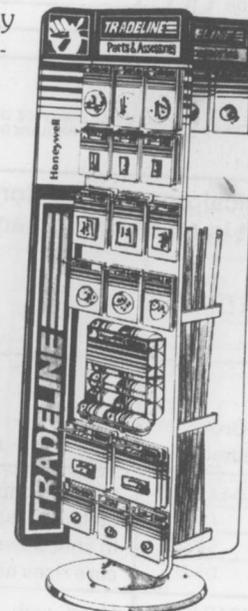
PARTS AND ACCESSORIES

Order Number	Description	Use With
120320 (see 130367 picture)	Replacement cell.	C554A
122555C	Well Assembly, copper, 3/4 in. NPT, 4 in. insulation, 3-3/8 in. insertion.	R4166A
122555G	Well Assembly, copper, 3/4 in. NPT, 4 in. insulation, 5-3/8 in. insertion.	R4166B
123732AA	Well Assembly, 1/2 in. NPT, 1-1/2 in. insulation, 3-3/8 in. insertion.	L8151; R8182H,J
124299AA	Well Assembly, 3/4 in. NPT, 1-1/2 in. insulation, 3-3/8 in. insertion.	R8182H,J
128732	Terminal cover and conduit connections.	R4184, R8184, R8185, R8189
130367 	Replacement cad cell. Plugs into C554A socket. 140 F [60 C] max. temp.	C554A
4074BJS 	Envelope assembly. Contains oil line mounting bracket, nut, and screw.	C554A

Honeywell Service Center for TRADELINE Replacement Parts

An eye-catching display featuring a wide assortment of skin-packed parts and accessories.

For more information on the Service Center and a list of parts and accessories available for display, see page 262.

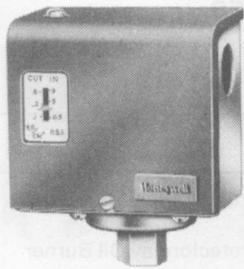


TRADELINE



pressure controllers

PA404A,B PRESSURE CONTROL CONTROLLERS



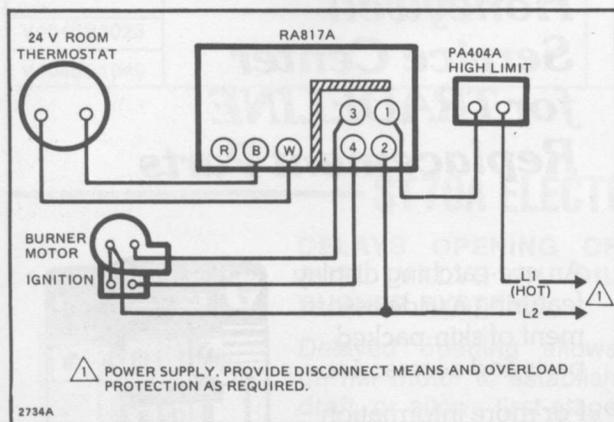
HIGH LIMIT PRESSURE SAFETY CONTROL.

Used in 24, 120, or 240 V control circuits or in self-powered millivoltage applications. Pressure Sensing Element: Stainless steel diaphragm. Spst Micro Switch snap-acting switch. Max. Operating Pressure: 20

psi [137.9 kPa]. Max. Ambient Temp: 150 F [66 C]. Mounting Means: 1/4 in. female pipe threads. Case Dimensions: 4-15/32 in. [113.5 mm] high, 3-3/8 in. [85.7 mm] wide, 2-1/2 in. [63.5 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A):

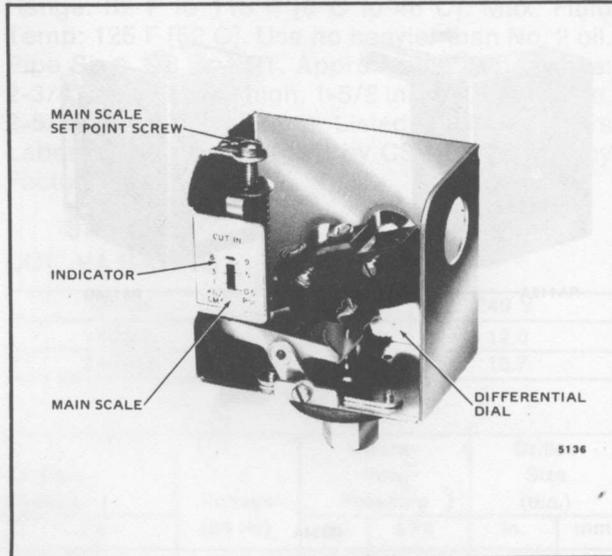
	120 Vac	240 Vac	277 Vac
Full Load	8.0	5.1	—
Locked Rotor	48.0	30.6	—
Resistive	8.3	8.3	7.2
Millivoltage	0.25 at 1/4 to 12 Vdc.		



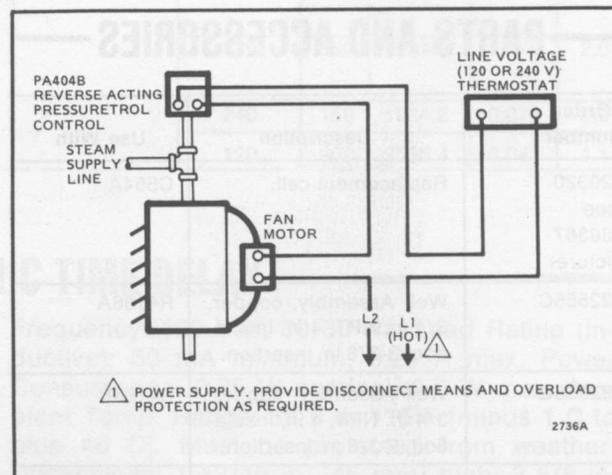
Typical connections for PA404A used as a high limit in an oil-fired steam system.

TRADELINE models.

Order Number	Application	Operating Range (adjustable)		Additive Differential (adjustable)		Switch Action
		psi	kPa	psi	kPa	
PA404A1033	Safety control for steam heating boilers; breaks an electrical circuit to shut down burner if steam pressure rises above a safe level.	0.5 to 9.0	3.4 to 62.1	1 to 5	6.9 to 34.5	Makes at set point on pressure fall; breaks at set point plus differential on pressure rise.
PA404B1023	Used with suspension type unit heaters to make the fan circuit when a pressure rise indicates the presence of steam.					Breaks at set point on pressure fall; makes at set point plus differential on pressure rise.



Cover-off view of PA404A.

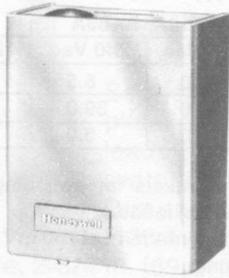


Typical connections for PA404B used in a unit heater installation.

relays and contactors

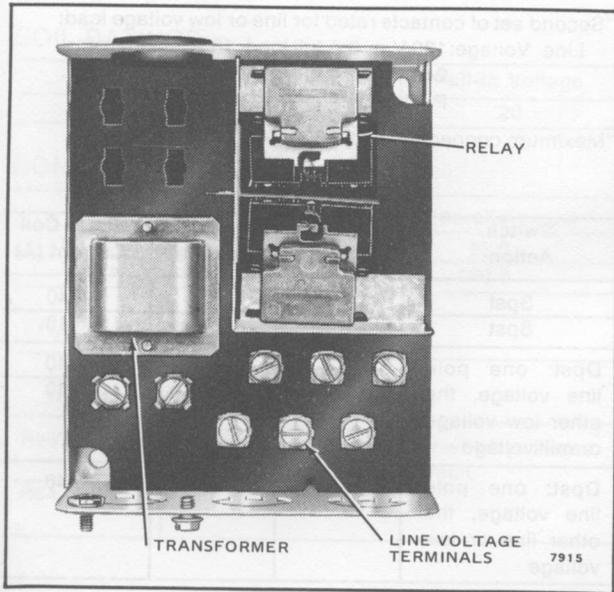


R182A,C; R482A-C; R882A-C,F SWITCHING RELAYS



ENCLOSED INTERMEDIATE RELAYS.

See order table for application and electrical ratings. Approximate Dimensions: 5-1/4 in. [133.4 mm] high, 4-1/4 in. [108.0 mm] wide, 3-1/32 in. [77.0 mm] deep. Listed by Underwriters Laboratories Inc.—R482A-C; R882A-C,F. Certified by CSA—R482A-C; R882A-C.



Cover-off view of R482.

RELAY CONTACT RATINGS (ac):

Model	Volts	Full Load (A)	Locked Rotor (A)
R182A	120	10.2	61.2
	240	5.1	30.6
R182C	120	7.4	44.4
	240	3.7	22.2
R482A	120	7.4	44.4
	240	4.5	27.0
R482B,C	120	7.2	43.2
	240	3.6	21.6
R882A	120	7.4	44.4
	240	4.5	27.0
R882B,C	120	7.4	44.4
	240	3.7	22.2
R882F	125 VA pilot duty at 120 and 240 V, 3 A full load at 24 V.		

TRADELINE models.

Order Number	Application	Voltage (50/60 Hz)	Switch Action	Control Circuit	Coil Voltage	Relay Coil Current (A)
R182A1004 ^a	For 24 V thermostat control of line voltage devices.	120	Spst	2- or 3-wire	24	0.40
R182C1051 ^a		120	Dpdt		24	0.35
R182C1069 ^a		240	Dpdt		24	0.35
R482A1008	Controlled by a line voltage controller.	120	Spst	2-wire	120	0.04
R482B1007		120	Spdt		120	0.07
R482B1015		208/240	Spdt		208/240	0.04
R482C1071		120	Dpdt		120	0.07
R482C1089		208/240	Dpdt		208/240	0.04
R882A1009		For use with separate low voltage power source.	24		Spst	2-wire	24	0.21
R882B1008	24		Spdt	24	0.21	
R882C1007	24		Dpdt	24	0.42	
R882F1004	24		1 spdt, 1 single-throw 3-branch	24	0.40	

^aIncludes integral transformer.

TRADELINE



relays and contactors

RA19A; RA89A; RA832A; R845A SWITCHING RELAYS



PROVIDES INTER-MEDIATE SWITCHING OF A LINE VOLTAGE DEVICE FROM A LOW VOLTAGE CONTROLLER.

Integral transformer provides low voltage power for control circuit. See order table for application. Max. Input: 5.0 W. Max.

Ambient Temp: 115 F [46 C] for 60 Hz, 105 F [41 C] for 50 Hz. Approximate Dimensions: 5-1/4 in. [133.4 mm] high, 4-1/4 in. [108.0 mm] wide, 3 in. [76.2 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA (except RA19A).

CONTACT RATINGS (A):

	RA19A; RA89A		RA832A ^{a,c} ; R845A ^{b,c}	
	120 Vac	240 Vac	120 Vac	240 Vac
Full Load	10.0	6.5	7.4	4.5
Locked Rotor	60.0	39.0	44.4	27.0
Resistive	10.0	6.0	10.0	6.0

^aIncludes auxiliary contacts for switching additional low or millivoltage (Powerpile) loads.

Millivolt Rating: 300 mA min. at 750 mV.

Low Voltage Rating:

Pilot Duty—50 VA at 24 V.

Dc Rating—1 A at 12 Vdc.

^bSecond set of contacts rated for line or low voltage load:

Line Voltage: 120 V — 3 A full load, 18 A locked rotor;

240 V — 2 A full load, 12 A locked rotor.

Pilot Duty: 50 VA at 24 V.

^cMaximum connected load: 2000 VA.

TRADELINE models.

Order Number	Application	Voltage (50/60 Hz)	Switch Action	Control Circuit	Coil Voltage	Relay Coil Current (A)
RA19A1006	For switching one line voltage load.	120	Spst	3-wire	24	0.40
RA89A1074		120	Spst	2-wire	24	0.40
RA832A1066	For switching two line voltage loads having a common power source.	120	Dpst: one pole line voltage, the other low voltage or millivoltage		24	0.40
RA832A1074		240			24	0.40
R845A1030	Provides dpst switching for hot water zone control systems, or spst control of two separate loads.	120	Dpst: one pole line voltage, the other line or low voltage		24	0.40

Honeywell Y-packs are combinations of controls specially designed and selected to simplify ordering, storage, and installation. These package sets contain all or most of the equipment necessary to install, replace, or retrofit in specific applications. The controls are packed together and stay together until needed by the service technician—an easy and convenient way to save time and money.

Y-packs in the RCC section of this catalog include:

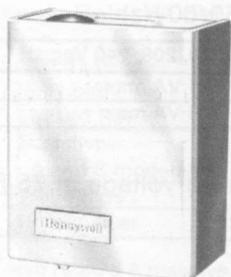
- Y343B Direct Spark Ignition Kit, page 45.
- Y86E,G Retrofit Intermittent Pilot Gas Burner Ignition Systems, page 47.
- Y517B Oil Service/Energy Savings Pack, page 71.
- Y499A RACPAKS, page 87.
- Y8183B Evaporative Cooler Control Pack, page 88.
- Y594 Multistage Combination Packs, page 110.

TRADELINE

relays and contactors



R847A HEAVY DUTY RELAY



PROVIDES SWITCHING FOR HIGH-CURRENT LOADS SUCH AS COOLING COMPRESSORS.

See order table for application. Internal, flexible leads permit spst or dpst switching. Approximate Dimensions: 5-1/4 in. [133.4 mm] high, 4-1/4 in. [108.0 mm] wide, 2-3/4 in. [69.9 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

[108.0 mm] wide, 2-3/4 in. [69.9 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

COIL RATINGS:

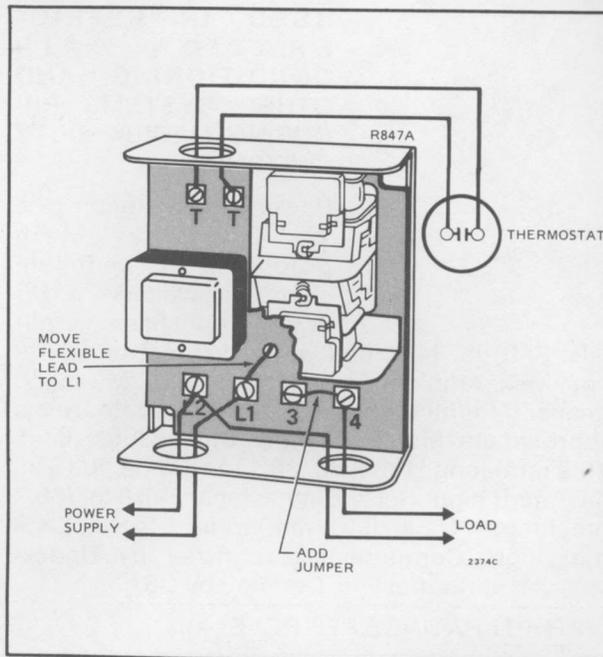
Voltage	Sealed	Inrush	Pull-in Voltage
24	8.4 VA	21.4 VA	20

CONTACT RATINGS (A):

	Dpst	Spst (parallel poles)
Full Load	16.0	22.0
Locked Rotor	72.0	100.0

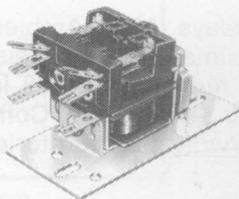
TRADELINE models.

Order Number	Application	Voltage (50/60 Hz)	Switch Action	Control Circuit	Coil Voltage	Relay Coil Current (A)
R847A1085	With internal transformer which provides 24 V power for control circuit.	120	Dpst or Spst	2-wire	24	0.35
R847A1093		240	Dpst or Spst		24	0.35



R847A wired to break one side of the circuit with spst switching.

R8231C IMPEDANCE RELAY



USED IN REFRIGERATION, AIR CONDITIONING, AND OTHER SYSTEMS WHICH REQUIRE REMOTE RESET OR LOCKOUT CIRCUITS.

Low voltage models require a transformer with an open circuit secondary between 24 and 27 Vac.

Relays suitable for use with the Honeywell R4242/R8242 and R8210/R4210 contactor series. Contacts: One pair normally open, one pair normally closed. Approximate Mounting Bracket Dimensions: 3 in. [76.2 mm] long, 1-1/2 in. [38.1 mm] wide, 9/16 in. [14.3 mm] high. Relay Dimensions: 2-5/8 in. [66.7 mm] long, 1-1/2 in. [38.1 mm] wide, 1-3/8 in. [34.9 mm] high. Component recognized by Underwriters Laboratories Inc.

COIL RATINGS (60 Hz only):

	24 V	208/240 V
Sealed VA	1.8	1.6/2.2
Inrush VA	3.7	3.2/4.2
Maximum Pickup Voltage	12.5	110.0

CONTACT RATINGS:

	24 V	120/240 V
Normally Open	3 A Pilot Duty	250 VA
Normally Closed	30 VA Pilot Duty	

ACCESSORY:

133983B Enclosure, NEMA Type 1.

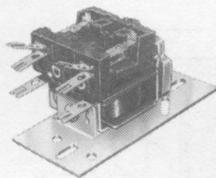
Order Number	Coil Voltage (ac)	Mounting
R8231C1007	24	Bracket for front mounting.

TRADELINE



relays and contactors

R4230F; R8230A,C,F SWITCHING RELAYS



USED IN REFRIGERATION, AIR CONDITIONING, AND OTHER SYSTEMS REQUIRING MEDIUM DUTY SWITCHING.

Power Consumption: 2.5 W. Contacts: Main poles—silver cadmium oxide; millivoltage (Powerpile)—gold flash. Terminals: 3/16 in. [4.8 mm] quick-connect or solder type. Max. Ambient Temp: 155 F [68 C]. Mounting Means: Mounting bracket assembled to relay. Approximate Mounting Plate Dimensions: 3 in. [76.2 mm] long, 1-1/2 in. [38.1 mm] wide, 9/16 in. [14.3 mm] high. Relay Dimensions: 2-5/8 in. [66.7 mm] long, 1-1/2 in. [38.1 mm] wide, 1-3/8 in. [34.9 mm] high. Component recognized by Underwriters laboratories Inc. Certified by CSA.

CONTACT RATINGS PER POLE (A):

	120 Vac	240 Vac	Powerpile ^a	
			120 Vac	240 Vac
Full Load	10	5	3	2
Locked Rotor	60	30	18	12
Resistive	15	10	—	—

^aOptional, specify when ordering.
Minimum—300 mA at 750 mV.
Dc Rating—1 A at 12 Vdc.

OPERATING COIL RATINGS (50/60 Hz):

	24, 120, 208, 240 Vac
Inrush	11 VA max.
Sealed	6 VA max.

Pull-in Voltage—75 percent rated voltage at 75 F [24 C].

ACCESSORY:

133983B Enclosure, NEMA Type 1.

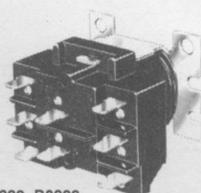
TRADELINE models.

Order Number	Coil Voltage	Switching	Includes
R4230F1000	120	Spdt ^b	Bag assembly with rear mounting bracket and mounting screw, 3/16 in. [4.8 mm] female quick-connects for field wires.
R8230A1044 ^a	24	Spst, N.O.	
R823C1024	24	3pst, N.O. contacts	
R8230F1001	24	Spdt ^b	

^aPowerpile ratings.

^bCan be converted to dpst (one N.O. and one N.C. contact) by removing a jumper. Includes wire nut.

R4222, R8222, R4228, R8228 GENERAL PURPOSE AND HEAVY DUTY SWITCHING RELAYS



R4222, R8222,
R4228, R8228



4074BVJ

GENERAL PURPOSE RELAYS FOR USE IN REFRIGERATION AND AIR CONDITIONING EQUIPMENT, APPLIANCES, VENDING MACHINES AND SIMILAR APPLICATIONS.

R4222 and R8222 contacts are available for millivoltage (Powerpile), pilot duty, and power pole applications. R4228 and R8228 have power rated contacts only. Molded terminal numbers and circuit diagram on top of relay provide easy identification for wiring and checking system operation. All models listed have double quick-connects for coil terminals. Mounting: 2 screws (up to No. 10 size) through holes in the metal base. Base is designed for easy re-

placement of competitive relays. Max. Ambient Temp: 155 F [68 C]. Approximate Overall Relay Dimensions: 1-7/8 in. [47.6 mm] high, 2-1/8 in. [54.0 mm] wide, 2-3/8 in. [60.3 mm] deep. Component recognized by Underwriters Laboratories Inc.

COIL RATINGS (50/60 Hz):

Rated Coil Voltage	Max. Pickup Voltage	Max. Sealed VA at Rated Voltage	Max. Inrush VA at Rated Voltage
24	18	10	20
120	96		
208/240	176		
277	220		
480	384		

continued next page

TRADELINE

relays and contactors



R4222, R8222, R4228, R8228 continued

CONTACT RATINGS: Power Poles (A per pole)—

R4222, R8222	120 Vac	208/240/277 Vac	480 Vac
Full Load	12	6	3
Locked Rotor	60	35	18
Resistive—			
A and C models ^a	20.8	20.8	10
All others	15	15	10
Horsepower	3/4 hp	3/4 hp	3/4 hp

^aAlso rated 5 A resistive at 600 V.

R4228A,B, R8228A,B	120 Vac	208/ 240 Vac	277 Vac	480 Vac
Full Load	16 | 18	18	12	5
Locked Rotor	96 | 72	72	72	30
Resistive ^a	25	25	25	15
Horsepower	1 hp	2 hp	2 hp	1.5 hp

^aAlso rated 10 A resistive at 600 V.

R4228D; R8228D	120 Vac	208/240/277 Vac	480 Vac
Full Load	5.5	5.5	3.0
Locked Rotor	15.0	15.0	8.0
Resistive ^a	25.0	25.0	12.5

^aAlso rated 10 A resistive at 600 V.

Pilot Duty Poles for R4222 and R8222 only:

Minimum—3 VA at 24, 120, and 480 Vac.

Maximum—25 VA at 24 Vac, 125 VA at 120, 240, and 480 Vac.

Resistive—3 A at 277 Vac (0.75 power factor).

Millivoltage (Powerpile) for R4222 and R8222 only: normally open pilot duty contacts are rated for millivoltage (Powerpile) applications—0.25 A at 0.25 to 12 Vdc.

R4222, R8222 SWITCHING CONFIGURATIONS:

Switching Configuration	Terminals	R4222 or R8222 Model Suffix	
		Power Rated	Pilot Duty Rated
Spdt		B	—
Dpdt		D	N
Dpdt (one power and one pilot duty)		Va	

^aPower rated contacts on silver-colored terminals and pilot duty rated contacts on brass-colored terminals.

R4228, R8228 SWITCHING CONFIGURATIONS:

Switching Configuration	Terminals	R4228 or R8228 Model Suffix Power Rated Only
Spst, N.O. (double quick-connects)		A
Spdt, (double quick-connects)		B
Dpst, N.O.		D

ACCESSORIES:

129384A Case and Cover Assembly.

135887 Bail only.

135959 Receptacle only.

137881A Adapters for converting 1/4 in. [6.4 mm] quick-connects to No. 6 screw terminals (bag of 8).

4074BVJ Receptacle with 8 color-coded plug-in leadwires and retaining bail, for panel mounting applications.

Q633A1007 4 x 4 in. [101.6 x 101.6 mm] plate-mounted relay receptacle with metal relay cover and 8 color-coded plug-in leadwires.

TRADELIN models.

Order Number	Switching	Coil Voltage (50/60 Hz)	Pole 1-2-3	Pole 4-5-6
R4222B1058	Spdt	277	Power	None
R4222B1082		120	Power	None
R4222B1090		208/240	Power	None
R4222D1013	Dpdt	120	Power	Power
R4222D1021		208/240	Power	Power
R4222D1070		277	Power	Power
R4222N1002	Dpdt	120	Pilot Duty	Pilot Duty
R4222N1010		208/240	Pilot Duty	Pilot Duty
R4222V1002	Dpdt	120	Power	Pilot Duty
R4222V1010		208/240	Power	Pilot Duty
R4228A1039	Spst, N.O. ^b	120	Power	Power
R4228A1047		208/240	Power	Power
R4228B1037	Spdt	120	Power	Power
R4228B1045		208/240	Power	Power
R4228D1033 ^a	Dpst, N.O.	120	Power	Power
R4228D1041 ^a		208/240	Power	Power
R8222B1067	Spdt	24	Power	None
R8222D1014	Dpdt	24	Power	Power
R8222N1011	Dpdt	24	Pilot Duty	Pilot Duty
R8222V1003	Dpdt	24	Power	Pilot Duty
R8228A1014	Spst, N.O.	24	Power	Power
R8228B1012	Spdt	24	Power	Power
R8228D1018	Dpst, N.O.	24	Power	Power

^aRating—25 A resistive.

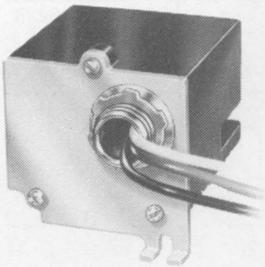
^bSpst, N.C. model available; contact your local Honeywell representative.

TRADELIN



relays and contactors

R4225A; R8225A-D FAN RELAYS



CONTROLS LINE VOLTAGE FAN MOTORS AND AUXILIARY CIRCUITS IN HEATING, COOLING OR HEATING-COOLING SYSTEMS.

R4225 provides line voltage control; R8225 provides low voltage control. Integral 1/2 in. conduit spud allows relay to be

mounted on standard junction box. Contacts: Silver cadmium oxide. Max. Operating Ambient Temp: 115 F [46 C]. Approximate Dimensions: 2-11/16 in. [68.3 mm] high, 2-1/2 in. [63.5 mm] wide, 3-7/16 in. [87.3 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS:

Coil Voltage—24 V, 60 Hz.
Maximum Inrush—11 VA.
Maximum Sealed—6 VA.
Pull-in Voltage—18 V at 75 percent rated voltage.

CONTACT RATINGS (A):

	120 Vac			240 Vac		
	N.O.	N.C.	Auxiliary	N.O.	N.C.	Auxiliary
Full Load	14.0	14.0	3.0	8.0	7.0	2.0
Locked Rotor	84.0	84.0	18.0	48.0	42.0	12.0
Resistive	16.0	14.0	3.0	8.0	7.0	2.0
Horsepower	3/4 hp	3/4 hp	1/10 hp	1 hp	3/4 hp	1/8 hp

TRADELINE model.

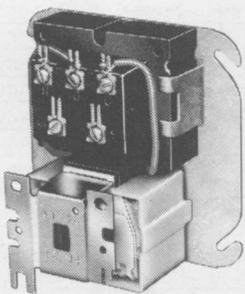
Order Number	Switching	Configuration and Color Coding
R4225A1008	Spdt, one N.O., one N.C.	
R8225A1017 ^a	Spdt, one N.O., one N.C.	
R8225B1007	Spst, N.O.	
R8225C1005	1 spst N.O. 1 spst N.C.	
R8225D1003	Dpst 1 main N.O. 1 aux. N.O.	

^aIncludes 134259 Flush Mounting Bracket.

ACCESSORY:

134259 Flush Mounting Bracket.

R8239A,B,D,G,H FAN CENTERS



PROVIDES LOW VOLTAGE CONTROL OF LINE VOLTAGE FAN MOTORS AND AUXILIARY CIRCUITS IN HEATING, COOLING, OR HEATING-COOLING CIRCUITS.

Enclosed relay with 38 VA transformer mounts on standard 4 x 4 in. junction

box. Relay Coil Ratings: 20 VA max. inrush, 9 VA sealed, 5 W. Max. Power Consumption: 7.0 W. Approximate Installation Dimensions: 4-1/2 in. [114.3 mm] high, 4-3/16 in. [106.4 mm] wide, 3-3/32 in. [78.6 mm] deep above mounting plate, 5/8 in. [15.9 mm] deep below mounting plate. Listed by Underwriters Laboratories Inc. Recognized by CSA.

CONTACT RATINGS (A):

FOR BOTH N.O. AND N.C. CONTACTS

R8239A,B,D—

	120 Vac	240 Vac
Full Load	13.8	6.9
Locked Rotor	82.8	41.4
Horsepower	3/4 hp	3/4 hp

R8239G,H—

	120 Vac	240 Vac
Full Load	16.0	12.0
Locked Rotor	96.0	72.0
Horsepower	1.0 hp	2.0 hp

R8239D—

Pilot Duty: 3 VA min., 25 VA max. at 24 Vac; 125 VA at 120, 240 and 480 Vac.

Resistive: 3 A at 277 Vac (0.75 power factor).

Powerpile: The normally open pilot duty contacts are rated for millivoltage applications—0.25 A at 0.25 to 12 Vdc.

continued next page

TRADELINE

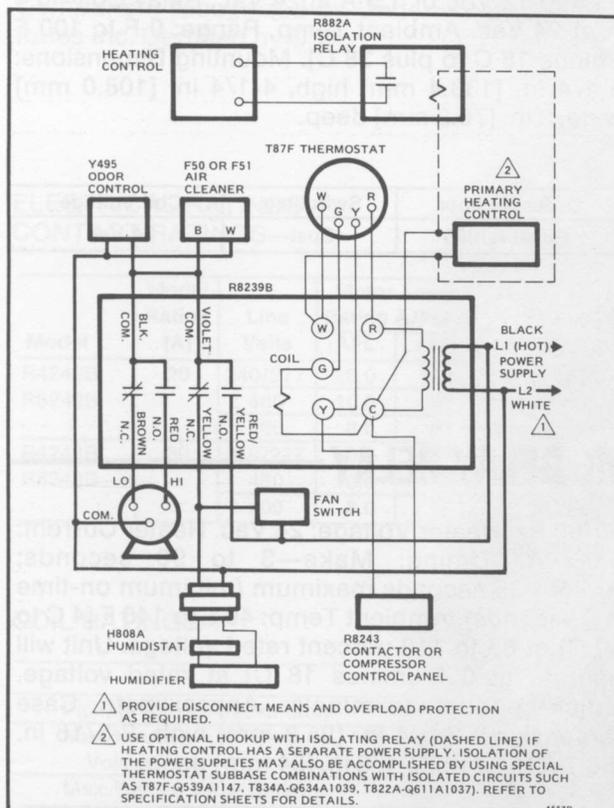
relays and contactors



R8239A,B,D,G,H continued

TRADELINE models. • SUPER TRADELINE model.

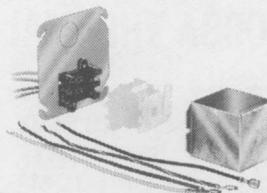
Order Number	Switching	Configuration and Color-Coding	Includes Replaceable Relay	Transformer	Application
R8239A1011	Spdt		R8222B	208/240 V primary, 27 V secondary.	Single- or 2-speed fan.
R8239A1052				120 V primary, 27 V secondary.	
R8239B1019	Dpdt		R8222D	208/240 V primary, 27 V secondary.	"Total Comfort" (with electronic air cleaner, humidifier, and blower motor).
•R8239B1043				120 V primary, 27 V secondary.	
R8239D1015	Dpst	LOAD CONTACTS BLACK BLACK PILOT DUTY CONTACTS RED RED	R8222U or R8222V	120 V primary, 27 V secondary.	Single-speed fan with an auxiliary circuit.
R8239G1000	Spst	LOAD CONTACTS BLACK BLACK	R8228A	120 V primary, 27 V secondary.	Single-speed, 1 hp fan application.
R8239G1018				208/240 V primary, 27 V secondary.	
R8239H1008	Spdt		R8228B	120 V primary, 27 V secondary.	Single- or 2-speed, 1 hp fan application.
R8239H1016				208/240 V primary, 27 V secondary.	



R8239B typical hookup with 2-speed fan. "Total Comfort" application includes electronic air cleaner, humidifier, and blower motor.

Q633A PLATE-MOUNTED RELAY RECEPTACLE

FOR INSTALLING R8222 AND R8228 RELAYS ON JUNCTION BOXES.



Use with appropriate relay and AT72D1683 or AT72D1691 SUPER TRADELINE transformer. Includes relay receptacle, cover, 8 leadwires, and 4 x 4 in. plate for junction box mounting.

TRADELINE model.

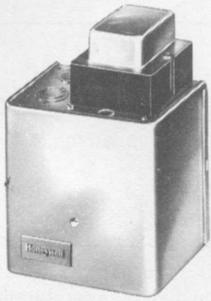
Order Number	Description
Q633A1007	Plate-mounted relay receptacle for use with any R8222 or R8228 Plug-in Relay.

TRADELINE



relays and contactors

R856B FAN CONTROL CENTER



FOR 24 VOLT CONTROL OF A LINE VOLTAGE EVAPORATOR FAN.

Used with heating-cooling thermostat and subbase combinations such as T87/Q539, T874/Q674, or T834/Q634. Includes 45 VA transformer and screw type terminals with lead-wires from relay contacts.

Approximate Dimensions: 7-1/8 in. [181.0 mm] high, 4-1/2 in. [114.3 mm] wide, 3-5/16 in. [84.1 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

CONTACT RATINGS (A):

	120 Vac		240 Vac	
	N.O.	N.C.	N.O.	N.C.
Full Load	14.0	10.0	8.0	7.0
Locked Rotor	84.0	60.0	48.0	42.0

RELAY COIL RATINGS:

	Sealed VA	Inrush VA	Sealed A
Standard Models	6	11	0.22

REPLACEMENT PART:
116826A Transformer.

Order Number	Fan Relay	Primary Power Supply
R856B1002	Spst	120 V

R8146A ADD-ON HEATING RELAY



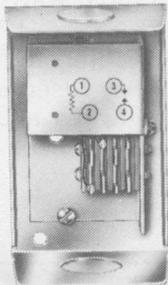
PROVIDES SWITCHING FOR A SELF-GENERATING (POWERPILE) HEATING SYSTEM WHEN COOLING IS ADDED TO EXISTING INSTALLATION.

Used with R856B Fan Center and T87F Thermostat. R8146A isolates millivolt heating

system power from 24 V cooling system control circuit. Electrical Ratings: Contacts—0.25 A at 0.25 to 12 Vdc or 1.5 A at 24 Vac. Relay Coil—0.4 A at 24 Vac. Ambient Temp. Range: 0 F to 100 F [minus 18 C to plus 38 C]. Mounting Dimensions: 5-1/4 in. [133.4 mm] high, 4-1/4 in. [108.0 mm] wide, 3 in. [76.2 mm] deep.

Order Number	Switching	Coil Voltage
R8146A1005	Spst	24 Vac

R8093A THERMAL TIME DELAY RELAY



PREVENTS INTERMITTENT COMPRESSOR OPERATION BY DELAYING START OF COMPRESSOR ON DEMAND FROM THERMOSTAT.

Prevents compressor damage as a result of rapid cycling. Prevents excessive inrush current on simultaneous start of

two compressors. Switch Action: Spst. Contacts normally open. Contact Rating: 1.5 A at 24 Vac,

50/60 Hz. Heater Voltage: 24 Vac. Heater Current: 0.08 A. Timing: Make—3 to 90 seconds; Break—35 seconds maximum (minimum on-time is 3 seconds). Ambient Temp: 40 F to 140 F [4 C to 60 C] at 85 to 110 percent rated voltage. Unit will operate at 0 F [minus 18 C] at rated voltage. Quick-connect terminals. Approximate Case Dimensions: 3-3/4 in. [95.3 mm] high, 2-5/16 in. [58.7 mm] wide, 2-1/8 in. [54 mm] deep.

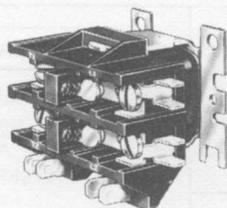
Order Number	Case and Cover	Includes
R8093A1008	Yes	—
R8093A1024	No	Mounting bracket

TRADELIN

relays and contactors



R4242B, R4243B, R8242B, R8243B CONTACTORS



ELECTROMAGNETICALLY OPERATED CONTACTORS PROVIDE SWITCHING FOR ACROSS-THE-LINE STARTING OF INDUCTION MOTORS.

Used in hermetic refrigeration compressors or for switching electric resistance heaters. Refer to tables below for electrical ratings and application. Mounting: Two screws (up to No. 10 size) through holes in base, or single screw mounting possible with shear-formed tab in panel. Coil Connections: Male, double 1/4 in. quick-connects. Contacts: Heavy duty, silver alloy, bridge type double-break contacts. Approximate Overall Dimensions: 2-3/16 in. [55.6 mm] high, 3-5/16 in. [84.1 mm] wide, 2-5/32 in. [54.8 mm] deep. Temp. Range: Minus 20 F to plus 155 F [minus 29 C to plus 68 C]. Component recognized by Underwriters Laboratories Inc. Certified by CSA.

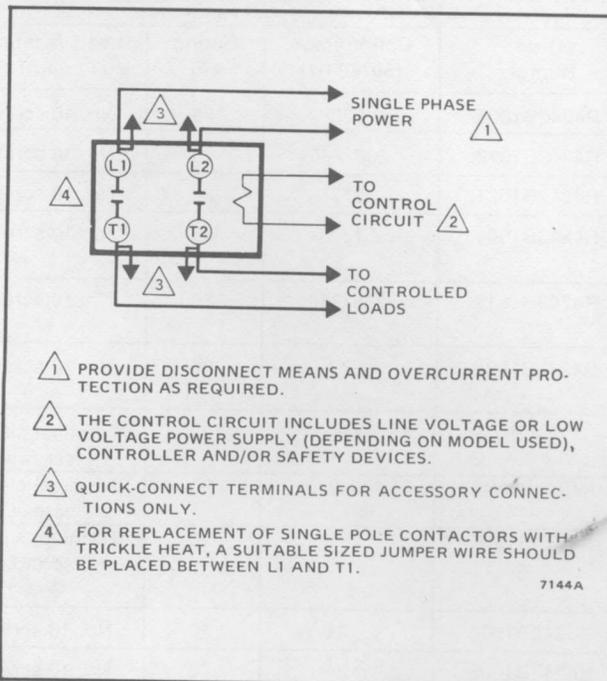
ELECTRICAL RATINGS: CONTACT RATINGS—

Model	Model Rating (A)	Line Volts	Motor Load Rating A/Pole		Resistive Load Per Pole	
			AFL	ALR	A	kW
R4242B	20	240/277	20.0	100	30	7.2/8.3
R8242B		480	10.0	50	30	14.4
		600	8.0	32	30	18.0
R4243B	30	240/277	30.0	125	40	9.6/11.1
R8243B		480	10.0	50	40	19.2
		600	8.0	32	40	24.0

COIL RATINGS—

		24 V	120 V	208/240 V	277 V
Pickup Voltage (maximum) ^a		18 V	96 V	177 V	230 V
Max. Inrush VA at Rated Voltage	20 A models	21.0 VA	21.0 VA	16.0 VA/21.0 VA	21.0 VA
	30 A models	24.0 VA	24.0 VA	20.8 VA/24.0 VA	24.0 VA
Max. Sealed VA at Rated Voltage	20 A models	10.5 VA	10.5 VA	8.0 VA/10.5 VA	10.5 VA
	30 A models	12.0 VA	12.0 VA	10.4 VA/12.0 VA	12.0 VA

^aVoltages listed are for the contactor base mounted vertically. Performance for horizontal mounting is decreased by 12 percent.



Typical wiring for R4242B, R8242B, R4243B, R8243B.

ACCESSORIES:

138550 Mounting Adapter Plate. To adapt contactors to competitive mounting dimensions.

138552B Enclosure.

139239 Terminal Clamp Screw. Accepts up to No. 8 wire.

190309 Right Pressure Lug and 190310 Left Pressure Lug. Accepts No. 4 to 14 wire, suitable for 208 to 600 Vac ratings, suitable for copper or aluminum wiring. NOTE: Order in pairs only. Example, a right and left lug needed for L1-L2 or for L1-T1.



relays and contactors

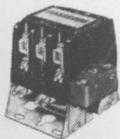
R4242B, R4243B, R8242B, R8243B continued

• SUPER TRADELINE models.

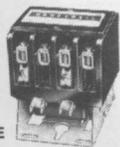
Order Number	Coil Voltage (50/60 Hz)	Rating (A)	Load Terminals (T1 and T2) ^a	Line Terminals (L1 and L2) ^a	Includes
R4242B1005	120	20	No. 10 screws	No. 10 screws	—
R4242B1013	208/240	20	No. 10 screws	No. 10 screws	
R4242B1021	277	20	No. 10 screws	No. 10 screws	
R4243B1004	120	30	No. 10 screws	Terminal clamp screws	
R4243B1012	208/240	30	No. 10 screws	Terminal clamp screws	
R4243B1020	277	30	No. 10 screws	Terminal clamp screws	
*R4243B1038	120	30	Terminal clamp screws	Terminal clamp screws	138550 Mounting Adapter Plate, two 12 in. [304.8 mm] coil lead-wires with quick-connects on one end and stripped on the other end, 2 wire nuts, six 1/4 in. [6.4 mm] female quick-connects, 2 mounting screws.
*R4243B1046	208/240	30	Terminal clamp screws	Terminal clamp screws	
*R4243B1053	277	30	Terminal clamp screws	Terminal clamp screws	
R8242B1006	24	20	No. 10 screws	No. 10 screws	—
R8243B1005	24	30	No. 10 screws	Terminal clamp screws	
*R8243B1013	24	30	Terminal clamp screws	Terminal clamp screws	138550 Mounting Adapter Plate, two 12 in. [304.8 mm] coil lead-wires with quick-connects on one end and stripped on the other end, 2 wire nuts, six 1/4 in. [6.4 mm] female quick-connects, 2 mounting screws.

^aTerminal clamp screws suitable for use with No. 8 wire. All terminals contain double 1/4 in. male quick-connect terminals for auxiliary connections.

R4212, R4214, R4220, R8212, R8214, R8220 CONTACTORS



3-POLE



4-POLE

DEFINITE PURPOSE CONTACTORS FOR SWITCHING MOTORS AND HEATING LOADS IN HEATING AND COOLING CONTROL APPLICATIONS.

See tables below for description and ratings. Add-on spdt auxiliary switches available (for

3-pole models) to switch fans, pumps, or other auxiliary loads. Main pole contacts are

double-break, bridge type, silver cadmium oxide alloy. Auxiliary pole contacts, made of fine silver, are bifurcated for high contact reliability on low power applications. Mounting: Screws through base that can be mounted in any position on a vertical plane. Overall Dimensions: 3-pole models: 3-15/32 in. [88.1 mm] high, 3-11/16 in. [93.7 mm] wide, 2-19/32 in. [65.9 mm] deep; 4-pole models: 3-15/32 in. [88.1 mm] high, 3-11/16 in. [93.7 mm] wide, 2-23/32 in. [69 mm] deep. Component recognized by Underwriters Laboratories Inc. Certified by CSA.

continued next page

TRADELINE

relays and contactors



R4212, R4214, R4220, R8212, R8214, R8220 continued

CONTACT RATINGS (A):

Main Poles—

Nominal Rating	Line Volts	Motor Rating ^b 3Ø 3P or 1Ø 2P			Resistive Rating (per pole)	Part Winding Start	
		Full Load	Locked Rotor	Recycle		Full Load	Locked Rotor
30 A (R4212, R8212)	240	30	180	180	40 ^a	30	144
	480	30	150	150	40	30	120
	600	30	120	120	40	30	96
40 A (R4214, R8214)	240	40	240	240	50 ^a	40	190
	480	40	200	165	50	40	160
	600	40	160	160	50	40	130
50 A (R4220, R8220)	277	50	300	300	60	50	240
	480	50	250	250	60	50	200
	600	50	200	200	60	50	160

^a240 resistive ratings also apply at 277 V.

^b30 A model ratings are per pole. Two-pole, 40 A models have a per pole rating if used with loads of 240 V or less and locked rotor rating of 180 A or less. All other 40 A models have 3Ø 3P or 1Ø 2P ratings.

Auxiliary Poles (internal)—

Line Volts	Fan Poles (normally open only)			Auxiliary Poles (normally open or normally closed)			
	Motor Rating (per pole)		Resistive Rating (per pole)	Motor Rating (per pole)		Resistive Rating (per pole)	
	Full Load	Locked Rotor		Full Load	Locked Rotor		
30 and 40 A Contactors	240	15	90	15	10	60	10
	480	10	60	10	5	30	5
	600	10	60	10	5	30	5

Auxiliary Switch (add-on spdt switch)—

	Full Load	Locked Rotor	Resistive
120 Vac	10.0	60.0	15.0
240 Vac	5.0	30.0	7.5

COIL RATINGS:

Rated Coil Voltage at 50/60 Hz	Color Code	30,40 A Contactors			50 A Contactors		
		Sealed VA at Rated Voltage	Inrush VA at Rated Voltage	Maximum Pickup Voltage	Sealed VA at Rated Voltage	Inrush VA at Rated Voltage	Maximum Pickup Voltage
24	Black	9.0	90	15.6	11.5	115	18.0
120	Red	9.6	96	90.0	11.0	110	96.0
208/240	Green	9.6	96	156.0	12.0	120	177.0
277	Blue	10.0	100	208.0	11.0	110	222.0
480	Gray	10.0	100	360.0	11.0	110	384.0
600	Brown	10.0	100	412.0	11.0	110	465.0

REPLACEMENT PARTS:

Replacement or Optional Contacts (includes power poles, movable contacts and springs)—

Part Number	Description
4074ACC	Auxiliary—light-duty—10 A and low voltage:
	Normally Open
4074BPD	Normally Closed
4074BPV	Medium Duty—replaces 25 and 30 A main poles and 15 A fan poles
4074BPE	Heavy Duty—replaces 40 A main poles
4074BVS	Heavy Duty—replaces 50 A main poles

ACCESSORIES:

129703A Metal Enclosure.
139278B Spdt Auxiliary Micro Switch Interlock.
No. 8 screw terminals and quick-connect adapters (for 3-pole contactors only).

continued next page

TRADELINE



relays and contactors

R4212, R4214, R4220, R8212, R8214, R8220 continued

REPLACEMENT COILS:

Rated Coil Voltage at 50/60 Hz	Color Code	30,40 A Contactors		50 A Contactors	
		Coil Bag Assy. for Models With Old Style Die-Cast Base ^a	Coil Bag Assy. for Models With New Style Stamped Steel Base ^b	Coil Bag Assy. for Models With Old Style Die-Cast Base ^a	Coil Bag Assy. for Models With New Style Stamped Steel Base ^b
24	Black	4074BPF	4074DAH	4074BVU	4074DAP
120	Red	4074BPG	4074DAJ	4074BVV	4074DAQ
208/240	Green	4074BPH	4074DAK	4074BVW	4074DAR
277	Blue	4074ACA	4074DAL	4074BYY	4074DAS
480	Gray	4074ACB	4074DAM	4074BVZ	4074DAT
600	Brown	4074BWE	4074DAN	4074BWA	4074DAU

^aAll coils have screw terminals; 1/4 in. [6.4 mm] quick-connect adapters are included in each bag assembly.

^bAll coils have 1/4 in. [6.4 mm] double quick-connect terminals; two screws to adapt terminals are included in each bag assembly.

TRADELINE models.

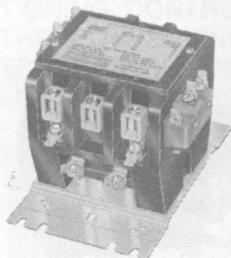
Order Number	Poles	Coil Voltage (50/60 Hz)	Nominal Contact Rating (A)	Terminal Assembly	Includes	
R4212G1323	3	120	30	Pressure lug with screw access. on poles 1 and 3.	Mounting screws, four 1/4 in. [6.4 mm] double quick-connects for contact terminals; 2 screws for coil terminals.	
R4212G1331	3	208/240	30			
R4214G1347	3	120	40	Pressure lug with screw access. on poles 1 and 3.		
R4214G1354	3	208/240	40			
R4214P1008	4	120	40	Pressure lug with screw access. on poles 1 and 3.		Mounting screws, four double 1/4 in. [6.4 mm] quick-connects for contact terminals, two 1/4 in. [6.4 mm] quick-connects for coil terminals; hardware to convert fourth pole from a N.O. fan pole to a N.C. auxiliary pole.
R4214P1016	4	208/240	40			
R4220B1092	3	120	50	Pressure lug with double quick-connect access. on poles 1 and 3.		
R4220B1100	3	208/240	50			
R8212G1209	3	24	30	Pressure lug with screw access. on poles 1 and 3.		
R8212G1217	3	Less Coil	30			
R8214G1140	3	24	40	Pressure lug with screw access. on poles 1 and 3.		
R8214G1157	3	Less Coil	40			
R8214P1009	4	24	40	Pressure lug with screw access. on poles 1 and 3.	Mounting screws: 4 double 1/4 in. [6.4 mm] quick-connects for contact terminals; two 1/4 in. [6.4 mm] quick-connects for coil terminals, and hardware to convert fourth pole from a N.O. fan pole to a N.C. auxiliary pole.	
R8214P1033	4	Less Coil	40			
R8220B1051	3	24	50	Pressure lug with screw access. on poles 1 and 3.		
R8220B1069	3	Less Coil	50			

TRADELINE

relays and contactors



R4234, R8234, R4236, R8236 DEFINITE PURPOSE CONTACTORS



MAGNETICALLY OPERATED, USED FOR SWITCHING MOTORS UP TO 75 AFL OR 90 A RESISTIVE ON REFRIGERATION AND AIR CONDITIONING EQUIPMENT OR NONINDUCTIVE ELECTRIC HEAT LOADS.

Spdt auxiliary switches are available to switch fans, pumps, or other auxiliary loads. Double break, bridge type, silver cadmium alloy contacts. Breakaway base for universal mounting. May be mounted in any position on a vertical plane. Max. Ambient Temp: 155 F [68 C]. Coil Terminals: No. 8 binding screw and 1/4 in. [6.4 mm] double quick-connects. Approximate Dimensions: 4-1/8 in. [104.8 mm] high, 3-3/4 in. [95.3 mm] wide, 4-1/2 in. [114.3 mm] deep. Mounting Plate: 6-1/2 in. [165.1 mm] long, 4 in. [101.6 mm] wide. Mounting base may be shortened to 5-1/8 in. [130.2 mm] long by breaking off ends at V-grooves. Component recognized by Underwriters Laboratories Inc. Component recognized by CSA.

CONTACT RATINGS:

Nominal Rated	Line Volts	Main Poles				Resistive Rating Per Pole
		Motor Rating 3Ø 3P or 1Ø 2P				
		Full Load	Locked Rotor	Recycle		
60 A (R4234, R8234)	240	60	360	360	75	
	277	60	360	360	75	
	480	60	300	300	75	
	600	60	240	240	75	
75 A (R4236, R8236)	240	75	450	450	90	
	277	75	450	450	90	
	480	75	375	375	90	
	600	75	300	300	90	

TRADELINE models.

Order Number	Coil Voltage (50/60 Hz)	No. Poles	Nominal Contact Rating (A)		Contact Terminals	Includes
			Full Load	Resistive		
R4234B1054	120	3	60	75	Pressure lug with access. screw term. on poles 1 and 3.	Snap-on coil cover.
R4234B1062	208/240	3	60	75		
R4236B1052	120	3	75	90		
R4236B1060	208/240	3	75	90		
R8234B1022	24	3	60	75		
R8234B1030	Less Coil	3	60	75		
R8236B1020	24	3	75	90		
R8236B1038	Less Coil	3	75	90		

AUXILIARY SWITCH CONTACT RATINGS (A):

	120 Vac	240 Vac	480 Vac	600 Vac
Full Load	10.0	5.0	1.0	0.8
Locked Rotor	60.0	30.0	6.0	4.8
Resistive	15.0	7.5	2.0	1.0

COIL RATINGS:

Rated Coil Voltage at 60 Hz	Sealed VA	Inrush VA	Maximum Pickup Voltage
24	20.4	252	18
120	17.4	240	96
208 ^a	15.3	195	172
240 ^a	20.4	259	222
277	17.7	244	222
480	18.7	250	384
600	18.6	246	440

^aCoil dual-rated for 208 or 240 Vac applications.

REPLACEMENT PARTS:

Coil Bag Assemblies (includes appropriate coil with snap-on coil cover, 2 return springs, instruction sheet, label, and terminal adapters)—

Order Number	Rated Coil Voltage	Color Code
4074BWU	24	Black
4074BWV	120	Red
4074BWW	208/240	Green
4074BWY	277	Blue
4074BWZ	480	Gray
4074BYA	600	Brown

4074BWT Terminal Bag Assembly. Includes 2 replacement contact terminals (pressure lug with built-in accessory screw terminal), 1 replacement shorting bar, 1 replacement contact spring.

ACCESSORY:

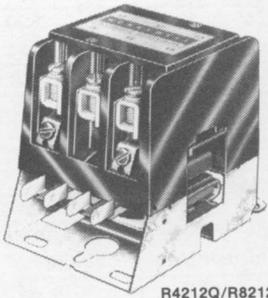
139028B Auxiliary Micro Switch Interlock. With No. 8 screw terminals with 3 quick-connect adapters. For switching low current loads. Spdt auxiliary switches may be field-mounted on one or both sides of contactor. Dimensions: 3/4 in. [19.1 mm] high, 2 in. [50.8 mm] wide, 1-1/2 in. [38.1 mm] deep.

TRADELINE

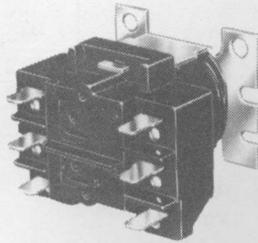


relays and contactors

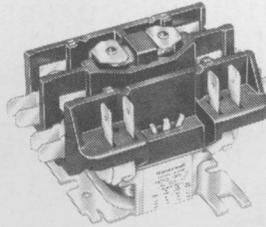
LOAD SHED RELAYS AND CONTACTORS



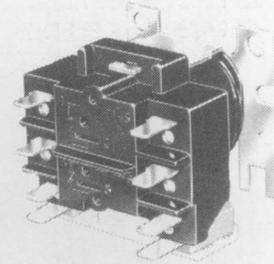
R4212Q/R8212Q
CONTACTORS



R4228E/R8228E
RELAYS



R4242E/R8242E
CONTACTORS



R8229E
RELAY

NORMALLY CLOSED RELAYS AND CONTACTORS FOR LOAD CONTROL SYSTEMS.

See order table for application. These relays and contactors will close and leave load operating in case of wiring or control problem, or relay malfunction. They consume no power while load is powered; require power only to shed load. Operate directly from a pilot duty rated relay in the load control system. Component recognized by Underwriters Laboratories Inc.

CONTACT RATINGS:

Model	120 Vac			240 Vac			277 Vac			480 Vac		
	Full Load	Locked Rotor	Resistive									
R4212Q/ R8212Q	15	75	48	15	75	48	15	75	48	—	—	—
R4242E/ R8242E	20	100	48	20	100	48	20	100	48	10	50	—
R4228E/ R8228E	18	72	25	18	72	25	5	30	25	5	30	15
R8229E	12	60	25	6	35	25	3	18	15	3	18	10

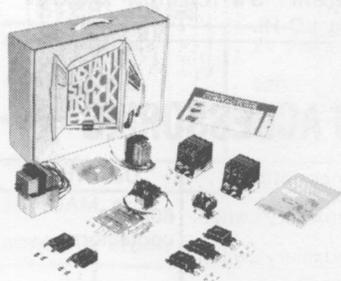
Order Number	Application	Voltage (50/60 Hz)	Switching
R4212Q1008	For 3-phase loads.	120	3pst
R4212Q1016		208/240	
R4212Q1024		277	
R4228E1006	For a single load.	120	Spst
R4228E1014		208/240	
R4228E1022		277	
R4242E1008	For large, single-phase loads.	120	Spst
R4242E1016		208/240	
R4242E1024		277	
R8212Q1009	For 3-phase loads.	24	3pst
R8228E1007	For a single load.	24	Spst
R8229E1006	For applications requiring quiet operation such as nursing homes, apartments, condominiums.	24	Spdt and spst
R8242E1009	For large, single-phase loads.	24	Spst

TRADELIN

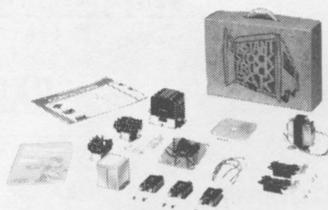


Y499A RACPAKS

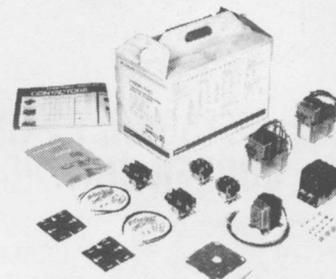
Y499A RESIDENTIAL AIR CONDITIONING PACKS CONTAIN THE MOST OFTEN USED AIR CONDITIONING CONTROLS. DEVICES IN THESE PACKAGES HAVE BEEN SELECTED ESPECIALLY FOR THE CONVENIENCE OF THE SERVICE TECHNICIAN WHEN INSTALLING OR REPLACING CONTROLS IN RESIDENTIAL AIR CONDITIONING SYSTEMS. SEE THE ORDER TABLE BELOW FOR A LIST OF THE CONTENTS OF EACH RACPAK.



Y499A1037



Y499A1052



Y499A1060

- SUPER TRADELINE models.

• Y499A1037 RACPAK CONTAINS:

Quantity	Device Number	Description
1	R8243B1013	2-pole, 30 A, light duty contactor.
1	R8212G1209	3-pole, 30 A, medium duty contactor.
1	R8214G1140	3 pole, 40 A, medium duty contactor.
1	R8228B1012	Spdt, one horsepower relay.
1	AT87A1106	50 VA, multitap transformer.
1	R8239B1043	Fan Control Center with dpdt R8222D Relay.
1	4074BPD	Auxiliary contacts for R4210 through R8214.
1	4074BPE	40 A contact assembly.
1	4074BPF	24 V replacement coil (black).
1	4074BPG	120 V replacement coil (red).
1	4074BPH	208/240 V replacement coil (green).
1	4074BPV	20/30 A contact assembly.
1	4074DAH	24 V replacement coil (black)—new style.
1	4074DAJ	120 V replacement coil (red)—new style.
1	4074DAK	208/240 V replacement coil (green)—new style.
1	50-0705	RAC Service Mini-Guide.
1	50-4131	RAC Chart.

• Y499A1052 RACPAK CONTAINS:

Quantity	Device Number	Description
1	R8243B1013	2-pole, 30 A, light duty contactor.
1	R8214G1009	3-pole, 40 A, heavy duty contactor.
1	R8222D1014	Dpdt, general purpose relay.
1	AT72D1683	40 VA, multimount step-down transformer.
1	Q633A1007	4 x 4 plate-mounted relay receptacle.
1	4074BPF	24 V replacement coil (black).
1	4074BPG	120 V replacement coil (red).
1	4074BPH	208/240 V replacement coil (green).
1	4074DAH	24 V replacement coil (black)—new style.
1	4074DAJ	120 V replacement coil (red)—new style.
1	4074DAK	208/240 V replacement coil (green)—new style.
1	50-0705	RAC Service Mini-Guide.
1	50-4131	RAC Chart.

• Y499A1060 RACPAK CONTAINS:

Quantity	Device Number	Description
2	R8243B1013	2-pole, 30 A, light duty contactor.
1	R8212G1209	3-pole, 30 A, medium duty contactor.
1	R8222D1014	Dpdt, general purpose relay.
1	R8228B1012	Spdt, one horsepower relay.
1	AT87A1106	50 VA, multitap transformer.
2	R8239B1043	Fan Control Center with dpdt R8222D Relay.
1	50-0705	RAC Service Mini-Guide.
1	50-4131	RAC Chart.



relays and contactors

Y8183B EVAPORATIVE COOLER CONTROL PACK

CONTAINS CONTROL PANEL, THERMOSTAT, AND SUB-BASE NEEDED TO CONTROL AN EVAPORATIVE COOLER WITH 2-SPEED FAN.

TRADELINE model.

Order Number	Contains
Y8183B1008	R8183B1015 Evaporative Cooler Control Panel. See below for description. T822C1181 Thermostat. Temp. Range: High, Low with markings 5-4-3-2-1. Less thermometer. Q634J1005 Subbase. System Switching: COOL-VENT-PUMP-OFF. Fan Switching: LO-HI.

R8183A,B EVAPORATIVE COOLER CONTROL PANELS



R8183A



R8183B

PROVIDES AUTOMATIC TEMPERATURE AND VENTILATION CONTROL AND REMOTE FAN SPEED SELECTION OF AN EVAPORATIVE COOLER WITH 2-SPEED FAN.

For use with T822C thermostat and Q634J subbase. Complete pack-

age contains transformer and three relays on prewired panel. Separate relays for fan and pump operations. Ambient Temp. Range: 32 F to 150 F [0 C to 66 C]. Approximate Dimensions: 6-1/8 in. [155.6 mm] high, 4-1/4 in. [108.0 mm] wide, 3-1/8 in. [79.4 mm] deep. Listed by Underwriters Laboratories Inc.—R8183B.

ELECTRICAL RATINGS:

Coil Rating—all 3 relays rated at 24 V, 50/60 Hz.

Primary Voltage—see order table.

Secondary Voltage—29.5 V maximum, 50/60 Hz (20 VA maximum).

Horsepower Rating—see order table.

CONTACT RATINGS:

Fan Rating (A)—

	1/2 hp models		3/4 hp models	
	120 Vac	240 Vac	120 Vac	240 Vac
Full Load	10	5	14	7
Locked Rotor	60	30	84	42

Pump Rating (A)—

	120 Vac	240 Vac
Full Load	10	5
Locked Rotor	60	30

Max. Combined Load (fan and pump): 2000 VA.

Order Number	Primary Voltage (50/60 Hz)	Horsepower Rating	Case and Cover
R8183A1009	120	1/2	No
R8183B1007	120	1/2	Yes
R8183B1015	120	3/4	Yes
R8183B1023	208/240	3/4	Yes

PARTS AND ACCESSORIES

Order Number	Description	Use With
139028A	Spdt auxiliary switch.	60/75 A contactors
139028B	Spdt auxiliary switch.	
139029A	Spdt auxiliary switch.	25/30/40/50 A contactors
139278B (picture same as 139028B)	Spdt auxiliary switch.	

COIL ASSEMBLIES (25, 30, 40 A):

Bag assemblies—all include one coil with double quick-connect terminals and unassembled screws. FOR MODELS WITH DIE-CAST BASE.

4074BPF black	24 V coil.	R4210/R8210 series
4074BPG red	120 V coil.	
4074BPH green	208/240 V coil.	
4074ACA blue	277 V coil.	
4074ACB gray	480 V coil.	
4074BWE brown	600 V coil.	

COIL ASSEMBLIES (50 A only):

Bag assemblies—all include double quick-connect terminals and unassembled screws. FOR MODELS WITH DIE-CAST BASE.

4074BVU black/white	24 V coil.	R4220/R8220 series
4074BVV red/white	120 V coil.	
4074BVW green/white	208/240 V coil.	
4074BVY blue/white	277 V coil.	
4074BVZ gray/white	480 V coil.	
4074BWA brown/white	600 V coil.	

continued next page

TRADELINE

relays and contactors

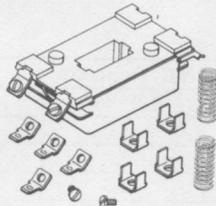


Parts and Accessories continued

Order Number	Description	Use With
COIL ASSEMBLIES (25, 30, 40 A): Bag assemblies—all include one coil with double quick-connect terminals and unassembled screws. FOR MODELS WITH STAMPED STEEL BASE.		
4074DAH black	24 V coil.	R4210/R8210 series ↓
4074DAJ red	120 V coil.	
4074DAK green	208/240 V coil.	
4074DAL blue	277 V coil.	
4074DAM gray	480 V coil.	
4074DAN brown	600 V coil.	

Order Number	Description	Use With
COIL ASSEMBLIES (50 A only): Bag assemblies—all include double quick-connect terminals and unassembled screws. FOR MODELS WITH STAMPED STEEL BASE.		
4074DAP black/white	24 V coil.	R4220/R8220 series ↓
4074DAQ red/white	120 V coil.	
4074DAR green/white	208/240 V coil.	
4074DAS blue/white	277 V coil.	
4074DAT gray/white	480 V coil.	
4074DAU brown/white	600 V coil.	

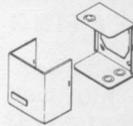
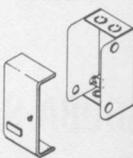
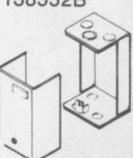
COIL ASSEMBLIES (60, 75 A):
Bag assemblies—all include one coil with screw terminals, two dummy screw terminals, four single quick-connect adapters, one snap-on coil cover, two return springs, two pressure sensitive labels to identify repairable contactors.



Order Number	Description	Use With
4074BWU black	24 V coil.	R4234/R8234, R4236/R8236 ↓
4074BWV red	120 V coil.	
4074BWW green	208/240 V coil.	
4074BWY blue	277 V coil.	
4074BWZ gray	480 V coil.	
4074BYA brown	600 V coil.	

Order Number	Description	Use With
--------------	-------------	----------

ENCLOSURE, CASES, AND COVERS FOR RELAYS AND CONTACTORS

129384A	Case and Cover. 	R450B; R850B; R851E,G; R4222/R8222 series
129703A	Contactor Enclosure. 	R8210, R8212, R8214, R8220 series
133983B (picture same as 129384A)	Case and Cover.	R4230/R8230 series
138552B	Case and Cover. 	R4242/R8243 series, R8242/R8243 series

REPLACEMENT CONTACTS (30, 40, 75 A):
Pressure Lug Terminal Assembly—includes two screw terminals with contacts, one contact bar, one contact spring.



4074BPE	40 A.	R4214/R8214
4074BPV	30 A.	R4212/R8212
4074BWT	75 A.	R4234/R4236

MISCELLANEOUS PARTS & ACCESSORIES

128571	Adapter plate.	R450B; R850B; R851E,G
137397	Adapter plate.	R4212
139796	Pressure lugs.	R8243
4074ACC	N.O. auxiliary contacts.	R4210/R8210 series
4074BPD	N.C. auxiliary contacts.	↓
4074BSM	Bag assembly with four 'U'-shape male quick-connect terminals.	
4074BVS	Bag assembly.	R4220/R8220
4074EAK	Plug-in receptacle, wire bail, 6 loose leads.	R8222

TRADELINE



special switches

S483B WINTER WATCHMAN



USED AS A FREEZE WARNING DEVICE. COMPLETES CIRCUIT TO HOUSEHOLD LAMP ON TEMPERATURE FALL, INDICATING FAILURE OF HEATING PLANT.

Plugs directly into wall outlet. Lamp plugs into receptacle at bottom of Win-

ter Watchman device. Useful when house is unoccupied to notify a neighbor of a temperature drop so heating source fault can be rectified before freeze-up occurs. Max. Load: 120 W resistive. Listed by Underwriters Laboratories Inc.; certified by CSA.

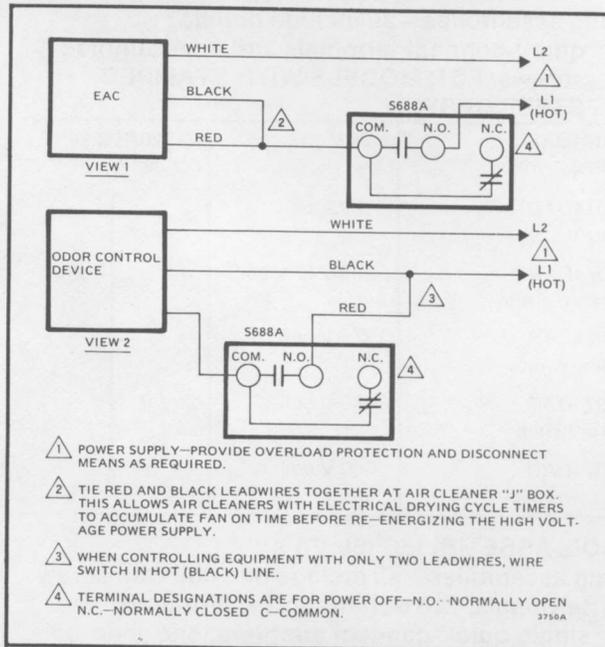
Order Number	Range
S483B1002	30 F to 60 F [minus 1 C to plus 16 C], adjustable

S688A SAIL SWITCH



USED IN FORCED AIR SYSTEMS TO ACTIVATE ELECTRONIC AIR CLEANERS, ODOR CONTROL SYSTEMS, HUMIDIFIERS, OR OTHER AUXILIARY EQUIPMENT IN RESPONSE TO AIRFLOW FROM SYSTEM FAN.

May be used in electric heating systems to prove minimum airflow. Allows auxiliary equipment to be wired independently of blower motor. Consists of polyester film sail-mounted on an spdt, Micro Switch snap-acting switch. Max. Ambient Temp: 125 F [52 C] at switches; 170 F [77 C] at sail. Mounts in vertical or horizontal airflow. Sail Dimensions: Insertion length—10 in. [254.0 mm]; maximum width—5 in. [127.0 mm]; area—26.2 sq. in. [16,903 mm²]. Approximate Case Dimensions: 2-5/16 in. [58.7 mm] high, 3-3/4 in. [95.3 mm] wide, 2-1/8 in. [54.0 mm] deep. Listed by Underwriters Laboratories Inc.; certified by CSA.



Typical hookups using S688A to activate an electronic air cleaner or an odor control device.

CONTACT RATINGS (A):

	N.O. Contacts ^a			N.C. Contacts ^a		
	24 Vac	120 Vac	240 Vac	24 Vac	120 Vac	240 Vac
Full Load	2.0	2.0	1.0	1.0	1.0	0.5
Locked Rotor	12.0	12.0	6.0	6.0	6.0	3.0
Resistive	5.0	5.0	2.5	2.5	2.5	2.5

^aPilot duty ratings.

REPLACEMENT PART:
123773A Sail.

Order Number	N.O. Contacts	N.C. Contacts
S688A1007	Make at 250 fpm [1.3 m/s]; break at 75 fpm [0.4 m/s].	Make at 75 fpm [0.4 m/s]; break at 250 fpm [1.3 m/s].

TRADELINE

special switches



S830A FILTER FLAG INDICATOR



INDICATES NEED TO CLEAN OR REPLACE AIR FILTERS IN FORCED-AIR HEATING, AIR CONDITIONING, AND HEAT PUMP EQUIPMENT.

Red flag drops into window on suction increase caused by filter obstruction. Can also actuate an

indicator light on system panel or special thermostat subbase. Mounts on downstream side of furnace filter, directly on fan compartment or at a remote location using 1/4 in. tubing. Electrical

Ratings: 1.5 A running, 7.5 A locked rotor at 24 Vac. Pressure Range: 0.1 to 0.7 in. wc [0.02 to 0.2 kPa]. Max. Operating Temp: 170 F [77 C]. Approximate Dimensions: 3-1/4 in. [82.6 mm] high, 2-1/4 in. [57.2 mm] wide, 2 in. [50.8 mm] deep from end of knob to base.

ACCESSORIES:

- 114729 Clip for flush mounting (2 required).
- 114748 Plate for flush mounting. Dimensions: 4 in. [101.6 mm] high, 3-1/16 in. [77.8 mm] wide, 1/32 in. [0.8 mm] deep.

Order Number	Switch Contacts
S830A1005	Normally open, make when flag drops into window.

PARTS AND ACCESSORIES

Order Number	Description	Use With
101715	Receptacle assembly, light. With red bullseye.	Manual switch
101721A	Switch, 4pdt, 3 position (center OFF.) Rating: 10 A at 250 V, 1/2 hp at 115/230 Vac.	Manual switch
101722A	Switch, dpdt, 2 position. Rating: 12 A at 125 V, 10 A at 250 V.	Manual switch
101724A	Switch, 3pdt, 2 position. Rating: 10 A at 250 V, 3/4 hp 1 or 3 phase 115/575 Vac.	Manual switch
101730	Dial. Marked ON-OFF-AUTO.	3-position switch
101731	Dial. Marked SUMMER-OFF-WINTER.	3-position switch
113575A	Strap, nameplate and tab. For single switch applications.	Manual switch
113577A	Nameplate and tab strip—1 light, 1 switch application.	General
113578A	Mounting strap with screws. For single switch applications.	Manual switch
113579A	Mounting strap with screws. For 2 switch applications.	Manual switch
113580A	Mounting strap with screws. For light and switch applications.	Manual switch

Order Number	Description	Use With
113583A	Cover assembly (includes plate and ring nut).	S547A,B
113585A	Wallplate, double.	Manual switch
113586A	Wallplate, single switch.	Manual switch
113588A ^b	Wallplate—1 switch, 1 light.	Manual switch
113611	Lens Cap—green.	Switch lights
113614	Lens Cap—white.	Switch lights
114682A	Plate, single switch. For 4 x 4 utility box.	Manual switch
801736A ^a	Switch assembly—dpdt, 2 position.	Manual switch
801736B ^a	Switch assembly—spdt, center OFF.	Manual switch
801736C ^a	Switch assembly—spdt, 2 position.	Manual switch
801736D ^a	Switch assembly—dpdt, center OFF.	Manual switch
801736E ^a	Switch assembly—4pdt, 2 position.	Manual switch
801736F ^a	Switch assembly—4pdt, center OFF.	Manual switch

^aFor utility box mounting—rounded corners.

^bFor switch box mounting—square corners.



stoker controls

R883B STOKERELAY CONTROLLER



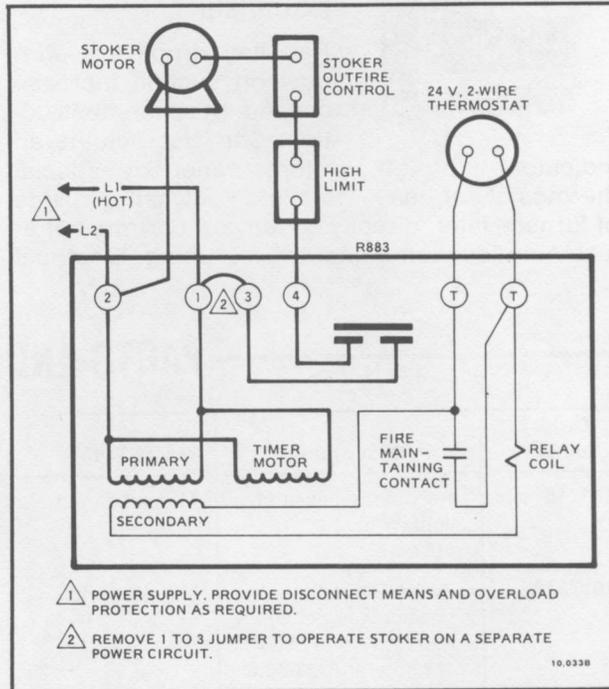
COMBINATION SWITCHING RELAY AND SYNCHRONOUS MOTOR-DRIVEN TIMER.

Provides periodic burner operation to maintain fire when thermostat does not demand burner operation (as in mild weather). Used with any 2-wire, 24 V thermostat or operating

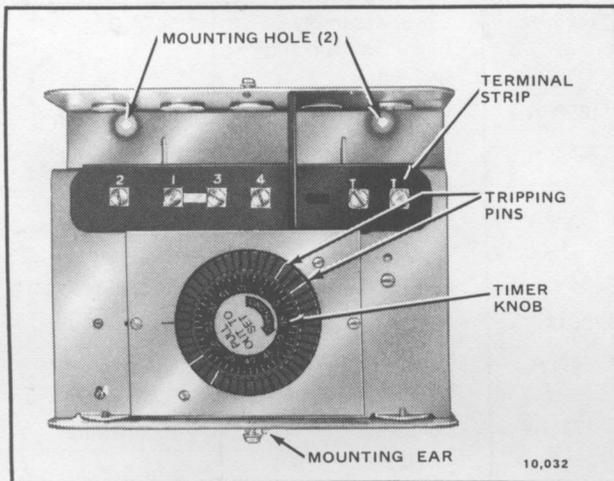
controller. Terminals arranged to permit control of a separate load if desired. Wiring knockouts for 1/2 in. conduit on top and sides of case. Adjustable timing in 75 second intervals from 0 to 60 minutes. Mounting Means: Two screw holes in back of case and mounting ear at bottom of case. Thermostat Heat Anticipator Setting: 0.2 A. Case Dimensions: 6-1/4 in. [158.8 mm] high, 7-3/4 in. [196.9 mm] wide, 3-1/2 in. [88.9 mm] deep. Listed by Underwriters Laboratories Inc.

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	10.2	5.1
Locked Rotor	61.2	30.6



Typical hookup and internal schematic for R883B directly controlling a stoker.



Internal view of R883B.

Order Number	Voltage (60 Hz)	Timing (adjustable)
R883B1014	120	1-1/4 minute intervals from 0 to 60 minutes. Adjustable tabs turn burner on and off in a 60 minute cycle.
R883B1022	240	

New!
Residential Controls Center

Residential Controls Reference Manual

These two permanent poly binders contain the facts about Honeywell RCC controls and systems—a valuable reference source for those who sell, install, or service residential heating and/or air conditioning equipment.

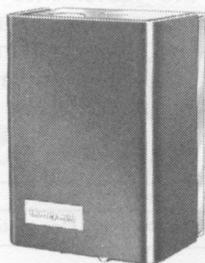


TRADELINE

stoker controls



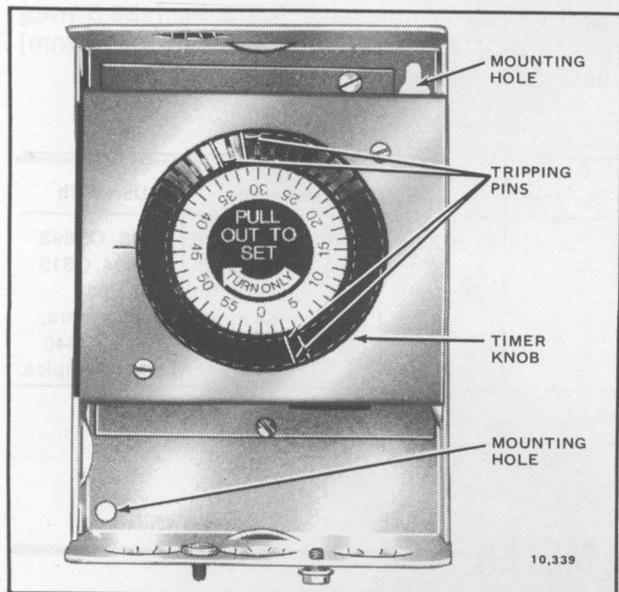
S400B TIMER



FOR LINE VOLTAGE SWITCHING IN ANY APPLICATION WHERE PERIODIC TIMED SWITCHING IS REQUIRED.

Used to control the operation of devices like stoker motors, poultry and livestock feeders, and special lighting. When used with a

line voltage controller, S400A maintains stoker fire by providing short ON periods between controller OFF periods. Adjustable timing in 75 second intervals from 0 to 60 minutes. Mounting Means: Two screw holes in back of case. Connection terminals permit control of a separate contactor (heavy duty relay) on a 3-phase line.

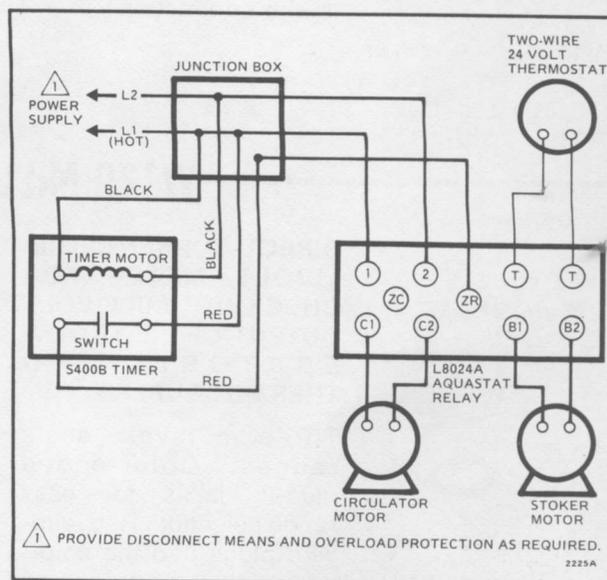


Internal view of S400B.

Dimensions: 6 in. [152.4 mm] high, 4-1/4 in. [108.0 mm] wide, 3-1/4 in. [82.6 mm] deep. Certified by CSA.

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	7.4	5.1
Locked Rotor	44.4	30.6



Typical hookup using an S400B and an Aquastat relay to control a forced hot water system with domestic hot water.

Order Number	Voltage (60 Hz)	Timing (adjustable)
S400B1006	120	1-1/4 minute intervals from 0 to 60 minutes.
S400B1014	240	

Over 150 specification sheets with complete information on RCC controls and systems including—



- Features
- Applications
- Specifications
 - Dimensions
 - Electrical Ratings
 - Temperature Ranges
 - Pressure Limits
 - More
- Approval Body Listings
- Installation Instructions
 - Internal Schematics
 - Hookups and Wiring Diagrams
- Operation
- Service and Checkout Procedures
- Ordering Information

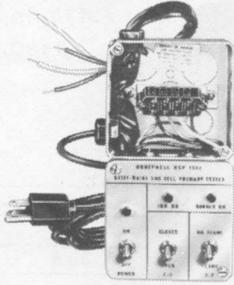
For an order blank and information on updates, order options, and prices see page 249.

TRADELINE



test instruments

DSP1544 CAD CELL PRIMARY TESTER



ON-THE-JOB TESTER FOR CAD CELL PRIMARY CONTROLS.

Easy-to-use tester permits the service technician to check all functions of the cad cell primary quickly. To use, fasten primary to the upper half of the tester, make connections to T-T

and F-F terminals, and plug the tester into a standard 120 V, 60 Hz electrical outlet. Lead Length: 12 in. [304.8 mm]. Power Cord: 3-prong plug, 6 ft [1.8 m] long. Cannot be used to test primaries with solid state load switching.

Order Number	Use To Test
DSP1544	R8184, R8185, R8404 Primary Controls

W129 MILLIVOLTMETER



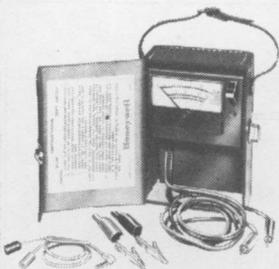
DIRECT-CURRENT MILLIVOLT METER FOR CHECKING MILLIVOLT OUTPUT OF PILOT GENERATORS AND THERMOCOUPLES.

Three millivolt scale ranges. Color-coded plug-in jacks for easy range selection. Red lead-wire plugs into the color-coded jacks, depending on the scale range: black—0 to 50, red—0 to 500, yellow—0 to 1500.

Approximate Dimensions: 5-3/8 in. [136.5 mm] long, 3 in. [76.2 mm] wide, 3-1/2 in. [88.9 mm] deep.

Order Number	Scale Ranges	Leadwires	Use With
W129A1008	0 to 50 0 to 500 0 to 1500	Two 24 in. [609.6 mm] leads. Black common, red for scale range selection.	CS82, CS893, CS894, Q313 Pilot Generators; Q309, Q340 Thermocouples.

W136A TEST METER



COMBINATION AC/DC VOLTMETER AND DC MICROAMMETER USED TO TEST BURNER EQUIPMENT.

Also used to verify that signal from flame detector is sufficient to operate flame relay. Meter has 4 ranges: 300 Vac (checks line voltage and other voltages), 150 Vdc (checks dc voltage such as flame relay voltage) 25 μ a (checks flame signal current on systems using rectifying flame rod, photocell, infrared or ultraviolet flame detectors) and SPL (checks flame signal current on systems with Dynamic Self Check amplifier). Protective circuit prevents meter burnout on 25 μ a or SPL

settings. Black leather carrying case holds meter, and has compartment for storing test leads and accessories. Includes two push-on alligator clips which fit over probes and 196146 Meter Connector Plug to plug into flame signal meter jack. Test Leads: Two, color-coded, 30 in. [762 mm], pinjack probe terminals. Case Dimensions: 6-1/4 in. [158.8 mm] long, 4-1/4 in. [108 mm] wide, 2-3/8 in. [60.3 mm] deep (cover closed).

REPLACEMENT PARTS:
196146 Meter Connector Plug.
No other parts replaceable.

Order Number	Sensitivity (ohms/volt)		Accuracy (full scale)
	0-300 Vac	0-150 Vdc	
W136A1045	20,000	40,000	2%



W720B SYSTEMS TESTER



MULTIPURPOSE METER FOR CHECKING OIL, GAS, ELECTRIC HEATING, AND AIR CONDITIONING EQUIPMENT.

Used to check ac voltages to 500 V; ac current to 75 A (clamp-on transformer required); dc millivoltage to 1500 mV; resistance values to 3000 ohms (also continuity); and temperatures from 70 F to 1500 F [21 C to 816 C] (thermocouple provided). Replaceable fuse in input circuit protects meter movement if selector switch is set on the wrong scale for a given test.

ACCESSORY:

136081 Clamp-on Transformer. Measures ac current up to 75 A.

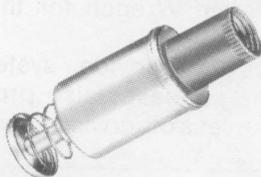
REPLACEMENT PARTS:

- 136082 Input Leads, 1 black, 1 red.
- 136083 Output Leads, 2 green.
- 136084 Jumper, 6 in. [152.4 mm].
- 136085 Thermocouple, 4 ft. [1.2 m].
- 136714 Fuse.
- 389974 Flexible Adapter Switch Extension.
- 389994 Adapter Switch for making open-closed circuit checks.

Order Number	Scale	Ranges
W720B1011	Millivolt	0 to 50, 0 to 500, 0 to 1500
	Milliamp	0 to 15, 0 to 150, 0 to 300
	Ohm	0 to 400, 0 to 3,000
	Temp. (F [C])	70 to 1500 [21 to 816]
	Volt (ac)	0 to 50, 0 to 500
	Amp (ac) ^a	0 to 15, 0 to 75

^aRequires clamp-on transformer. Order Part No. 136081 separately.

394530 THERMOCOUPLE TESTER

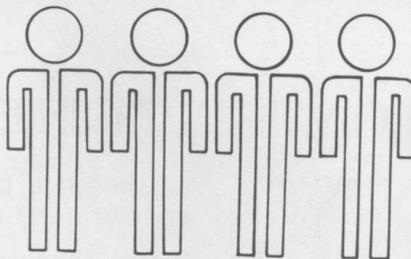


FOR QUICK TESTING OF THERMOCOUPLE OUTPUT.

Provides visual indication of proper thermocouple operation.

Order Number	Description
394530	Thermocouple Tester

Honeywell Residential Training Materials



Personnel training has been an important service provided to Honeywell Residential Group customers for many years. Our products are used by thousands of independent dealer/contractors across the country and around the world. Both the comfort and safety of the consumer depend on proper application and installation of our control devices. Since this involves not only product quality and performance but also the skill of the installer and servicer, training is important to us. We have made a major long-term commitment to employee and customer training. For a list of Honeywell training materials see pages 255 to 258.



thermostat guards

HONEYWELL THERMOSTAT GUARDS AND KEY LOCK COVERS HELP SAVE ENERGY AND FUEL—KEEP HEATING AND COOLING COSTS DOWN!

- Prevent costly tampering with thermostat temperature settings by installing one of these thermostat guards or Key Lock covers. Keeps thermostat under lock and key to maintain desired settings... and assures proper system performance!
- Rugged guards and Key Lock covers protect thermostats against damage, making them ideal for offices, restaurants, lobbies, stores, and similar areas.

THE ROUND WITH KEY LOCK COVER



T87F2998



T87F3004

T87F THERMOSTATS FOR HEATING, COOLING, OR HEATING-COOLING SYSTEMS WITH A KEY LOCK COVER TO PREVENT TAMPERING WITH THERMOSTAT/SUB-BASE SETTINGS.

Thermostats may be used with Q539 Switching Subbases for system and fan switching at the thermostat location. The black and satin chrome finish provides rugged good looks which complement any interior decor. Helps maintain desired settings for energy saving and top system performance. A key is required to remove the cover.

Two keys included. Electrical Rating: 1.5 A at 30 Vac. Adjustable Heat Anticipator: 0.1 A to 1.2 A. Fixed Cooling Anticipator: 0 to 1.5 A, 24 to 30 Vac. Temp. Setting Range: 40 F to 90 F [4 C to 32 C]. Switching Action: Dust-free, spdt mercury switch operated by coiled bimetal. Approximate Dimensions with Key Lock cover in place: 4-1/32 in. [102.4 mm] diameter, 2 in. [50.8 mm] deep.

REPLACEMENT PART:

- 190881 Key for Key Lock covers.
- 190877A Key Lock Cover with window.
- 190877B Key Lock Cover without window.

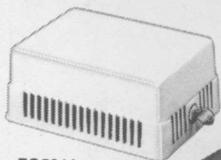
ACCESSORIES:

- 104994A Calibration Wrench for thermostat recalibration.
- Q539 Subbases to provide system and fan switching. The subbases also provide cooling anticipation, unless otherwise specified.

TRADELINE models.

Order Number	Description	Includes	Mounting
T87F2998	Heating, cooling, or heating-cooling thermostat including Key Lock Cover with window.	137421A Wallplate and mounting screws and 190002 (6 in. [152.4 mm]) Cover Ring and mounting screws. Cover ring is for junction box mounting or for covering old thermostat marks.	<ol style="list-style-type: none"> 1. Wallplate (included) for heating only, cooling only, or spdt heating (series 20). provides cooling anticipation and series 20 heat anticipation. 2. Q539 Subbase (order separately) for heating-cooling systems.
T87F3004	Heating, cooling, or heating-cooling thermostat including Key Lock Cover without window.		

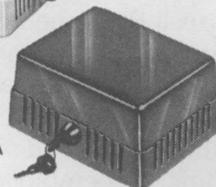
TG500A, TG501A UNIVERSAL THERMOSTAT GUARDS



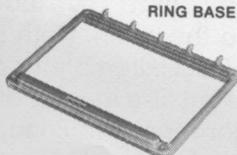
TG501A



SOLID BASE



TG500A



RING BASE

TAMPERING, DAMAGE, AND UNAUTHORIZED ADJUSTMENT OF THERMOSTAT SETTINGS.

These universal thermostat guards fit most Honeywell and competitive wall thermostats. See order table for a list of Honeywell thermostats that can be used with these guards. Tamper-resistant tumbler lock. Guards may be mounted in a vertical or horizontal position. They prevent tampering with thermostat and subbase settings while allowing air circulation around the thermostat for proper thermostat/system performance.

THESE THERMOSTAT GUARDS ENCLOSE AND PROTECT WALL THERMOSTATS AGAINST

continued next page

TRADELINE

thermostat guards



TG500A, TG501A continued

TRADELINE models. • SUPER TRADELINE models.

Order Number	Description	Use With	Approximate Dimensions	
			Cover	Base
•TG500A1003	Clear plastic cover, clear ring and solid type mounting bases. Includes tumbler lock and 2 keys.	T26, T42, TS86, T87/Q539, T92, T222, T282, T451/Q473, T498, T651/Q473, T819, TS819, T822, TS822, T834/Q634, T853, T872/Q672, T874/Q674, T882/Q611, TS882, T921, T7047A-C, T7048, T4039C,G, T4051/Q651, T6051/Q651, T6052/Q651, T8082/Q682 (TG501 only), T8085/Q682 (TG501 only), T8100 (TG501 only), T8200 (TG501 only).	5-5/8 in. [142.9 mm] high, 6-7/8 in. [174.6 mm] wide, 3-3/8 in. [85.7 mm] deep.	5-1/2 in. [139.7 mm] high, 6-9/16 in. [166.7 mm] wide, 3/8 in. [9.5 mm] deep.
•TG500A1011	Opaque beige plastic cover, beige ring and solid type mounting bases. Includes tumbler lock and 2 keys.			
TG501A1002	Clear plastic cover, clear ring and solid type mounting bases. Includes tumbler lock and 2 keys, screw anchors.		6-1/4 in. [158.8 mm] high, 8-5/8 in. [219.1 mm] wide, 4 in. [101.5 mm] deep.	6-1/4 in. [158.8 mm] high, 8-3/4 in. [222.3 mm] wide, 3/8 in. [9.5 mm] deep.
TG501A1010	Opaque beige plastic cover, beige ring and solid type mounting bases. Includes tumbler lock and 2 keys, screw anchors.			

TG503A THERMOSTAT GUARD



PROTECTS T26, T86, TS86, AND T87 (LESS SUBBASE) ROUND THERMOSTATS AGAINST TAMPERING, DAMAGE, AND UNAUTHORIZED ADJUSTMENT OF THERMOSTAT SETTINGS.

Curved slot allows viewing

of scale setting. Tamper-resistant screw type lock. Includes metal backplate, 2-terminal wallplate, metal guard ring, Allen wrench for locking screw, wall cover ring, bracket for outlet box mounting, mounting screws.

Order Number	Use With
TG503A1000	T26, T86, TS86, T87 (less subbase) Round thermostats.

TG504A KEY LOCK COVERS FOR T874 THERMOSTATS



TG504A1025



TG504A1033

THESE KEY LOCK COVERS PROTECT T874 THERMOSTATS AND Q674 SUBBASES AGAINST DAMAGE AND HINDER TAMPERING WITH THERMOSTAT SETTINGS AND SUBBASE SWITCHES.

Easy-to-install Key Lock cover replaces thermostat cover without removal or adjustment of thermostat. No screws or mounting accessories are required. Ideal for office areas, lobbies, stores, restaurants, clinics, and other areas where

protection of T874/Q674 is needed. This rugged molded plastic cover allows good airflow for proper system performance. Thermometer Range: 55 F to 95 F [13 C to 35 C]. Approximate Dimensions: 4-5/8 in. [117.5 mm] high, 6-3/8 in. [161.9 mm] wide, 2-1/4 in. [57.2 mm] deep.

TRADELINE models.

Order Number	Internal Thermometer ^a	External Thermometer	Includes
TG504A1025	Yes	No	Tumbler lock and 2 keys.
TG504A1033	Yes	Yes	

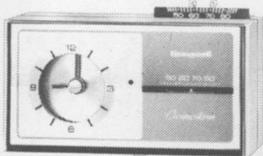
^aReads right to left.

TRADELINE



thermostats—Chronotherm

T8082A CHRONOTHERM FUEL SAVER THERMOSTAT



LOW VOLTAGE THERMOSTAT COMBINES ACCURATE TEMPERATURE CONTROL AND A SELF-STARTING, BATTERY-OPERATED, QUARTZ CLOCK. TEMPERATURES ARE AUTOMATICALLY LOWERED (HEATING) OR ALLOWED TO RISE (COOLING)

FOR A SET TIME PERIOD ONE OR MORE TIMES EVERY 24 HOURS.

See order table for application. Add Q682 Sub-base for system and fan switching in heating-cooling systems. Coiled bimetal element operates spdt mercury switch. Temp. Range: 42 F to 88 F [6 C to 31 C]. Adjustable Heat Anticipator: 0.1 A to 1.2 A. Electrical Rating: 15 to 30 Vac. Battery charging current is 10 mA, nominal, during heating off cycle, or during cooling. Dimensions: 4-1/16 in. [103.2 mm] high, 6-3/4 in. [171.5 mm] wide, 2-1/4 in. [57.2 mm] deep. For T8082A models designed to meet Department of Defense specifications, see page 111.

T8082 FEATURES

- Thermostat is easily programmed by placing color-coded pins in clock program dial.
- Self-contained battery operates quartz clock during power outages.
- Program advance button provides programming override if desired.
- Program indicator shows program mode.
- Program pins, program indicator, and temperature setting levers are color-coded for easy recognition.

REPLACEMENT PARTS:

- 191108BA Wallplate for 2-wire heating or 3-wire, spdt heating systems. Includes series 20 terminal identification for spdt heating systems.
- 191108AD Wallplate for 2-wire cooling systems.
- 191108AJ Wallplate for directly powering the clock.
- 191127B Replacement Rechargeable Nickel Cadmium Battery, 2-1/4 in. Replaces 191127A battery.
- 191135A Cover Assembly.
- 193933A Replacement Rechargeable Nickel Cadmium Battery, 1-1/8 in. Replaces 193933 and 195044 batteries and connectors.
- 4074DAY Program Pin Bag Assembly. Includes two high temperature (red) program pins, and two low temperature (blue) program pins.

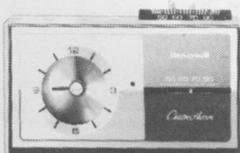
ACCESSORIES:

- 104994A Calibration Wrench.
 - 131181D Lever Locking Screws, No. 4-40 x 1/4 in. [6.4 mm] self-tapping screws.
 - 192075A Fast Charge Battery Package with holder and leads with alligator clips.
 - 193121A Cover Plate Assembly. Includes cover plate, wall bracket, and screws.
 - 4074EBR Adjustable Lever Stop. Contains one 133991 Lever Stop and one 80912C Screw.
- Thermostat Guards. See page 96.

TRADELINE model.

Order Number	Application
T8082A1148	For 2- or 3-wire heating systems. Includes wallplate, 2 outlet box mounting screws, 3 wall screws, and 3 sets of program pins. For heating-cooling systems add Q682 Subbase (order separately).
T8082A1254	For 2-wire, gas air conditioning systems. Includes wallplate, 2 outlet box mounting screws and 3 wall screws.

T8085A,B,C,R; TS8085A CHRONOTHERM FUEL SAVER THERMOSTATS



SINGLE- AND MULTI-STAGE THERMOSTATS COMBINE ACCURATE TEMPERATURE CONTROL AND A SELF-STARTING 24 Vac CLOCK. TEMPERATURES ARE AUTOMATICALLY LOWERED (HEATING) OR ALLOWED TO RISE (COOLING)

FOR A SET TIME PERIOD ONE OR MORE TIMES EVERY 24 HOURS.

See order table for application. Add Q682 Sub-base to T8085 for system and fan switching in heating-cooling systems. Use system transformer or separate 24 Vac transformer to power clock. Temp. Range: 42 F to 88 F [6 C to 31 C]. Dimensions: 4-1/16 in. [103.2 mm] high, 6-3/4 in. [171.5 mm] wide, 2-1/4 in. [57.2 mm] deep.

ELECTRICAL RATINGS:

- Clock—15 to 30 Vac.
- Switches—1.2 A running, 1.5 A inrush.

continued next page

TRADELINE



T8085A,B,C,R; TS8085A continued

T8085, TS8085 FEATURES

- Thermostat is easily programmed by placing color-coded pins in clock program dial.
- Self-starting 24 Vac clock.
- Program advance button provides programming override if desired.
- Program indicator shows program mode.
- Program pins, program indicator, and temperature setting levers are color-coded for easy recognition.

REPLACEMENT PARTS:

191108AC Wallplate (TS8085A only) for 250, 500, or 750 mV heating systems.

191108AJ Wallplate (T8085A only) for 2- or 3-wire heating systems.

4074DAY Program Pin Bag Assembly. Includes two high temperature (red) program pins, and two low temperature (blue) program pins.

ACCESSORIES:

104994A Calibration Wrench.

131181D Lever Locking Screws, No. 4-40 x 1/4 in. [6.4 mm] self-tapping screws.

193121A Cover Plate Assembly. Includes cover plate, wall bracket, and screws.

4074EBR Adjustable Lever Stop. Contains one 133991 Lever Stop and one 80912C Screw.

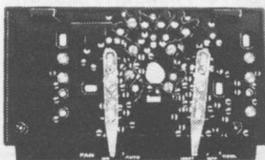
AT20A or AT87 Transformer, for systems requiring a separate transformer to power the 24 Vac clock.

Thermostat Guards. See page 96.

Order Number	Application	System Stages		Anticipation
		Heat	Cool	
T8085A1004	For 2- or 3-wire heating systems. Add Q682B Subbase (order separately) for single-stage heating-cooling.	1	a	Heat Anticipation: 0.1 A to 1.2 A, adj.
T8085B1002	For residential and light commercial applications such as two-stage compressors and integrated economizers. Manual changeover. Requires Q682B Subbase (order separately).	1	2	Heat Anticipation: 0.1 A to 1.2 A, adj. Cool Anticipation: Fixed.
T8085C1000	For residential and light commercial applications such as two-stage high efficiency heating systems and two-stage hydronic heating systems. Manual changeover. Requires Q682B Subbase (order separately).	2	1	First Stage Heat and Cool Anticipation: Fixed. Second Stage Heat Anticipation: 0.1 A to 1.2 A adj.
T8085R1015	For residential add-on heat pump applications. Manual changeover. Requires Q682L Subbase (order separately) which has LED system indicators for emergency heat and auxiliary heat.	2	1	First Stage Heat and Cool Anticipation: Fixed. Second Stage Heat Anticipation: 0.1 A to 1.2 A, adj.
TS8085A1003	For 250, 500, or 750 mV heating systems. Requires an additional 24 Vac transformer to power clock (order separately).	1	None	Heat Anticipation: 0.1 A, fixed.

^aFor single-stage heating-cooling add Q682B Subbase (order separately).

Q682B,L THERMOSTAT SUBBASES



PROVIDES SYSTEM AND FAN SWITCHING AND MOUNTING BASE FOR T8082 AND T8085 CHRONOTHERM FUEL SAVER THERMOSTATS IN HEATING-COOLING SYSTEMS.

T8082 applications. Mounts directly on wall or on horizontal outlet box. Dimensions: 4 in. [101.6 mm] high, 6-3/4 in. [171.5 mm] wide, 7/8 in. [22.2 mm] deep.

ELECTRICAL RATING (A):

Switch Contacts—2.5 A running, 7.5 A inrush at 30 Vac.

See order table for application and switching. Q682B models available to replace Q682A in

continued next page

TRADELINE



thermostats—Chronotherm

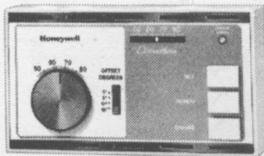
Q682B,L continued

TRADELINE models.

Order Number	Application	Switching		Use With
		System	Fan	
Q682B1011	With RC-RH terminals for isolated heating-cooling circuits.	HEAT-OFF-COOL	ON-AUTO	T8082A ^a , T8085A
Q682B1029	With single R terminal and O and B terminals.			
Q682B1037	With AUTO fan in heat and cool modes; for electric heat systems.			
Q682B1045	With RC-RH terminals for isolated heating-cooling circuits and O and B terminals. Use H terminal for second stage heating or cooling.			T8085B,C
Q682L1010	With Em. Ht. and Aux. Ht. LED's. For multistage heating-cooling systems.	EM.HT.-HEAT-OFF-COOL		T8085R

^aQ682B replaces Q682A in T8082 applications.

T8100A MICROELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTAT



COMBINES AUTOMATIC CONTROL OF SINGLE STAGE, HEATING-COOLING SYSTEMS AND A PROGRAMMABLE ENERGY SAVINGS PERIOD REPEATING ONCE EVERY 24 HOURS.

Use with Q6000A Subbase for heating-cooling systems or Q6000B Wallplate for heating-only systems or Q6000C Adapter Wallplate when replacing a T87 Thermostat (heating only) with a T8100. Temp. Range: 42 F to 88 F [4 C to 32 C]. Electrical Rating: 15 to 30 Vac.

T8100 FEATURES

- Programs or reprograms in seconds—ideal standard replacement thermostat.
- SET key to program or reprogram thermostat.
- REVIEW key to recall previously entered program.
- CHANGE program key overrides programmed period.
- Energy savings light indicates when in offset, hours of offset (when used with SET or REVIEW key), or loss of program (when flickering continuously).

- Offset switch with energy saving temperature selection of 0, 5, 10, or 15 F [0, 3, 6, or 9 C] from comfort setting.
- Pull-up instruction card for quick programming instructions.

SWITCH RATINGS (A) at 30 Vac (including Q6000A,B,C):

	Heat	Cool
Full Load	0.15 to 1.2	0.15 to 1.2
Locked Rotor	3.5	7.5

ACCESSORIES:

- 196393A Cover Plate Assembly for covering old thermostat mounting marks or for mounting on outlet box.
- Q6000A Subbase for heating-cooling systems.
- Q6000B Wallplate for heating-only systems.
- Q6000C Adapter Wallplate for replacing a T87 thermostat (heating-only) with a T8100.

Order Number	Cycles per hour		Use With
	Heating	Cooling	
T8100A1005	Factory-set at 6 (adj.)	3, fixed	Q6000A, Q6000B, Q6000C

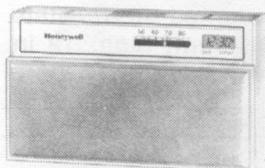
DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
T8100 w/Q6000A	3-1/2	89.9	7-3/4	196.9	1-11/16	42.9
T8100 w/Q6000B	3-1/2	89.9	6-3/8	161.9	1-9/16	38.9
T8100 w/Q6000C	4-1/2	114.3	7-5/8	193.7	2-1/4	57.2

TRADELINE



T8200A MICROELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTAT



COMBINES AUTOMATIC CONTROL OF SINGLE STAGE, HEATING-COOLING SYSTEMS AND ONE OR TWO PROGRAMMABLE ENERGY SAVINGS PERIODS REPEATING EVERY 24 HOURS.

Use with Q6000A Subbase for heating-cooling systems or Q6000B Wallplate for heating-only systems or Q6000C Adapter Wallplate when replacing a T87 thermostat (heating-only) with a T8200. Temp. Range: 42 F to 88 F [4 C to 32 C]. Electrical Rating: 15 to 30 Vac.

T8200 FEATURES

- One or two programmable energy savings periods every 24 hours.
- 5- or 7-day offset program (5-day skips program on weekends).
- SKIP next program key.
- CHANGE program key.
- Digital clock continuously indicates time-of-day, offset times, skip, and offset symbols.

DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
T8200 w/Q6000A	3-1/2	89.9	7-3/4	196.9	1-11/16	42.9
T8200 w/Q6000B	3-1/2	89.9	6-3/8	161.9	1-9/16	38.9
T8200 w/Q6000C	4-1/2	114.3	7-5/8	193.7	2-1/4	57.2

- Offset switch with energy saving temperature selection of 0, 5, 10, or 15 F [0, 3, 6, or 9 C] from comfort setting.

SWITCH RATINGS (A) at 30 Vac (including Q6000A,B,C):

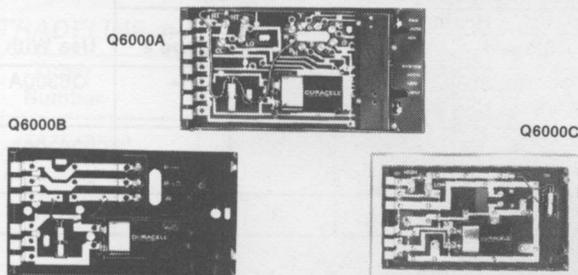
	Heat	Cool
Full Load	0.15 to 1.2	0.15 to 1.2
Locked Rotor	3.5	7.5

ACCESSORIES:

- 196393A Cover Plate Assembly for covering old thermostat mounting marks or for mounting on outlet box.
- Q6000A Subbase for heating-cooling systems.
- Q6000B Wallplate for heating-only systems.
- Q6000C Adapter Wallplate for replacing a T87 thermostat (heating-only) with a T8200.

Order Number	Cycles per hour		Use With
	Heating	Cooling	
T8200A1004	Factory-set at 6 (adj.)	3, fixed	Q6000A, Q6000B, Q6000C

—Q6000A SUBBASE, Q6000B WALLPLATE, Q6000C ADAPTER WALLPLATE—



See order table for application. Spring finger contacts on thermostat make electrical connection between thermostat and subbase or wallplate. Use a 9 V alkaline battery to retain program in case of power loss longer than 10 seconds. Mounts directly on wall.

ACCESSORY:

- 196393A Cover Plate Assembly for covering old thermostat mounting marks or for mounting on outlet box. Includes cover plate, adapter ring, and 2 mounting screws.

USED WITH T8100 AND T8200 MICRO-ELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTATS.

Order Number	Application	Switching	
		System	Fan
Q6000A1005	For heating-cooling systems.	HEAT-OFF-COOL	AUTO-ON
Q6000B1003	For heating-only systems.	None	
Q6000C1000	For heating-only systems. Allows installation of T8100 or T8200 directly to T87 Wallplate (heating-only).	None	



thermostats—Chronotherm

DSP1938 TABLE TOP DISPLAY



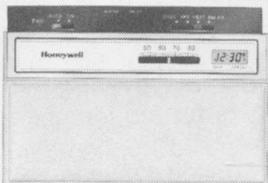
STANDING SMOKED PLEXIGLASS DISPLAY WITH PRE-DRILLED HOLES FOR MOUNTING EITHER A T8100, A T8200, OR BOTH (THERMOSTATS NOT INCLUDED).

ings Chart and a pocket for literature. Comes with three different decals describing the benefits of the microelectronic thermostat and wiring instructions to allow operation of mounted thermostats. Dimensions: 18-1/2 in. [469.9 mm] high, 12 in. [304.8 mm] wide, 6 in. [152.4 mm] deep.

Order Number	Description
DSP1938	Table top display for T8100 and T8200 thermostats.

Includes Chronotherm Thermostat Energy Sav-

—T8300 MICROELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTAT—



COMBINES FUNCTIONS OF T874 MULTISTAGE THERMOSTAT AND T8200 MICROELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTAT. CONTROLS UP TO TWO

STAGES OF HEAT AND TWO STAGES OF COOL ON HEAT PUMP SYSTEMS.

Requires Q6300 Heating/Cooling Subbase to provide mounting base and system and fan switching. Temp. Range: 42 F to 88 F [5 C to 31 C]. Electrical Rating: 20 to 30 Vac. Dimensions (including Q6300 Subbase): 6-7/16 in. [163.5 mm] wide, 4-1/2 in. [114.3 mm] high, 2-1/4 in. [57.2 mm] deep.

T8300 FEATURES

- One or two programmable energy savings periods every 24 hours.
- Intelligent Recovery* function provides two hours of recovery after each offset period to ensure maximum energy savings.

- Easy programming identical to T8200.
- No deviation from set point even in high loads for better temperature control.
- 5- or 7-day offset program (5-day skips program on weekends).
- SKIP next program key.
- CHANGE program key.
- Digital clock continuously indicates time-of-day, offset times, skip, and offset symbols.
- Offset switch with energy saving temperature selection of 0, 5, 10, or 15 F [0, 3, 6, or 9 C] from comfort setting.
- No battery backup.

*Trademark

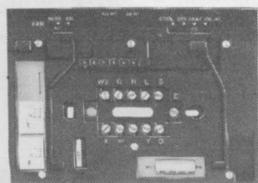
SWITCH RATING: 1.2 A running; 3 A inrush (auxiliary heat), 5 A inrush (compressor).

ACCESSORY:

196393A Cover Plate Assembly for covering old thermostat mounting marks or for mounting on outlet box.

Order Number	Application	Cycles per hour (factory-set)				Use With
		Heating		Cooling		
		Stage 1	Stage 2	Stage 1	Stage 2	
T8300A1003	For heat pumps with fast cycling second stage.	3	6	3	—	Q6300A
T8300A1011	For heat pumps with slower (conventional) second stage.	3	3	3	—	Q6300A
T8300B1001	For 2-speed compressor heat pumps.	3	3	3	3	Q6300B

—Q6300 HEATING/COOLING SUBBASE



PROVIDES SYSTEM AND FAN SWITCHING, AND MOUNTING BASE FOR T8300 MICROELECTRONIC CHRONOTHERM FUEL SAVER THERMOSTAT.

Subbase available with light emitting diodes (LED's) to indicate EM. HT. and AUX. HT. (standard) or SERVICE, CHECK, FILTER, LOCKOUT.

ACCESSORY:

196393A Cover Plate Assembly for covering old thermostat mounting marks or for mounting on outlet box.

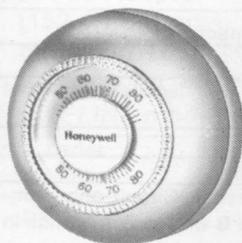
Order Number	Switching		Use With
	System	Fan	
Q6300A1002	T8300A	COOL-OFF-HEAT-EM. HEAT	AUTO-ON
Q6300B1000	T8300B	COOL-OFF-HEAT-EM. HEAT	AUTO-ON

TRADELINE

thermostats—single-stage



T87F THERMOSTAT—THE ROUND



PROVIDES TEMPERATURE CONTROL FOR 24 TO 30 VOLT RESIDENTIAL HEATING, COOLING, OR HEATING-COOLING SYSTEMS.

Features dustproof, spdt mercury switch, adjustable heat anticipator, and a 2- or 3-wire

wallplate for heating only, cooling only, or heating-cooling systems with remote switching. Add a Q539 subbase in systems requiring system and fan switching at the thermostat location. Q539 also provides cooling anticipator. For T87F models designed to meet Department of Defense specifications, see page 111. Also see Thermostat Guards section, page 96, for THE ROUND WITH KEY LOCK COVER.

APPROXIMATE DIMENSIONS:

	Diameter		Depth	
	in.	mm	in.	mm
T87F	3- 1/4	82.6	1-1/2	38.1
T87F with 137421 Wallplate or Q539 Subbase	3-11/16	93.7	1-3/4	44.5

ELECTRICAL RATINGS:

Mercury Switch: Full Load—1.5 A; Locked Rotor—3.5 A at 30 Vac.

Adjustable Heat Anticipator: 0.1 A to 1.2 A.

Cooling Anticipator: 0 A to 1.5 A, 24 to 30 Vac.

REPLACEMENT PARTS:

104456B Wallplate Assembly, 2 terminals (heating only models). Includes terminal screws.

114854 Crystal, 1.9 in. [48.4 mm] dia.

114855-01370 Thermostat Cover Ring.

ACCESSORIES:

104994A Calibration Wrench.

129044A Adapter Plate Assembly. Includes 6 in. [152.4 mm] cover ring and adapter plate. For mounting T87F thermostat on outlet box and for covering old thermostat mounting marks.

137421A Wallplate for heating and cooling systems. For T87F without positive OFF. Includes spdt heating only (series 20) alternate terminal markings and cooling (also series 20) anticipator.

137421B Wallplate for heating and cooling systems. For T87F with positive OFF.

TG503A1000 Metal Thermostat Guard. Includes locking cover, backplate, and bracket for mounting on a standard size outlet box. Also includes 104456B 2-terminal Wallplate. Not for use with T87F mounted on 137421 Wallplate or Q539 Thermostat Subbase.

TRADELINE models. • SUPER TRADELINE model.

Order Number	Range ^b		Features	Includes
	F	C		
•T87F1859 ^a	40 to 90	4 to 32	Replaces heating, cooling, and heating-cooling models (use Q539 for heating-cooling). Alternate series 20 terminal markings on 137421A Wallplate.	6 in. [152.4 mm] cover ring, 137421A 3-terminal Wallplate.
T87F1867	50 to 90	10 to 32	With positive OFF.	6 in. [152.4 mm] cover ring, 137421B 3-terminal Wallplate.
T87F2360	45 to 75	7 to 24	Limited set point range.	104456B Wallplate.
T87F2782	35 to 65	2 to 18	Heating only; limited set point range.	Locking cover and locking dial. Allen-head screws and wrench included for locking cover. 137421A 3-terminal Wallplate.
T87F2873	40 to 90	4 to 32	Concealed 2-terminal heating only wallplate.	104456B Wallplate.

^aUse T87F1859 as a replacement for former TRADELINE model T26A1433 and T87C1252.

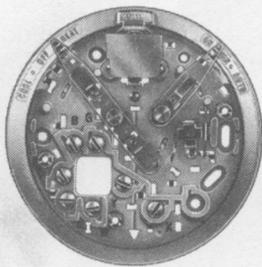
^bTemperature scale in Fahrenheit on thermostat.

TRADELINE



thermostats—single-stage

Q539 THERMOSTAT SUBBASES



PROVIDES SYSTEM AND FAN MOUNTING AND SWITCHING FOR T87F THERMOSTATS.

Includes cooling anticipator and letter-coded screw terminals for electrical connections. Wide range of switching functions fits most cooling or heating-cooling applications.

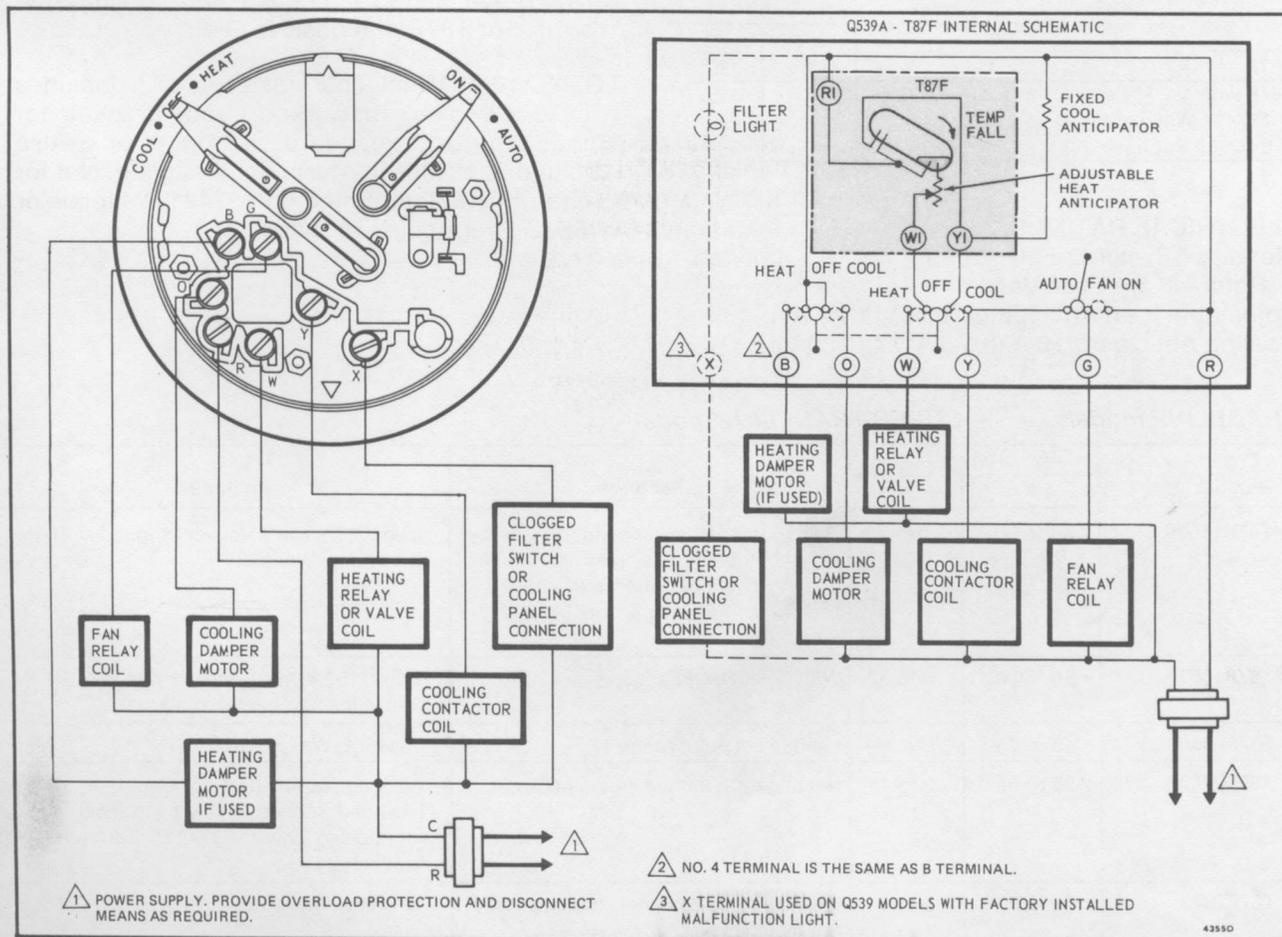
Electrical Ratings: 2 A at 24 Vac. Optional Indicator Lamp: 28 Vac. All Q539 subbases mount directly on wall. To mount on an outlet box, use 6 in. [152.4 mm] cover ring (included with some T87F models) or order 129044A Adapter Plate Assembly. Approximate Dimensions (with T87F): 3-11/16 in. [93.7 mm] dia., 1-3/4 in. [44.5 mm] deep.

REPLACEMENT PART:
129571 Filter Light.

TERMINAL DESIGNATIONS:^a

Terminal	Connection
R	Transformer.
RH	Heating transformer with isolated heat-cool circuits.
W	Heating relay or valve coil.
Y	Cooling contactor coil.
B,4	Heating damper (if used). Circuit only completed between R and B with system switch in heat position; "4" terminal is the same as Honeywell "B" terminal.
O	Cooling damper (if used). Circuit only completed between R and O with system switch in cool position.
G	Fan relay coil.
X	Clogged filter switch. Only available on subbase with malfunction light.
P	Heat pump contactor coil.
Z	Q539D,H—low voltage fan switch for control of fan relay in AUTO position for both heating and cooling control.

^aR₁, W₁ and Y₁, are not marked on thermostat subbase. They are mounting posts and electrical connections for the thermostat.



Typical hookup and internal schematic for Q539-T87F heat, cool, and heat-cool applications using common power supply.

continued next page

TRADELINE

thermostats—single-stage



Q539 continued

ACCESSORIES:

129044A Adapter Plate Assembly. Includes 6 in. [152.4 mm] cover ring and adapter plate. For mounting T87F Thermostat on outlet box and for covering old thermostat mounting marks.

135734A Indicator Light Assembly. field addable. Includes light bulb with 2-3/4 in. [69.9 mm] leadwires with spade terminals, black retainer plate, 2 self-tapping screws, and 5 lenses. Q539 lenses indicate FILTER or CHECK.

TRADELINE models.

Order Number	Fan	Switching System	Use With	Remarks
Q539A1014	ON-AUTO	COOL-OFF-HEAT	T87F	For conventional single transformer heating-cooling systems. With O and B terminals.
Q539A1121	ON-AUTO	COOL-OFF-HEAT	T87F	Cooling anticipator designed for use with gas air conditioners.
Q539A1147	ON-AUTO	COOL-OFF-HEAT	T87F	Independent heat-cool circuits. For heating only systems with summer fan operation.
Q539B1005	NONE	COOL-OFF-HEAT	T87F	Internal system fan control.
Q539C1020	ON-AUTO	COOL-OFF	T87F	Use on cooling only systems.
Q539G1000		HEAT-OFF-FAN	T87F	With external jumper between R-RH for common heating-cooling transformer.
Q539H1009	ON-AUTO	NONE	T87F	With extra terminal for low volt fan control in AUTO position.
Q539J1006	AUTO-ON	COOL-OFF-HEAT	T87F	Automatic fan on both heating and cooling. For heat pump and electric heat.

TS86A POWERPILE THERMOSTAT



FOR CONTROL OF AUTOMATIC, SELF-POWERED GAS HEATING SYSTEMS. USE ONLY WITH A MILLIVOLTAGE PILOT GENERATOR.

Coiled bimetal element operates dustproof, spst mercury switch. See order table for application.

Mercury Switching Rating: 0.1 A at 750 mV. Fixed Differential: 0.5 F [0.3 C]. Mounting Means: Heating-only wallplate with captive mounting screws included with thermostat. Approximate Dimensions: 3-1/4 in. [82.6 mm] dia., 1-1/2 in. [38.1 mm] deep.

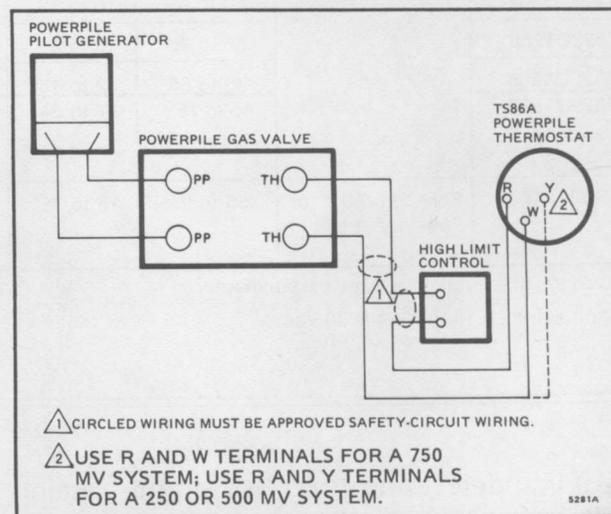
ACCESSORIES:

104994A Calibration Wrench.
129044A Adapter Plate Assembly. Includes 6 in. [152.4 mm] cover ring and adapter plate. For

TRADELINE models.

Order Number	Application	Positive OFF	Scale Range		Heat Anticipator (750 mV Only)
			F	C	
TS86A1371	250/500, or 750 mV	No	40 to 90	4 to 32	Yes
TS86A1389		Yes	40 to 90	4 to 32	Yes

mounting thermostat on outlet box and for covering old thermostat mounting marks. Thermostat Guards. See page 97.



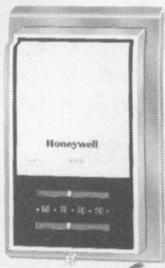
Typical Powerpile millivolt system using TRADELINE TS86A with a TRADELINE wallplate.

TRADELINE



thermostats—single-stage

T822C,D; TS822A THERMOSTATS



FOR 24 VOLT HEATING OR COOLING APPLICATIONS OR MILLIVOLT HEATING SYSTEMS.

See order table for application. Coiled bimetal element operates dustproof, spst mercury switch. These thermostats mount directly on a wall or on a standard vertical out-

let box. Setting lever and thermometer scale on thermostat face. Approximate Dimensions: 4-3/4 in. [120.7 mm] high, 2-7/8 in. [73.0 mm] wide, 1-1/8 in. [28.6 mm] deep. For T822D and TS822A models designed to meet Department of Defense specifications, see page 111. Certified by CSA—T822D.

ELECTRICAL RATINGS:

T822C—1.0 A running, 5.0 A inrush.

T822D—0.18 to 0.8 A or 0.32 to 1.2 A at 30 Vac (optional).

TS822A—

Without heat anticipator: 0.1 A at 250, 500, or 750 mV.

With heat anticipator: 0.1 A at 750 mV.

ACCESSORIES:

104994A Calibration Wrench.

193120A Mounting Plate Assembly. Includes adapter plate for mounting on horizontal or vertical outlet box. Covers old thermostat mounting.

Thermostat Guards. See page 96.

TRADELINE models.

Order Number	Application	Scale Range		Heat Anticipator	Positive OFF	Remarks
		F	C			
T822C1090	For low voltage control of cooling systems.	55 to 95	13 to 35	Yes ^a	No	—
T822C1181	For use with evaporative coolers.	High, low with markings 5-4-3-2-1.		None	No	Use only with Q634J1005.
T822D1024	For low voltage control of heating systems.	55 to 95	13 to 35	Yes ^b	No	Adjustable temperature stops. Spanner-heat screws, wrench included to prevent unauthorized set point adjustment.
T822D1032		60 to 95	16 to 35	Yes ^b	Yes	
T822D1255		55 to 95	13 to 35	Yes ^c	No	
T822D1685		35 to 65	2 to 18	Yes ^b	No	
T822D1693		45 to 75 ^d	7 to 24	Yes ^b	No	
TS822A1039	For 250/500 or 750 mV heating systems.	55 to 95	13 to 35	Yes	Yes	—

^aCooling anticipation by fixed carbon heater.

^cAdjustable, 0.32 to 1.2 A at 30 Vac.

^bAdjustable, 0.18 to 0.8 A at 30 Vac.

^d68 F marked on scale.

If you detect any  errors in this catalog, please let us know. We want the information in our catalog to be as accurate as possible; we appreciate your help in making it so.

See page 263.

TRADELINE

thermostats—single-stage



T834A,C THERMOSTATS



FOR LOW VOLTAGE CONTROL OF RESIDENTIAL HEATING, COOLING, OR HEATING-COOLING SYSTEMS.

See order table for description. T834A requires Q634 Subbase to provide system and fan switching; T834C has integral switching. Tem-

perature Scale Range: 55 F to 95 F [13 C to 35 C]. Switching: Spdt mercury switch makes R to W on temperature fall, R to Y on temperature rise. Mounts directly on wall or on standard vertical outlet box. Approximate Dimensions: 4-3/4 in. [120.7 mm] high, 2-7/8 in. [73.0 mm] wide, 1-1/8 in. [28.6 mm] deep. Certified by CSA.

ELECTRICAL RATINGS:

Heating—0.18 to 0.8 A at 30 Vac max. (0.32 to 1.2 A optional).

Cooling—1.5 A running, 7.5 A inrush at 30 Vac.

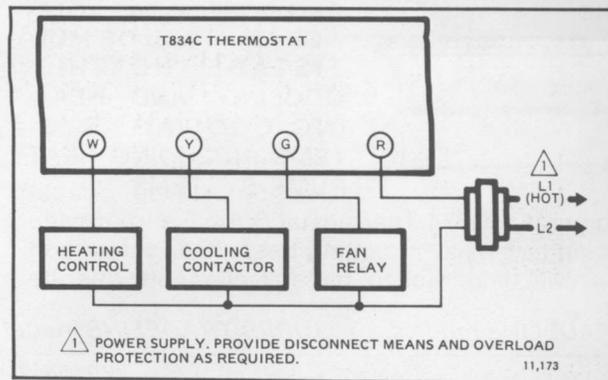
Adjustable Heat Anticipator—0.18 to 0.8 A.

TRADELINE model.

Order Number	Switching		Cooling Anticipator	Mounting
	Fan	System		
T834A1261 ^a	None	None	In subbase.	Has captive screws for mounting on wallplate or Q634A subbase.
T834C1137 ^b	ON-AUTO	HEAT-OFF-COOL	In thermostat.	Two screws through base to wall or vertical outlet box.

^aOrder a Q634 Thermostat Subbase to add system switching.

^bOptional 120935G Wallplate available.



Typical heating-cooling hookup for T834C.

ACCESSORIES:

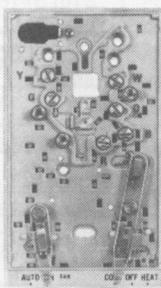
104994A Calibration Wrench.

193121A Mounting Plate Assembly. Includes adapter plate for mounting on horizontal or vertical outlet box. Covers old thermostat mounting.

Q634 Thermostat Subbase for mounting T834A models.

Thermostat Guards. See page 96.

Q634A,G THERMOSTAT SUBBASES



PROVIDES SYSTEM AND FAN SWITCHING FOR T834A THERMOSTATS.

Used in low voltage heating-cooling, or cooling only systems. Electrical Ratings: System and Fan Switch—2 A at 24 to 30 Vac. Mounts directly on wall or vertical outlet box.

Approximate Dimensions (including thermostat): 5 in. [127.0 mm] high, 2-7/8 in. [73.0 mm] wide, 1-3/8 in. [34.9 mm] deep.

ACCESSORIES:

193121A Mounting Plate Assembly. Includes adapter plate for mounting on horizontal or vertical outlet box. Covers old thermostat mounting marks.

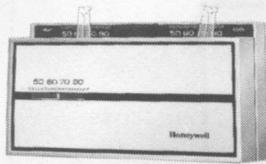
Order Number	Use With	Application	Switching	
			Fan	System
Q634A1047	T834A	For standard single transformer heating-cooling systems.	AUTO-ON	COOL-OFF-HEAT
Q634G1033	T834A	For electric heat or heat pump systems. Provides auto fan operation in heat and cool.	AUTO-ON	COOL-OFF-HEAT

TRADELINE



thermostats—multistage

T874 MULTISTAGE THERMOSTATS



PROVIDES LOW VOLTAGE CONTROL OF MULTISTAGE HEATING, COOLING, AND HEATING-COOLING SYSTEMS INCLUDING HEAT PUMP SYSTEMS.

Requires a Q674 Thermostat Subbase to provide wiring terminals, mounting base, and system and fan switching. Coiled bimetal elements operate

silent, dust-free mercury switches. External levers and scale for temperature setting on top of thermostat case. Electrical Rating: 24 to 30 Vac. Temperature Scale Range: 42 F to 88 F [6 C to 31 C]. Changeover Differential: 3 F [1.7 C] minimum between heating and cooling. Approximate Dimensions (including Q674 subbase): 3-1/2 in. [88.9 mm] high, 5-5/8 in. [142.9 mm] wide, 2-1/8 in. [54.0 mm] deep. For T874 models designed to meet Department of Defense specifications, see page 111.

TRADELINe models. • SUPER TRADELINe model.

Order Number	System Stages			Anticipator Ranges (A)				Remarks
				Heating (adj)		Cooling (fixed)		
	Heat	Cool	Other	Stage 1	Stage 2	Stage 1	Stage 2	
T874A1036	1	1	—	0.1 to 1.2	—	0 to 1.0	—	Includes 194559R Locking Cover and Locking Lever Assembly.
T874A1150	1	1	—	0.1 to 1.2	—	0 to 1.0	—	Field adjustable stops factory-set to prevent setting heat lever above 68 F [20 C] and cooling lever below 78 F [26 C]. 194559R Locking Cover and Locking Lever Assembly.
T874B1019	1	2	—	0.1 to 1.2	—	0 to 1.0	0 to 1.0	Includes 194559R Locking Cover and Locking Lever Assembly.
T874C1018	2	1	—	0.1 to 1.2	0.1 to 1.2	0 to 1.0	—	Includes 194559R Locking Cover and Locking Lever Assembly.
T874C1125	2	1	—	0.1 to 1.2	0.1 to 1.2	0 to 1.0	—	12 F [7 C] differential between heating stages.
*T874D1165	2	2	—	0.1 to 1.2	0.1 to 1.0	0 to 1.0	0 to 1.0	Field adjustable stops factory-set to prevent setting heat lever above 68 F [20 C] and cooling lever below 78 F [26 C]. Includes 194559R Locking Cover and Locking Lever Assembly.
T874E1016	—	2	—	—	—	0 to 1.0	0 to 1.0	Includes 194559R Locking Cover and Locking Lever Assembly.
T874F1015	2	—	—	0.1 to 1.2	0.1 to 1.2	—	—	Includes 194559R Locking Cover and Locking Lever Assembly.
T874G1246 ^d	2	1	1 ^a	0 to 1.0 ^c	0.1 to 1.2	—	0 to 1.0	Heat pump thermostat. 194559R Locking Cover and Locking Lever Assembly. Use with Q674F1212 subbase.
T874N1016 ^d	2	1	1 ^b	0.1 to 1.2	—	0 to 1.0	—	Heat pump thermostat. 194559R Locking Cover and Locking Lever Assembly. Use with Q674F1220 subbase.
T874R1152 ^d	2	1	—	0 to 1.0 ^c	0.1 to 1.2	0 to 1.0	—	Heat pump thermostat. Use with Q674L1207 only.
T874W1015 ^f	3 ^e	2	—	0 to 1.0 ^c	0 to 1.0 ^c	0 to 1.0	0 to 1.0	Use with Q674B1216 only.

^aChangeover operates in cooling mode.

^bChangeover operates in heating mode.

^cFixed voltage type anticipation.

^dHeat pump thermostat. For replacement of other customer special heat pump thermostats and subbases, contact your heat pump equipment manufacturer. You may also want to contact your Honeywell sales representative and/or consult the T874/Q674 specification sheet, Honeywell form no. 60-2485 for replacement information and internal circuitry of specific models.

^eThird stage of heating has anticipator range of 0 A to 1.0 A, fixed.

^fAvailable in Y594W1014 pack. See page 110.

continued next page

TRADELINe



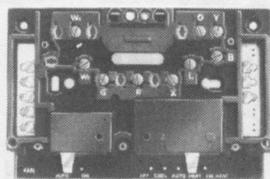
T874 continued

ACCESSORIES:

- 194559R Locking Cover and Locking Lever Assembly with thermometer. Includes cover, screws, Allen wrench for locking cover, and two self-tapping insulated screws.
- 194559S Locking Cover and Locking Lever Assembly without thermometer. Includes cover, screws, Allen wrench for locking cover, and two self-tapping insulated screws.

- 4074ECK Adjustable Lever Stop.
- C815A Outdoor Thermistor. See page 110.
- TG504A1025 Key Lock Cover with blank face and internal thermometer. See page 97.
- TG504A1033 Key Lock Cover with external thermometer. See page 97.
- Thermostat Guards. See page 96.

Q674 THERMOSTAT SUBBASES



PROVIDES WIRING TERMINALS, MOUNTING BASE, AND SYSTEM AND FAN SWITCHING FOR T874 MULTISTAGE THERMOSTATS.

See order table for application and switch position. Mounts on wall or horizontal outlet box. An adapter plate is available for mounting on vertical outlet box (see ACCESSORIES). Subbases available with no light, 1

light, or 2 light emitting diodes (LED's). Approximate Dimensions: 3-1/2 in. [88.9 mm] high, 5-5/8 in. [142.9 mm] wide, 5/16 in. [7.9 mm] deep.

ELECTRICAL RATINGS:

Switch Contacts—2.5 A at 30 Vac (7.5 A inrush).
Optional LED Lights—30 Vac.

ACCESSORY:

193121A Adapter Plate Assembly for covering old thermostat mounting marks or for mounting on vertical outlet box. Includes cover plate, adapter ring, and two mounting screws.

TRADELINE models.

Order Number ^a	Includes	Switch Positions		Use With
		System	Fan	
Q674A1019	—	HEAT-AUTO-COOL	AUTO-ON	T874A-D
Q674B1018	"G" terminal isolated on heating to provide fan relay operation from external low voltage fan switch.	HEAT-OFF-COOL	AUTO-ON	T874A-D
Q674B1034	—	HEAT-OFF-COOL	AUTO-ON	T874A-D
Q674B1075	For AUTO fan operation in heat and cool for electric furnace.	HEAT-OFF-COOL	AUTO-ON	T874A-D
Q674B1216	—	HEAT-OFF-COOL	AUTO-ON	T874W1015 only.
Q674C1058	—	OFF-AUTO	AUTO-ON	T874A-F
Q674D1040	For use when subbase switching is not required.	None	None	T874A-F
Q674E1049	—	OFF-HEAT-AUTO-COOL	AUTO-ON	T874A-D
Q674F1022	With one LED to indicate FILTER, CHECK, LOCKOUT, or EM. HT.	OFF-EM. HT.-HEAT-AUTO-COOL	AUTO-ON	T874C,D
Q674F1212	With two LED's to indicate AUX. HT. or EM. HT.	OFF-COOL-AUTO-HEAT-EM. HT.	AUTO-ON	T874G1246 only.
Q674F1220	With two LED's to indicate AUX. HT. or EM. HT.	OFF-COOL-AUTO-HEAT-EM. HT.	AUTO-ON	T874N1016 only.
Q674G1070	O and B terminals for operation of fan in AUTO position.	OFF-AUTO	None	T874A-F
Q674L1207	With two LED's to indicate AUX. HT. or EM. HT.	EM. HT.-HEAT-OFF-COOL	AUTO-ON	T874R1152 only.

^aYou may also want to contact your Honeywell sales representative and/or consult the T874/Q674 specification sheet, Honeywell form 60-2485, for replacement information and internal circuitry of specific models.





thermostats—multistage

Y594 MULTISTAGE COMBINATION PACKS

COMBINES APPROPRIATE T874 MULTISTAGE THERMOSTAT AND Q674 SUBBASE FOR SPECIFIC APPLICATIONS WITH OUTDOOR RESET.

Order Number	Application	Contains		
		Thermostat	Subbase	Thermistor
Y594G1161	For General Electric heat pumps. Replaces GE AY28X138 and AY28X077 automatic changeover thermostats.	T874G1204	Q674J1043	—
Y594R1136	For General Electric heat pumps. Replaces GE AY28X078 and AY28X139 manual changeover thermostats.	T874R1053	Q674L1140	—
Y594W1014	For new applications requiring 3 heat/2 cool switching on conventional equipment.	T874W1015	Q674B1216	C815A1005

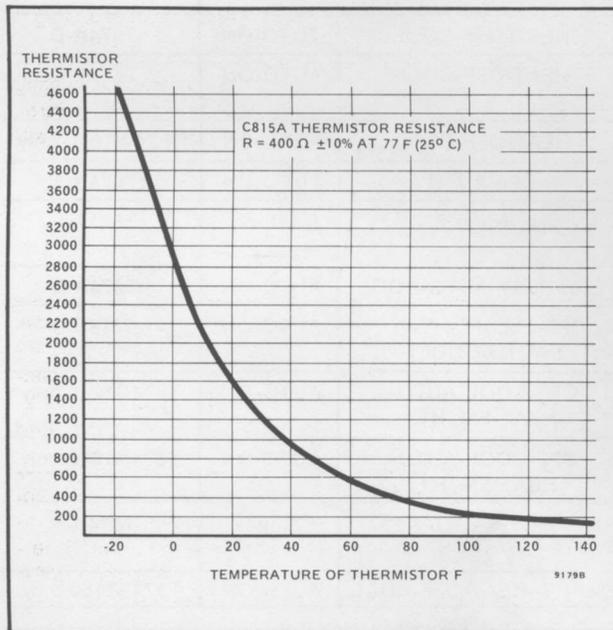
—C815A OUTDOOR THERMISTOR—

OUTDOOR THERMISTOR FOR USE WITH T874 MULTISTAGE THERMOSTATS WITH PROVISION FOR OUTDOOR RESET.

Resets T874 control point. Two black 6 in. [152.4 mm] leads. Ambient Temp. Range: Minus 45 F to plus 113 F [minus 43 C to plus 45 C]. Resistance: 400 ohms.

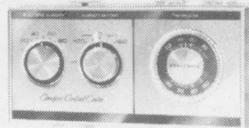
ELECTRICAL RATING: 24 to 30 Vac.

Order Number	Use With
C815A1005	T874 Multistage Thermostats with outdoor reset.



C815A thermistor resistance chart.

W884B COMFORT CONTROL CENTER



PROVIDES TEMPERATURE AND HUMIDITY CONTROL IN RESIDENTIAL APPLICATIONS.

All comfort controls, including a T87F

Thermostat, Q539 Thermostat Subbase and H86 Humidistat are combined in the W884 to make a convenient, attractive control center. An odor control system switch may be installed (order separately). Optional filter light indicates a clogged-filter condition. Dimensions: 4-5/16 in. [109.5 mm] high, 7-1/2 in. [190.5 mm] wide, 2-3/8 in. [60.3 mm] deep.

ACCESSORIES:

133326BA Filter Light.

133747AA Odor Control System Switch—HI-LOW-OFF.

Order Number	Device	Specifications
W884B1007	T87F2378	Switching: spdt. Temp. Range: 50 F to 100 F [10 C to 38 C]. Switch Rating: 1.5 A at 30 Vac. Heat Anticipator: 0.1 to 1.2 A, adjustable; factory-set at 0.4 A.
	Q539A1162	System Switching: COOL-OFF-HEAT. Fan Switching: AUTO-ON. Switch Rating: 2 A at 30 Vac.
	H86A1112	Switching: spst; makes on RH decrease. RH Range: 10 to 35 percent. Differential: 2 to 3 percent RH. Switch Rating: 0.5 A at 24 Vac.

thermostats—DoD



LOW VOLTAGE THERMOSTATS MEETING DEPARTMENT OF DEFENSE SPECIFICATIONS

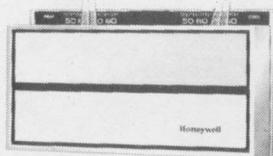
(Department of Defense [DoD] Manual 4270.1-M)
See SPECIFICATIONS and order table below for heating, cooling, and heating-cooling thermostats meeting DoD standards.



T87



T822
TS822



T874



T8082

SPECIFICATIONS:

Model	Electrical Rating	Anticipation		Switching	Dimensions
		Heating	Cooling		
T87	1.5 A at 30 Vac.	Adj. 0.1 A to 1.2 A.	Fixed 0 A to 1.5 A, 24 to 30 Vac.	Spdt	3-1/4 in. [82.6 mm] dia., 1-1/2 in. [38.1 mm] deep.
T822	1.5 A at 30 Vac.	Adj. 0.18 A to 0.80 A.	—	Spst	4-3/4 in. [120.7 mm] high, 2-7/8 in. [73.0 mm] wide, 1-1/8 in. [28.6 mm] deep.
TS822	0.1 A at 750 mV.	Fixed resistor.	—		
T874	Heating—1.2 A at 30 Vac at each stage. Cooling—1.5 A at 30 Vdc.	Adj. 0.1 A to 1.2 A each stage.	Fixed 0 A to 1.0 A, 24 to 30 Vac.	Spst	3-1/2 in. [88.9 mm] high, 5-5/8 in. [142.9 mm] wide, 2-1/8 in. [54.0 mm] deep.
T8082	1.5 A at 30 Vac.	Adj. 0.1 A to 1.2 A.	Fixed 0 A to 1.0 A, 24 to 30 Vac.	Spdt	4-1/16 in. [103.2 mm] high, 6-3/4 in. [171.5 mm] wide, 2-1/4 in. [57.2 mm] deep.

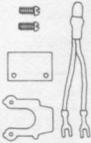
Order Number	Application	Set Point Range	Features	Additional
T87F2816	Heating only.	38 F to 72 F [3 C to 22 C]	Locking cover. No thermometer.	Includes wallplate and screws.
T87F2824	Cooling only.	78 F to 112 F [26 C to 44 C]	Locking cover. No thermometer.	
T822D1719	Heating only.	38 F to 72 F [3 C to 22 C]	No thermometer.	For wall or vertical outlet box mounting. Two screws furnished for wall mounting.
TS822A1161	Heating only, 750 mV applications.	38 F to 72 F [3 C to 22 C]	No thermometer.	
T874A1176	1-stage heating. 1-stage cooling.	Heating: 40 F to 72 F [4 C to 22 C] Cooling: 78 F to 90 F [26 C to 32 C]	Locking cover. No thermometer.	Separate levers for heating and cooling set point control. Set point lever ranges not adjustable.
T874C1141	2-stage heating. 1-stage cooling.	Heating: 40 F to 72 F [4 C to 22 C] Cooling: 78 F to 90 F [26 C to 32 C]	Locking cover. No thermometer.	
T8082A1296	Heating only.	38 F to 72 F [3 C to 22 C]	Locking cover; lever locking screws. No thermometer. Maximum 65 F [18 C] during setback period with 7 F [4 C] minimum setback. With fixed 5 hr. setback.	With color-coded program advance button, program indicator, and temperature setting levers. Also includes 2- or 3-wire wallplate and screws.
T8082A1312	Heating-cooling.	40 F to 90 F [4 C to 32 C]	Locking cover; lever locking screws. No thermometer. Max. Setting in Heat Mode: 72 F [22 C] with 7 F [4 C] minimum setback. Min. Setting in Cool Mode: 78 F [26 C] with 7 F [4 C] minimum setup. With fixed 5 hr. setback.	With color-coded program advance button, program indicator, and temperature setting levers. Requires Q682A or B Subbase (order separately).

TRADELINE



thermostats

PARTS AND ACCESSORIES

Order Number	Description	Use With	Order Number	Description	Use With
104994A	Calibration wrench.	Low voltage thermostats	191127B	Battery replacement pack, 3 Vdc.	T8082
 113502A	Adapter plate. For mounting vertical thermostat on a standard size horizontal switch box.	T462, T870	191135M	Cover assembly.	T8082A
129044A	Adapter ring assembly. Includes cover ring, adapter ring and mounting screws. Covers marks left by old thermostat. Allows mounting on vertical or horizontal outlet box.	T26, T87F, TS86, Q539	192075A	Battery quick-charge kit.	T8082
129571	Light bulb. 1.2 W at 28 Vac. Screw base.	Q539	193121A	Cover plate assembly. Includes cover plate, wall bracket and screws.	T874, T8082, T8085
 135734A	Field addable indicator light package. Contains light with leads, four lenses, two screws and one shield.	Q539	193817A	Battery replacement pack.	T800
 137421A,B	Wallplate. Includes three terminals marked R, W, Y and alternate series 20 terminal designations.	T87F	193933A	Battery replacement pack, 1.5 Vdc.	T8082
			195264B	Cover assembly.	T8085A,B,C,R
			196393A	Cover plate assembly. Covers old thermostat mounting marks or for mounting on outlet box.	T8100, T8200
			4074DAY	Program pins assembly.	T8082, T8085
			4074EBR	Adjustable lever stop.	T8082, T8085
			4074EDS	Locking guard key and clear LED window.	TG504

Save Energy and Keep Heating and Cooling Costs Down!

There's a Honeywell Locking Thermostat, Cover, or Guard for virtually all applications.

- **T87F2998 and T87F3004 Key Lock Thermostats** are ideal for public areas where both security and appearance are important. Available with a 'see through' or a solid face.
- **TG500 and TG501 Universal Thermostat Guards** fit most rectangular Honeywell thermostats.
- **TG503 Locking Thermostat Guard** fits all Honeywell 'Round' Thermostats without subbase.
- **TG504 Key Lock Cover for T874 Multistage Thermostats.** Available with exposed or hidden thermometer.

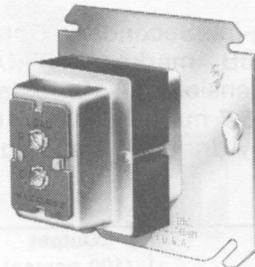
See pages 96 and 97 for more information.

TRADELINE

transformers

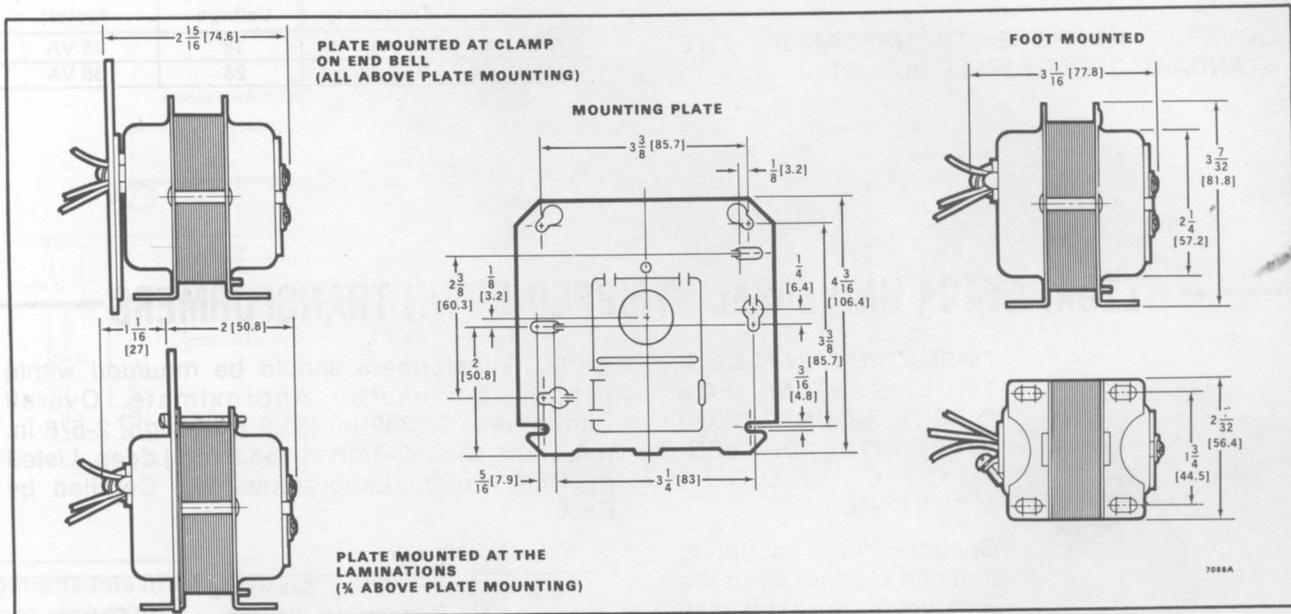


AT72D TRANSFORMER



24 VOLT CONTROL CIRCUIT STEP-DOWN TRANSFORMER DESIGNED TO OPERATE ANY 24 V CONTROL SYSTEM, INCLUDING THERMOSTATS, GAS VALVES, AND/OR RELAYS.

NEC Class 2 general purpose transformer. Meets NEMA Standard ST2-1973 "Residential Controls Class 2 Transformers." Marked: NEMA Type D. Overload protection provided. Color-coded leadwire connections. Output (100 percent power factor): 40 VA. Listed by Underwriters Laboratories Inc. Certified by CSA.



SUPER TRADELINE AT72D mounting dimensions in in. [mm in brackets]. Mounting options include foot-mounting; plate-mounting for use on 4 x 4 in., 4 in. octagon, and 2 x 4 in. electrical boxes; and clamp-mounting via a junction box knockout.

- *SUPER TRADELINE models.*

Order Number	Primary		Secondary		Mounting
	Voltage (50/60 Hz)	Connections	Voltage (open circuit)	Connections	
•AT72D1683 •AT72D1691	120 208/240	9 in. [228.6 mm] leadwires.	26.5	2 screw terminals.	Can be foot-mounted; plate-mounted on 4 x 4 in., 4 in. octagon, or 2 x 4 in. electrical boxes (transformer all above plate or ¾ above plate); or clamp-mounted via a junction box knockout.

AT72F TRANSFORMER

TRANSFORMER FOR USE IN ELECTRONIC AIR CLEANER SYSTEMS.

Box over secondary terminals provides mounting for S830 Filter Flag Indicator.

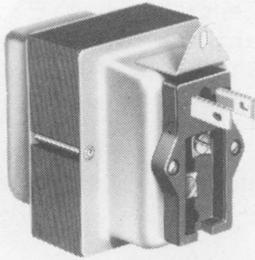
Order Number	Primary Voltage/Frequency	Secondary Voltage (open circuit)	Output (100 percent power factor)
AT72F1004	120 V, 60 Hz	13	10 VA

TRADELINE



transformers

AT86A,B PLUG-IN TRANSFORMERS

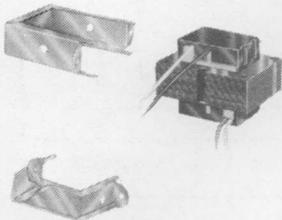


Primary Connections: Plug-in. Secondary Connections: Terminals. AT86B marked: NEMA Type D. Approximate Dimensions: 2-15/16 in. [74.6 mm] high, 2-5/8 in. [66.7 mm] wide, 2-3/16 in. [55.6 mm] deep. Listed by Underwriters Laboratories Inc.

Order Number	Primary Voltage/ Frequency	Secondary Voltage	Output (100 percent power factor)
AT86A1009	120 V, 60 Hz	18	25 VA
AT86B1008	120 V, 60 Hz	25	38 VA

GENERAL PURPOSE TRANSFORMER. FITS STANDARD DUPLEX WALL OUTLET.

AT20A, AT40A UNIVERSAL STRIPPED-DOWN TRANSFORMERS



OPERATES A 24 V CONTROL SYSTEM. FOR DIRECT MOUNTING OR HORIZONTAL OR VERTICAL FOOT-MOUNTING.

Channel frame mounting feet and slots allow for the 3 mounting positions (see illustration). Meets NEMA ST2-1973 Standard, "Res-

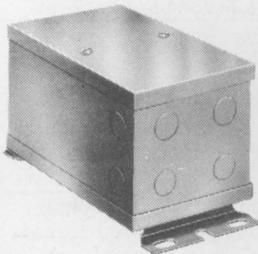
idential Controls—Class 2 Transformers." AT20A marked: NEMA Type B; AT40A marked: NEMA Type D. 9 in. [228.6 mm] primary and secondary

leads. Transformers should be mounted within proper enclosure. Approximate Overall Dimensions: 2-3/32 in. [53.2 mm] high, 2-5/8 in. [66.7 mm] wide, 2-3/16 in. [55.6 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.

TRADELINE models.

Order Number	Primary Voltage (50/60 Hz)	Secondary Voltage (open circuit)	Output (100 percent power factor)
AT20A1123	120 V	26.5	20 VA
AT40A1121	120 V	26.5	40 VA
AT40A1139	240 V	26.5	40 VA

AT92A,B,C TRANSFORMERS



HEAVY DUTY, MULTI-TAPPED TRANSFORMERS, POTTED AND ENCASED IN HEAVY SHEETMETAL BOX WITH REMOVABLE COVER.

Primary and secondary leadwires are color-coded. Case has 8 knockouts for 1/2 in. conduit. Max. Ambient Temp: 100 F [38 C]. Mounting:

Foot-mounted case with 4 elongated screw holes and 2 screw slots. Approximate Dimensions: 4-11/16 in. [119.1 mm] high, 9-11/16 in. [246.1 mm] long, 4-13/16 in. [122.2 mm] deep including brackets. Listed by Underwriters Laboratories Inc. Certified by CSA.

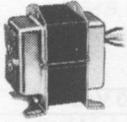
Order Number	Voltage (60 Hz)		Capacity
	Primary	Secondary	
AT92A1007	120/240/480	17/24	100 VA
AT92B1006	240/280	120/240	100 VA
AT92C1005	120/240/480	17/24	250 VA

TRADELINE

transformers



AT87A, AT88A TRANSFORMERS



Foot-Mounted

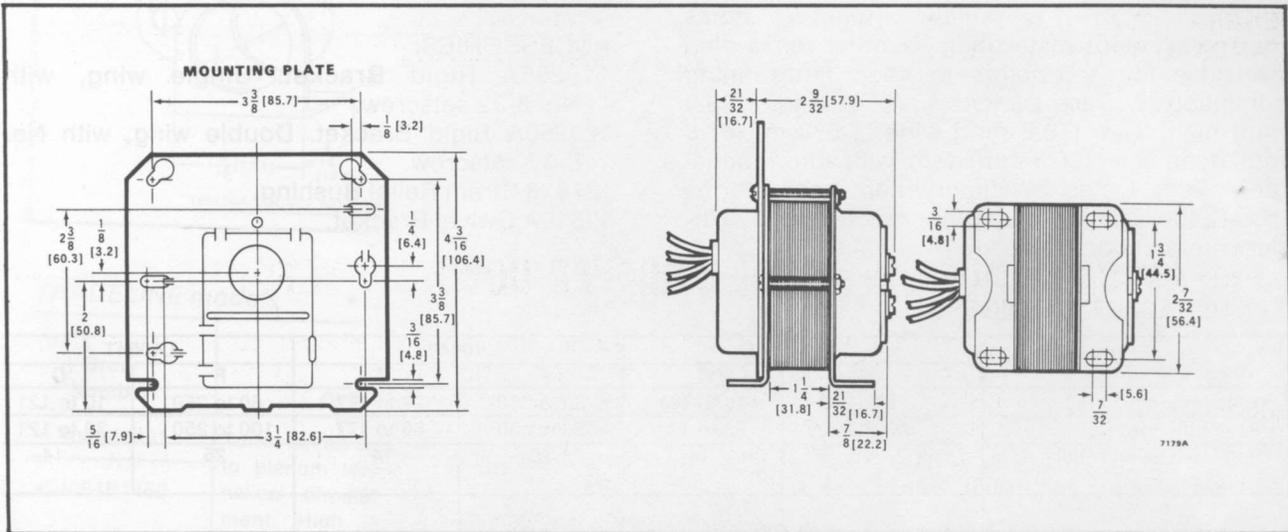


AT87A1106

USED PRIMARILY FOR POWERING 24 V AIR CONDITIONING CIRCUITS. CAN ALSO BE USED IN OTHER APPLICATIONS THAT DO NOT EXCEED THE LISTED RATINGS.

See order table for description. Overload protection provided. Leadwires for primary connections are color-coded as follows.

120 V	208 V	240 V	277 V	480 V	Common
White	Red	Orange	Brown	Black/Red	Black



Dimensions in in. [mm in brackets] of SUPER TRADELINE AT87A1106 for combination 4 x 4 in. plate- or foot-mounting.

TRADELINE model. • SUPER TRADELINE model.

Order Number	Primary		Secondary		Output (100 percent power factor)	Mounting	Overload Protection
	Voltage (50/60 Hz)	Connections	Voltage (open circuit)	Connections			
AT87A1007	120	9 in. [228.6 mm] leads.	26.5	2 screw terminals.	48 VA	4 x 4 in. plate.	Fusible link in primary.
AT87A1049	120	12 in. [304.8 mm] leads.	26.5	12 in. [304.8 mm] leads.	48 VA	Foot-mounted.	Fusible link in primary.
AT87A1056	120/208/240	12 in. [304.8 mm] leads.	28.0	12 in. [304.8 mm] leads.	48 VA	Foot-mounted.	3.2 A fuse in secondary.
•AT87A1106	120/208/240	13 in. [330.2 mm] leads.	28.0	2 screw terminals.	50 VA	Foot-mounted or 4 x 4 in. plate.	Built-in protection.
AT87A1155	480 ^a	12 in. [304.8 mm] leads.	26.5	12 in. [304.8 mm] leads.	48 VA	Foot-mounted.	Fusible link in primary.
AT87A1189	277 ^a		26.5		48 VA		
AT88A1005	120		26.5		75 VA		
AT88A1021	208/240 ^a		26.5		75 VA		
AT88A1047	480 ^a		26.5		75 VA		

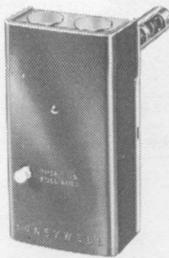
^a60 Hz.

TRADELINE



warm air controls

L4064B,D,J,T FAN AND LIMIT CONTROLLERS



FOR CONTROL OF HIGH LIMIT AND FAN MOTOR IN ALL TYPES OF FORCED AIR HEATING SYSTEMS.

See tables below for temperature ratings and application. Push-in terminals for easy installation. Adapts to many competitive mounting holes

for replacement installation. Manual fan switch overrides fan set points to keep fan running continuously. Case Dimensions: 5-1/4 in. [133.4 mm] high, 3 in. [76.2 mm] wide, 1-5/8 in. [41.3 mm] deep (2 in. [50.8 mm] deep with auto-manual fan switch). Listed by Underwriters Laboratories Inc.—L4064B,D,T. Component recognized by Underwriters Laboratories Inc.—L4064J.

ELECTRICAL RATINGS (A):

	120 Vac		240 Vac	
	Fan	Limit	Fan	Limit
Full Load	14	8	7	4
Locked Rotor	84	48	42	24

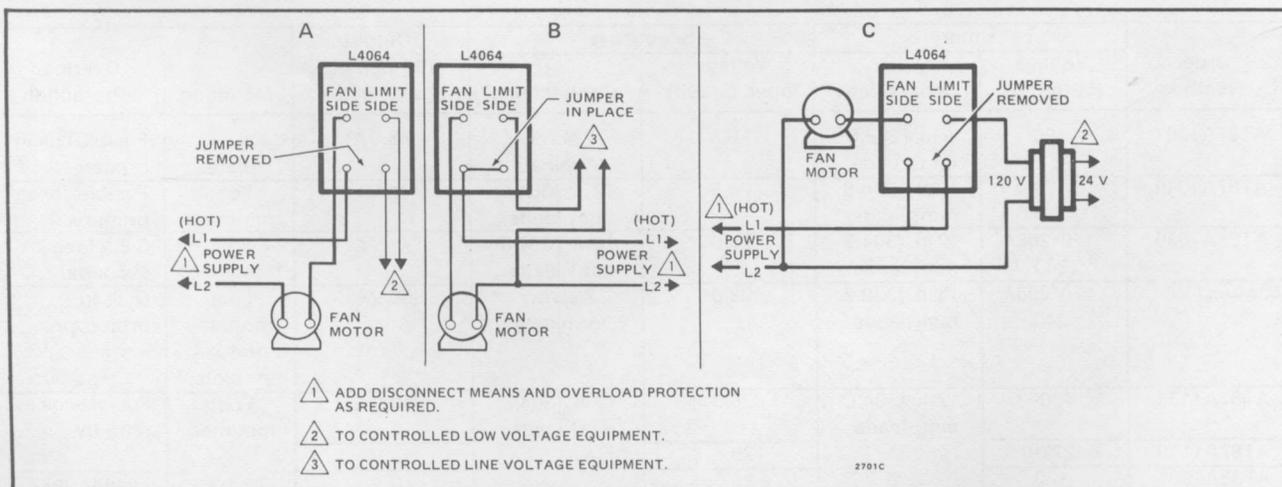
Pilot Duty: 2 A at 24 Vac; 0.25 A at 0.25 to 12 Vdc.
Max. Combined Connected Load: 2000 VA.

ACCESSORIES:

- 110265A Rigid Bracket. Single wing, with No. 8-32 setscrew.
- 129250A Rigid Bracket. Double wing, with No. 8-32 setscrew.
- 137813 Strain Relief Bushing.
- 32612A Swivel Bracket.

TEMPERATURE RATINGS:

	L4064B,D		L4064J		L4064T	
	F	C	F	C	F	C
Scale Range	50 to 250	10 to 121	80 to 350	27 to 177	50 to 250	10 to 121
High Limit Range	100 to 250	38 to 121	150 to 350	66 to 177	100 to 250	38 to 121
High Limit Differential, Fixed	25	14	25	14	25	14
Fan Setting Range ON	65 to 215	18 to 104	100 to 305	38 to 152	Fan comes on 9 sec. after call for heat	
OFF	50 to 200	10 to 96	80 to 290	27 to 143	50 to 200	10 to 96
Fan Differential, Adj.	22, min.	12, min.	27, min.	15, min.	—	—
Minimum Switch Temp.	32	0	32	0	-40	-40
Maximum Switch Temp.	190	88	190	88	190	88
Maximum Element Temp.	350	177	250 above limit set point	139 above limit set point	350	177



- A: L4064 limit in low voltage circuit.
- B: L4064 limit in line voltage circuit.
- C: L4064 limit in line voltage circuit without jumper.

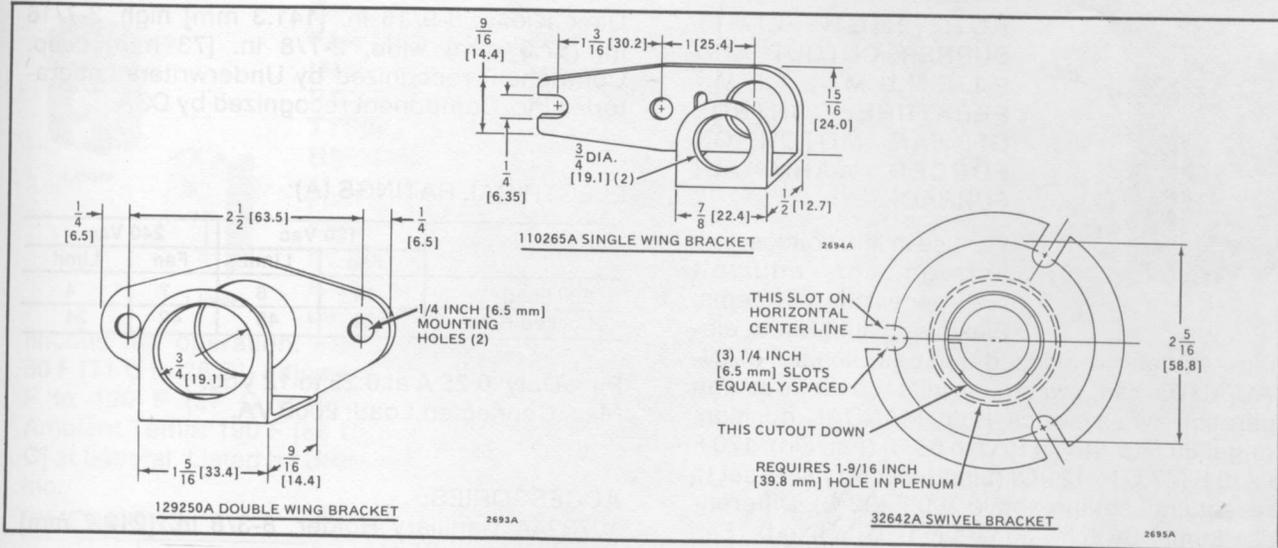
continued next page

TRADELINE

warm air controls



L4064B,D,J,T continued



Mounting options for L4064.

TRADELINE models. • SUPER TRADELINE models.

Order Number	Application	Insertion Element		Mounting	Includes
		in.	mm		
•L4064B1451	Turns fan on and off according to plenum temperature. With helical bimetal sensing element. High limit stop factory-set at 200 F [93 C].	11	279.4	Surface or rigid bracket.	Cover, screw terminal adapters, rigid mounting bracket ^a , insertion tube adapter (allowing replacement of 5/8, 3/4, or 1 in. [15.9, 19.1, or 25.4 mm] dia. element models), and two snap-on strain reliefs.
•L4064B1469		5	127.0		
L4064B2210		11	279.4	Surface.	
L4064B2228	5	127.0			
L4064B2236	8	203.2			
L4064D1002	Turns fan on and off according to plenum temperature. With spiral sensing element. High limit stop factory-set at 200 F [93 C].	1-1/2	38.1	Rigid bracket.	Screw terminal adapters, manual fan switch.
L4064J1008	Turns fan on and off according to plenum temperature. With helical bimetal sensing element. Special high temperature range suitable for gravity heating systems. High limit stop factory-set at 250 F [121 C].	11	279.4		
•L4064T1129	Bimetal heater turns fan on approximately 20 to 90 seconds after thermostat calls for heat. ^b Fan turns off according to plenum temperature. High limit stop factory-set at 200 F [93 C].	5	127.0	Surface or rigid bracket.	Cover, screw terminal adapters, manual fan switch, rigid mounting bracket ^a , insertion tube adapter (allowing replacement of 5/8, 3/4, or 1 in. [15.9, 19.1, or 25.4 mm] dia. element models), and two snap-on strain reliefs.

^aUse of rigid mounting bracket allows installer to vary insertion length to fit application.

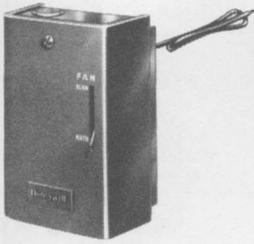
^bTiming varies according to voltage and ambient temperature at switch.

TRADELINE



warm air controls

L4017B COMBINATION CONTROL



FOR HIGH LIMIT BURNER CUTOUT AND PLENUM TEMPERATURE CONTROL OF FAN MOTOR ON FORCED WARM AIR FURNACES.

For use in line voltage, low voltage, or millivolt (self-generating) systems. Flexible, liquid-filled element actuates enclosed snap switches.

MANUAL-AUTO fan switch permits continuous fan operation when switch is in MANUAL position. Range: 60 F to 140 F [16 C to 60 C] (Fan On); 170 F to 250 F [77 C to 121 C] (Limit). Factory stop set to prevent limit setting above 200 F [93 C]. Differential: Limit Switch—25 F [14 C], fixed; Fan Switch—15 F to 50 F [8 C to 28 C], adjustable. Max. Ambient Temp: 190 F [88 C] at switches, 300 F [149 C] at sensing element. Case

Dimensions: 5-9/16 in. [141.3 mm] high, 3-7/16 in. [87.3 mm] wide, 2-7/8 in. [73 mm] deep. Component recognized by Underwriters Laboratories Inc. Component recognized by CSA.

ELECTRICAL RATINGS (A):

	120 Vac		240 Vac	
	Fan	Limit	Fan	Limit
Full Load	14	8	7	4
Locked Rotor	84	48	42	24

Pilot Duty: 0.25 A at 0.25 to 12 Vdc.
Max. Connected Load: 2000 VA.

ACCESSORIES:

- 107324A Capillary Holder, 8-3/8 in. [212.7 mm] long.
- 21136E Adapter Plate Bag Assembly to match mounting holes of competitive devices.

TRADELINE models.

Order Number	Insertion Length ^a	Includes
L4017B1186	60 in. [1524.0 mm] capillary (incl. bulb).	Adjustable limit stop and element support bracket.
L4017B1194	10 in. [254.0 mm], self-supporting.	Adjustable limit stop.

^aInsertion length includes capillary length plus element length.

L4029E HIGH LIMIT CONTROLLER



OPENS LINE OR LOW VOLTAGE CIRCUIT AND SHUTS OFF FAN IF AIR TEMPERATURE REACHES SET POINT.

Manual reset. May be used as a fire stat in ductwork. Positive lockout of burner in case of fan failure. Flat bimetal strip inserted directly into air-

stream actuates snap-acting, spst, normally closed switch. L4029E is a limit controller only, and should not be used as a starting switch. Max. Ambient Temp: 190 F [88 C] at switch; 350 F [177 C] at element. Element Insertion Length: 3 in. [76.2 mm]. Case Dimensions (excluding element): 3-3/4 in. [95.3 mm] high, 2-5/16 in. [58.7 mm] wide, 2 in. [50.8 mm] deep. Listed by Underwriters Laboratories Inc. Component recognized by CSA.

ELECTRICAL RATINGS (A):

	30 Vac	120 Vac	240 Vac
Full Load	2	10	5
Locked Rotor	—	60	30

Pilot Duty: 0.25 A at 0.25 to 12 Vdc.

TRADELINE models.

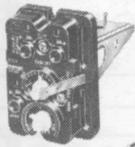
Order Number	Temperature Cutout Setting (fixed)	
	F	C
L4029E1011	135	57
L4029E1029	200	93
L4029E1045	240	116
L4029E1052	145	63
L4029E1060	225	107
L4029E1219	165	74
L4029E1227	125	52

TRADELINE

warm air controls



L4068E,F FAN CONTROLS



L4068F



L4068E

OPERATES FURNACE FAN MOTOR ACCORDING TO AIR TEMPERATURE IN ALL TYPES OF FORCED AIR HEATING SYSTEMS.

Flat bimetal element, inserted into the airstream, actuates an spst snap-acting switch. Manual switching for continuous fan operation. Fan Differential: 20 F to 50 F [11 C to 28 C], adjustable. Fan Off Range: 80 F to 120 F [27 C to 49 C], adjustable. Max. Ambient Temp: 190 F [88 C] at switch; 350 F [177 C] at bimetal. Listed by Underwriters Laboratories Inc.

DIMENSIONS:

Model	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
L4068E	3-3/4	95.3	2-5/16	58.7	2-3/8	60.3
L4068F	2-3/4	69.9	1-7/8	47.6	2-3/8	60.3

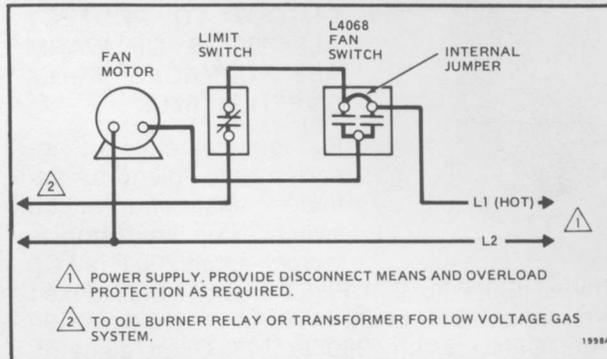
ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	14	7
Locked Rotor	84	42

Pilot Duty: 50 VA at 24 Vac.

ACCESSORY:

132475E Case and Cover Assembly for L4068F.



Typical wiring for L4068E,F used in forced air heating system.

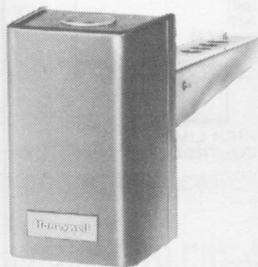
TRADELINE models.

Order Number	Element Length		With Case and Cover
	in.	mm	
L4068E1047	3	76.2	Yes
L4068E1054	7	177.8	Yes
L4068F1078 ^a	3	76.2	No ^b
L4068F1086 ^a	7	177.8	No ^b

^aFan off factory-set at 100 F [38 C]; fan differential factory-set at 25 F [14 C].

^bOrder case and cover separately, if required. See ACCESSORY.

L6068A AIR SWITCH



CONTROLS FAN IN WARM AIR APPLICATIONS.

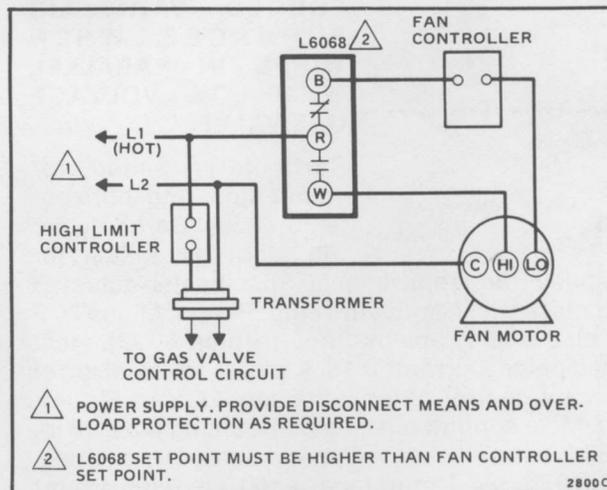
Prevents reverse air circulation and abnormal filter temperatures in downflow furnaces. With spdt switching for 2-speed blower operation. Fixed Differential: 20 F [11 C]. Max. Ambient Temp: 190 F [88 C] at switch; 350 F [177 C] at bimetal. Push-in terminals. Approximate Case Dimensions: 3-3/4 in. [95.3 mm] high, 2-5/16 in. [58.7 mm] wide, 2 in. [50.8 mm] deep. Listed by Underwriters Laboratories Inc.

ELECTRICAL RATINGS (A):

	120 Vac		240 Vac	
	R-W	R-B	R-W	R-B
Full Load	14	10	7	5
Locked Rotor	84	60	42	30

Pilot Duty: 50 VA at 24 Vac.

Max. Connected Load: 2000 VA.



Typical wiring connections for L6068 used to control a 2-speed fan motor. R-W makes, R-B breaks on temperature rise to set point.

Order Number	Element Insertion Length		Range	
	in.	mm	F	C
L6068A1009	3	76.2	125 to 165	52 to 74
L6068A1017	7	177.8		

TRADELINE



warm air controls

L4069A LIMIT CONTROLLER



USED AS A HIGH TEMPERATURE BURNER CUTOUT TO PROTECT ALL TYPES OF WARM AIR FURNACES FROM OVERHEATING.

Flat bimetal element, inserted into plenum, actuates spst snap-action switch. High limit stop is factory-set at 200 F [93 C].

Range: 180 F to 250 F [82 C to 121 C]. Fixed Differential: 25 F [14 C]. Max. Ambient Temp: 190 F [88 C] at switch, 350 F [177 C] at element. Approximate Dimensions: 3-3/4 in. [95.3 mm] high, 2-5/16 in. [58.7 mm] wide, 2 in. [50.8 mm] deep. Component recognized by Underwriters Laboratories Inc.

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	8	4
Locked Rotor	48	24

Pilot Duty: 50 VA at 24 Vac. 0.25 A at 0.25 to 12 Vdc (millivoltage systems).

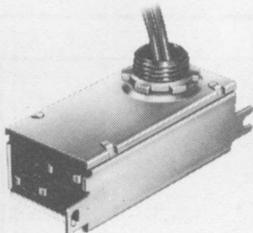
ACCESSORY:

124199A Limit Stop Kit.

TRADELINE models.

Order Number	Element Length		With Cover
	in.	mm	
L4069A1060	7	177.8	Yes
L4069A1078	3	76.2	Yes

S876A FURNACE FAN TIMER CONTROL



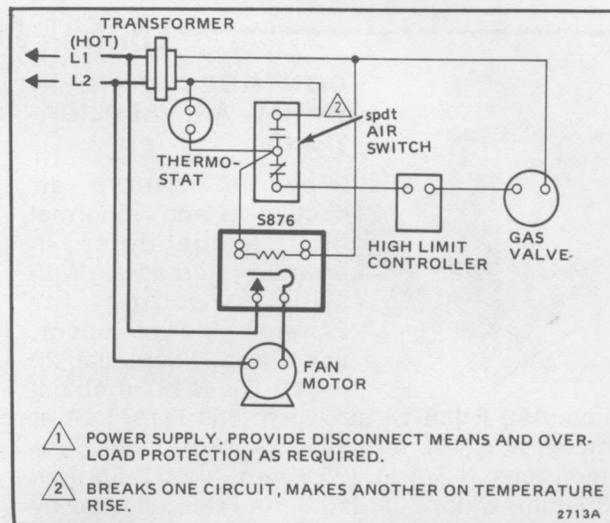
PROVIDES TIMED FAN OPERATION OF FORCED WARM AIR FURNACES WHEN WIRED IN PARALLEL WITH LOW VOLTAGE GAS VALVE.

Particularly suited for counterflow and horizontal furnaces. Can be used with spdt air switch for

2-speed fan applications. Spst heater-actuated bimetal switch. Ambient Temp. Range: Minus 20 F to plus 140 F [minus 29 C to plus 60 C]. Heat Anticipator Current: 0.16 A plus current draw of primary control. Supply Voltage: 24 Vac. Mounting: Male conduit bushing or mounting tabs. 18 in. [457.2 mm] leads. Approximate Dimensions: 3-5/16 in. [84.1 mm] long (4-3/16 in. [106.4 mm] with mounting tab), 1-9/16 in. [39.7 mm] wide, 1-3/16 in. [30.2 mm] deep (1-11/16 in. [42.9 mm] with bushing). Component recognized by Underwriters Laboratories Inc. Certified by CSA.

ELECTRICAL RATINGS (A):

	120 Vac	240 Vac
Full Load	14	7
Locked Rotor	84	42



Hookup for S876A used on conventional or counterflow furnace, with spdt air switch to provide fan operation in case of excessive plenum temperature.

TRADELINE model.

Order Number	Timing Sequence	
	Fan On	Fan Off
S876A1016	1 min. after burner starts	2 min. after burner shutdown

TRADELINE

Honeywell

Residential Group ENERGY PRODUCTS

The next 120 pages feature the following Honeywell Energy Products:

- Auxiliary Equipment
- Chiller Controls
- Dampers
- Economizers
- Environmental Control Systems
- Hydronic Zone Controls
- Line Voltage and Proportional Thermostats
- Load Control Systems
- Motors
- Outdoor Reset Controls
- Power Line Carrier System
- Refrigeration Controls
- Remote Bulb Temperature Controls
- Step Controllers
- Timers
- Valves



Controls available only through Authorized Honeywell Energy Management Distributors are headlined in orange for easy recognition. A list of Authorized Energy Management Distributors, arranged by location, follows the product section. See page 243.

PRODUCTS TO CONSERVE ENERGY AND SAVE YOU MONEY

Honeywell energy management systems help you control energy efficiently and automatically. They have been installed in office buildings, restaurants, fast-food operations, supermarkets, convenience stores, drugstores, hotels/motels and similar commercial buildings. In installation after installation, these systems generate substantial savings, an attractive payback, and a profitable bottom line. For more information about energy management systems and their components, consult the following pages.

COMMERCIAL CONTROLS REFERENCE MANUAL

A two-volume set containing specification sheets, selection guides, survey forms for utility rate analysis, guide specifications, promotional and training literature—all this and more. Honeywell will mail you current information to update your Commercial Controls Reference Manual approximately every six months. For ordering information, see page 253.



auxiliary equipment

Honeywell switches and transformers commonly used in residential control systems are in the **RESIDENTIAL CONTROLS** section of this catalog, pages 1 through 120. Refer to the Model Number Index, page iv, for exact page number.

AT74A,B,C TRANSFORMERS

Foot-mounted



Plate-mounted

RUGGED, HEAVY DUTY, GENERAL PURPOSE MULTITAPPED TRANSFORMERS.

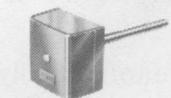
Tapped transformer secondaries provide a selection of three different low voltages. Terminals are identified by voltages for convenience in wiring. Approx. Dimensions

(plate mounting): 4-3/16 in. [106 mm] high, 4-3/16 in. [106 mm] wide, 4-1/8 in. [105 mm] deep. Approximate Dimensions (foot mounting): 3 in. [76 mm] high, 4-1/16 in. [103 mm] wide, 3-5/16 in. [84 mm] deep. Listed by Underwriters Laboratories Inc.

Order Number	Primary Voltage (50/60 Hz)	Secondary Voltage	VA Rating (100 percent power factor)	Mounting
AT74A1005	120	18, 20, 24	100 VA at 24 V	4 x 4 in. junction box.
AT74A1013	208	18, 20, 24	100 VA at 24 V	
AT74A1021	240	18, 20, 24	100 VA at 24 V	
AT74B1004 ^a	120	18, 20, 24	65 VA at 24 V	
AT74C1037	120	20, 24, 28	110 VA at 28 V	Foot-mounted for panel or wall surface mounting.

^aWith replaceable secondary fuse.

C7031 ELECTRONIC TEMPERATURE SENSORS



C7031B,C



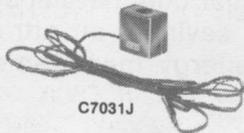
C7031E



C7031K



C7031D



C7031J

ELECTRONIC TEMPERATURE SENSOR USED WITH W927, W902, W903 ELECTRONIC CONTROLLERS AND M7044, M7045 ELECTRONIC MODUTROL MOTORS IN RESIDENTIAL OR COMMERCIAL HEATING AND COOLING SYSTEMS.

Refer to order table for general application. C7031 solid state thermistor element provides accurate sensing of temperature changes and is not affected by dust, dirt, or vibration. Primary sensors (see order table) can be used with a remote set point potentiometer.

ACCESSORIES:

S963B1011 Remote Set Point Potentiometer. Used with C7031B,C,D,K. Calibrated in degrees Fahrenheit.

801967D Remote Set Point Potentiometer. Used with C7031B,C,D,K. Calibrated in degrees Celsius.

103755DA Well Assembly. Used with C7031B in hot water applications. Includes well and mounting clip.

continued next page

TRADELINE

auxiliary equipment



C7031 continued

Order Number	Application	Sensor Type	Operating Range (Element)		Element Insertion Length		Sensitivity (Ohms per 1 F [0.6 C])	Sensor Resistance (Ohms) ^c at 74 F [23 C]	Sensor Used With
			F	C	in.	mm			
C7031B1009 ^d	Duct discharge air, hot water	Primary	40 to 240	4 to 60	5 ^b	127 ^b	4.2	1772	W902, W903, M7044, M7045, W927G,H,J
C7031C1007 ^a	Duct discharge air	Primary	40 to 240	4 to 60	18	457	4.2	1772	W902, W903, M7044, M7045, W927G,H,J
C7031D1005 ^{a,d}	Hot or chilled water (includes immersion well)	Primary	40 to 240	4 to 60	3-3/8	86	4.2	1772	W902, W903, M7044, M7045, W927G,H,J
C7031D1047 ^a	Hot water discharge sensor	Primary	80 to 230	4 to 116	3-3/8	86	4.2	1977	W927H,J
C7031E1002	Secondary anticipation and discharge stabilization in air handling systems	Secondary	40 to 140	4 to 60	10	254	4.2	982	M7044, M7045
C7031F1000	Outdoor reset of discharge air temperature	Secondary	-40 to +110	-40 to 43	—	—	13.6	947	W902, W903, M7044, M7045, W927G,H,J
C7031G1016	Outdoor reset of room temperature	Secondary	-40 to +110	-40 to 43	—	—	2.2	993	M7044, M7045, W7100
C7031J1001	Duct discharge air	Primary	40 to 180	4 to 82	150	3810	4.2	1772	W902, W903, M7044, M7045, W927G,H,J
C7031K1009	Strap-on pipe sensor	Primary	40 to 240	4 to 116	—	—	4.2	1772	W902, W903, M7044, M7045, W927G,H,J

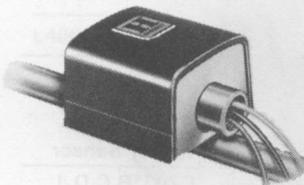
^aMoistureproof element.

^bInsertion length for bulb. See Immersion Well Table, page 227.

^cResistance decreases as temperature increases.

^dAvailable with 564 ohm Balco resistor for use in chart recording applications. Resistance increases as temperature increases. Specify when ordering.

L6076B CHANGEOVER AQUASTAT CONTROLLER



PROVIDES SUMMER - WINTER CHANGEOVER OF THERMOSTAT IN HYDRONIC HEATING-COOLING SYSTEM.

Compact controller connects to copper tubing by a removable spring clip. Switching Action: Spdt, makes Red to Yellow on

temperature rise to 83 F [28 C] nominal, makes Red to Blue or Black on temperature fall to 68 F [20 C], nominal. Leadwires: 24 in. [610 mm]. Approximate Dimensions: 2-11/16 in. [68 mm] long, 2-11/16 in. [68 mm] wide, 1-3/4 in. [44 mm] high. Listed by Underwriters Laboratories Inc.; CSA certified.

continued next page

TRADELINE



auxiliary equipment

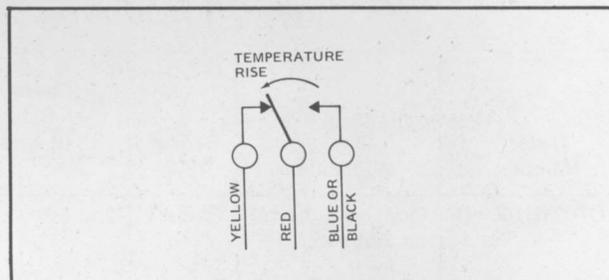
L6076B continued

ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	4.4	2.2
Locked Rotor	26.4	13.2

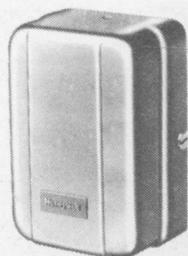
Pilot Duty—125 VA.

Order Number	Max. Fluid Temperature	Case and Cover
L6076B1023	210 F [99 C]	Yes



L6076B switching.

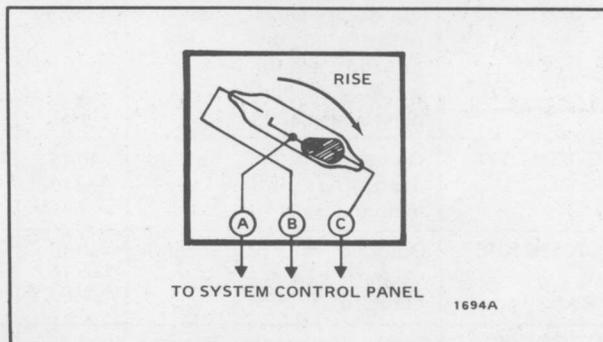
T238A OUTDOOR THERMOSTAT



PROVIDES CHANGE-OVER FROM OUTDOOR TEMPERATURE.

Bimetal-actuated low voltage spdt mercury switch breaks one circuit, makes another on temperature rise. Switch Contact Rating: 1.5 A at 30 Vac. Operating Ambient Temperature Range: Mi-

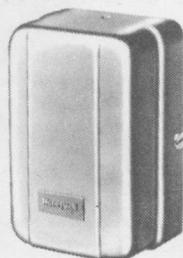
nus 60 F to plus 135 F [minus 51 C to plus 57 C]. Approximate Dimensions: 4-3/8 in. [111 mm] high, 3 in. [76 mm] wide, 2 in. [51 mm] deep.



Internal schematic and hookup for T238A outdoor thermostat.

Order Number	Range		Differential	
	F	C	F	C
T238A1000	40 to 70	4 to 21	3, nominal	1.7, nominal
T238A1018	15 to 45	-9 to +7		
T238A1034	65 to 95	18 to 35		

T7001F OUTDOOR AIR SENSOR



SENSES OUTDOOR TEMPERATURE WITH TEMPERATURE SENSITIVE THERMISTOR ELEMENT.

Used with a reset control such as W902 or W903, M7044, M7045 motors, and W927G,H,J Electronic Sequencers. T7001F has an auxiliary mercury

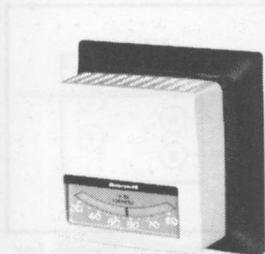
switch to provide a system ON-OFF function. System resets the control point for heating medium in response to outdoor temperature changes. Control Range: Auxiliary Switch— 65 F to 95 F [18 C to 35 C]; thermistor—minus 35 F to plus 110 F [minus 37 C to plus 43 C]. Auxiliary Switch Rating: 1.5 A at 30 Vac. Approximate Dimensions: 4-3/8 in. [111 mm] high, 3 in. [76 mm] wide, 2 in. [51 mm] deep.

Order Number	Control Range				Element Resistance	Sensitivity per 1 F [0.6 C]	Reset Control	Used With Primary Sensor
	Auxiliary Switch		Thermistor					
	F	C	F	C				
T7001F1014	65 to 95	18 to 35	Minus 35 to plus 110	Minus 37 to plus 43	947 ohms at 70 F [21 C]	13.6 ohms	W902, W903 M7044, M7045 W927G,H,J	C7031B,C,D,J
T7001F1022	40 to 70	4 to 21						

TRADELINE



H915A NEOSTAT HUMIDITY CONTROLLER



PROVIDES PROPORTIONAL CONTROL OF MOTORIZED SPRAYS AND COOLING EQUIPMENT FOR DEHUMIDIFICATION.

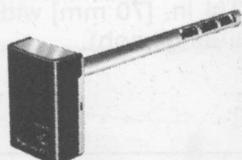
Generally used for humidifying/dehumidifying control applications of packaged air conditioner or central fan systems

in hotels, offices or any other buildings. Desired set point can be easily locked at inside to prevent unauthorized change of setting. Ambient Operating Temp: 59 F to 104 F [15 C to 40 C]. Mounting: Screws through holes in back of case.* Approximate Dimensions: 3.54 in. [90 mm] high, 3.54 in. [90 mm] wide, 1.84 in. [47 mm] deep.

*Do not mount Neostat controller where it may be affected by vibration.

Order Number	Control Provided	Relative Humidity Range	Nominal Throttling Range
H915A1016	Proportional; 135 ohm pot.	30 to 80% RH	12% RH fixed (at 50% RH)

L4064K AIRSTAT FAN SAFETY CUTOFF CONTROLLER



MANUAL RESET FAN SAFETY CUTOFF SWITCH. PROVIDES SHUTDOWN OF FAN OPERATION WHENEVER DUCT TEMPERATURE RISES TO A POINT THAT INDICATES THE PRESENCE OF A FIRE.

Used in all types of heating, ventilating and air conditioning systems. Device mounts on the system main return duct, ahead of the fresh air intake. Controller locks out to prevent premature return of fan operation and must be manually reset before the fan can resume operation. Ambient Operating Temperature: 32 F to 190 F [0 C to 88 C] maximum at switches; 350 F [177 C] maximum at sensing element. Mounting: Rigid bracket, swivel bracket, or surface mount. Ap-

proximate Case Dimensions: 4-1/4 in. [108 mm] high, 3 in. [76.2 mm] wide, 1-5/8 in. [41.3 mm] deep (2 in. [50.8 mm] deep with reset switch). Listed by Underwriters Laboratories Inc.

ELECTRICAL RATINGS (spst limit switch):

Voltage	Full Load (Amperes)	Locked Rotor (Amperes)
24 Vac	2	—
120 Vac	8	48
240 Vac	4	24
0.25 to 12 Vdc	0.25	—

NOTE: Limit switch also rated at 125 VA at 480 Vac.

ACCESSORIES:

10724 Flange (rigid bracket) and 12950 Screw. 32612A Swivel Bracket.

Order Number	Description	Insertion Element		Control Range		Max. Ambient Temperature		Mounting
		in.	mm	F	C	F	C	
L4064K1006	Spst switch breaks on temp. rise, manual reset. Scale in degrees Celsius.	11-1/2	292.1	50 to 165	10 to 74	190 at switch; 350 at element	88 at switch; 177 at element	Surface, rigid or swivel bracket
L4064K1014	Same as K1006 but scale in degrees Fahrenheit.							



auxiliary equipment

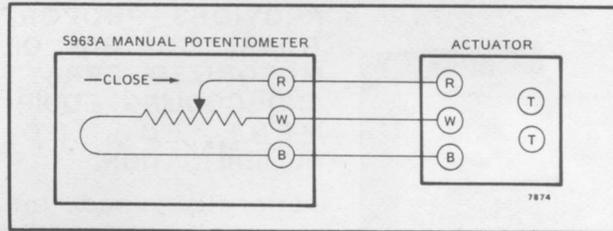
S963A MANUAL POTENTIOMETER



FOR REMOTE MINIMUM-POSITION MANUAL CONTROL OF PROPORTIONAL OR ELECTRONIC MOTORS AND RELAYS.

For vertical mounting on outlet box (switch box must be at least 1-3/4 in. [45 mm] deep). Slot on front for attaching the tabs

provided (heating, cooling, zone). Scale marked OPEN-CLOSE. Three-terminal wiring panel. Screw connections. Approximate Dimensions: 4-1/4 in. [108 mm] high, 2-3/4 in. [70 mm] wide, 2-5/16 in. [59 mm] deep (including knob).



Internal schematic and typical wiring diagram for the S963A.

REPLACEMENT PART:
113591 Tab Sheet for system.

Order Number	Resistance	Use With
S963A1004	135 ohm	Proportional Motors and Relays
S963A1012	270 ohm	

S963B MANUAL POTENTIOMETER



FOR REMOTE SET POINT CONTROL OF ELECTRONIC (SERIES 70) MOTORS AND PANELS.

For vertical mounting on outlet box (switch box must be at least 1-3/4 in. [45 mm] deep). S963B is

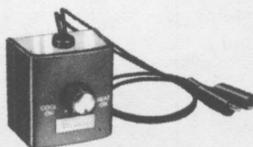
control point adjustment for electronic motors such as M7044 and M7045, and electronic panels such as W902 and W927. Scale marked OPEN-CLOSE. Three-terminal wiring panel. Leadwire connections. Approximate Dimensions: 4-1/4 in. [108 mm] high, 2-3/4 in. [70 mm] wide, 2-5/16 in. [59 mm] deep (including knob).

REPLACEMENT PART:
113591 Tab Sheet for system.

Order Number	Potentiometer Resistance (ohms)	Temperature Range		Sensors	Used On
		F	C		
S963B1003	360	60- 90	16-32	T7047B,C; T7022B	M7044, M7045
S963B1011	240	40-140	4-60	C7031B,C,D,J	M7044
S963B1029	480	40-140	4-60	C7031B,C,D,J	W902, W903
S963B1037	480	60- 90	16-32	T7047A,C,D,E; T7022A	W927A-F, W7100
S963B1060	600	40-140	4-60	C7031B,C,D,J	W927G,H,J
S963B1078 ^a	500	40- 90	4-32	—	W7100
S963B1086 ^a	1000	40-140	4-60	—	W7100

^aAvailable only through Authorized Honeywell Energy Management Distributors.

S963C THERMOSTAT SIMULATOR



TEMPORARILY REPLACES A SPACE THERMOSTAT WHEN CHECKING ELECTRONIC PANELS OR MOTORS. CONTAINS A POTENTIOMETER AND A FIXED RESISTOR.

Provides modulating checkout of W927 Sequencer or M734B,C

Damper Motor. Allows individual inspection of each output stage and inspection of motors in midposition. Includes alligator clips for easy connection to device terminals. Resistor: 1620 ohms. Potentiometer: 200 ohms. Approximate Dimensions: 2-7/8 in. [73 mm] high, 2-1/2 in. [64 mm] wide, 2-1/2 in. [64 mm] deep.

continued next page

auxiliary equipment

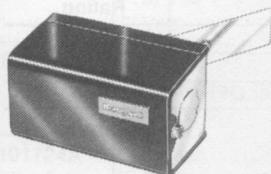


S963C continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Throttling Range	Electrical Connections
S963C1002	1620 to 1820 ohms, nominal	18 in. [457 mm] leadwires with alligator clips

S437A, S637A SAIL SWITCH



S437 MAKES AN ELECTRICAL CIRCUIT; S637 MAKES A CIRCUIT AND BREAKS ANOTHER ON INCREASE IN AIR VELOCITY IN FORCED AIR DUCT.

Micro switch snap-acting switch operated by aluminum sail inserted in air stream. Suitable for

farm crop dryers. Insertion Length: 3-1/2 in. [89 mm]. Maximum Ambient Temperature: 150 F

[66 C]. Differential: Adjustable 550 to 900 fpm [2.8 to 4.6 m/s]. Approximate Case Dimensions: 2-15/16 in. [59 mm] high, 3-3/4 in. [95 mm] wide, 2 in. [51 mm] deep. Listed by Underwriters Laboratories Inc.

SWITCH CONTACT RATINGS (amperes):

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6

2.0 A at 24 Vac.

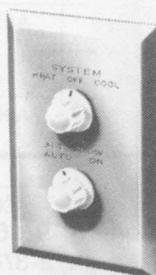
15.0 A at 6 Vdc.

7.5 A at 12 Vdc.

Order Number	Switching	Operating Velocity ^a		Sail Dimensions	
		fpm	m/s	in.	mm
S437A1009	Spst	1900-2250	9.7-11.4	1 x 3	25 x 76
S437A1025	Spst			1-1/2 x 4	38 x 102
S637A1004	Spdt			1 x 3	25 x 76
S637A1012	Spdt			1 x 2-1/2	25 x 64

^aContacts make.

S566A,B,C ROTARY SWITCHES

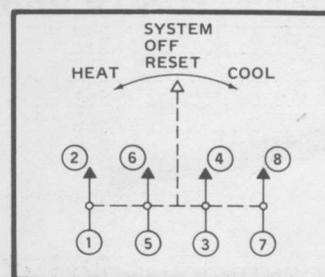


PROVIDES REMOTE LOW VOLTAGE CONTROL SYSTEM SELECTION ON ZONED HEATING-COOLING SYSTEMS.

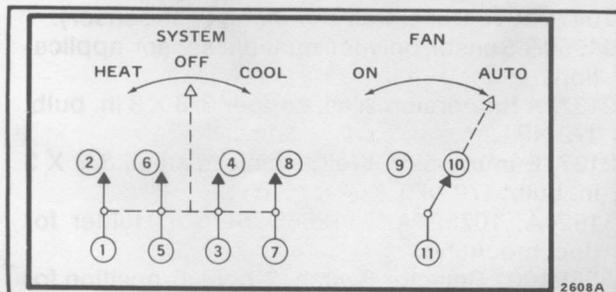
These switches may be used with any heating-cooling thermostat such as a backplate-mounted T87F. Refer to

order table for switching. Electrical Rating: 1.5 A at 24 Vac. Airflow Switch (S566C): 10 VA at 24 Vac. Mounting: Standard switch box (included). Approximate Switch Plate Dimensions: 4-1/2 in. [114 mm] high, 2-3/4 in. [70 mm] wide (standard single switch plate).

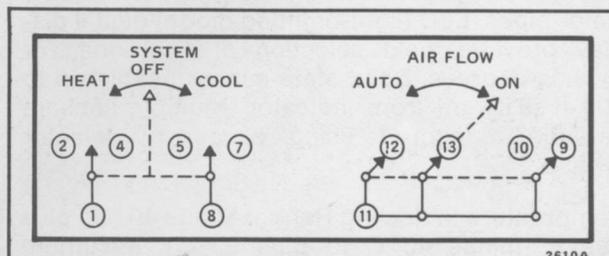
Order Number	Switching
S566A1005	System: Heat-Off-Cool Fan: Auto-On
S566B1004	System: Off-Heat-Reset-Cool



S566B internal schematic.



S566A internal schematic.



S566C internal schematic.

TRADELINE



auxiliary equipment

S547A,B MANUAL SWITCHES



PROVIDES MANUAL CHANGEOVER IN A HEATING-COOLING SYSTEM.

May be used as a day-night changeover switch. S547A makes and breaks 2 circuits; S547B makes and breaks 4 circuits (or less depending on switch hookup).

Package includes toggle switch and mounting bracket for flush or wall mounting. Switch box must be at least 1-3/4 in. [44 mm] in depth to provide room for S547.

TRADELINE models.

Order Number	Switch Action	Current Rating
S547A1005	Dpdt	15 A
S547B1004	4pdt	10 A
S547B1012	4pdt with center OFF	10 A

W9076 DIGITAL TEMPERATURE INDICATOR



PROVIDES CONTINUOUS DIGITAL DISPLAY OF TEMPERATURE.

Monitors temperature in space, ducts, or hot/cold water pipes. LED (light-emitting diode) digital display provides field selection of Fahrenheit or Celsius degrees. Solid-state sensor usable up to 300 ft [91.4 m] from indicator. Multiple sensors can be monitored using accessory selector switch.

Temperature Indicating Range: Minus 40 F to plus 199 F [minus 40 C to plus 93 C]. Maximum Ambient Operating Temperature: 32 F to 120 F

[0 C to 49 C]. Indicator Dimensions: 4-9/16 in. [116 mm] wide, 1-15/16 in. [49 mm] high, 2-3/4 in. [70 mm] deep. Sensor Dimensions: 3/8 in. [10 mm] diameter, 2-5/8 in. [67 mm] long. Input Power: 24 Vac, 50/60 Hz.

ACCESSORIES:

- C7056A1001 Sensor in wall-mounting case.
- T7047C1090 Case, wall-mounting (less sensor).
- 194950B Sensor only for multiple sensor applications.
- 121371A Immersion Well, copper 3/8 X 3 in. bulb, 1/2 NPT.
- 121371E Immersion Well, stainless steel, 3/8 X 3 in. bulb, 1/2 NPT.
- 131524A, 107324A, 311266D Sensor Holder for duct mounting.
- S566E1001 Selector Switch, 2-pole, 6-position for multiple remote sensors.

TRADELINE



PARTS AND ACCESSORIES

SWITCH ACCESSORIES

Order Number	Description	Use With
101715	Receptacle Assembly, light. With red bullseye.	Manual switch
101721A	Switch, 4pdt, 3 position. (Center OFF.) Rating: 10 A at 250 V, 1/2 hp at 115/230 Vac.	
101722A	Switch, dpdt, 2 position. Rating: 12 A at 125 V, 10 A at 250 V.	
101724A	Switch, 3pdt, 2 position. Rating: 10 A at 250 V, 3/4 hp 1 or 3 phase 115/575 Vac.	
101730	Dial. Marked ON-OFF-AUTO.	3 - position switch
101731	Dial. Marked SUMMER-OFF-WINTER.	3 - position switch
113575A	Strap, nameplate and tab. For single switch applications.	Manual switch
113577A	Nameplate and tab strip—1 light, 1 switch application.	General use
113578A	Strap, mounting. With screws. For single switch applications.	Manual switch
113579A	Strap, mounting. With screws. For 2 switch applications.	
113580A	Strap, mounting. With screws. For light and switch applications.	
113583A	Cover Assembly (incl. plate, ring nut).	S547A,B

Order Number	Description	Use With
113585A	Wallplate, double.	
113586A	Wallplate, single switch.	
113588A ^b	Wallplate—1 switch, 1 light.	
113611	Lens Cap—green.	Switch lights
113614	Lens Cap—white.	
114682A	Plate, single switch. For 4 x 4 utility box.	Manual switch
801736A ^a	Switch Assembly—dpdt, 2 position.	
801736B ^a	Switch Assembly—spdt, center OFF.	
801736C ^a	Switch Assembly—spdt, 2 position.	
801736D ^a	Switch Assembly—dpdt, center OFF.	
801736E ^a	Switch Assembly—4pdt, 2 position.	
801736F ^a	Switch Assembly—4pdt, center OFF.	

^aFor utility box mounting—rounded corners.

^bFor switch box mounting—square corners.

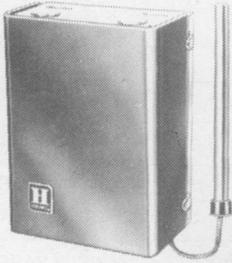
MISCELLANEOUS ACCESSORIES

Order Number	Description	Use With
102459A	Template for drawing circuits.	General use
311057	Lubricant. Plastilube No. 2, 2 oz.	Valves
32611	Grommet, rubber. To fit knockout for 1/2 inch conduit.	General use



chiller controls

CR71B SOLID STATE MULTISTAGE CONTROLS



PROVIDES 4-STAGE CONTROL OF MULTI-STAGE COMPRESSORS OR UNLOADING TYPE COMPRESSORS BASED ON RETURN WATER TEMPERATURE IN CHILLER APPLICATIONS.

Solid state circuitry. Ambient compensated from minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Combination quick-connect and screw terminals. Voltage and Frequency: 120 V, 50/60 Hz. Power Consumption: 6 W maximum. Temperature Control Range: 0 F to 60 F [minus 18 C to plus 16 C].

Sensing Element: 3/8 x 6 in. [10 x 152 mm] bulb, 15 ft [4.6 m] cable assembly. Listed by Underwriters Laboratories Inc.

CONTACT RATINGS AT 120 AND 240 Vac:

	R to W	R to B
Inrush	750 VA	240 VA
Running	75 VA	40 VA

REPLACEMENT PART:

135795B Sensor.

ACCESSORY:

112620B Well Assembly.

Available only through Authorized Honeywell Energy Management Distributors.

TRADELINE model.

Order Number	Differential				Case and Cover	Mounting	Includes
	Per Stage		Inter-stage				
	F	C	F	C			
CR71B1054	2.5	1.4	2.5	1.4	Yes	Wall mounting	112620B Well

Honeywell Tradeline and Super Tradeline Controls

Honeywell **TRADELINE** and **SUPER TRADELINE** controls eliminate unnecessary inventory duplication and save you money. These controls are specifically designed and equipped with accessories to meet all your replacement needs. You get maximum controlability with a minimum number of devices. Fewer replacement controls to learn and stock means faster on-the-job replacement, and more jobs completed effectively and quickly.

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value.

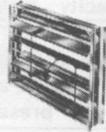
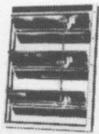
SUPER TRADELINE controls offer features not available on **TRADELINE** or standard models. Added features and installation accessories such as special adapters, universal mounting, and extra-wide control ranges, give Honeywell **SUPER TRADELINE** controls a built-in versatility—one **SUPER TRADELINE** model can quickly and easily replace a wide range of Honeywell and competitive controls.

Both **SUPER TRADELINE** and **TRADELINE** models provide a picture of the control, critical specifications, and cross-reference information **on the box label** where it is highly visible. This enables the service technician to quickly and accurately choose and install the correct replacement control.

TRADELINE



D640, D641 LOW LEAKAGE DAMPERS



CONTROL VOLUME OF CIRCULATING AIR IN HEATING, COOLING, ECONOMIZER, OR VENTILATING SYSTEMS. MODULATING OR 2-POSITION MOTOR OPERATES DAMPERS.

D640 dampers have parallel action blades—all blades rotate in the same direction. D641 dampers have opposed action blades—adjacent blades rotate in opposite directions. Refer to order table for specifications. Order damper size closest to size of duct and cfm [m^3/hr] capacity.

SPECIFICATIONS—D640 TRADELINE dampers:

Blades: 6 or 8 in. [152 or 203 mm], or combination of both, 16 gauge. Drive blades 36 in. [914 mm] or longer are reinforced. Blades mounted horizontally.

Frame Construction: 13-gauge roll formed galvanized steel channel—horizontal, $5/8 \times 3 \times 3/32$ in. [16 x 76 x 2 mm]; vertical, $13/16 \times 4-1/2 \times 3/32$ in. [21 x 114 x 2 mm]. Spring-loaded stainless steel side seals.

Bearings: Nylon.

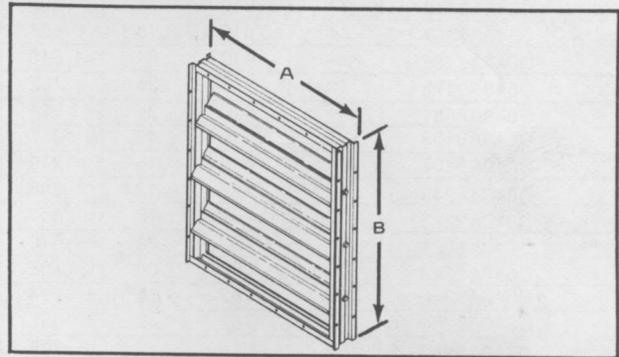
Motor Mounting: 4 in. [102 mm] long, 1/2 in. [13 mm] diameter extendable axles for use with externally mounted motor. Right-hand drive ear for internally mounted motor is factory installed.

Max. Pressure Differential: 3 in. wc [0.75 kPa].

Max. Approach Velocity: 1500 fpm [7.6 m/s].
Ambient Temperature Range: Minus 40 F to plus 200 F [minus 40 C to plus 93 C].

Leakage: 1 percent leakage in normal economizer applications.

Non-TRADELINE custom-built D640 and all D641 dampers are available. D640's have 8 in. [203 mm] minimum A and B dimensions. D641's have 12 in. [305 mm] minimum A and 14 in. [356 mm] minimum B dimensions. Both are available in 2 in. [51 mm] increments up to 48 in. [1219 mm]. Larger requirements are made up of multisection units, field connected vertically and horizontally. Drive axles and vertical drive linkage are included. Options available include oilite bearings, vertical blades, and neoprene blade edging. Specify internal motor mounting if needed. Other specifications are the same as D640 TRADELINE models. **TO ORDER CUSTOM BUILT D640 AND D641 DAMPERS, CONTACT YOUR HONEYWELL REPRESENTATIVE.**



TRADELINE D640 parallel horizontal blades.

DAMPER SIZING—AN EXAMPLE

An application calls for a damper with a 4,000 cfm [6,800 m^3/hr] capacity. Any of the dampers in the chart below could be used. From these, the contractor can choose the damper which most closely corresponds to the duct dimensions. The contractor could actually use any damper with flow capacity up to 6,000 cfm [10,200 m^3/hr] and have acceptable performance.

OS Number	Approximate Dimensions				Capacity	
	A		B		cfm at 1000 fpm at .03 in. wc press. diff.	m^3/hr at 18,300 m/hr at 7.5 Pa press. diff.
	in.	mm	in.	mm		
D640A9066	12	305	48	1219	4,000	6,800
D640A9165	24	610	24	610	4,000	6,800
D640A9421	48	1219	12	305	4,000	6,800
D640A9116	18	457	36	914	4,500	7,650
D640A9298	36	914	18	457	4,500	7,650
D640A9173	24	610	30	762	5,000	8,500
D640A9231	30	762	24	610	5,000	8,500
D640A9124	18	457	42	1067	5,250	8,925
D640A9363	42	1067	18	457	5,250	8,925

continued next page

TRADELINE



dampers

D640, D641 continued

ACCESSORIES: see page 134.

Q605 Linkages: see page 133 for specifications.

Available only through Authorized Honeywell Energy Management Distributors.

TRADELINE models.

Order Number	Approximate Dimensions						Capacity	
	A ^b Top/ Bottom		B ^b Sides		sq ft	m ²	cfm at 1000 fpm at .03 in. wc press. diff. ^a	m ³ /hr at 18,300 m/hr at 7.5 Pa press. diff. ^a
	in.	mm	in.	mm				
D640A9009	12	305	12	305	1.0	.09	1,000	1,700
D640A9017	12	305	18	457	1.5	.14	1,500	2,550
D640A9025	12	305	24	610	2.0	.19	2,000	3,400
D640A9033	12	305	30	762	2.5	.23	2,500	4,250
D640A9041	12	305	36	914	3.0	.28	3,000	5,100
D640A9058	12	305	42	1067	3.5	.33	3,500	5,950
D640A9066	12	305	48	1219	4.0	.37	4,000	6,800
D640A9074	18	457	12	305	1.5	.14	1,500	2,550
D640A9082	18	457	18	457	2.3	.21	2,250	3,825
D640A9090	18	457	24	610	3.0	.28	3,000	5,100
D640A9108	18	457	30	762	3.8	.35	3,750	6,375
D640A9116	18	457	36	914	3.5	.33	4,500	7,650
D640A9124	18	457	42	1067	5.3	.49	5,250	8,925
D640A9132	18	457	48	1219	6.0	.56	6,000	10,200
D640A9140	24	610	12	305	2.0	.19	2,000	3,400
D640A9157	24	610	18	457	3.0	.28	3,000	5,100
D640A9165	24	610	24	610	4.0	.37	4,000	6,800
D640A9173	24	610	30	762	5.0	.46	5,000	8,500
D640A9181	24	610	36	914	6.0	.56	6,000	10,200
D640A9199	24	610	42	1067	7.0	.65	7,000	11,900
D640A9207	24	610	48	1219	8.0	.74	8,000	13,600
D640A9215	30	762	12	305	2.5	.23	2,500	4,250
D640A9223	30	762	18	457	3.8	.35	3,750	6,375
D640A9231	30	762	24	610	5.0	.46	5,000	8,500
D640A9249	30	762	30	762	6.3	.59	6,225	10,583
D640A9256	30	762	36	914	7.5	.70	7,500	12,750
D640A9264	30	762	42	1067	8.8	.82	8,750	14,875
D640A9280	36	914	12	305	3.0	.28	3,000	5,100
D640A9298	36	914	18	457	4.5	.42	4,500	7,650
D640A9306	36	914	24	610	6.0	.56	6,000	10,200
D640A9314	36	914	30	762	7.5	.70	7,500	12,750
D640A9322	36	914	36	914	9.0	.84	9,000	15,300
D640A9355	42	1067	12	305	3.5	.33	3,500	5,950
D640A9363	42	1067	18	457	5.3	.50	5,250	8,925
D640A9371	42	1067	24	610	7.0	.65	7,000	11,900
D640A9389	42	1067	30	762	8.8	.82	8,750	14,875
D640A9421	48	1219	12	305	4.0	.37	4,000	6,800
D640A9439	48	1219	18	457	6.0	.56	6,000	10,200
D640A9447	48	1219	24	610	8.0	.74	8,000	13,600
D640A9470	48	1219	48	1219	16.0	1.49	16,000	27,200
D640A9488	14	356	14	356	1.4	.13	1,360	2,312
D640A9496	16	406	16	406	1.8	.17	1,780	3,026
D640A9504	20	508	20	508	2.8	.26	2,780	4,726

^aTo find capacity in systems with fpm [m/hr] different from 1000 fpm [18,300 m/hr], use this conversion formula:

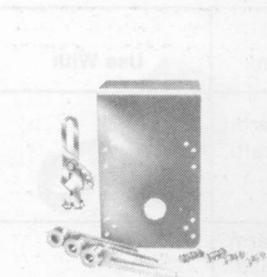
$$\text{cfm} = \frac{\text{cfm from chart} \times \text{fpm}}{1000 \text{ fpm}} \quad \text{m}^3/\text{hr} = \frac{\text{m}^3/\text{hr from chart} \times \text{m/hr}}{18,300 \text{ m/hr}}$$

^bSee drawing on page 131.

TRADELINE



Q605A, B, D, E DAMPER LINKAGES



CONNECT MODUTROL MOTOR TO STANDARD DAMPER OR SET OF DAMPERS TO PROVIDE CONTROL OF DUCT AIRFLOW.

Linkages include ball joints, motor crank arm, and 1/2 in. [13 mm] damper arm. Adjustable to any degree of damper

opening. See order table for application.

ACCESSORY:

191385 Internal Motor Mounting Kit. Must be used

when Q605B is used with non-TRADELINe dampers.

PARTS AND ACCESSORIES: see page 134.

Order Number	Length	
	in.	mm
27520C00021	12	305
27520D00021	15	381
27520E00021	18	457
27520G00021	24	610
27520K00021	36	914
27520L00021	48	1219

TRADELINe models.

• SUPER TRADELINe model.

Order Number	Application	Motor Mounting Bracket	Includes Damper Arm for 1/2 in. [13 mm] Diameter Shaft	Motor Crank Arm	Ball Joints
Q605A1070	For mounting motor externally on duct.	Yes	1	Yes	2
Q605B1012	For mounting motor inside duct. Includes damper arm for modulating damper operation.	Yes	—	Yes	2
•Q605D1069	For mounting motor externally or internally on duct.	Yes	3	Yes	4
Q605E1050	For mounting motor directly on wall or on outside of duct.	None	1	Yes	2

Q298B DAMPER LINKAGE



CONNECTS M833 OR M835 MOTOR TO ONE OR TWO ZONE DAMPERS.

May also be used to link shafts of 2 dampers together. Includes bushings for damper shafts 1/4 and 3/8 in. [6 and 10 mm] in diameter. No bushing needed for 1/2 in. [13 mm] damper shafts.

ACCESSORY:

121825AA—Crank Arm and Shaft Assembly to connect one M835A motor to two zone dampers.

Order Number	Damper Arms	Includes Ball Joints	Push Rod
Q298B1065	2	2	1 (24 in. [610 mm])

TRADELINe



dampers

PARTS AND ACCESSORIES

Order Number	Description	Use With
101662A	Bracket provides braced shelf for mounting damper motor on duct.	Dampers, motors
102546	Ball joint assembly for 5/16 in. pushrod. Mount with 1/4-28 x 7/16 in. stud, lockwasher and nut.	Dampers
102931-00021	Adapter arm to motor crank arm.	
103598A Skin pack (2 units) 103598	Ball joint assembly for 1/4 in. pushrod. Mount with 10-32 NC x 5/16 in. stud, lockwasher and nut.	Q257A, Q298B
104643A	Adapter for driving 2 dampers from 1 crank arm.	Modutrol motors
121825AA	Auxiliary crank arm assembly.	M835A
14000644-004	Left hand drive ear.	Dampers
14000644-002	Right hand drive ear.	
14000722-001	Double couplings.	
14003834-001	Vertical stacking kit.	
15753085-002	Reinforcing strip.	
167452B	Hand quadrant.	
26025BA Skin pack (2 units) 26025B	Damper crank arm for 3/8 in. shaft. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90. Radius 1 to 5 in. nom.	
26026B	Crank arm assembly for 1/2 in. shaft.	

Order Number	Description	Use With
26026G 26026GA Skin pack (2 units)	Damper crank arm for 1/2 in. shaft. Elongated slot.	Q605
27174B	Damper crank arm for 7/16 in. shaft. Elongated slot for linkage connection. Slot scaled for 40-50-60-75-90.	Dampers
27514B	Damper arm for 3/4 in. damper shaft.	
27518A Skin pack (4 units)	Ball joint assembly for 5/16 in. pushrod connection to duct damper linkage assembly or damper motor crank arm. Mount with 1/4-28 x 9/16 in. stud, lockwasher and nut.	Dampers, damper linkages
27520C-00021	Pushrod, 12 in.	Dampers
27520D-00021	Pushrod, 15 in.	
27520E-00021	Pushrod, 18 in.	
27520G-00021	Pushrod, 24 in.	
27520K-00021	Pushrod, 36 in.	
27520L-00021	Pushrod, 48 in.	
7616BR 7616BRA Skin pack (2 units)	Motor crank arm.	
DSP 1816	Damper Demo Kit.	

MOTOR APPLICATION GUIDE

BE SURE TO USE A HONEYWELL MODUTROL MOTOR WITH YOUR HONEYWELL DAMPER!

Motor	Torque		Damper Rating	
	lb.-in.	N-m	sq ft	sq m
One-minute stroke				
M734, M934	35	4	23	2.1
M445, M7045, M745, M845, M945, M955	50	6	37	3.4
M644, M7044, M744, M944, M954	150	17	46	4.3

For further information, refer to Form No. 60-2000-3, D640A, D641A Louvered Dampers.

TRADELINE



W859C,D ECONOMIZER CONTROL PACKAGES



CONTAINS ALL CONTROLS NEEDED TO OPERATE AN OUTDOOR RETURN AIR DAMPER SYSTEM.

Used with M944 and M945 Modutrol motors which have internal balancing relay, including those with internal heaters. Provides proportional control of the

dampers to maintain mixed air temperature. Includes a proportional mixed air temperature controller, outdoor air changeover controller, minimum position potentiometer, and transformer. Refer to order table for application. Mounts on top of motors having internal balancing relay, in place of original cover. Maximum Operating Ambient Temperature: 125 F [52 C]. Maximum Duct Temperature: 125 F [52 C]. Mixed air controller has 10 ft [3 m] capillary and 12 ft [3.7 m] averaging element; changeover controller has 5 ft [1.5 m] capillary and liquid-filled sensing element.

ELECTRICAL RATINGS:

Input Voltage: 120/208/240 V, 60 Hz.

Transformer Output Power Rating: 40 VA.

TRADELINE models.

Transformer Secondary Voltage: 25 Vac.

ACCESSORIES:

107324A Bulb Holder to support outside air sensing bulb in air duct.

314439 Mounting Clips to mount mixed air control averaging element in duct.

113665 Grommet to secure capillary tubing in duct hole.

S963A Manual Potentiometer to provide remote control of damper position.

W950 Status Panel to provide system indication and manual switching in heating, cooling, and ventilating systems.

R8225A Fan Relay to provide manual control of minimum outside air during heating and for use in an automatic economizer system.

L6018C or T675 Thermostat to provide automatic control of minimum outside air during heating or automatic control of night setback.

T874 Multistage Thermostat for use in an automatic economizer system to regulate space temperature, with Q674 Subbase to provide remote manual changeover switch.

H205A Enthalpy Controller for use with W859D.

118837-01340 Protective Screw-on Caps for replacement of lost or misplaced cap.

Order Number	Description
W859C1040	Economizer control package with compressor lockout switch and leadwires for wiring remote potentiometer and remote minimum position switch.
W859D1015	Economizer control package with leadwires for wiring enthalpy control, remote potentiometer, and minimum position switch. Two spdt relays controlled by external enthalpy control provide outdoor air changeover and compressor lockout. ^a Less changeover controller, for use with H205 Enthalpy Controller. Can be connected to operate from the cooling thermostat to provide a totally integrated control system which locks out the economizer in the heating system.

^aRelay contacts make R to W on temperature rise above outside air changeover controller set point; make R to B on temperature fall below outside air changeover controller set point.

W899G ECONOMIZER PACKAGE



CONTROLS OUTDOOR AND RETURN AIR DAMPERS TO MAINTAIN THE PROPER MIXED AIR TEMPERATURE FOR MOST ECONOMICAL OPERATION OF ECONOMIZER VENTILATION SYSTEMS.

Includes W859D economizer mounted to M945A

motor. Uses remote H205 Enthalpy Controller to operate relay-controlled changeover and compressor lockout switches. W899G can be con-

trolled by space thermostat to provide true first stage of cooling. Motor is proportional acting; will position the damper at any point between fully open and fully closed according to the demands of the controller. Spring return closes damper on power failure. Crankshaft: Double-ended, 3/8 in. [10 mm] square. Ambient Temperature Range: 15 F to 125 F [minus 9 C to plus 52 C]. Torque: 50 lb.-in. [5.7 N-m] (25 lb.-in. [2.8 N-m] on auxiliary end). Approximate Dimensions: 10-11/32 in. [263 mm] high, 5-5/8 in. [143 mm] wide, 9-1/4 in. [235 mm] deep.

continued next page

TRADELINE



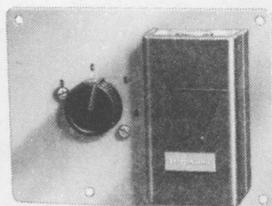
economizers

W899G continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Voltage (50/60 Hz)	VA	Stroke (degrees)	Timing (seconds)	Mixed Air Sensor
W899G1034	24	31	160	60	10 ft (3 m) capillary with 12 ft (3.7 m) averaging bulb.
W899G1042	120/208/240	34	160	60	10 ft (3 m) capillary with standard bulb.

H205A ENTHALPY CONTROLLER



SENSES TOTAL HEAT CONTENT (TEMPERATURE AND RELATIVE HUMIDITY) OF AIR.

Used to control amount of outside air brought into the system, with respect to "total" heat content or enthalpy of outside air. Combines temperature and humidity sensors in a

single device. Humidity Sensor: Thin nylon ribbon. Temperature Sensing Element: Liquid-filled bulb mounted on back of control. Switching Action: Spdt—terminals 2 (red) and 1 (yellow) make on enthalpy increase; terminals 2 (red) and 3 (blue) make on enthalpy decrease to set point. Relative Humidity Range: 20 percent to 80 percent. Mounts in any position inside an outdoor air duct. Maximum Operating Ambient Temperature: 150 F [66 C].

ELECTRICAL RATINGS:

H205A1012—

Terminals 1 (yellow) and 2 (red)—50 VA at 24 Vac.

Terminals 2 (red) and 3 (blue)—100 mA (min.) to 250 mA (max.) at 24 Vac.

H205A1038, H205A1046—

3 mA (min.) at 11 Vdc; 250 mA (max.) resistive at 24 Vac.

APPROXIMATE CONTROL RANGES:

Dial Setting	20 Percent RH		50 Percent RH		80 Percent RH	
	F	C	F	C	F	C
A (Maximum, full CW)	78	26	73	23	68	20
B	73	23	68	20	63	17
C	68	20	63	17	59	15
D (Minimum, full CCW)	62	17	58	14	53	12

Order Number	Includes	Remarks
H205A1012	Mounting plate, adj. knob and scale.	For use in electromechanical systems, such as the W859D Economizer Control Package.
H205A1038 ^a		For use with electronic systems.
H205A1046	Mounting plate, adj. knob and scale.	For use with electronic systems.

^aLess case and cover, mounting plate, and adjusting knob.

TRADELINE

Presenting

RAMP

The ZA7000 Remote Access Monitoring Program (RAMP) is a powerful software package designed by Honeywell Energy Products Center with your needs in mind. RAMP places users in the new age of energy management—the age of centralized programming, system control and management information. From the moment power is turned on, RAMP helps you control costs, organize information and make better decisions.

Simplicity and Sophistication

RAMP uses the popular Apple II Plus* computer to communicate over ordinary dial-up telephone lines with every W7000/Q7000 in your business. This means that multiple W7000 Load Control Systems can be monitored from one location—simply, efficiently and according to plan.

RAMP expands and automates the many features and functions of the Q7000 Communications Module on every W7000 installation:

- Automatically polls multiple W7000 installations every night.
- Reports energy usage data and system failures.
- Prepares a summary "MORNING REPORT" before the work day begins.
- Allows review and modification of new or existing W7000 programs.
- Permits identification of channel loads by name.
- Saves W7000 programs on permanent disk memory.
- Programs a W7000 in less than two minutes telephone connect time.
- Maintains detailed daily energy usage history for a full year.
- Maintains monthly energy usage summaries for five years.
- Converts Apple to a data terminal for direct communication with a Q7000.

RAMP is a friendly program—no computer experience is necessary. It is completely "menu driven." All commands are entered in simple English responses to prompts appearing on the video screen. Step-by-step instructions provide a guide to every RAMP function...the first time you operate the system.

*Apple II Plus is a trademark of the Apple Computer Inc.

Efficiency Built-In

With the "autopolling" feature, RAMP supervises system operation and audits the energy used by ten W7000/Q7000 installations nightly—not only eliminating operator time, but also taking advantage of the lowest possible telephone rates.

The one-page "MORNING REPORT" prints out energy usage data and compares it with the previous four week history of energy usage for that particular day of the week. In addition, system status is reported, assuring continuing savings.

The cataloging feature of RAMP keeps track of the energy history for 200 installations for five years. The complete operating program for each W7000 is stored on disk and is immediately available for inspection, modification or remote programming. You are protected against lengthy periods of down time due to accidental W7000 memory loss through the RAMP "bullet-proof" program storage/downloading features.

All of these capabilities are contained on a single computer disk. Getting RAMP up and running requires only inserting the program disk and turning the computer on. RAMP lets you truly manage your energy management systems.

Turnkey Installation Gets You Going Fast

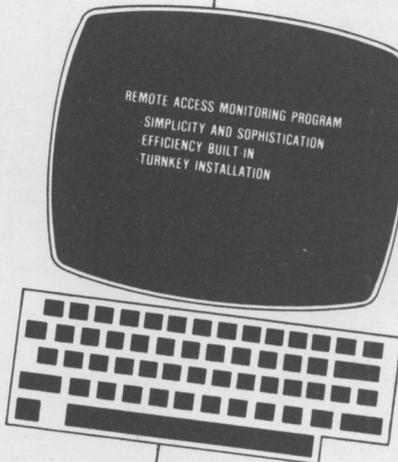
A turnkey load control installation requires extensive planning and specialized knowhow. A Honeywell Energy Management Contractor Specialist will help you set energy management goals and will provide system planning, design, installation, and the required follow-up services including RAMP.

In short, the EM Specialists will do everything associated with their specialty, energy management, so you can be free to concentrate on your specialty—operation of your business.

Honeywell

Energy Products Center

For more information on the ZA7000 RAMP or other Honeywell products and services write: Honeywell Inc. Energy Products Center, 10400 Yellow Circle Drive, Minnetonka, MN 55343.



12/81

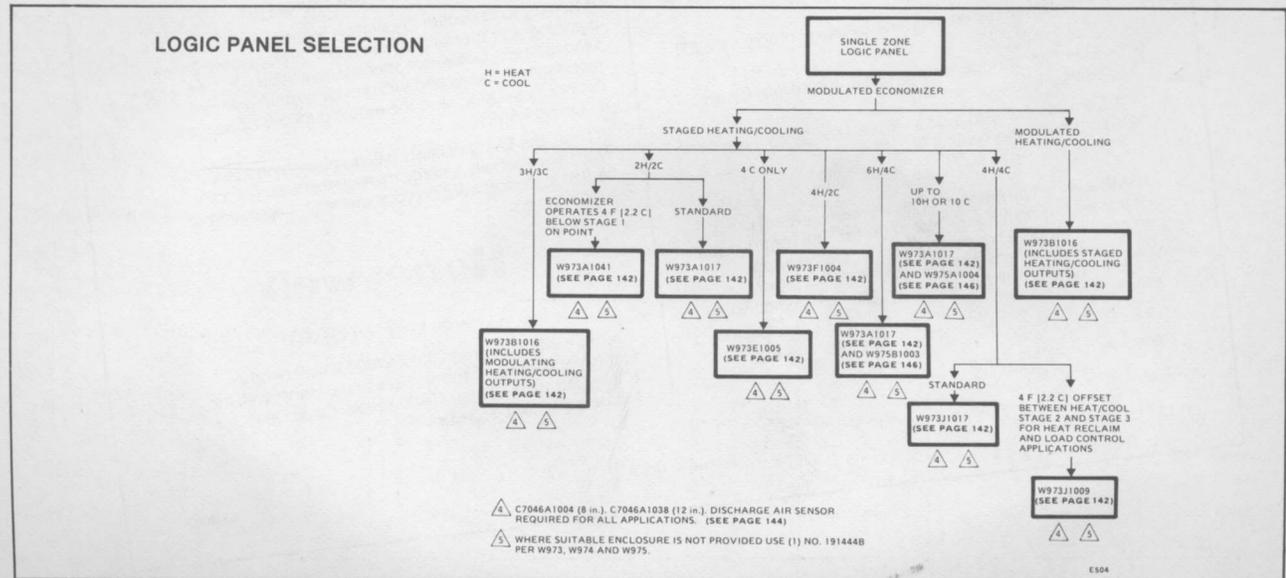
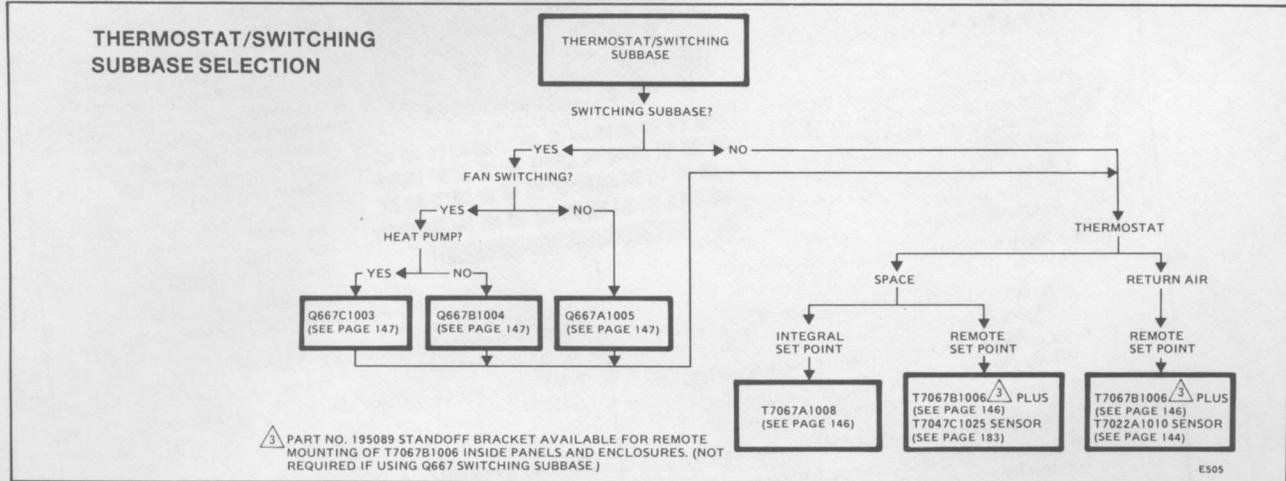
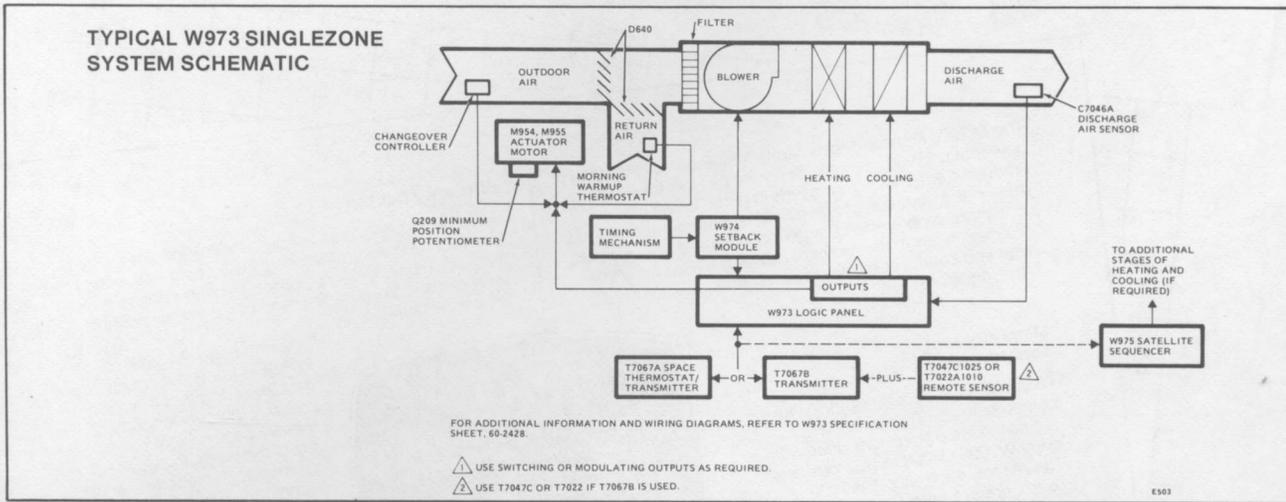
Printed in U.S.A.

63-8002

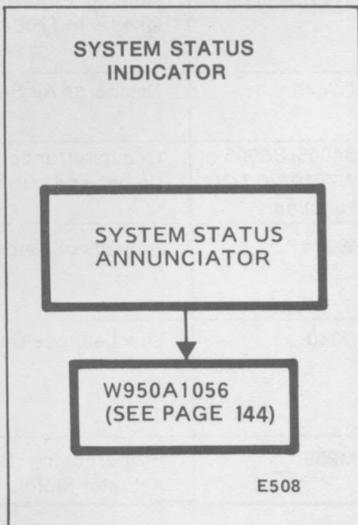
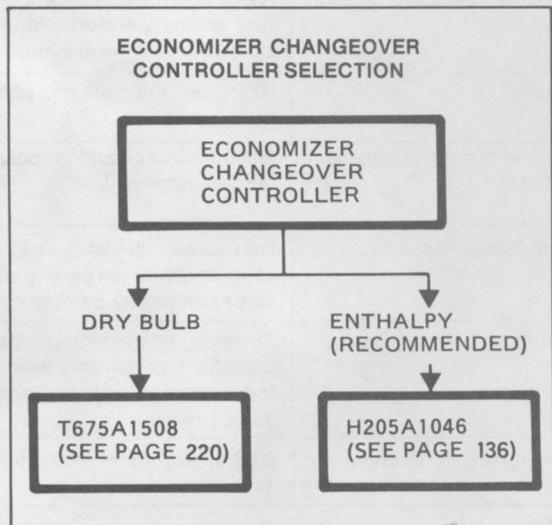
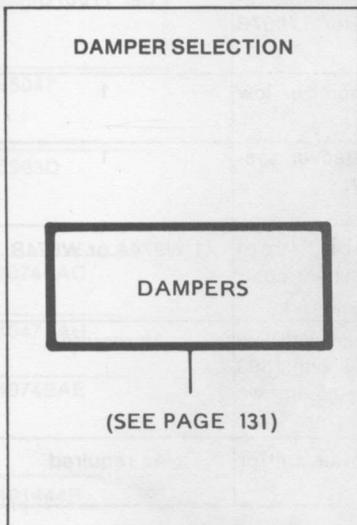
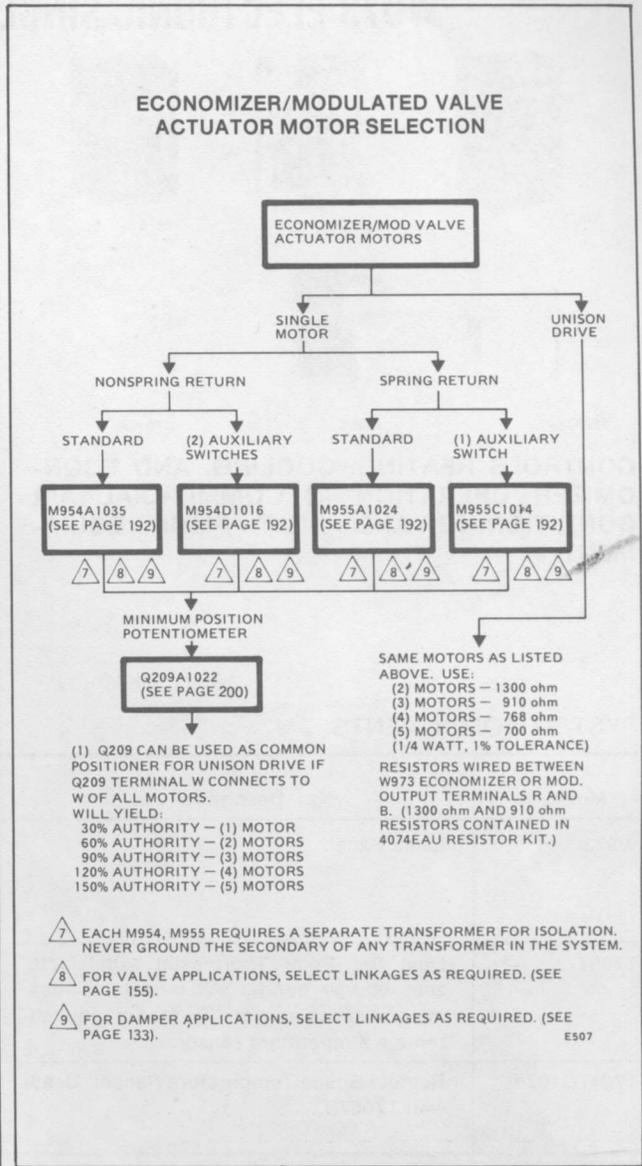
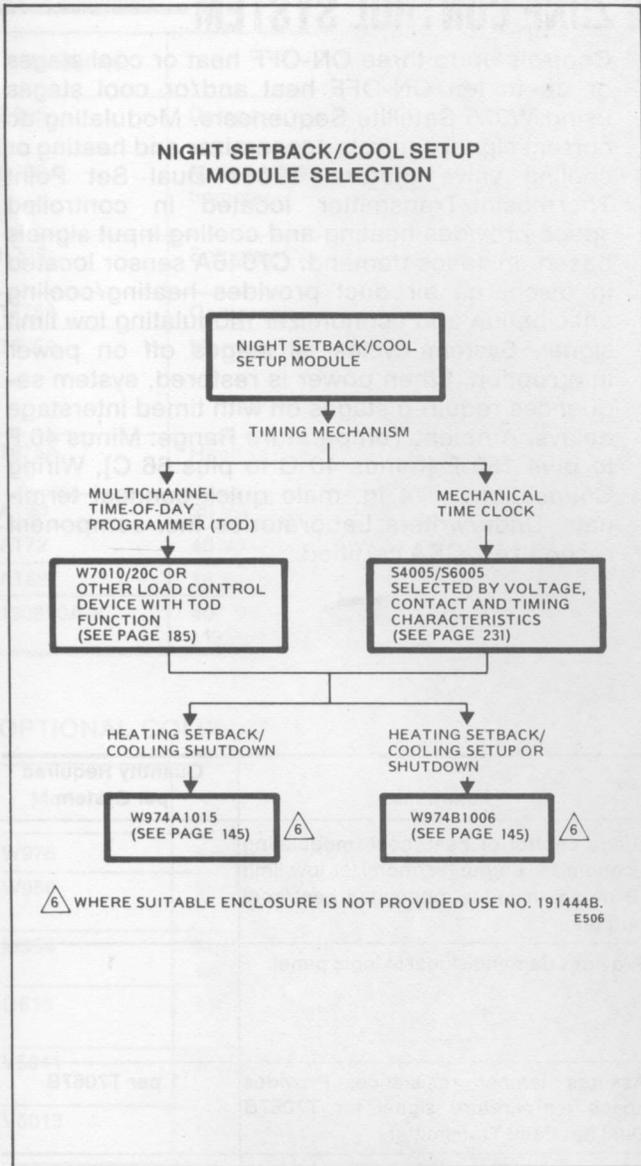


environmental control systems

The W973 Single Zone Component Selection Guide as shown on this page and the facing page is designed as an aid in component selection for a typical single zone environmental control system. Detailed information for individual components can be found on succeeding pages (pages 140-147).



TRADELINE





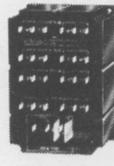
W973 ELECTRONIC SINGLE ZONE CONTROL SYSTEM



W973



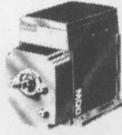
W974



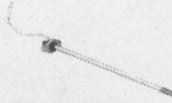
W975



T7067



M955



C7046A

CONTROLS HEATING, COOLING, AND ECONOMIZER OPERATION IN COMMERCIAL AIR CONDITIONING AND HEAT PUMP EQUIPMENT.

Controls up to three ON-OFF heat or cool stages or up to ten ON-OFF heat and/or cool stages using W975 Satellite Sequencers. Modulating dc current signal controls economizer and heating or cooling valve motors. T7067 Dual Set Point Thermostat/Transmitter located in controlled space provides heating and cooling input signals based on space demand. C7046A sensor located in discharge air duct provides heating/cooling anticipation and economizer modulating low limit signal. System cycles all stages off on power interruption. When power is restored, system sequences required stages on with timed interstage delays. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Wiring Connections: 1/4 in. male quick-connect terminals. Underwriters Laboratories Inc. component recognized; CSA certified.

SYSTEM COMPONENTS:

Model No.	Description	Functions	Quantity Required per System
W973	Logic Panel.	Stage control of heat, cool, modulating economizer output, economizer low limit (B model includes modulated heat/cool outputs).	1
T7067	Dual Set Point Thermostat (adjustable zero energy band). "A" model includes integral space sensor, "B" model requires remote temperature sensor.	Provides demand signal to logic panel.	1
T7047C1025	Remote Space Temperature Sensor. Used with T7067B.	Assures tamper resistance. Provides space temperature signal for T7067B Dual Set Point Transmitter.	1 per T7067B
T7022A1010	Remote Return Air Temperature Sensor. Used with T7067B.	Assures tamper resistance. Provides return air temperature signal for T7067B Dual Set Point Transmitter.	1 per T7067B
C7046A	Discharge Air Sensor.	Heat/cool anticipation, economizer low limit.	1
S4005/S6005 or W7010/20 TOD Function	Occupied/unoccupied timing mechanism (to be used with W974).	Occupied/unoccupied changeover system adjustment.	1
W974	Setback or Setback/Setup Panel.	Initiates heat setback, cool setup/lockout; fan cycling with heat/cool; close outdoor air dampers.	1 W974A or W974B
D640	Low Leakage Dampers.	To facilitate outdoor air intake with low leakage. One percent leakage with 1500 fps approach velocity and 0.5 in. wc static pressure.	As required
M955	Proportioning Spring-return Economizer Actuator Motor.	Operates outdoor air, return air and/or exhaust air dampers.	As required

continued next page



W973 continued

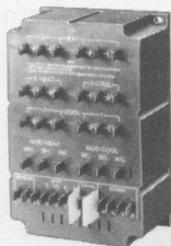
Model No.	Description	Functions	Quantity Required per System
Q605	Damper Linkage.	Mechanically links actuator to single or multiple damper configuration.	As required
Q209A	Motor-mounted Minimum Position Potentiometer.	Provides adjustment for outdoor air minimum position to assure oxygen replenishment.	As required
H205	Enthalpy Changeover Control.	Determines suitability of outdoor air for free cooling.	1
T675A	Compressor Low Ambient Limit Control.	Compressor protection.	1
T675A	Morning Warmup Thermostat.	Holds outdoor air damper closed until air temperature approaches space temperature set point during occupied mode.	1
T675A	Heating high limit.	Protects heating equipment from overheating should air flow be lost.	1
AT20	20 VA Transformer.	System component power supply.	As required
AT72	40 VA Transformer.	System component power supply.	As required
AT88	75 VA Transformer.	System component power supply.	As required
130810A-K	40 VA Cover Mount Transformer for M954/M955/M744/M745 actuator motors.	System component power supply.	1 per motor

OPTIONAL COMPONENTS:

Model No.	Description	Functions	Quantity Required per System
W975	Satellite Sequencer.	Expands staging capability.	As required
W950	System Supervisor.	Provides annunciation of system operational conditions (six indicator lamps).	1
M954	Proportioning Valve Actuator Motor (non-spring return).	Operates valve for modulated heating or cooling.	As required
Q618	Valve Linkage.	Mechanically links actuator motor to valve.	As required (see page 202)
V5011	2-Way Valve.	2-position or modulated control of steam and water in heating/cooling systems.	As required (see page 233)
V5013	3-Way Mixing or Diverting Valve.	Modulated control of steam and water in heating/cooling systems.	As required (see page 238)
V5051	2-Way Cage Valve.	2-position or modulated control of steam and water in heating/cooling systems requiring tight closeoff.	As required (see page 239)
V5047	2-Way Double Seated Globe Valve.	2-position or modulated control of high pressure steam and water where positive final shutoff is not required.	As required (see page 237)
S963D	Thermostat Simulator.	Simulates signal from thermostat/transmitter to allow checkout and troubleshooting of control system at W973 location.	1
4074EAC	Resistor Kit.	Required for use of M734/M744/M745 actuator motors with W973.	As required
4047EAU	Resistor Kit.	Required for unison operation of multiple M954/M955 actuator motors with W973.	As required
4074EAE	Resistor Kit.	Required to allow independent economizer low limit operation when one T7067 drives multiple W973 Logic Panels.	1 per W973
191444B	W973/W975 Case and Cover.	Required when suitable wiring enclosure is not available.	1 per W973/W975



W973 LOGIC PANELS



CONTROLS HEATING, COOLING, AND ECONOMIZER OPERATION IN COMMERCIAL AIR CONDITIONING AND HEAT PUMP EQUIPMENT.

Controls up to three ON-OFF heat or cool stages or up to ten ON-OFF heat and/or cool stages using W975 Satellite

Sequencers. Modulating dc current signal controls economizer and heating or cooling valve motors. T7067 Dual Set Point Thermostat/Transmitter located in controlled space provides heating and cooling input signals based on space demand. C7046A sensor located in discharge air duct provides heating/cooling anticipation and economizer modulating low limit signal. System cycles all stages off on power interruption. When power is restored, system sequences required stages on with timed interstage delay. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Wiring Connections: 1/4 in. male quick-connect terminals. Underwriters Laboratories Inc. component recognized; CSA certified.

ELECTRICAL RATINGS:

Voltage and Frequency—24 Vac, 50/60 Hz.
Maximum Power Consumption—8 VA.

Contact Rating (spst)—

Contact	Voltage VA	Inrush VA	Running VA
Normally Open	24	240	60
Normally Closed	24	75	30
Normally Open	120/240	750	75
Normally Closed	120/240	240	40

SYSTEM COMPONENTS:

(See W973 Electronic Single Zone Control System, pages 140-141).

S936D Thermostat Simulator (startup and troubleshooting aid).

4074EAC Resistor Kit required for M734/M744/M745 actuator motors used with W973 (1-3 motors).

4074EAE Resistor Kit allows independent economizer low limit operation when one T7067 thermostat drives multiple W973's.

4074EAU Resistor Kit required for unison operation of M954/M955 actuator motors with W973 (1-3 motors).

191444B W973/W975 Case and Cover.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Modulating Econ. With Mod. Low Limit	Modulating Heating Output	Modulating Cooling Output	Heating Stages ^a	Cooling Stages ^a
W973A1017	Yes	No	No	2	2
W973A1041 ^b	Yes	No	No	2	2
W973B1016	Yes	Yes	Yes	3	3
W973E1005	Yes	No	No	0	4
W973F1004	Yes	No	No	4	2
W973J1017	Yes	No	No	4	4
W973J1009 ^c	Yes	No	No	4	4

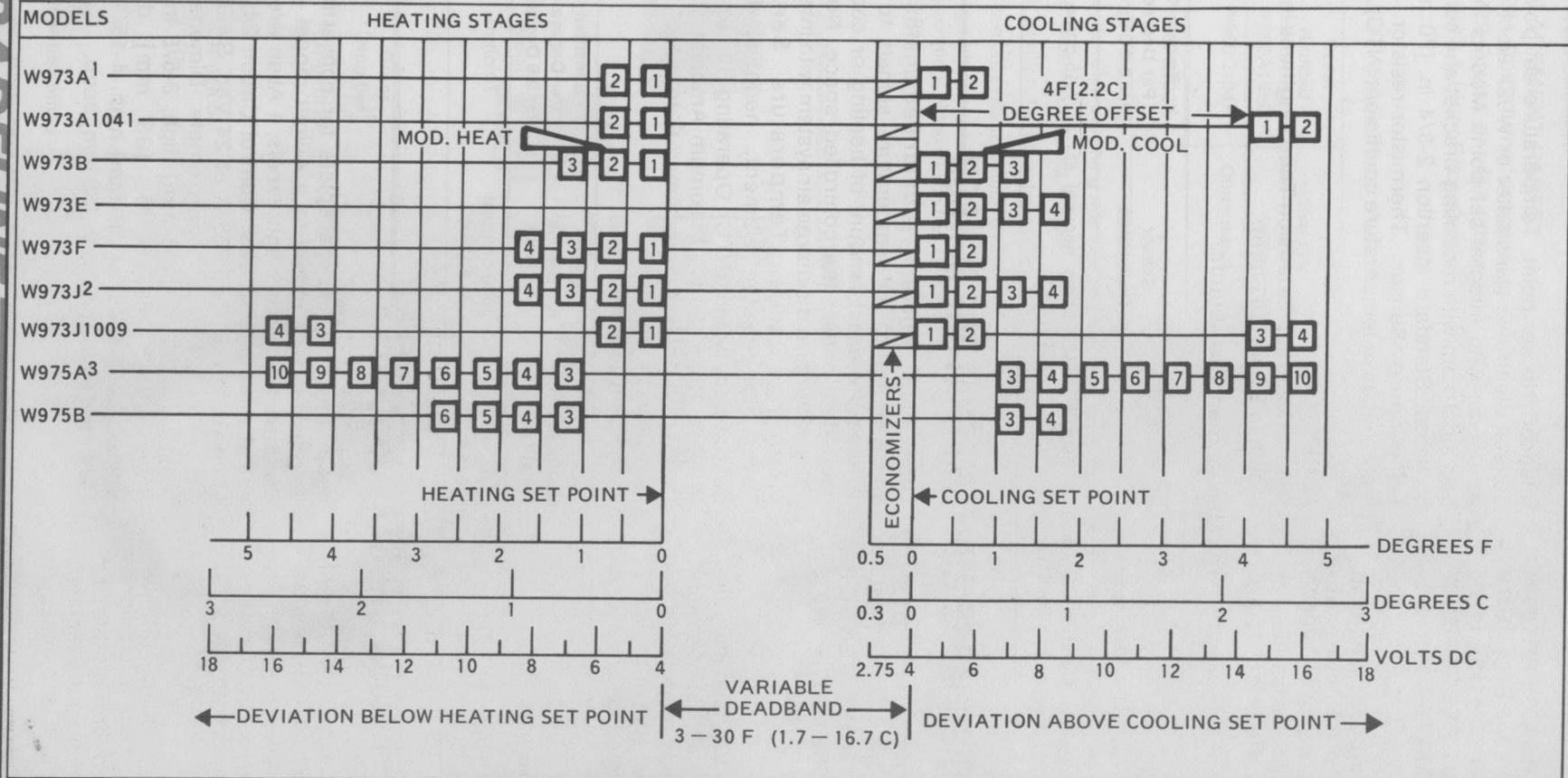
^aW975 Satellite Sequencer can be used to increase number of on-off stages to 10 heat or 10 cool, maximum.

^bW973A1041 provides 4 F [2.2 C] economizer offset between economizer and stage 1. Special scaleplate included.

^cW973J1009 provides 4 F [2.2 C] interstage differential between stage 2 and stage 3 for load control and heat reclaim applications.

continued next page

TRADELINE



NOTES:

- EXCEPT W973A1041 (LISTED NEXT).
- EXCEPT W973J1009 (LISTED NEXT).
- W975A PROVIDES UP TO 8 ADDITIONAL STAGES FOR EITHER HEATING OR COOLING, NOT BOTH.

	STAGE OPERATING POINTS			DEVICE	DIFFERENTIALS ° FAHRENHEIT		
	COOL STAGE	HEAT STAGE	MODULATING OUTPUT		STAGE	INTERSTAGE	THROTTLING RANGE
W973	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ECONOMIZER	—	—	0.5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	MOD COOL	—	—	1.0
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	MOD HEAT	—	—	1.0
W975	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLING STAGES	.4 1st stage .25 STG 2-10	0.5	—
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HEATING STAGES	.25	0.5	—
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HEATING AND COOLING STAGES	.25	0.5	—

E567

W973 stage operating points, differentials, and throttling ranges.





T7022A ELECTRONIC RETURN AIR TEMPERATURE SENSOR

ELECTRONIC RETURN AIR TEMPERATURE SENSOR FOR USE WITH T7067B ELECTRONIC TRANSMITTER.



Thermistor senses return air temperature and sends modulating resistance signal to T7067B electronic transmitter or W927 electronic se-

quencer. No set point. Temperature set point is done at electronic transmitter or W927 electronic sequencer with integral set point. Mounts in return air stream with mounting bracket and screws provided. Standard insertion 2-3/4 in. [70 mm]. Temperature Sensor: Thermistor-resistor element, negative temperature coefficient (NTC).

ACCESSORY:

7640HS Insertion Extension Tube lengthens insertion to 9.5 in. [241 mm].

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Use With	Description	Sensor Resistance	Sensitivity Per Degree F [Per 0.6 Degree C]
T7022A1010	T7067B W927	Electronic Return Air Temperature Sensor without set point adjustment	1420 ohms nominal at 75 F [24 C]	15 ohms

C7046A DISCHARGE AIR TEMPERATURE SENSOR

ELECTRONIC DISCHARGE AIR TEMPERATURE SENSOR FOR USE WITH W973 LOGIC PANEL.



Thermistor senses discharge air temperature and sends modulating resistance signal to W973

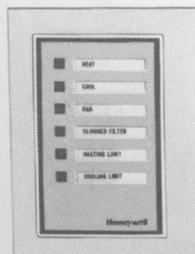
Logic Panel where it is balanced against the space or return air temperature signals to determine the exact amount of heating or cooling needed to satisfy the controlled space. No set point. Mounts in discharge air system with integral mounting flange. Temperature Sensor: Thermistor-resistor element, negative temperature coefficient (NTC). Operating Range: 40 F [4 C] to 150 F [66 C]. Maximum Ambient: 250 F [121 C]. Wiring Connections: 6 in. [152 mm] leadwires.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Insertion Length	Sensor Resistance (Nominal)	Sensitivity Per Degree F [Per 0.6 Degree C]
C7046A1004	Electronic Discharge Air Temperature Sensor without set point	8 in. [203 mm]	3000 ohms at 77 F (25 C)	70 ohms
C7046A1038		12 in. [305 mm]		

W950A,C,G STATUS PANELS

PROVIDES SYSTEM INDICATION AND MANUAL SWITCHING IN HEATING, COOLING, AND VENTILATION SYSTEMS.



Indicator lights monitor desired system functions. Refer to order table for application and switching. W950's include 6 indicator

lights and accessory faceplate for converting a 6-light standard model to a 4-light model. Also includes 42 indicator light labels, 1 Allen wrench, and 2 mounting screws. Control Circuit 24 Vac. Light Bulb: 0.8 W, 0.035 A at 24 Vac. Switches: 2.5 A at 24 Vac. Approximate Dimensions: W950A—4-5/8 in. [118 mm] high, 3-5/8 in. [92 mm] wide, 1-5/16 in. [33 mm] deep; W950C,G—4-5/8 in. [118 mm] high, 4-15/16 in. [124 mm] wide, 1-5/16 in. [33 mm] deep.

continued next page

environmental control systems



W950A,C,G continued

REPLACEMENT PARTS:

- 118221 Color Lens for lights; green.
- 118222 Color Lens for lights; red.
- 118399B 4-Light Faceplate.

- 139759 and 139952 Indicator Light Labels. Self adhesive labels (42) fit slots in cover.
- 190821 Light Bulb with 2-1/4 in. [57 mm] leads.
- 24799 Locking Allen Wrench.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Use With	Application	Switching	
			System	Fan
W950A1056	W973	Indication only. ^a	—	—
W950C1047	Other than W973	Indication, system switching, and fan switching.	HEAT-OFF-COOL ^b	ON-AUTO ^c
W950G1027		Indication, system switching, fan switching; remote set point adjustment.	HEAT-OFF-COOL ON-OFF ^d	(see footnote ^e)

^aFor system/fan switching with W973, also use Q667 Subbase.

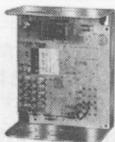
^bIn OFF position, heating, cooling, and fan cannot operate.

^cIn ON position, fan operates continuously except when system switch is in the OFF position.

^dTwo-switch, system switching model. (When switch No. 2 is in the OFF position, heating, cooling and fan cannot operate).

^eFan operation is field selectable. Connect fan relay to terminal G for continuous fan operation; to terminal N for automatic fan operation. When switch No. 1 is in the AUTO or COOL, fan runs continuously; in HEAT, fan runs intermittently.

W974A,B SETBACK/SETUP MODULES



W974A



W974B

USED WITH W973 LOGIC PANEL TO CONSERVE ENERGY DURING BUILDING UNOCCUPIED PERIODS.

See order table for description. Wiring Connections: 1/4 in. male quick-connect terminals. Mounts in any position on flat surface. Dimensions:

5-5/16 in. [135 mm] high, 4-1/8 in. [105 mm] wide, 3 in. [76 mm] deep.

ELECTRICAL RATINGS:

Voltage and Frequency—24 Vac, 50/60 Hz.
Maximum Power Consumption—1 VA.

ACCESSORY:

4074EAR W974 Cover.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Selectable Heating Setback	Selectable Cooling Setup
W974A1015	Provides cooling shutdown and heating setback. During unoccupied period, outdoor air damper is closed and fan is switched from continuous to intermittent operation with call for heating.	5, 10, or 15 F [2.8, 5.5, or 8.3 C]	Cooling Lockout
W974B1006	Provides heating setback and either cooling shutdown or cooling setup. During unoccupied periods, outdoor air damper is closed and system fan is switched from continuous to intermittent operation. In cooling setup mode, W974B automatically cycles fan with a call for heating, cooling, or economizer. In cooling shutdown mode, W974B automatically cycles fan with a call for heating. Economizer provides first stage of cooling in cooling setup mode.		5, 8, or 12 F [2.8, 4.4, or 6.7 C]

TRADELINE

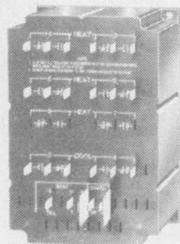


environmental control systems

W975A,B ELECTRONIC SATELLITE SEQUENCERS



W975A



W975B

PROVIDE ADDITIONAL STAGING CAPABILITY FOR THE W973 SOLID STATE ENERGY MANAGEMENT CONTROL SYSTEM.

See order table for description. Operates in response to separate heating and cooling ramp dc voltage signals from T7067 dual set point thermostat. Ambient Operating Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Wiring Connections: 1/4 in. male quick-connect terminals. Dimensions: 6-1/4 in. [159 mm] high, 4-1/8 in. [105 mm] wide, 2-3/4 in. [70 mm] deep. Underwriters Laboratories Inc. component recognized; CSA certified.

ELECTRICAL RATINGS:

Voltage and Frequency—24 Vac, 50/60 Hz.

Maximum Power Consumption—8 VA.

Contact Ratings (spdt relays)—

Contact	Voltage Vac	Inrush VA	Running VA
Normally Open	24	240	60
Normally Closed	24	75	30
Normally Open	120/240	750	75
Normally Closed	120/240	240	40

ACCESSORY:

191444B W973/W975 Case and Cover.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description
W975A1004	Provides 8 additional ON-OFF stages of heating or cooling for W973 Singlezone Logic Panel.
W975B1003	Provides 2 additional ON-OFF stages of cooling and 4 additional ON-OFF stages of heating for W973 Singlezone Logic Panel.

T7067A,B THERMOSTAT AND TRANSMITTER



T7067A THERMOSTAT AND T7067B TRANSMITTER CONTROL SPACE TEMPERATURE WHEN USED WITH W973 LOGIC PANEL.

Separate heat and cool adjustable set point levers provide adjustable dead-band from 3 F to 30 F [1.6 C to 16.6 C]. Separate

1-16 Vdc voltage ramps provide independent heating and cooling signals to W973 Singlezone Logic Panel. Two light-emitting diodes (LED's) under T7067 cover for system checkout. C7046A Discharge Air Sensor provides anticipation. One T7067 can control up to 6 parallel W973 panels. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Set Point Adjustment Range: 55 F to 85 F [13 C to 29 C]. Mounts on standard 2 x 4 in. outlet box or on a nonconductive flat surface. Approximate Dimensions: 4-5/8 in. [118 mm] high, 2-13/16 in. [71 mm] wide, 1-1/4 in. [32 mm] deep.

ELECTRICAL RATINGS:

Voltage—20 Vdc from W973 panel.

Current Draw—20 mA.

ACCESSORIES:

4074EBT Resistor Kit—Permits T7067 Thermostat/Transmitter to drive the RP7505 Electric/Pneumatic Transducer to provide modulated heating/cooling control of pneumatic valve actuators.

130821C Vertical Mount Kit for horizontal junction box.

Q667A,B,C Subbase.

S963D1001 Thermostat Simulator.

T7067B only—

T7047C1025 Remote Sensor, wall-mounted.

T7022A1010 Return Air Sensor.

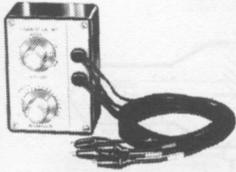
Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Temperature Sensor	Includes
T7067A1008	Integral temperature sensor.	Wiring plate, separate locking, heating and cooling set point levers, locking cover, without thermometer.
T7067B1006	T7047C1025 or T7022A1010 Remote Temperature Sensor (order separately).	

TRADELINE



S963D THERMOSTAT SIMULATOR



FOR CHECKOUT OF W973 SINGLEZONE LOGIC PANELS AND W975 SATELLITE SEQUENCERS.

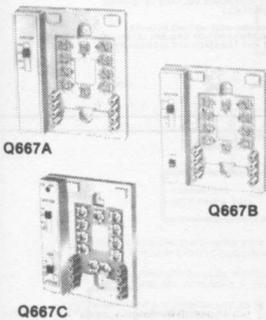
Consists of 2 potentiometers and a resistor

assembly mounted in a test box. Simulates HEAT and COOL ramp signals of a T7067 thermostat and the economizer low limit function. Leadwires have color-coded bands with corresponding W973 terminal numbers. Alligator clips for easy connection to device terminals. Leadwire Length: 3 ft [0.9 m]. Approximate Dimensions: 4 in. [102 mm] high, 2-7/8 in. [73 mm] wide, 2-1/4 in. [57 mm] deep.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Heat/Cool Ramp Signal		Economizer Low Limit Signal	
	Minimum	Maximum	Minimum	Maximum
S963D1001	Less than 2 V	16.6 V	4.0 V; equivalent to 45 F [7 C] at the C7046 Discharge Sensor	4.5 V; equivalent to 69 F [21 C] at C7046 Discharge Sensor

Q667A,B,C SUBBASE



PROVIDES MANUAL SWITCHING FOR T7067 THERMOSTAT/TRANSMITTERS.

Mounts directly on wall or on vertical 2 x 4 in. outlet box. T7067 mounts on subbase with mounting screws which also complete electrical connections between

thermostat/transmitter and subbase. Approximate dimensions 4-3/4 in. [121 mm] high, 3-15/16 in. [100 mm] wide, 15/16 in. [24 mm]

deep.

ELECTRICAL RATINGS:

System Switch Contacts—1 AFL, 6 ALR at 24 Vac; 50 microamps at 1 Vdc.

Fan Switch Contacts—1 AFL, 6 ALR at 24 Vac.

ACCESSORIES:

130821B Cover Plate Assembly (mount on external junction box to cover exposed circuit board).

130821C Vertical Mount Kit for horizontal junction box.

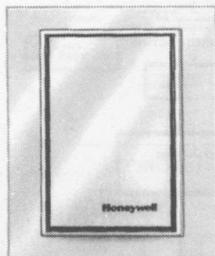
Available only through Authorized Honeywell Energy Management Distributors.

Order Number	System Switching ^a	Fan Switch	Comments
Q667A1005	COOL/AUTO/HEAT/OFF	NONE	
Q667B1004	COOL/AUTO/HEAT/OFF	AUTO/ON	
Q667C1003	COOL/AUTO/HEAT/EM. HT.	ON/AUTO/OFF ^b	EM. HT. LED ANNUNCIATOR

^aWhen fan switch is set to AUTO, the fan is intermittent in HEAT continuous in system AUTO or COOL.

^bOFF position shuts off entire system.

T7047C1025 ELECTRONIC SPACE TEMPERATURE SENSOR



ELECTRONIC SPACE TEMPERATURE SENSOR FOR USE WITH T7067B ELECTRONIC TRANSMITTER.

Thermistor senses space temperature and sends modulating resistance signal to T7067B Electronic Transmitter. No thermometer; no set

point. Temperature set point is done at T7067B Electronic Transmitter. Mounts on wall or 2 x 4 in. vertical outlet box with screws provided. Temperature Sensor: Thermistor-resistor element, negative temperature coefficient (NTC).

ACCESSORY:

130821C Adapter Plate Assembly for mounting T7047C1025 vertically on horizontal junction box.

Available only through Authorized Honeywell Energy Management Distributors.

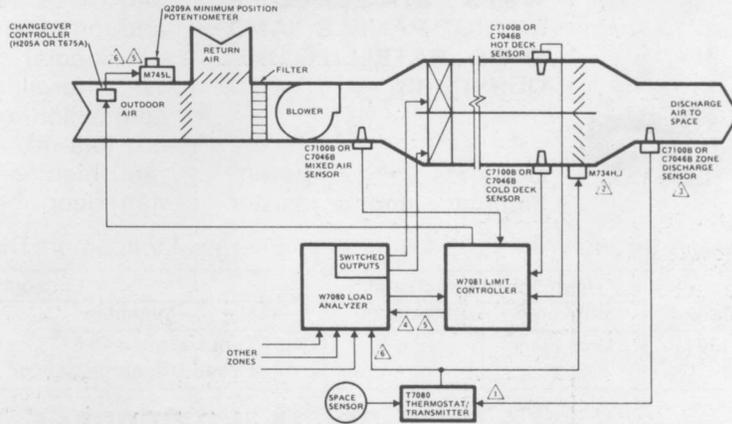
Order Number	Use With	Description	Sensor Resistance	Sensitivity Per Degree F [Per 0.6 Degree C]
T7047C1025	T7067B	Electronic Sensor without set point adjustment	1420 ohm nom. at 75 F	15 ohms



environmental control systems

The W7080 Multizone Component Selection Guide as shown on this page and the facing page is designed as an aid in component selection for a typical multizone environmental control system. Detailed information for individual components can be found on succeeding pages (pages 150-165).

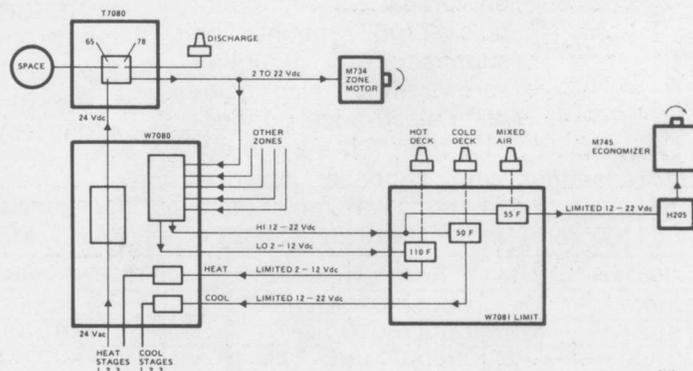
TYPICAL W7080 MULTIZONE SYSTEM SCHEMATIC



- ⚠ SPACE SENSOR IS INTEGRAL WITH T7080A. IF REMOTE TEMPERATURE SENSING IS DESIRED, USE T7080B WITH T7081C1087 FOR REMOTE SPACE TEMPERATURE SENSING; USE C7100B1013 OR C7046B1010 FOR REMOTE RETURN AIR TEMPERATURE SENSING.
- ⚠ ONE M734H/J AND MIXING DAMPERS REQUIRED FOR EACH ZONE.
- ⚠ ONE C7100B1013 OR C7046B1010 REQUIRED IN EACH ZONE DISCHARGE AIR STREAM.
- ⚠ MODULATED HEATING AND COOLING DRIVE SIGNALS ARE AVAILABLE AT THE HT (HEAT) AND C (COOL) TERMINALS OF THE W7080A LOAD ANALYZER.
- ⚠ UP TO SIX TOTAL MOTORS (ECONOMIZER AND MODULATED VALVE) CAN BE DRIVEN FROM THE W7080 LOAD ANALYZER. FOR UNISON OPERATION, PARALLEL WIRE MOTOR DRIVE SIGNAL TERMINALS R AND C (MOTOR O/S NUMBER, SIGNAL SOURCE, AND REFERENCE VOLTAGE DETERMINE ACTUAL OPERATIONAL CHARACTERISTICS).
- ⚠ THE W7080A LOAD ANALYZER, M744 AND M745 MOTORS REQUIRE SEPARATE TRANSFORMERS. M734 MOTORS DO NOT REQUIRE SEPARATE TRANSFORMERS. DO NOT GROUND ANY TRANSFORMER SECONDARY IN THE SYSTEM.

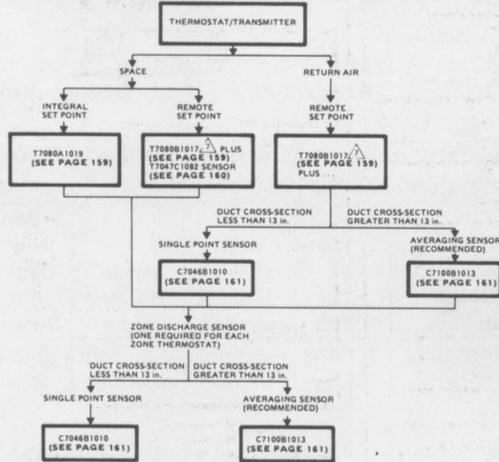
ES18

W7080 MULTIZONE SYSTEM OPERATION



ES19

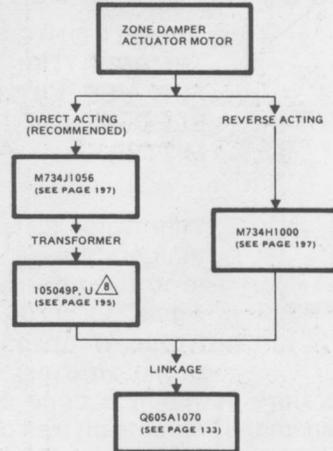
THERMOSTAT SELECTION



⚠ PART NO. 195289 STANDOFF BRACKET AVAILABLE FOR REMOTE MOUNTING OF T7080B1017 INSIDE PANELS AND ENCLOSURES.

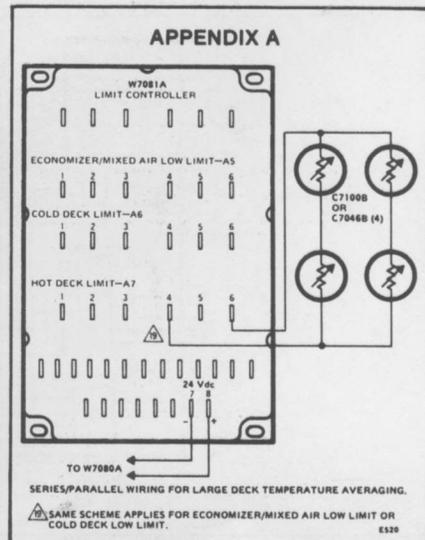
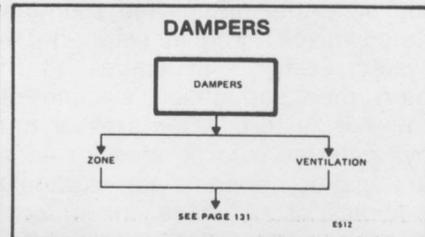
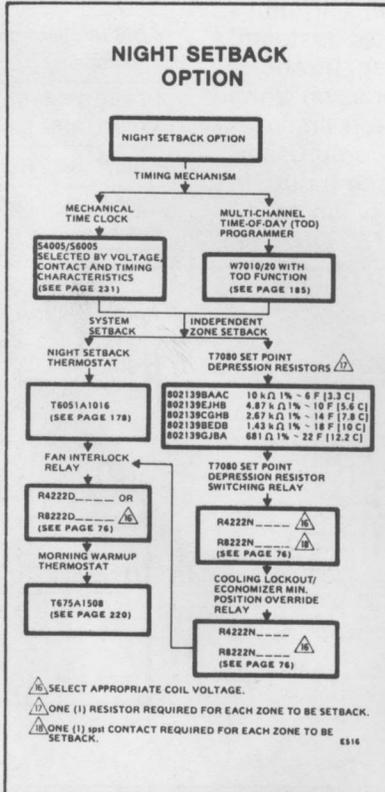
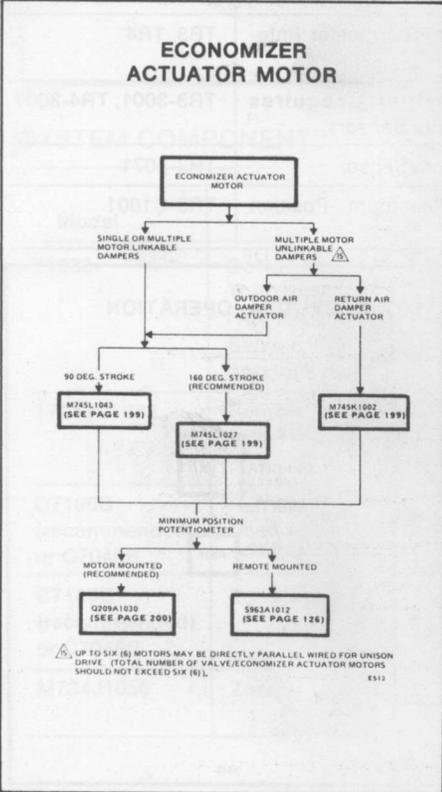
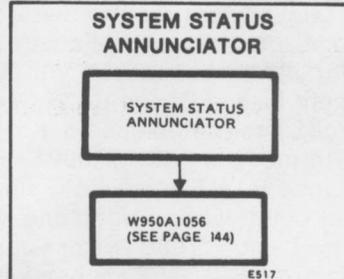
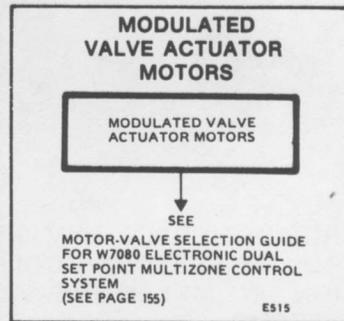
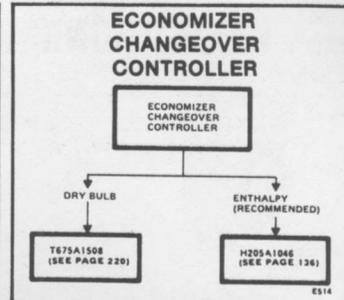
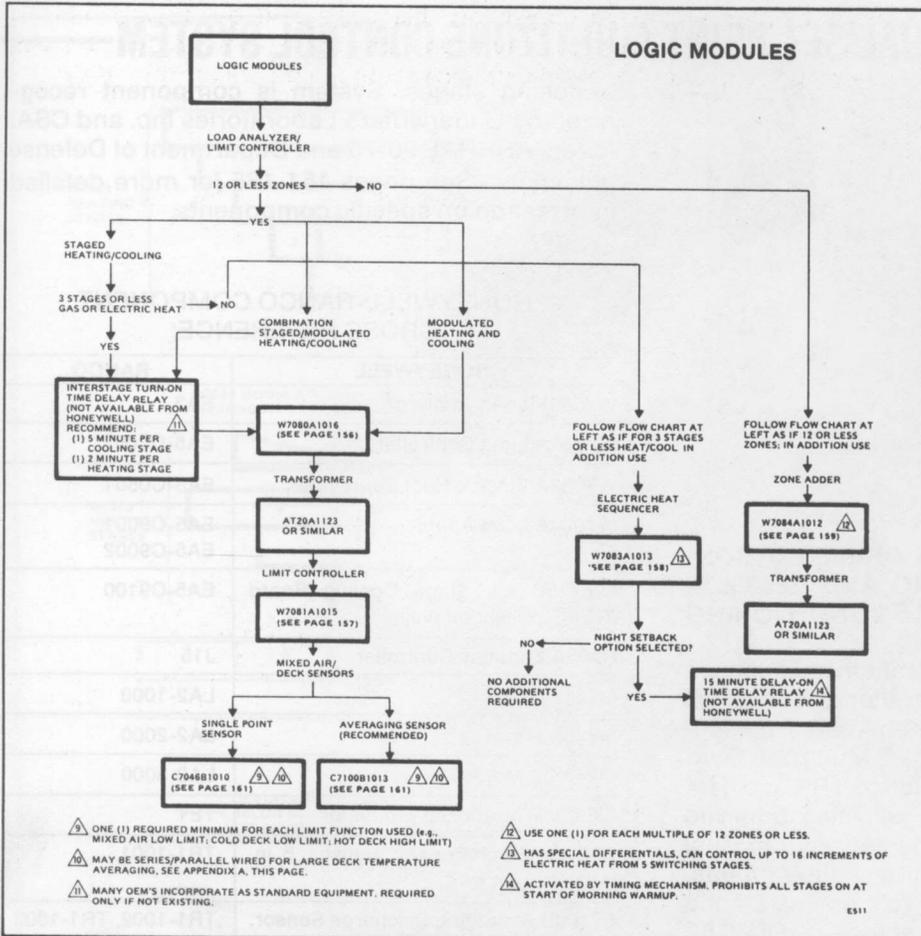
ES09

ZONE DAMPER ACTUATOR MOTOR



⚠ MULTITAP MODELS. SELECT APPROPRIATE MOUNTING STYLE.

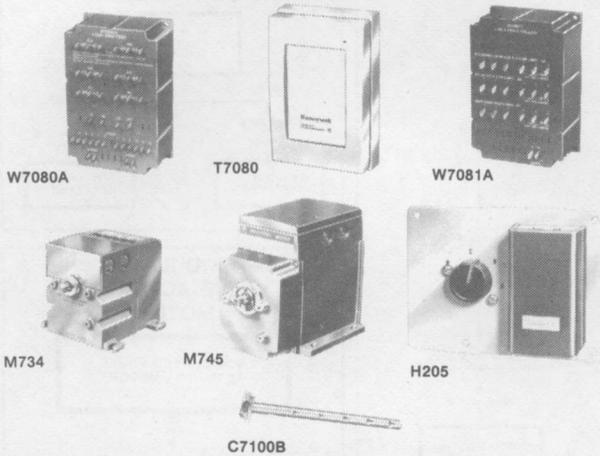
ES10





environmental control systems

ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM



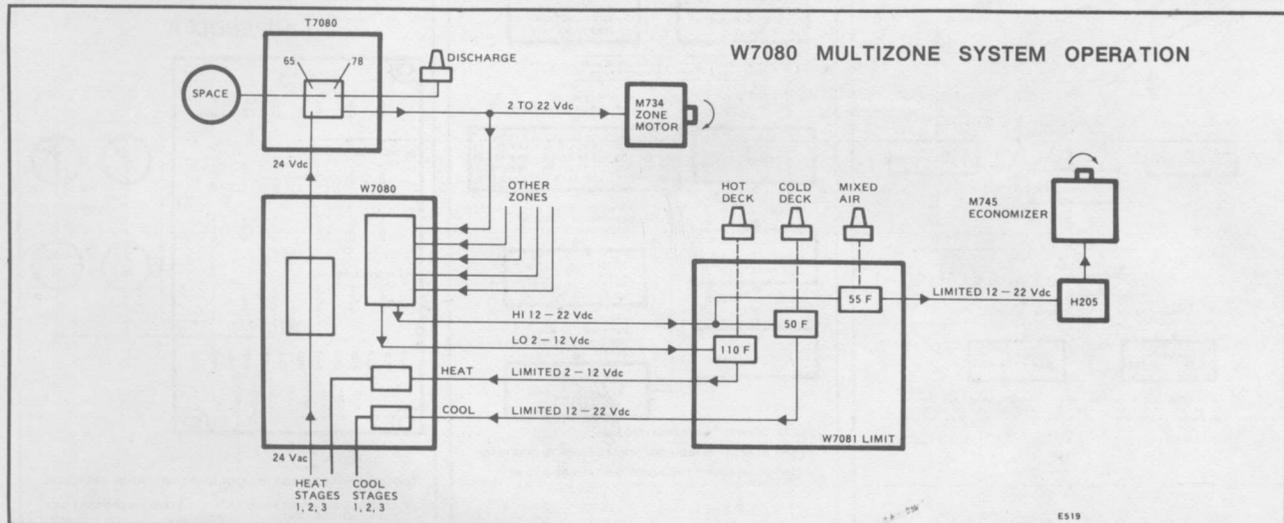
PROVIDES SPACE DEMAND ORIENTED CONTROL OF HEATING, COOLING AND VENTILATION IN MULTIZONE AIR CONDITIONING SYSTEMS.

Designed for new and field retrofit installations in multizone air conditioning equipment and as direct component-for-component field replacement for the Ranco EA3 LODAPT Multizone Control System. Replacement of Ranco TR3 and TR4 Thermostats with T7080A, B will also upgrade Ranco EA3 System from single set point to dual set point with no additional wiring requirements. The basic W7080 system controls up to 12 zone dampers, 3 ON/OFF heating stages, 3 ON/OFF cooling stages, integrated economizer and modulated valves for chiller water, hot water or steam. System switches all stages off when power is interrupted; sequentially switches stages on when power is restored. Compressor turn-on time delays must be incorporated for each compressor. Optional components can expand zone inputs in multiples of 12 zones and/or control up to 16 increments of electric heat from 5 ON/OFF

switching stages. System is component recognized by Underwriters Laboratories Inc. and CSA. Meets ASHRAE 90-75 and Department of Defense guidelines. See pages 151-165 for more detailed information on specific components.

HONEYWELL-RANCO COMPONENT CROSS REFERENCE:

HONEYWELL	RANCO
W7080A Load Analyzer	EA3
W7081A Limit Controller	EA5-C3002
W7083A Electric Heat Sequencer	EA5-C0501
W7084A Zone Adder	EA5-C9001, EA5-C9002
195325B 4th Stage Cooling Board (OEM application only)	EA5-C9100
H205A Enthalpy Controller	J15
M734J Motor	LA2-1000
M745P Motor	LA2-2000
M745K,L Motor	LA2-3000
S7080A Thermostat Simulator	TE1
C7046B Discharge Air Sensor, 6 in. [152 mm]	TR1-1001
C7100B Averaging Discharge Sensor, 13 in. [330 mm]	TR1-1002, TR1-1003
T7080A Electronic Thermostat (integral sensor)	TR3, TR4
T7080B Transmitter (requires T7047C1082 Remote Sensor)	TR3-3001, TR4-3001
T7047C1082 Remote Sensor	TR3-5071
S963A Remote Minimum Position Potentiometer	TR5-C1001



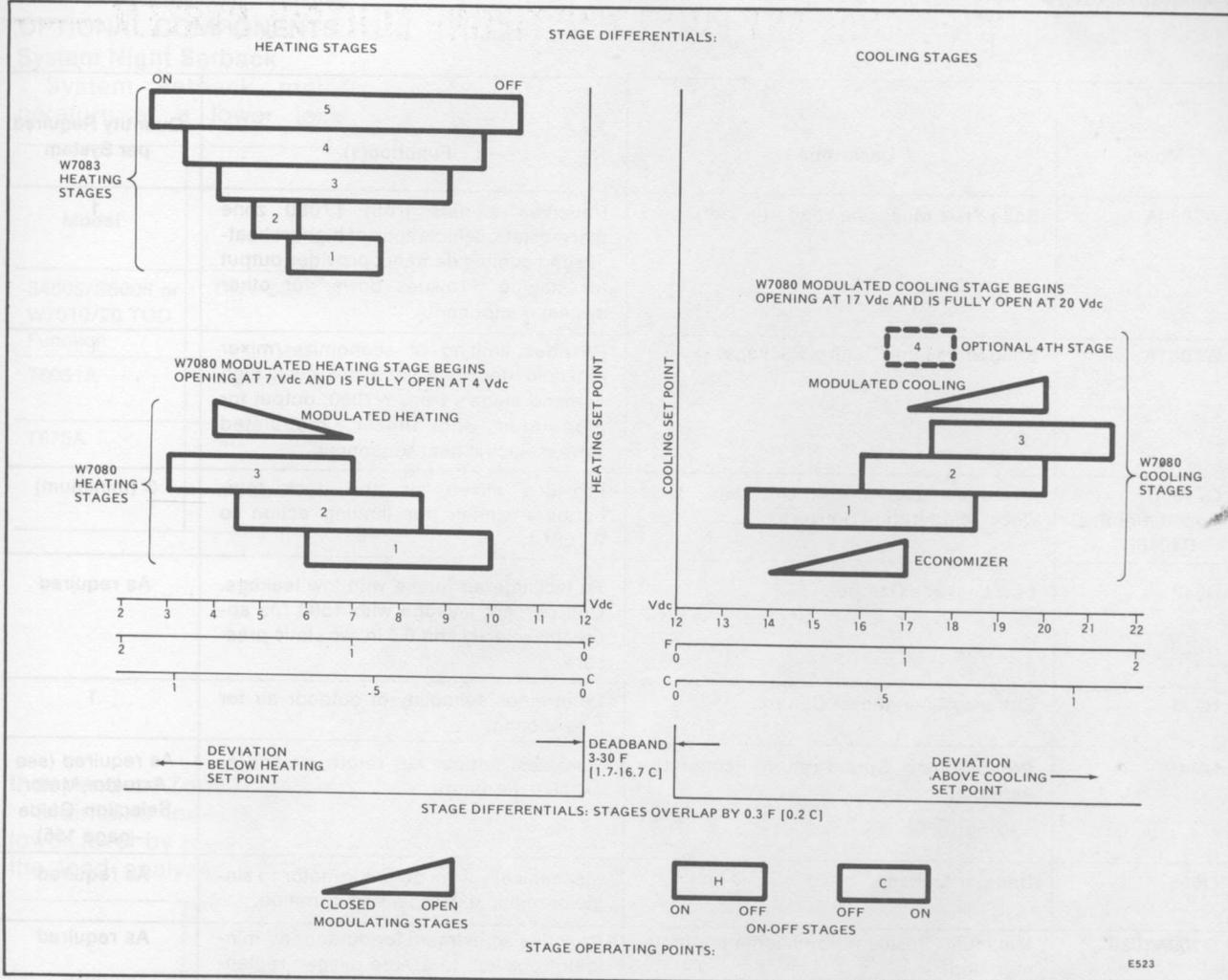
continued next page

TRADELINE

environmental control systems



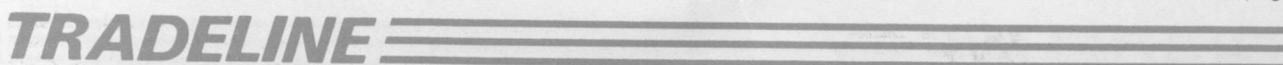
Electronic Dual Set Point continued



SYSTEM COMPONENTS:

Model	Description	Function(s)	Quantity Required per System
T7080	Solid State Dual Set Point/Zone Thermostat (adjustable zero energy band); "A" model: Integral Thermistor Space Sensor. "B" model: Requires remote temperature sensor.	Provides heating-cooling demand signal to zone damper motor and multizone control logic panel (W7080).	1 per zone of control
T7047C1082	Remote Space Temperature Sensor. Used with T7080B.	Assures tamper resistance. Provides space temperature signal for T7080B Dual Set Point Transmitter.	1 per T7080B
C7100B (recommended) or C7046B	Remote Return Air Temperature Sensor. Used with T7080B.	Assures tamper resistance. Provides return air temperature signal for T7080B Dual Set Point Transmitter.	1 per T7080B
C7100B (recommended) or C7046B	Zone Discharge Sensor.	Heat, cool anticipation.	1 per T7080
M734J1056	Zone Damper Actuator Motor.	Modulates zone air mixing from hot and cold deck.	1 per zone of control

continued next page





environmental control systems

Electronic Dual Set Point continued

Model	Description	Function(s)	Quantity Required per System
W7080A	Solid State Multizone Load Analyzer.	Receives signals from T7080 zone thermostats, selects zone of highest heating and cooling demand, provides output for staging. Provides power for other system components.	1
W7081A	Solid State Limit Control Package.	Provides limiting of economizer/mixer air, cold deck low, and hot deck high demand signals from W7080; output for modulated economizer, modulated valves, electric heat sequencer.	1
C7100B (recommended) or C7046B	Mixed Air/Economizer, Hot Deck, Cold Deck Temperature Sensors.	Provides mixed air and deck temperature signals for limiting action to W7081A.	3 (minimum)
D640	Low Leakage Damper.	To facilitate air intake with low leakage. One percent leakage with 1500 fps approach velocity and 0.5 in. wc static pressure.	As required
H205	Enthalpy Changeover Control.	Determines suitability of outdoor air for free cooling.	1
M745	Proportioning Spring-return Economizer Actuator.	Operates outdoor air, return air and/or exhaust air dampers.	As required (see Actuator Motor Selection Guide —page 155)
Q605	Damper Linkage.	Mechanically links actuator motor to single or multiple damper configuration.	As required
Q209A1030	Minimum Position Potentiometer, motor mounted.	Provides adjustment for outdoor air minimum position to assure oxygen replenishment.	As required
T675	Compressor Low-ambient Limit Control.	Compressor protection.	1
—	Delay-on Time Delay Relays (not available from Honeywell).	System stability and reduced energy usage.	1 per stage (Only if OEM has not included as standard equipment)
AT20	20 VA Transformer.	System component power supply.	As required
AT72	40 VA Transformer.	System component power supply.	As required
AT88	75 VA Transformer.	System component power supply.	As required
130810A-K	40 VA Cover Mounted Transformer for M744/M745 actuator motors.	System component power supply.	1 per motor
105049P,U	Motor Mounted Transformer for M734 motor.	System component power supply.	1 per 24 V M734
191444B	W973/W975 Case and Cover.	Required when suitable wiring enclosure is not available.	1 per W7080, W7081, W7082, W7084

continued next page



Electronic Dual Set Point continued

OPTIONAL COMPONENTS:

System Night Setback

System setback maintains building temperature at a lower level at night by making/breaking power to W7080A Load Analyzer in response to temperature changes in a master zone.

ing/breaking power to W7080A Load Analyzer in response to temperature changes in a master zone.

Model	Description	Function(s)	Quantity Required per System
S4005/S6005 or W7010/20 TOD Function	Time Clock or Time-of-Day Programmer.	Occupied/unoccupied changeover system adjustment. Lockout cooling.	1
T6051A	Night Setback Thermostat.	Overrides time clock for heating low limit set point.	1
T675A	Morning Warmup Thermostat.	Holds outdoor air damper closed until return air temperature approaches space temperature set point during recovery from night setback.	1

Independent Zone Night Setback

Maintains independent zone temperatures at lower level by modifying zone demand signals to the load analyzer. Mechanical cooling must be

locked out through relay interlock to prevent sub-cooling during night setback. Heat setback selection: 6 F to 22 F [3.3 C to 12.2 C].

Model	Description	Function(s)	Quantity Required per System
S4005/S6005 or W7010/20 TOD Function	Time Clock or Time-of-Day Programmer.	Occupied/unoccupied changeover system adjustment.	1
R4222N R8222N	Pilot Duty Relay.	Dpdt-Intermittent fan.	1
		Dpdt-Override economizer minimum position, lockout cooling.	1
		Spst-Each zone to be set back.	As required
802139BAAC	Resistor (10.0k ohm).	Provides 6 F [3.3 C] setback.	1 per zone to be set back
802139EJHB	Resistor (4.87k ohm).	Provides 10 F [5.6 C] setback.	
802139CGHB	Resistor (2.67k ohm).	Provides 14 F [7.8 C] setback.	
802139BEDB	Resistor (1.43k ohm).	Provides 18 F [10 C] setback.	
802139GJBA	Resistor (681 ohm).	Provides 22 F [12.2 C] setback.	
T675A	Morning Warmup Thermostat.	Holds outdoor air damper closed until return air temperature approaches space temperature set point during recovery from night setback.	1

continued next page



environmental control systems

Electronic Dual Set Point continued

System Capability Expansion

Model	Description	Function(s)	Quantity Required per System
W7083	Solid State Electric Heat Sequencer.	Can control multiple heating elements of unequal sizes to provide 16 increments of electric heat from 5 stages of control.	1
W7084	Solid State Zone Adder.	Provides zone expandability beyond 12 zones.	1 per multiple of 12 zones or less

Modulating Valves

Model	Description	Function(s)	Quantity Required per System
V5011	Two-way Valve.	Two-position or modulated control of steam and water in heating/cooling systems.	As required (see page 233)
V5013	Three-way Mixing or Diverting Valve.	Modulated control of steam and water in heating/cooling systems.	As required (see page 238)
V5051	Two-way Cage Valve.	Two-position or modulated control of steam and water in heating/cooling systems requiring tight closeoff.	As required (see page 239)
V5047	Two-way Double Seated Globe Valve.	Two-position or modulated control of high pressure steam and water where positive final shutoff is not required.	As required (see pages 237)
Q601 Q618A	Valve Linkage (select on basis of actuator type and desired seal-off force).	Mechanically links actuator motors and valves.	As required (see pages 201,202)
M734H1026 M734J1015 M744D1003 M745G1007 M745P1007	Valve Actuator Motors (select on basis of mechanical and electrical, normal position, valve type, etc.).	Modulate chilled water, hot water, or steam.	As required (see pages 197, 198, 199)

ACCESSORY:

Model	Description	Function(s)	Quantity Required per System
S7080A	Thermostat Simulator.	Portable checkout/service tool—simulates HEAT and COOL ramp signal of a T7080 thermostat.	1

TRADELINE

MOTOR SELECTION GUIDE FOR W7080 ELECTRONIC CONTROL SYSTEM

Input Signal Range		Zone Dampers 10.5-13.5 Vdc		Economizers 14-17 Vdc			Valves ^b 4-7 Vdc					
Torque	lb.-in.	35		50			50		35		150	
	N-m	4.0		5.7			5.7		4.0		17	
Voltage		120	24	24			24	24	24		24	
Spring Return		No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	
Normal Position	Elec.	N.O.	N.C.	N.O.	N.C.	N.C.	N.O.	N.C.	N.O.	N.C.	N.C.	
	Mech.	—	—	N.C.	N.C.	N.C.	N.O.	N.C.	—	—	—	
Timing		30	30	35	35	60	60	60	60	60	60	
Stroke	90°	M734H1000										
			M734J1056 ^c									
				M745K1002 ^d								
					M745L1043 ^d							
	160°						M745L1027 ^d					
								M745G1007				
									M745P1007 ^d			
										M734H1026 ^c		
									M734J1015 ^c			
										M744D1003 ^d		

^aInternal heater.

^bSee Motor-Valve Selection Guide for W7080 Electronic Multizone Control System below for specific motor/valve applications.

^cUse 105049P,U Motor Mounted Transformer—select appropriate primary voltage.

^dUse 130810A-C Cover Mount Transformer—select appropriate primary voltage.

MOTOR-VALVE SELECTION GUIDE FOR W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM

Actuator Linkage Transformer	Proportional Spring Return		Proportional Nonspring Return		
	M745G1007	M745P1007	M734H1026	M734J1015	M744D1003
	Q618A1032	Q618A1032	Q618A1032	Q618A1032	Q618A1024
	Not Required	130810B Cover	105049P,U Remote Mounted	105049P,U Remote Mounted	130810B Cover
2-way Screwed Single seated V5011A and C 1/2-3 in.	● e		● d		
2-way Screwed Double seated V5047A 1-2 in.	● a,e		● a,d		
2-way Flanged Single seated V5011A 2-1/2-3 in.	● e		● d		
3-way Mixing Screwed V5013A 1/2-2 in.	● f	● f	● f	● f	● f
3-way Mixing Flanged V5013B 2-1/2 and 3 in.					● f
3-way Diverting Flanged V5013C 2-1/2 and 3 in. ^c					● f

^aUse Q601L1002 in place of Q618A1032.

^bUse Q601K1003 in place of Q618A1024.

^cNot recommended where tight closeoff is required.

^dWith 2-way valve, used in heating and/or cooling applications based on reference voltage wiring.

^eRecommended on steam heating applications for coil freeze protection on power failure.

^fWith 3-way valve, can be used in heating and/or cooling applications provided valve is properly piped.

Electronic Dual Set Point continued

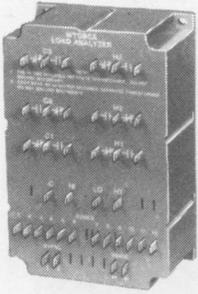
environmental control systems





environmental control systems

W7080A LOAD ANALYZER



CONTROLS HEATING, COOLING AND SPACE DEMAND ORIENTED ECONOMIZER OPERATION IN THE HONEYWELL ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM.

Controls up to 12 zone dampers, three stages of on-off heating, modulated heating, modulated economizer, three stages of on-off cooling and modulated cooling. Responds to highest heating and cooling demand from T7080 zone thermostat/transmitter. Analyzer is short-circuit protected source of 24 Vdc power for zone thermostat/transmitter, sensors, and W7081A Limit Controller package. Switches all stages off when power is interrupted, sequentially switches stages on when power is restored. No adjustment or calibrations required. Mounts with four No. 8 screws (not provided) through mounting holes in base. Optional components can be added to expand zone capability and switching stages. Am-

Stant Operating Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Electrical Connections: 1/4 in. quick-connect male terminals. Approximate Dimensions: 6-1/4 in. [159 mm] high, 4-1/8 in. [105 mm] wide, 2-5/16 in. [59 mm] deep. Recognized by Underwriters Laboratories Inc. and CSA. Meets ASHRAE 90-75 and Department of Defense guidelines.

ELECTRICAL RATINGS:

Voltage and Frequency—24 Vac, 50/60 Hz.
Maximum Power Consumption—10 VA.

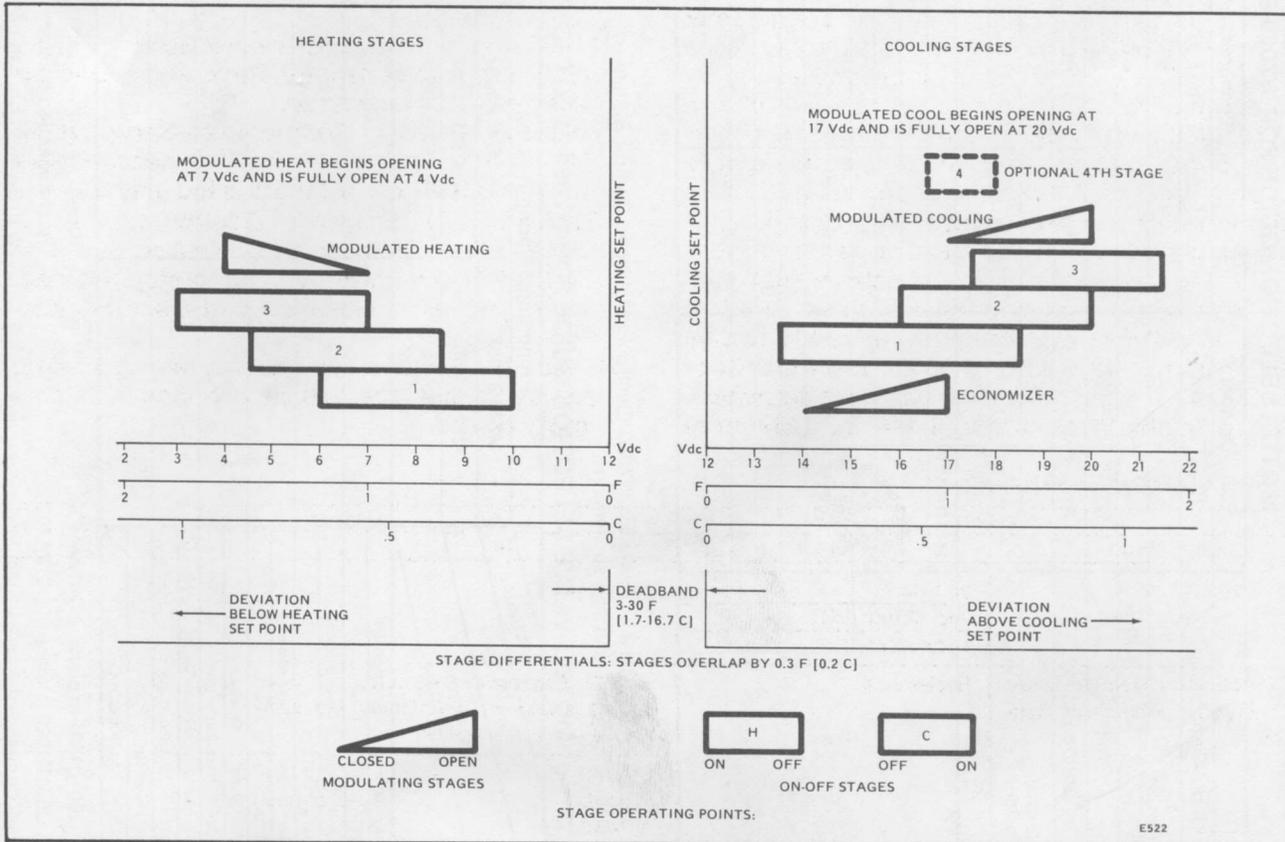
ACCESSORIES: See System Components section and/or Component Selection Flow Charts for Electronic Dual Set Point Multizone Control System (pages 148-154).

RELAY CONTACT RATINGS:

Contact	Voltage ¹ Vac	Inrush VA	Running VA
Normally Open	24	240	60
Normally Closed	120/240	750	75
Normally Open	24	75	30
Normally Closed	120/240	240	40

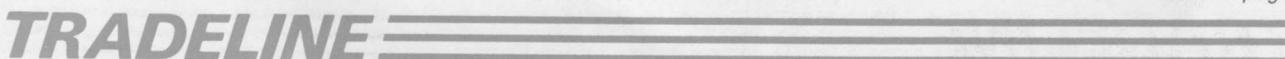
¹VA ratings not valid when maximum load is connected to both normally open and normally closed contacts.

STAGE DIFFERENTIALS:



W7080A stage and modulated valve operating points, differentials, and throttling ranges.

continued next page



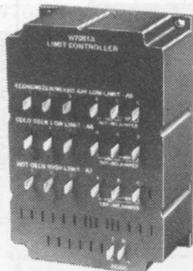


W7080A continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Inputs		Outputs	
		From	Signal	To	Signal
W7080A1016	Load Analyzer provides control of ON/OFF and modulated cooling and modulated economizer functions.	Transformer	24 Vac	T7080A T7080B W7081A 195325B	24 Vdc
		T7080A T7080B	2-22 Vdc		
		W7081A	Limited 12-22 Vdc Cooling (C)	W7081A	2-12 Vdc (LO)
Limited 2-12 Vdc Heating (HT)	12-22 Vdc (HI)				
			Controlled Loads	Dry contact closures (pilot duty)	

W7081A LIMIT CONTROLLER



USED WITH W7080A LOAD ANALYZER TO PROVIDE COLD DECK LOW LIMIT, HOT DECK HIGH LIMIT, AND ECONOMIZER/MIXED AIR LOW LIMIT FUNCTIONS.

Limits the maximum and minimum temperatures of the hot and cold decks and of the mixed air

supplying modified demand signals to the W7080A Load Analyzer and to the economizer. The positive limits stabilize deck temperatures under light load conditions providing greater comfort and reducing energy usage. Has jumper selectable set points for each of its three functions. Mounts with four No. 8 screws (not provided) through mounting holes in base. Ambient Operating Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Electrical Connections: 1/4 in. quick-connect male terminals. Approximate Dimensions: 6-1/4 in. [159 mm]

high, 4-1/8 in. [105 mm] wide, 2-5/16 in. [59 mm] deep.

ELECTRICAL RATINGS:

Supply Voltage—24 Vdc (from W7080A Load Analyzer).

Maximum Power Consumption—0.29 VA.

ACCESSORIES:

C7100B Averaging Temperature Sensor (13 in. [330 mm] probe length). Deck and mixed air sensors—recommended.

C7046B Single Point Temperature Sensor (6 in. [152 mm]). Deck and mixed air sensors (use where C7100B probe length is too long).

H205A Enthalpy Changeover Controller.

T675A Dry Bulb Changeover Controller.

M745L1027 Economizer Actuator Motor. 160 deg. stroke, 60 sec, mechanical and electrical, normally closed.

M745L1043 Economizer Actuator Motor: 90 deg. stroke, 30 sec, mechanical and electrical, normally closed.

INPUT/OUTPUT SIGNALS:

Inputs		Outputs	
From	Signal	To	Signal
W7080A	24 Vdc	W7080A	Limited 2 to 12 Vdc (HT)
	2 to 12 Vdc (LO)		Limited 12 to 22 Vdc (C)
	12 to 22 Vdc (HI)		
C7100B or C7046B Hot Deck, Cold Deck, Mixed Air Sensors	Resistance	M745L Economizer Actuator Motor (using H205 Enthalpy Changeover Controller)	Limited 12 to 22 Vdc (economizer)
		M734H,J M744D M745G,H,P Valve Actuator Motors	Limited 2 to 12 Vdc (heating) Limited 12 to 22 Vdc (cooling)

continued next page



environmental control systems

W7081A continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Function	Field Selectable Limit Set Point	
			F	C
W7081A1015	Limit Controller Package	Cold deck low limit	45, 50, 55	7, 10, 13
		Hot deck high limit	90, 110, 130	32, 43, 54
		Economizer/mixer air low limit	50, 55, 60	10, 13, 16

W7083A ELECTRONIC HEAT SEQUENCER



USED WITH W7080A LOAD ANALYZER TO PROVIDE SEQUENTIAL SWITCHING OF 5 ON/OFF STAGES OF ELECTRIC HEAT.

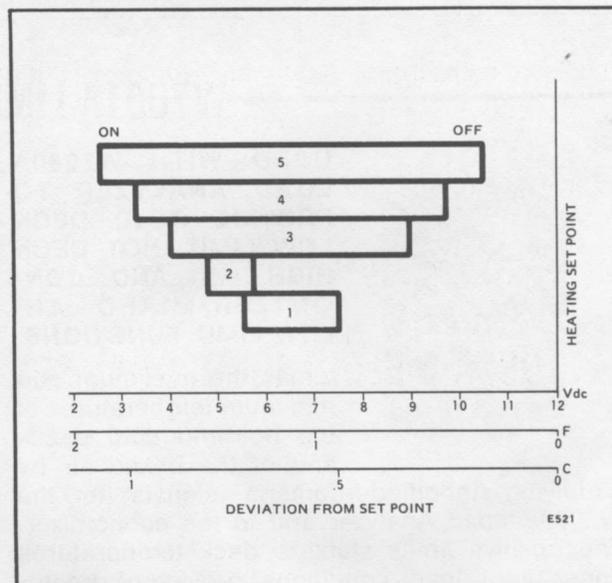
Used in place of the three heating stages of the W7080A when electric heat is utilized and more than three stages of control

are required. Switches all stages off when power is interrupted, switches stages on sequentially when power is restored (60 seconds required to sequence on). Special switching differentials allow up to 16 increments of electric heat from five stages of control. Input to the W7083A is the limited LO signal output from W7081A Limit Controller. Mounts with four No. 8 screws (not provided) through mounting holes in base. Ambient Operating Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Electrical Connections: 1/4 in. quick-connect male terminals. Approximate Dimensions: 6-1/4 in. [159 mm] high, 4-1/8 in. [105 mm] wide, 2-5/16 in. [59 mm] deep. Recognized by Underwriters Laboratories Inc. and CSA.

ELECTRICAL RATINGS:

Voltage—24 Vdc (from W7080A Load Analyzer).
Maximum Power Consumption—1.4 VA.

STAGE DIFFERENTIALS:



W7083A Electronic Heat Sequencer stage ON-OFF and overlap.

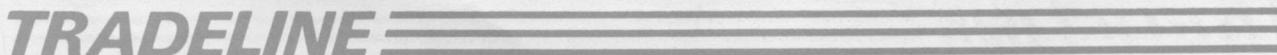
INPUT/OUTPUT SIGNALS:

Inputs		Outputs	
From	Signal	To	Signal
W7080A	24 Vdc	Controlled Loads	Dry Contact Closures (Pilot Duty)
W7081A	Limited 2 to 12 Vdc (LO)		

Available only through Authorized Honeywell Energy Management Distributors.

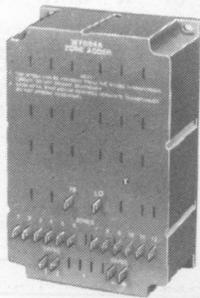
Order Number	Description	Contact	Contact Ratings		Running VA
			Voltage Vac	Inrush VA	
W7083A1013	Electric heat sequencer to switch up to 5 ON/OFF stages of electric heat.	Normally Open	24	240	60
		Open	120/240	750	75
		Normally Closed	24	75	30
		Closed	120/240	240	40

NOTE: VA ratings not valid when maximum load is connected to both normally open and normally closed contacts.





W7084A ZONE ADDER



USED WITH W7080A LOAD ANALYZER TO EXPAND ZONE CAPABILITY IN MULTIPLES OF 12 ZONES.

Unit monitors the demand signal from up to 12 additional zones, selects the strongest heating and cooling signal, and supplies them to the W7080A

Load Analyzer to govern proper response. Operates from a separate 24 Vac power source. Supplies a regulated 24 Vdc power source to its zone

thermostats. Mounts with four No. 8 screws (not provided) through mounting holes in mounting base. Ambient Operating Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Electrical Connections: 1/4 in. quick-connect male terminals. Approximate Dimensions: 6-1/4 in. [159 mm], 4-1/8 in. [105 mm] wide, 2-5/16 in. [59 mm] deep.

ELECTRICAL RATINGS:
Voltage and Frequency—24 Vac 50/60 Hz.
Maximum Power Consumption—3 VA.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Inputs From	Voltage	Outputs To	Voltage
W7084A1012	Zone Adder inputs for up to 12 additional zones	Transformer	24 Vac	W7080A W7081A W7083A 195325B	2 to 12 Vdc (LO) 12 to 22 Vdc (HI)
		T7080A T7080B	2 to 22 Vdc		

T7080A,B ELECTRONIC DUAL SET POINT THERMOSTAT/TRANSMITTER



USED IN W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM TO PROVIDE MODULATING SPACE TEMPERATURE CONTROL.

Separate heat and cool adjustable set point levers provide adjustable deadband from 3 F to 30 F

[1.6 C to 16.6 C]. Single 2 to 22 Vdc voltage ramp provides heating/cooling signal to W7080 Load Analyzer. Outputs constant 12 Vdc when sensed temperature within deadband range. Ramp output decreases on call for heat; increases on call for cooling. C7100B or C7046B Air Temperature Sensors are used to provide heating/cooling anticipation and can also be optionally used as remote return air temperature sensors with the T7080B transmitter. Operates on 24 Vdc supplied by W7080A Load Analyzer. Mounts on standard 2 x 4 in. outlet box or on non-conductive flat surface. Ambient Operating Temperature: Minus 40 F to 150 F [minus 40 C to plus 66 C]. Approximate Dimensions: 4-5/8 in. [188 mm] high, 2-13/16 in. [71 mm] wide, 1-1/4 in. [32 mm] deep. Meets ASHRAE and Department of Defense guidelines.

ELECTRICAL RATINGS:
Supply Voltage—24 Vdc from W7080A Load Analyzer.
Current Draw—4 mA.

ACCESSORIES:
130821C Vertical Mount Kit for horizontal junction box.
193120A Faceplate for use where T7080 must be horizontally mounted on horizontal junction box.
C7100B Averaging Zone Discharge Air Sensor for heating/cooling anticipation (13-in. [330 mm] probe length)—recommended.
C7046B Single Point Zone Discharge Air Sensor (6-in. [152 mm] probe length) for use where C7100B probe is too long for duct or plenum cross section.
M734J1056 Zone Damper Actuator Motor.
T7080B only—
T7047C1082 Remote Space Temperature Sensor, wall mounted.
C7100B Remote Return Air Averaging Temperature Sensor (recommended); 13-in. [330 mm] probe length.
C7046B Remote Return Air Single Point Temperature Sensor; 6-in. [152 mm] probe length. For use where C7100B probe is too long for duct or plenum cross section.

continued next page



environmental control systems

T7080A continued

T7080A,B—

Independent Zone Night Setback Resistors provide heating setback of 6 F to 22 F [3.3 C to 12.2 C]. Require connection using time clock or pilot duty relay contact between wiring wall plate terminals 3 and 5 of T7080A or T7080B thermostat/transmitter.

802139BAAC Resistor (10.0 k ohm 1%) provides 6 F [3.3 C] setback.

802139EJHB Resistor (4.87 k ohm 1%) provides 10 F [5.6 C] setback.

802139CGHB Resistor (2.67 k ohm 1%) provides 14 F [7.8 C] setback.

802139BEDB Resistor (1.43 k ohm 1%) provides 18 F [10 C] setback.

802139GJBA Resistor (681 ohm 1%) provides 22 F [12.2 C] setback.

INPUT/OUTPUT SIGNALS:

Inputs		Outputs	
From	Signal	To	Signal
W7080A	24 Vdc	W7080, W7084	2 to 22 Vdc
C7100B or C7046B ^a	Resistance		
T7047C1082, C7100B ^b C7046B	Resistance	M734J1056	2 to 22 Vdc (motor closed at 10.5 Vdc or less, open at 13.5 Vdc or more)
Time clock Night setback resistor ^c	Contact closure and fixed resistance		

^aT7080A or B—Zone Discharge Air Sensor.

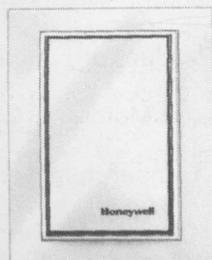
^bT7080B only—Remote Space or Return Air Sensors.

^cOnly if independent zone night setback option used.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Heating/ Cooling Deadband	Set Point Adjustment Range	Includes
T7080A1019	Dual Set Point Zone Thermostat Transmitter with integral sensor.	Min. 3 F [1.7 C]	55 F to 85 F [13 C to 29 C]	Wiring wallplate, separate locking heating-cooling set point levers; locking cover; without thermometer.
T7080B1017	Dual Set Point Zone Transmitter less sensor. Used with T7047C1082 Space Sensor; C7100B1013 or C7046B1010 Remote Return Air Sensors.	Max. 30 F [17 C]		

T7047C1082 ELECTRONIC SPACE TEMPERATURE SENSOR



ELECTRONIC SPACE TEMPERATURE SENSOR FOR USE WITH T7080B ELECTRONIC TRANSMITTER IN W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM.

Thermistor-resistor senses space temperature and sends modulated resistance signal to T7080B Electronic Transmitter. No thermometer; no set point. Temperature set point is adjusted at T7080B Electronic Transmitter. Mounts on wall or 2 x 4 in. outlet box (vertical or horizontal) with screws

provided. Contains horizontal faceplate for use when T7080B must be horizontally mounted. Thermistor-resistor element has negative temperature coefficient (NTC). Approximate Dimensions: 4-5/8 in. [118 mm] high, 3-5/8 in. [92 mm] wide, 1-5/16 in. [33 mm] deep.

ACCESSORIES:

130821C Adapter Plate Assembly for mounting T7047C1082 vertically on horizontal junction box.

193120A Horizontal Faceplate for use in installations where T7080B must be horizontally mounted on a horizontal outlet box.

continued next page

TRADELINE

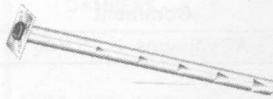


T7047C1082 continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Sensor Resistance	Resistance Sensitivity per Degree at Midrange (nominal)	
			F	C
T7047C1082	2-wire; electronic sensor without set point adjustment	22,800 ohms nominal at 77 F [25 C]	675	1290

C7100B AVERAGING TEMPERATURE SENSOR



PRIMARY AND/OR SECONDARY AVERAGING TEMPERATURE SENSOR FOR W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM.

Intended for use as zone discharge, hot deck, cold deck and/or remote return air temperature sen-

sor with the W7080 Electronic Dual Set Point Multizone Control System. No settings or calibration required. Negative temperature coefficient (NTC) carbon type, thermistor-resistor sensing element. Mounts on duct wall or plenum surface with integral mounting flange, or in a 2 x 4 in. junction box. Maximum Ambient Temperature: 250 F [121 C]. Electrical Connections: 1/4 in. quick-connect terminals.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Operating Range		Element Insertion Length		Resistance Sensitivity per Degree at Midrange (nominal)		Sensor Resistance (Ohms) at 77 F [25 C]
	F	C	in.	mm	F	C	
C7100B1013	40 to 150	4 to 66	13	330	675	1290	22,800

C7046B AIR TEMPERATURE SENSOR



PRIMARY AND/OR SECONDARY SINGLE POINT TEMPERATURE SENSOR FOR W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM.

Intended for use as zone discharge, hot deck, cold deck and/or remote return air temperature sen-

sor with the W7080 Electronic Dual Set Point Multizone Control System. Used in place of the C7100B Averaging Temperature Sensor where duct or plenum cross section is less than 13 in. No settings or calibration required. Negative temperature coefficient (NTC) carbon type, thermistor-resistor sensing element. Mounts on duct wall or plenum surface with integral mounting flange, or in a 2 x 4 in. junction box. Maximum Ambient Temperature: 250 F [122 C]. Electrical Connections: 6 in. [152 mm] leadwires.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Operating Range		Element Insertion Length		Resistance Sensitivity per Degree at Midrange (nominal)		Sensor Resistance (Ohms) at 77 F [25 C]
	F	C	in.	mm	F	C	
C7046B1010	40 to 150	4 to 66	6	152	675	1290	22,800

TRADELINE



environmental control systems

S7080A THERMOSTAT SIMULATOR



FOR CHECKOUT OF W7080 ELECTRONIC DUAL SET POINT MULTIZONE CONTROL SYSTEM.

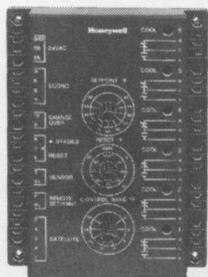
Consists of a potentiometer and a resistor assembly mounted in a test box. Simulates

HEAT/COOL ramp signal of a T7080 Thermostat/Transmitter and zone discharge sensor. Color-coded leadwire markings and alligator clips for easy connection to device terminals. Leadwire Length: 2-1/2 ft. [76 m]. Approximate Dimensions: 2-7/8 in. [73 mm] high, 4 in. [102 mm] wide, 2-3/16 in. [56 mm] deep (including knob).

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Heat		Cool		Comment
	Maximum	Minimum	Minimum	Maximum	
S7080A1002	3 Vdc	10 Vdc	18.5 Vdc	21.5 Vdc	All voltages \pm .25 Vdc

W7100A-E DISCHARGE AIR TEMPERATURE CONTROL



MAINTAINS AN AVERAGE DISCHARGE AIR TEMPERATURE IN VARIABLE AIR VOLUME SYSTEMS, OR OTHER SYSTEMS REQUIRING DISCHARGE AIR CONTROL OF MULTISTAGE COOLING OR HEATING. REDUCES KILOWATT DEMAND AND CON-

SUMPTION BY MAINTAINING THE MINIMUM AMOUNT OF HEATING OR COOLING CAPACITY REQUIRED TO HOLD THE DISCHARGE AIR SET POINT. UTILIZES ECONOMIZER FOR FREE COOLING WHEN AVAILABLE.

The W7100 is a discharge air controller which maintains an average discharge air (DA) temperature in variable air volume (VAV) cooling systems by modulating an economizer and sequencing stages of mechanical cooling. The W7100 can also be applied to electric makeup air and other systems requiring discharge air control of multistage heating or cooling. Refer to order table for application.

Up to six cooling and/or heating stages can be controlled by the W7100. With the addition of the W7101 Satellite Sequencer, up to 6 additional stages, 4 cool/2 heat, or 2 cool/4 heat can be controlled. The C7100A Averaging Discharge Sensor provides a signal to the W7100 which determines the number of cooling or heating stages to be energized. Set point, reset, and control band adjustments are provided for field settings. Reset sensor and remote set point inputs are provided for remote adjustment of discharge

set point. Light-emitting diodes (LED's) on the W7100 panel show which stages of heating or cooling are on.

The W7100 is a flexible system offering advanced microprocessor control to minimize droop and has provision for systems without an economizer. The system cycles to all stages off when the power is interrupted. When power is restored, the economizer will first be modulated open (if enthalpy is suitable), then stages of mechanical cooling will be sequenced on. If enthalpy is not suitable for economizer operation, the first stage of cooling or heating is energized within five minutes.

Voltage Ratings: 20 to 30 Vac at 60 Hz; 20 to 26.4 Vac at 50 Hz. Maximum Power Consumption: 12 VA at 24 Vac, 50/60 Hz. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Wiring Connections: 1/4 in. male quick-connect terminals. Approximate Dimensions: 8-5/8 in. [219 mm] high, 6-1/2 in. [161 mm] wide, 3 in. [76 mm] deep. Component recognized by Underwriters Laboratories Inc.; CSA certified.

Contact Ratings (spdt relays)—

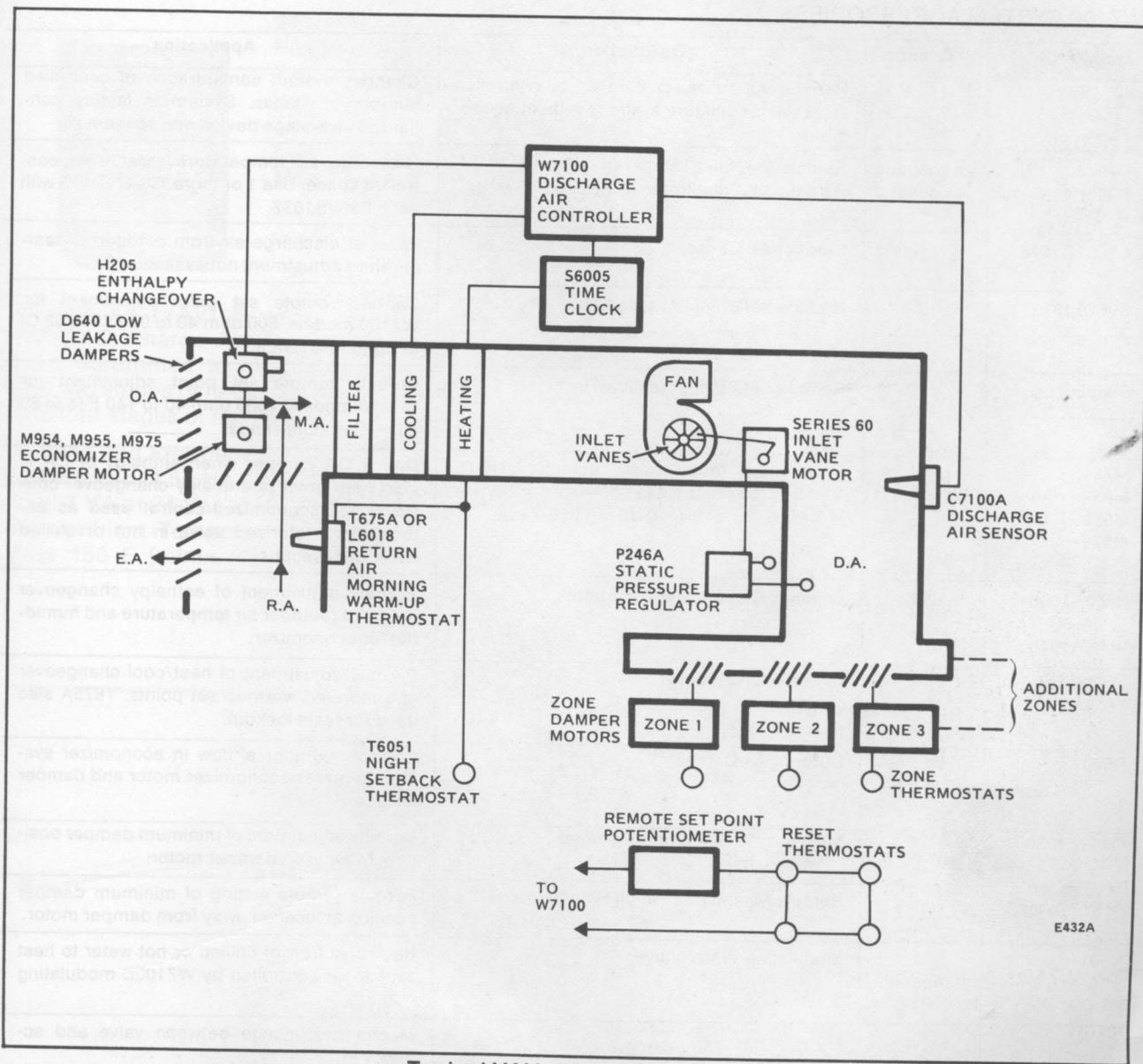
Contact	Voltage	Inrush VA	Running VA
N.O.	24	240	60
N.C.	24	75	30
N.O.	120/240	750	75
N.C.	120/240	240	40

continued next page

TRADELINE



W7100A-E continued



Typical VAV system diagram.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Economizer	Modulating Heat Output	Modulating Cooling Output	Heating Stages ^b	Cooling Stages ^b	Set Point Range ^c	
						F	C
W7100A1012	Yes	No	No	None	6	40 to 90	4 to 32
W7100B1002	Yes	No	No	6	None	40 to 140	4 to 60
W7100C1000	Yes	No	No	2	4	40 to 90	4 to 32
W7100D1008	Yes	Yes ^a	Yes ^a	None	None	40 to 140	4 to 60
W7100E1005	Yes	Yes	No	1	4	40 to 90	4 to 60

^aW7100D has single selectable modulating output—either heat or cool.

^bNumber of W7100 stages can be increased by 6 stages — 4 cool/2 heat, or 2 cool/4 heat by using the W7101A Satellite Sequencer.

^cRanges of 90 degree models can be extended to 140 with remote set point option.

continued next page

TRADELINE



environmental control systems

W7100A-E continued

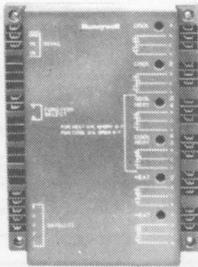
W7100 SYSTEM ACCESSORIES:

Model	Quantity	Description	Application
4074EFV	1	Resistor Kit to select number of controlled stages and configure systems without economizer.	Changes system configuration of controlled number of stages. System is factory configured as 6-stage device with economizer.
T7047C1025 S963B1037	as needed as needed	Remote Set Point Temperature Sensor Remote Set Point Potentiometer	Discharge air temperature reset from controlled space. Use 1 or more T7047C1025 with each S963B1037.
C7031G1016	1	Outdoor Air Sensor	Reset of discharge air from outdoor air temperature adjustment not available.
S963B1078	1	Remote Set Point Potentiometer	Permits remote set point adjustment for W7100 models. 500 ohm 40 to 90 F [5 to 32 C] temperature range.
S963B1086	1	Remote Set Point Potentiometer	Permits remote set point adjustment for W7100 models. 1000 ohm 40 to 140 F [5 to 60 C] temperature range.
M734 M954 M955 M975	} 1	Economizer motor valve actuator. NOTE: 4074EAC Resistor Kit is necessary to convert M734D,G motor from 0-10 mA to 0-7 mA.	Opens OA damper when enthalpy of OA is below set point of enthalpy changeover controller for economizer control used as actuator for motorized valve in hot or chilled water applications.
H205A1038 or H205A1046	1	Enthalpy Changeover Controller	Permits adjustment of enthalpy changeover set point (outdoor air temperature and humidity) for economizer.
L6018C or T675A	1	Dry Bulb Changeover	Permits adjustment of heat/cool changeover and morning warmup set points. T675A also used for reset lockout.
D640	size as needed	Outdoor Air Damper	Controls outdoor airflow in economizer system. Requires economizer motor and damper linkage.
Q209A1030	1	Minimum Position Potentiometer	Permits adjustment of minimum damper position. Mounts on damper motor.
S963A	if desired	Remote Minimum Position Potentiometer	Permits remote setting of minimum damper position at location away from damper motor.
V5011, V5013	as needed	Modulating Water Valve	Regulates flow of chilled or hot water to heat exchanger controlled by W7100D modulating output.
Q618	as needed	Linkage	Mechanical linkage between valve and actuator.
T6051	1	Night Setback Thermostat	Set to maintain minimum night space temperature.
C7100A1015	1	Averaging Discharge Air Temperature Sensor	Senses duct discharge air temperature for input to W7100.
W7101A1003	as needed	Satellite Sequencer	Adds up to 6 on/off stages of control (4 heat/2 cool, or 2 heat/4 cool) to W7100 system capability.
AT72D1683 AT87A1106 AT88A1005 AT88A1021	as needed	System Transformer 40 VA, 120 Vac 50 VA, 120/208/240 Vac 75 VA, 120 Vac 75 VA, 208/240 Vac	Size VA to system load.
4074EDJ	if desired	Resistor Kit and Test Plug	Used in controller checkout.

TRADELINE



W7101A SATELLITE SEQUENCER



SOLID STATE LOGIC PANEL FOR USE WITH THE W7100 TO PROVIDE ADDITIONAL STAGES OF CONTROL FOR DISCHARGE AIR TEMPERATURE.

Provides up to six additional stages for controlling the discharge air temperature of variable air volume (VAV) systems when used with a W7100 Discharge Air Controller. The W7101 can be programmed to have four stages of cooling and two stages of heating, or two stages of cooling and four stages of heating.

Voltage and Frequency: 20 to 30 Vac at 60 Hz, 20 to 26.4 Vac at 50 Hz. Maximum Power Consumption: 7 VA at 24 Vac at 60 Hz; 9 VA at 24 Vac at 50 Hz. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Wiring

Connections: 1/4 in. [6 mm] quick-connect terminals.

Contact Ratings:

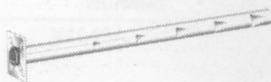
Contact	Voltage	Inrush VA	Running VA
N.O.	24	240	60
N.C.	24	75	30
N.O.	120/240	750	75
N.C.	120/240	240	40

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Heating Stages	Cooling Stages	Operating Range	
			F	C
W7101A1003	2	4	minus 40 to plus 150	minus 40 to plus 66
	4	2		

ELECTRICAL

C7100A AVERAGING DISCHARGE SENSOR



PROVIDES THE INPUT REQUIRED BY THE W7100 DISCHARGE AIR TEMPERATURE CONTROLLER.

No settings or calibration required. Mounts on duct wall or in a 2 x 4 in. junction box. Platinum PTC (positive temperature coefficient) sensing ele-

ment. Maximum Ambient Operating Temperature: 250 F [121 C]. Electrical Connections: 1/4 in. [6 mm] quick-connect male terminals.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Operating Range		Element Insertion Length		Sensor Sensitivity		Resistance in Ohms at 77 F [25 C]
	F	C	in.	mm	Ohms/1 F	Ohms/1 C	
C7100A1015	40 to 220	4 to 104	13	330	4.8	8.6	3484

(See pages 162 to 164 for information on C7100B Averaging Discharge Sensor).



hydronic zone controls

HYDRONIC ZONE SYSTEMS

THESE LISTS SHOW ZONE CONTROLS NEEDED FOR HYDRONIC HEATING SYSTEMS.

These lists do not include basic controls required for boiler control such as the pressure control, low water cutoff or high limit. See INDEX for specific catalog pages of controls listed.

CIRCULATOR CONTROL

Control Required	Forced Hot Water ^a
T87F } Thermostat T8082 }	One per zone
Circulator	One per zone
L8124 Aquastat-Relay	1
T678B } Outdoor Reset T475A } Control ^b	1

^aTwo-zone, 3-zone, or 4-zone

^bOptional

ELECTRIC VALVE CONTROL

Control Required	Forced Hot Water ^a	Two Pipe Steam ^a
T87F } Thermostat T8082 }	One per zone	One per zone
V8043F Zone Valve	One per zone	—
V2045/V5045 Zone Valve	—	One per zone
Circulator	1	—
L8124 Aquastat	1	—
L4006A Aquastat	—	1
T678B } Outdoor Reset T475A } Control ^b	1	—
R182C Relay	—	One per zone

NON-ELECTRIC RADIATOR VALVES

Control Required	Forced Hot Water ^a	Two Pipe Steam ^a
T5068 Thermostatic Control V5076 Radiator Valve	One each per zone	One each per zone

^aTwo-zone, 3-zone, or 4-zone

^bOptional

V4043, V4044, V8043, V8044 MOTORIZED VALVES



ON-OFF AND DIVERTING VALVES CONSIST OF AN ACTUATOR MOTOR AND VALVE ASSEMBLY FOR CONTROLLING THE FLOW OF HOT OR COLD WATER, AND SOME MODELS FOR STEAM.

Refer to order table for application. Manual opener (on all except straight-through, normally open valves) for valve

operation on power failure. Valve returns to automatic position when power is restored. Motor actuator may be replaced without removing the valve body or draining the system. Moisture sealed motor on all diverting and normally open valves. End Switch: 120 V, 4.4 A running with 26.4 A inrush. Use end switch 130445A (switch and bracket) for V8043E,F; use end switch 135967 for V8044E. Pilot duty 50 VA at 24 V. Listed by Underwriters Laboratories Inc.

ACCESSORY:

803867A Conduit Cover for line voltage use of end switch on V8043.

continued next page

TRADELINE

hydronic zone controls



V4043, V4044, V8043, V8044 continued

TEMPERATURE AND FLOW RATINGS

Valve Family	Flow Capacity Rating		Max. Close-off Pressure ^a		Max. Fluid Temp.		Max. Ambient Temp.	
	Cv	kv	psi	kPa	F	C	F	C
V8043	3.5	3.0	20	138	165 ^b	74 ^b	125	52
	8.0	6.9	8	55			125	52
V4043A,B,J	1.0	.9	50	345	240	116	125	52
	3.5	3.0	20	138			125	52
	8.0	6.9	8	55			125	52
V8044	4.0	3.4	10	69	165 ^c	74 ^c	125	52
	7.0	6.0	10	69			125	52
V4044	4.0	3.4	10	69	200	93	125	52
	7.0	6.0	10	69	200	93	125	52
V4043E,J; V8043J (steam)			15	103	250	121	125	52

^aStatic Pressure Rating: 125 psi [862 kPa], all models.

^b240 F [116 C] for V8043H,J.

^c240 F [116 C] for V8044G.

ELECTRICAL RATINGS:

Valve Model Number	Type of Electrical Connection ^b	Voltage (ac) and Frequency (Hz)	Electrical Current Draw (A)	Replacement Powerhead Part Numbers	
				Electrical Connection on Man. Opener End	Electrical Connection Opposite Man. Opener
V4043A	18 in. [457 mm]	120/60	.08	130441ANM	—
		220/50—240/60	.04	130441ANH	—
		240/50	.04	130441ANJ	—
V4043B		120/60	.08	130441AQQ	—
		208/60	.04	130441AQE	—
		220/50—240/60	.04	130441AQF	—
V4043E		120/60	.08	130441ATA	—
V8043A		24/50-60	.32	130441ANA	—
V8043B		24/50-60	.32	130441AQA	—
V8043E		24/50-60	.32	130441APA	—
V8043F	Terminal block	24/50-60	.32	130441UA	—
V8043J	18 in. [457 mm]	24/50-60	.32	—	—
V4044A	18 in. [457 mm]	208/60	.04	—	130441ARK
		240/50	.08	—	130441ARM
		220/50—240/60	.04	—	130441ARN
	72 in. [1829 mm]	120/60	.08	—	130441AEC
	96 in. [2.4 m]	120/60	.08	—	130441ARQ ^a
V4044B	18 in. [457 mm]	120/60	.08	13044BDF	130441ASK ^a
		220/50—240/60	.04	—	130441ASJ
		240/50	.04	—	130441ASH
V4044C	72 in. [1829 mm]	120/60	.08	—	130441ZC
V8044A	18 in. [457 mm]	24/50-60	.32	130441BEA	130441ARA ^a
V8044B		24/50-60	.32	130441BDB	130441ASA ^a
V8044E		24/50-60	.32	130441AVA	—

^aStandard replacement for valves listed.

^bLead length outside of conduit opening (except V8043F).

continued next page

TRADELINE

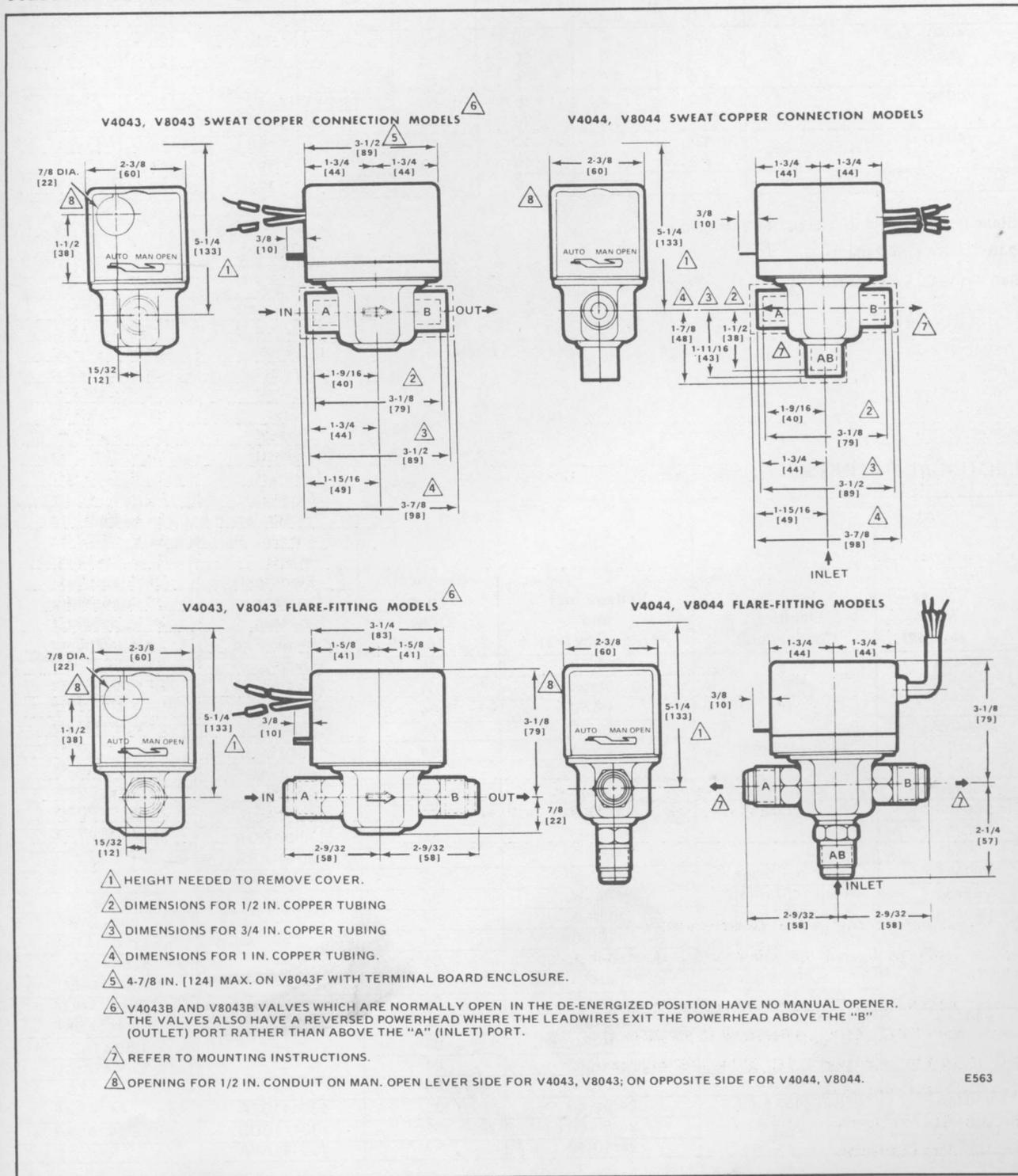


hydronic zone controls

V4043, V4044, V8043, V8044 continued

REPLACEMENT PARTS:

- 802344 O-ring.
- 802360JA Sealed Motor, 24 V.
- 802360LA Sealed Motor, 120 V.
- 802360MA Sealed Motor, 208 V.
- 802360NA Sealed Motor, 240 V.



E563

V4043, V8043, V4044, V8044 installation dimensions in in. [mm in brackets].

continued next page



hydronic zone controls



V4043, V4044, V8043, V8044 continued

TRADELINE models.

Order Number	Valve Body Pattern	De-energized Position	Pipe Connections	Control Circuit
V4043A1002	Straight-through	Normally closed	1/2 flare	120 V, 60 Hz
V4043A1010			1/2 sweat	120 V, 60 Hz
V4043A1028			1/2 flare	208 V, 60 Hz
V4043A1044			1/2 flare	240 V, 60 Hz
V4043A1051			1/2 sweat	240 V, 60 Hz
V4043A1184 ^d			1/2 sweat	120 V, 60 Hz
V4043A1259 ^e			3/4 sweat	120 V, 60 Hz
V4043A1317 ^e			1 sweat	120 V, 60 Hz
V4043B1000	Straight-through	Normally open	1/2 flare	120 V, 60 Hz
V4043B1018			1/2 sweat	120 V, 60 Hz
V4043E1003 ^a	Straight-through	Normally closed	1/2 sweat	120 V, 60 Hz
V4044A1001	2-position diverting	Port A normally closed	1/2 flare	120 V, 60 Hz
V4044A1019			1/2 sweat	120 V, 60 Hz
V4044A1043			1/2 flare	240 V, 60 Hz
V4044A1050			1/2 sweat	240 V, 60 Hz
V4044A1191 ^f			3/4 sweat	120 V, 60 Hz
V4044A12909			1/2 sweat	120 V, 60 Hz
V4044B1009 ^{b,c}			1/2 flare	120 V, 60 Hz
V4044B1017 ^{b,c}			1/2 sweat	120 V, 60 Hz
V4044B1314 ^{b,c,f}	3/4 sweat	120 V, 60 Hz		
V8043A1003	Straight-through	Normally closed	1/2 flare	24 V, 50/60 Hz
V8043A1011			1/2 sweat	24 V, 50/60 Hz
V8043A1029			3/4 sweat	24 V, 50/60 Hz
V8043A1037			1 sweat	24 V, 50/60 Hz
V8043B1019	Straight-through	Normally open	1/2 sweat	24 V, 50/60 Hz
V8043B1027			3/4 sweat	24 V, 50/60 Hz
V8043E1004 ^l	Straight-through	Normally closed	1/2 sweat	24 V, 50/60 Hz
V8043E1012 ^l			3/4 sweat	24 V, 50/60 Hz
V8043E1020 ^l			1 sweat	24 V, 50/60 Hz
V8043E1061 ^{e,l}			3/4 sweat	24 V, 50/60 Hz
V8043E1079 ^{e,l}			1 sweat	24 V, 50/60 Hz
V8043F1028 ^{j,l}			1/2 sweat	24 V, 50/60 Hz
V8043F1036 ^{j,l}	3/4 sweat	24 V, 50/60 Hz		
V8043F1051 ^{j,l}	1 sweat	24 V, 50/60 Hz		
V8043F1093 ^{e,k,j,l}	3/4 sweat	24 V, 50/60 Hz		
V8043F1101 ^{e,k,j,l}	1 sweat	24 V, 50/60 Hz		
V8043J1003		Normally open	1/2 sweat	24 V, 50/60 Hz
V8044A1002	2-position diverting	Port A normally closed	1/2 flare	24 V, 50/60 Hz
V8044A1010			1/2 sweat	24 V, 50/60 Hz
V8044A1044 ^f			3/4 sweat	24 V, 50/60 Hz
V8044A10519			1/2 sweat	24 V, 50/60 Hz
V8044B1018 ^c	2-position diverting	Port A normally closed	1/2 sweat	24 V, 50/60 Hz
V8044E1003 ^l	2-position diverting	Port A normally closed	1/2 sweat	24 V, 50/60 Hz
V8044E1011 ^{f,l}			3/4 sweat	24 V, 50/60 Hz

^aSteam only.

^bBottom inlet.

^cIncludes integral spdt changeover Aquastat control.

^dCapacity index 1.0 C_v [0.9 k_v], differential pressure 50 psi [345 kPa].

^eCapacity index 8.0 C_v [7.0 k_v], differential 8 psi [55 kPa].

^fCapacity index 7.0 C_v [6.0 k_v], differential 10 psi [69 kPa].

^g4.0 C_v [3.5 k_v] "A" main port, 2.5 C_v [2.1 k_v] "B" bypass port.

^hWith 96 in. [2438 mm] leads.

ⁱWith 36 in. [914 mm] leads.

^jTerminal board connector.

^kNo end switch enclosure.

^lIncludes end switch.

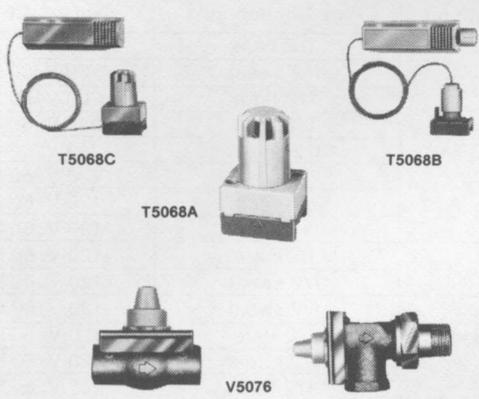
continued next page

TRADELINE



hydronic zone controls

V5076A,B; T5068A-C THERMOSTATIC RADIATOR VALVES



LIMITED RANGE T5068A1019 SPECIFICATIONS
 Temperature Range: 65.5 F to 70.5 F [18 C to 21.4 C].
 Ambient Temperature Range: 40 F to 125 F [4 C to 52 C].
 Throttling Range: 5 F [3 C].
 Scale Markings: 1 through 7 (minimum setting 65.5 F [18 C]).

CONTROLS ROOM TEMPERATURE BY MODULATING FLOW OF HOT WATER OR STEAM THROUGH FREE-STANDING RADIATORS, CONVECTORS, OR BASEBOARD UNITS.

Valve body is installed on radiator or convactor. Thermostatic head modulates water or steam flow through the valve in response to individual room requirements. Refer to order tables for description/specifications.

V5076 SPECIFICATIONS
 Max. Static Pressure: Water—200 psi [1379.0] kPa. Max. Steam Pressure: 15 psi [103.4 kPa] saturated steam. Max. Fluid Temp.: 240 F [116 C]. Max. Close-off Pressure: T5068A—25 psi [172.4 kPa]; T5068B,C—15 psi [103.4 kPa]. Max. Differential Pressure for Quiet Water Service: 20 psi [137.9 kPa].

T5068 SPECIFICATIONS
 Temperature Range: 55 F to 90 F [13 C to 32 C]. Ambient Temperature Range: 40 F to 125 F [4 C to 52 C]. Throttling Range: 10 F [5 C]. Scale Markings: 1 through 7 (minimum setting 55 F [13 C]).

CAPACITY INDEX:

Body Style	Body Size					
	1/2 in. [13 mm]		3/4 in. [19 mm]		1 in. [25 mm]	
	Cv	kv	Cv	kv	Cv	kv
Straight-through	2.4	2.1	2.7	2.3	2.9	2.5
Angle	2.4	2.1	2.7	2.3	2.9	2.5
Sweat	2.0	1.7	2.2	1.9		

REPLACEMENT PARTS:

- 392068-3 Seal Assembly for V5076A.
- 392068-4 Seal Assembly for V5076B.
- 391650 Adjustable Range Stop for T5068A,C.

ACCESSORIES:

- 394519 One-pipe Steam Adapter Kit for V5076B.
- 391966 Locking Set Point Assembly for T5068B.
- 391963 Locking Set Point Assembly for T5068A,C.
- 391961-1 Adapter Kit for mounting T5068 to V5061A Valve Body (Water).
- 391961-2 Adapter Kit for mounting T5068 to V5061B Valve Body (Steam).
- 392200 Wrench for limited range T5068.
- 391720 Locking Cover, T5068B.
- 391644 Upper Limit Set Point, T5068A,C.

Order Number	Application	Body Pattern	Size	Capacity	
				Cv	kv
V5076A1017	For hot water system only	Straight-through	1/2 in. NPT	2.4	2.1
V5076A1025		Angle	1/2 in. NPT	2.4	2.1
V5076A1041		Straight-through	3/4 in. NPT	2.7	2.3
V5076A1058		Angle	3/4 in. NPT	2.7	2.3
V5076A1066		Straight-through	1 in. NPT	2.9	2.5
V5076A1074		Angle	1 in. NPT	2.9	2.5
V5076B1007	For 2-pipe steam system only	Straight-through	1/2 in. NPT	2.4	2.1
V5076B1015		Angle	1/2 in. NPT	2.4	2.1
V5076B1023		Straight-through	3/4 in. NPT	2.7	2.3
V5076B1031		Angle	3/4 in. NPT	2.7	2.3
V5076B1049		Straight-through	1 in. NPT	2.9	2.5
V5076B1056		Angle	1 in. NPT	2.9	2.5
V5076B1064 ^a	For 1-pipe steam	Angle	1/2 in. NPT	2.4	2.1

^aIncludes 394519 1-pipe Steam Adapter Kit.

continued next page

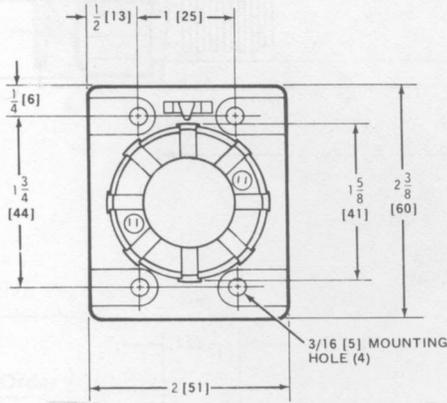


hydronic zone controls

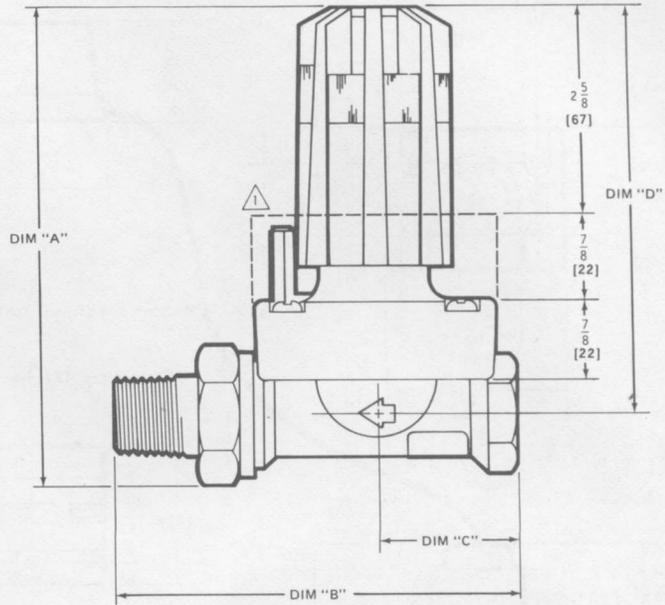


V5075A,B; T5068A-C continued

THERMOSTATIC ACTUATOR (TOP)

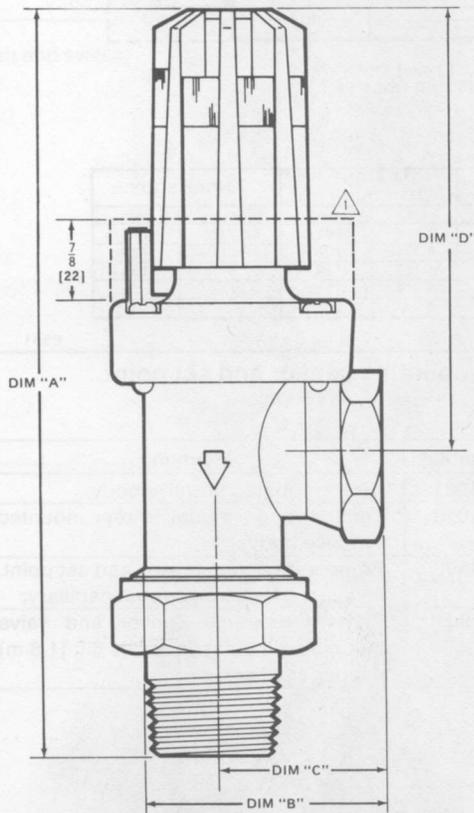


NPT STRAIGHT-THROUGH



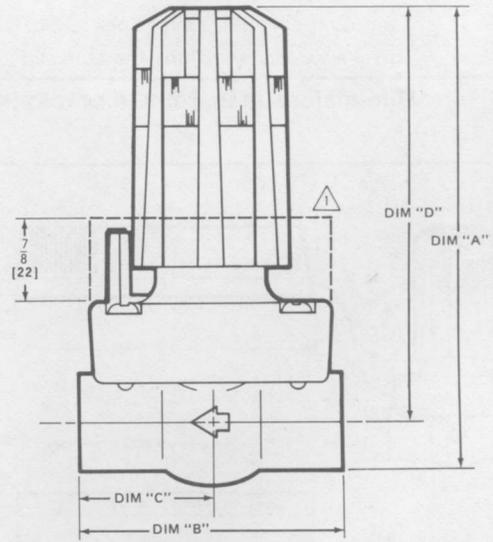
VALVE SIZE	DIM A		DIM B		DIM C		DIM D	
	in.	mm	in.	mm	in.	mm	in.	mm
1/2 (NPT)	5-1/4	133	4-1/4	105	1-7/16	37	4-5/8	117
3/4 (NPT)	5-1/16	129	4-7/16	113	1-7/16	37	4-3/8	111
1 (NPT)	5-1/2	140	4-9/16	116	1-1/2	38	3-11/16	94

NPT ANGLE BODY



VALVE SIZE	DIM A		DIM B		DIM C		DIM D	
	in.	mm	in.	mm	in.	mm	in.	mm
1/2 (NPT)	6-15/16	176	2-3/16	56	1-3/8	35	4-3/4	121
3/4 (NPT)	7-3/8	187	2-3/16	56	1-7/16	37	4-3/8	111
1 (NPT)	7-11/16	195	2-7/16	62	1-11/16	43	4-5/8	117

SWEAT STRAIGHT-THROUGH



VALVE SIZE	DIM A		DIM B		DIM C		DIM D	
	in.	mm	in.	mm	in.	mm	in.	mm
1/2 (SWEAT)	4-13/16	122	2-3/16	56	1-1/16	27	4-7/16	113
3/4 (SWEAT)	4-15/16	125	2-11/16	68	1-5/16	33	4-1/2	114

OPTIONAL ADJUSTABLE RANGE STOP OR OPTIONAL LOCKING SET POINT.

E560

Dimensions in in. [mm in brackets] of straight-through and angle pattern valve bodies with T5068A direct mounting thermostatic head.

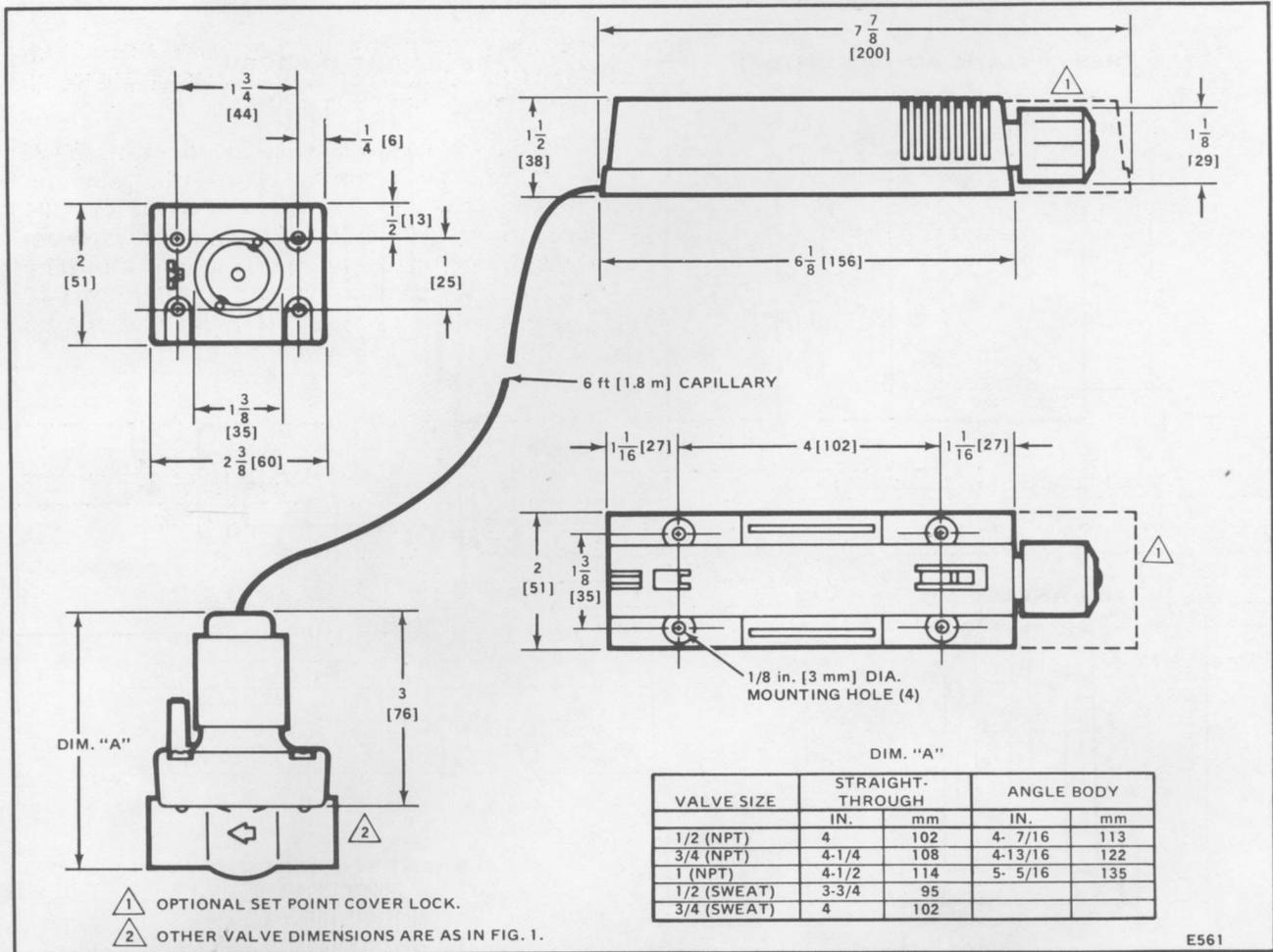
continued next page

TRADELINE

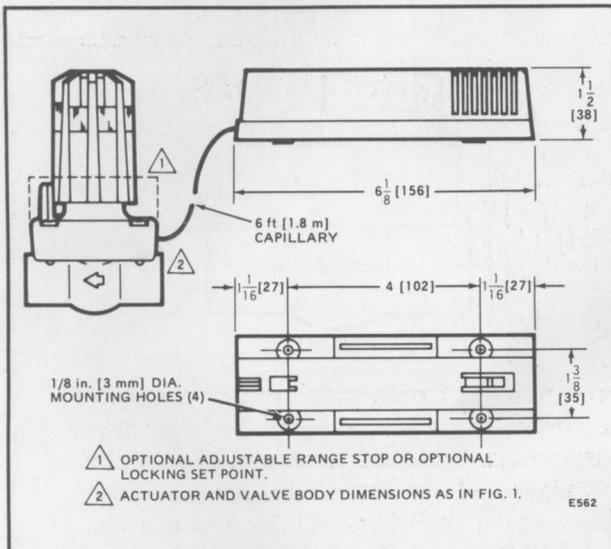


hydronic zone controls

V5076A,B; T5068A-C continued



Dimensions in in. [mm in brackets] of T5068B remote mounting sensor and set point.



Dimensions in in. [mm in brackets] of T5068C remote mounting sensor and direct mounting set point.

Order Number	Mounting
T5068A1001	Direct mounted on valve body.
T5068A1019	Limited-range model. Direct mounted on valve body.
T5068B1009	Remote mounted sensor and set point. Includes 6 ft [1.8 m] copper capillary.
T5068C1007	Remote mounted sensor and valve mounted set point. Includes 6 ft [1.8 m] copper capillary.

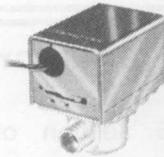
continued next page

TRADELINE

hydronic zone controls



Y496A ZONE CONTROL BUILDER PAK



V8043



T822

CONTAINS DEVICES NECESSARY FOR TEMPERATURE CONTROL OF A SINGLE ZONE IN A HYDRONIC HEATING SYSTEM.

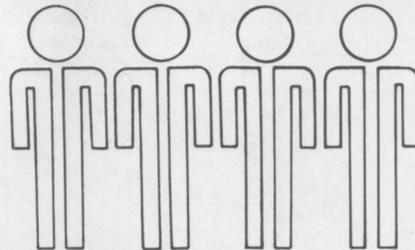
T822 Heating Thermostat included in the Y496 Builder Pak has a special heat anticipator designed for best performance when used with the V8043 Motorized Valve. 24 V power source required. Temperature Setting Range: 50 F to 90 F [10 C to 32 C]. Custom packed 12 valves and 12 thermostats to a carton. See pages 166-169 for description of V8043 Valve.

TRADELINE models.

Order Number	Valve Included		Capacity Index		Thermostat Included ^a 24 V, 50/60 Hz
	Model Number	Size	Cv	kv	
Y496A1009	V8043A1011	1/2 in. sweat	3.5	3.0	T822A1209
Y496A1017	V8043A1029	3/4 in. sweat	3.5	3.0	
Y496A1025 ^a	V8043E1012	3/4 in. sweat	3.5	3.0	
Y496A1033 ^a	V8043E1004	1/2 in. sweat	3.5	3.0	
Y496A1041 ^a	V8043E1061	3/4 in. sweat	8.0	6.9	

^aWith end switch.

Honeywell Residential Training Materials



Personnel training has been an important service provided to Honeywell Residential Group customers for many years. Our products are used by thousands of independent dealer/contractors across the country and around the world. Both the comfort and safety of the consumer depend on proper application and installation of our control devices. Since this involves not only product quality and performance but also the skill of the installer and servicer, training is important to us. We have made a major long-term commitment to employee and customer training. For a list of Honeywell training materials see pages 255 to 258.

TRADELINE



line voltage and proportional thermostats

Honeywell low voltage thermostats commonly used in residential control systems are in the RESIDENTIAL CONTROLS section of this catalog, pages 1 through 120. Refer to the Model Number Index, page iv, for exact page number.

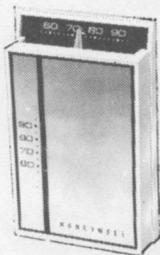
HONEYWELL THERMOSTAT GUARDS AND KEY LOCK COVERS HELP SAVE ENERGY AND FUEL—KEEP HEATING AND COOLING COSTS DOWN!

Prevent costly tampering with thermostat temperature settings by installing one of these thermostat guards or Key Lock covers. Keeps thermostat under lock and key to maintain desired settings... and assures proper system performance! For description and specifications see "Thermostat Guards" in the

RESIDENTIAL CONTROLS section of this catalog, pages 96-97.

Rugged guards and Key Lock covers protect thermostats against damage, making them ideal for offices, restaurants, lobbies, stores, and similar areas.

T451A; T651A LIGHT DUTY LINE VOLTAGE THERMOSTATS



FOR LINE VOLTAGE CONTROL OF FAN COILS, FANS, MOTOR STARTERS, VALVES, CONTACTORS, AND CIRCULATOR MOTORS IN HEATING, COOLING, AND HEATING-COOLING SYSTEMS.

Refer to order table for application. Mounts on

standard vertical outlet box. Thermometer on cover. Approximate Dimensions: 5-7/16 in. [138 mm] high, 3-1/4 in. [83 mm] wide, 1-3/16 in. [30 mm] deep. Listed by Underwriters Laboratories Inc.

ELECTRICAL RATINGS (amperes):

	208,		
	120 Vac	240 Vac	277 Vac
Full Load	8.0	4.0	4.0
Locked Rotor	48.0	24.0	4.0

7.2 A resistive.

Pilot Duty: 125 VA.

REPLACEMENT PARTS:

132310D White Cover, without thermometer.

132590C Silver-bronze Cover, without thermometer.

ACCESSORIES:

193120A Horizontal Mounting Kit.

134990C Horizontal Faceplate, blank (T451).

• SUPER TRADELINE model.

Order Number	Application	Switch Action On Temp. Rise	Temp. Scale Range		Fixed Differential		Includes	Remarks
			F	C	F	C		
T451A1132	Heating	Spst—breaks	56 to 94	13 to 34	2	1.1	Locking lever and locking cover	Q473A Subbase can be used to provide manual system switching (HEAT-OFF-COOL) in heating-cooling systems. Q473B Subbase provides AUTO-OFF switching in heating only or cooling only systems. Order subbase separately.
T451A1157			36 to 74	2 to 23				
T451A1173			56 to 84	13 to 29				
T451A1298			42 to 78	6 to 26				
•T651A1269 ^a	Heating and Cooling	Spdt—breaks heating and makes cooling	56 to 94	13 to 34	3	1.7	Locking lever and locking cover with optional blank cover	

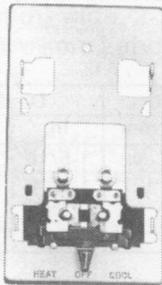
^aAutomatic changeover of a fan coil unit provided when used with L6018C.

TRADELINE

line voltage and proportional thermostats



Q473A,B SUBBASE



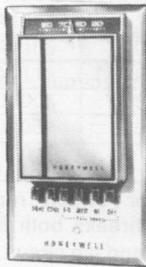
PROVIDES MANUAL SYSTEM SWITCHING FOR T451A AND T651A THERMOSTATS.

Electrical Rating (full load): 8.0 A at 120 Vac, 6.0 A at 240 Vac, 4.0 A at 277 Vac. Two spst switches. Dimensions: 6-3/16 in. [157 mm] high, 3-1/4 in. [83 mm] wide,

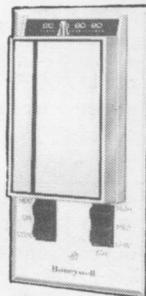
5/16 in. [8 mm] deep. Mounts on standard vertical outlet box. Q473A with T651A; Q473B with T451A are listed by Underwriters Laboratories Inc.

Order Number	Use With	Switch Positions
Q473A1040	T451A, T651A with molded cover	HEAT-OFF-COOL
Q473B1015	T451A, T651A with molded cover	AUTO-OFF

T694A,B,D,F FAN COIL THERMOSTATS



T694A,B,D



T694F

FOR LIGHT DUTY, LINE VOLTAGE CONTROL OF VALVES OR MOTORS ON FAN COILS IN A HEATING-COOLING SYSTEM.

Provides on-off cycling and manual fan-speed selection. Mounts horizontally or vertically on standard outlet box. Includes pressure sensitive labels to identify switching positions. Refer to the ordering table below for application. Spdt switching. Heating contacts make on temperature fall, cooling contacts make on temperature rise.

Temperature Setting Range: 56 F to 94 F [13 C to 34 C]. Fixed Differential: 3 F [1.7 C]. With molded cover. Approximate Dimensions: 8-7/16 in. [214 mm] high, 4-1/2 in. [114 mm] wide, 2-3/4 in. [70 mm] deep (extends 1-3/8 in. [35 mm] outward from wall). Listed by Underwriters Laboratories Inc.

CONTACT RATINGS (amperes):

	120 Vac	208/240 Vac	277 Vac
Full Load	8.0	4.0	4.0
Locked Rotor	48.0	24.0	—
Resistive (heating only)	7.2	7.2	7.2

Pilot Duty: 125 VA at 120, 208, and 240 Vac.

ACCESSORIES:

- 129168A Locking Cover Bag Assembly.
- 137518AAB Wallplate Assembly.

Order Number	Application	Switching Fan Speed	Changeover	Cooling Anticipator Voltage
T694A1079	Heating-cooling thermostat. OFF breaks fan circuit.	LO-MED-HI-OFF	—	120
T694B1094	Heating-cooling thermostat. Fan OFF switch breaks all control circuits except heat.	LO-MED-HI-OFF	HEAT-COOL	120
T694D1043	Heating-cooling thermostat. Heating and cooling circuits are isolated. Fan OFF breaks all control circuits except heat.	LO-MED-HI-OFF	HEAT-COOL	120
T694D1076		LO-MED-HI-OFF	HEAT-COOL	208/240
T694F1009	Heating-cooling thermostat with 2 rocker switches. Heating and cooling circuits are isolated. OFF switch breaks all power to fan and thermostat.	LO-MED-HI	HEAT-OFF-COOL	120

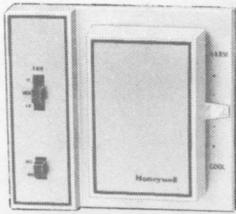
TRADELINE



line voltage and proportional thermostats

T4039 FAN COIL THERMOSTATS

CONTROLS LINE VOLTAGE VALVES OF A FAN COIL UNIT IN COOLING, MANUAL OR AUTOMATIC CHANGEOVER HEATING-COOLING SYSTEMS.



One or 2 valves may be operated directly from T4039. Positive deadband separates heating-cooling

circuits in automatic models. Allen wrench for cover and mounting screws furnished. Temperature Setting Range: 55 F to 95 F [13 C to 35 C]. Scale Range: Marked COOL-WARM in 10 F [5.6 C] increments from 75 F [24 C] midpoint.

Listed by Underwriters Laboratories Inc.; CSA certified.

DIMENSIONS:

Model	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
T4039C,G	4-5/8	117	3-5/8	92	1-5/16	33
T4039A,B D-F,H, J-N	4-5/8	117	5	127	1-5/16	33

ELECTRICAL RATINGS (amperes):

	Thermostat (Valve Load)		Fan Switch	
	Normal	Inrush	FL	LR
120 Vac	0.32	1.0	5.5	33.0
240 Vac	0.16	0.50	2.75	16.5'

Order Number	Application	Manual Fan Switch	Mounting	Remarks
T4039A1000 T4039B1008	Cooling	ON-OFF OFF-HI-MED-LO	Standard vertical outlet box, 4 in. square outlet box, or 2-ganged outlet box.	OFF breaks cooling circuit and fan circuit.
T4039D1004	Heating-Cooling	ON-OFF	Standard vertical outlet box, 4 in. square outlet box, or 2-ganged outlet box.	Remote changeover switch required. With positive OFF, breaks both heating and cooling circuits and fan circuit.
T4039E1001		OFF-HI-LO		Remote changeover switch required.
T4039F1009		OFF-HI-MED-LO		OFF breaks cooling circuit and fan circuit.
T4039G1007	Automatic Heating-Cooling	None	Standard vertical outlet box.	
T4039H1005		ON-OFF	Standard vertical outlet box, 4 in. square outlet box, or 2-ganged outlet box.	With positive OFF, breaks both heating and cooling circuits and fan circuit.
T4039K1008		OFF-HI-LO		With positive OFF, breaks both heating and cooling circuits and fan circuit.
T4039L1006		OFF-HI-MED-LO		OFF breaks cooling circuit and fan circuit.
T4039M1004		OFF-HI-MED-LO		With positive OFF, breaks both heating and cooling circuits and fan circuit.

T631A,B, FARM-O-STAT CONTROLLERS



PROVIDES LINE VOLTAGE CONTROL OF HEATING, COOLING, AND VENTILATING SYSTEMS IN FARM BUILDINGS OR STORAGE AREAS.

Typical applications include barns, poultry

houses, hog houses, pump houses, milk houses and crop storage houses. Slots in front and bottom of case provide maximum air circulation over the coiled sensing element. Snap switches permanently sealed against corrosion. Sensing Element: Coiled copper tube. Red finish.

continued next page

line voltage and proportional thermostats



T631A,B continued

Mounting: Screws through holes in back of case.
Dimensions: 4-5/16 in. [110 mm] high, 6-1/16 in. [154 mm] wide, 2-7/8 in. [73 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

REPLACEMENT PART:
103774 Spdt Switch.

ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac	With Heavy Duty Switch Rated at 1 hp	
			120 Vac	240 Vac
Full Load	7.4	3.7	16.0	8.0
Locked Rotor	44.4	22.2	96.0	40.0

Low Voltage Rating: 2.0 A at 24 Vac.

Order Number	Control Range		Switching	Fixed Differential				Maximum Ambient Temp.	
	F	C		Per Switch		Inter-Stage		F	C
				F	C	F	C		
T631A1006	35 to 100	2 to 38	Spdt snap switch	2.0	1.1	—	—	120	49
T631A1022	70 to 140	21 to 60		2.0	1.1	—	—	150	66
T631A1030	0 to 70	-18 to +21		3.0	1.7	—	—	125	52
T631A1063	-10 to +100	-23 to +38		3.0	1.7	—	—	125	52
T631A1097 ^a	32 to 104	0 to 40		2.0	1.1	—	—	120	49
T631A1105	70 to 140	21 to 60		8.0	4.4	—	—	150	66
T631A1113	35 to 100	2 to 38	Spdt snap switches rated at 1 hp [0.7 kW]	3.5	1.9	—	—	120	49
T631B1005	35 to 100	2 to 38	2 spdt snap switches	2.0	1.1	3.5	1.9	120	49
T631B1054	35 to 100	2 to 38	2 spdt snap switches rated at 1 hp [0.7 kW]	2.0	1.1	Adjustable		120	49

^aScale is in Celsius.

T631C AIRSWITCH CONTROLLER



FOR CONTROL OF COOLING, HEATING, OR VENTILATING EQUIPMENT.

Treated to resist corrosion. Slots in front and bottom of case provide maximum air circulation over the coiled sensing element. Snap switches permanently sealed against corrosion. Sensing element: Coiled copper tube. Gray finish. Switching: Spdt. Maximum Operating Temperature: 120 F [49 C]. Dimensions: 4-5/16 in. [110 mm] high, 6-1/16 in. [154 mm] wide, 2-7/8 in. [73 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

ELECTRICAL RATINGS: (amperes):

	120 Vac	240 Vac	With Heavy Duty Switch Rated at 1 hp		
			120 Vac	240 Vac	277 Vac
Full Load	7.4	3.7	16.0	8.0	3.0
Locked Rotor	44.4	22.2	96.0	40.0	18.0

Low Voltage Rating: 2.0 A at 24 Vac.

Resistance Load: 10.0 A at 120 Vac; 5.0 A at 240 Vac.

REPLACEMENT PART:
103774 Spdt Switch.

TRADELINE model.

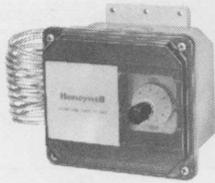
Order Number	Control Range		Switching	Fixed Differential		Maximum Ambient Temp.	
	F	C		F	C	F	C
T631C1004	-10 to +60	-23 to +16	1 hp [0.7 kW], spdt snap switch	3.0	1.7	125	52
T631C1012	20 to 90	-7 to +32		3.0	1.7	125	52
T631C1020	70 to 140	21 to 60	Spdt snap switch	2.0	1.1	150	66
T631C1053	35 to 100	2 to 38		2.0	1.1	120	49
T631C1103	-30 to +100	-34 to +38	1 hp [0.7 kW], spdt snap switch	5.0	2.8	125	52

TRADELINE



line voltage and proportional thermostats

T631F,G FARM-O-STAT CONTROLLER



PROVIDES LINE VOLTAGE CONTROL OF HEATING, COOLING, AND VENTILATING SYSTEMS IN FARM BUILDINGS OR STORAGE AREAS.

Typical applications include barns, brooder houses, poultry houses, hog houses, pump houses, milk houses and crop storage houses. NEMA 4X enclosure resists oil, water, dust, and

ELECTRICAL RATINGS (amperes):

corrosion. Clear plastic cover reveals set point, discourages tampering. Sensing element externally mounted for fast response and tin plated to resist corrosion. Reliable snap switches sealed against contamination. Insulated case has internal grounding screw for safety. Single-stage model (T631F) identified by red label, two-stage model (T631G) by white label. Available with external set point adjustment. Meets National Electrical Code Article 547-4 requirements.

Mounting: Screws through holes in corners of case. Dimensions: 5 in. [127 mm] high, 6-13/16 in. [173 mm] wide, 3-13/16 in. [97 mm] deep. Listed by Underwriters Laboratories Inc.

Voltage	24 Vac	120 Vac	240 Vac	277 Vac	With Switch Rated at 1 hp	
					120 Vac	240 Vac
Full Load	2.0	7.4	3.7	3.0	16.0	8.0
Locked Rotor	—	44.4	22.2	18.0	96.0	48.0

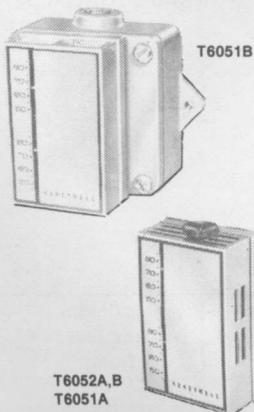
REPLACEMENT PART:
103774 Spdt Switch.

Model Number	Temperature Scale Range		Differential Switch		Additional Features
	F	C	F	C	
T631F1068	35 to 100	2 to 38	2.0	1.1	
T631F1084 ^a					
T631F1076	35 to 100	2 to 38	3.5	1.9	Snap switch with 1 hp contact rating.
T631F1092 ^a					
T631G1042 ^b	35 to 100	2 to 38	2.0	1.1	Snap switch with 1 hp contact rating. Adj. interstage differential. ^b
T631G1059 ^{a,b}					

^aSet point adjusted externally.

^bInterstage adjusted on left of switch. Range 0-7 F. Factory set at 3.5 F.

T6051, T6052 HEAVY DUTY LINE VOLTAGE THERMOSTATS



HEAVY DUTY LINE VOLTAGE THERMOSTATS ARE USED TO CONTROL FAN COILS, FANS, MOTOR STARTERS, VALVES, CONTACTORS, AND CIRCULATOR MOTORS IN HEATING AND/OR COOLING SYSTEMS.

With locking cover. Listed by Underwriters Laboratories Inc.; CSA certified.

APPROXIMATE DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
T6051A; T6052A,B ^a	5	127	3-1/8	79	1-5/8	41
T6051B ^b	5-5/8	143	6-3/8	162	4-7/16	113

^aSwitches and wiring terminals protrude into outlet box 7/8 in. [22 mm].

^bAllow 1/2 in. [13 mm] clearance for removing knob.

NOTE: T4051 models formerly available have been replaced by T6051A1016.

continued next page

Refer to order table for application and description. Add Q651A,B Subbases to provide system and fan switching at the thermostat location. The set point knob is removable to lock set point and prevent tampering.

TRADELINE

line voltage and proportional thermostats



T6051, T6052 continued

ACCESSORIES:

- 135531J Scaleplate, vertical, Celsius, 10 C to 25 C.
- 135531K Scaleplate, horizontal, Celsius, 10 C to 25 C.
- 23394B Locking Guard.
- 138541A Mounting Plate—23394B to outlet box.
- 135653AB Blank Metal Cover (without set point scale, without thermometer). Polished chrome.
- 135653AA Metal Cover with thermometer and set point scale. Polished chrome.
- 135654AC Blank Metal Cover (without set point scale, without thermometer). Silver bronze.

- 135654AA Metal Cover with thermometer and set point scale. Silver bronze.
- 135654AB Metal Cover with set point scale, without thermometer. Silver bronze.
- 135652AA Blank Faceplate (without set point scale, without thermometer). T6051.
- 135651A Faceplate with set point scale, without thermometer. T6051.
- 135531D Horizontal Faceplate with set point scale and thermometer.
- Q651 Switching Subbase. See page 180.
- Thermostat Guards. See Thermostat Guards in RESIDENTIAL CONTROLS section, pages 96-97.

TRADELINE models.

Order Number	Application	Switching	Mounting	Differ- ential		Scale Range		Remarks
				F	C	F	C	
T6051A1016	Heating/Cooling; with resistive rating for electric heat applications	Spdt	Vertical or horizontal mounting on standard outlet box, or on Q651 Subbase	1.0	0.6	46 to 84	8.0 to 29.0	Standard cover—135535B
T6051B1006	Heating/Cooling		Vertical mounting on explosion-proof housing	1.0	0.6	46 to 84	8.0 to 29.0	With explosion-proof housing; Fahrenheit scaleplate 50 F to 80 F
T6051B1014	Heating/Cooling			1.6	1.0	41 to 86	5 to 30	Explosion-proof housing; Celsius scaleplate, 5 C to 30 C
T6052A1015	2-stage heating or 2-stage cooling	2 spdt switches	Vertical or horizontal mounting on standard outlet box	See footnote ^a		46 to 84	8.0 to 29.0	
T6052A1023 ^b			Vertical mounting on standard outlet box	See footnote ^a		50 to 77	10 to 25	Celsius scaleplate
T6052B1013	1-stage heating-cooling system	2 spdt switches	Vertical or horizontal mounting on standard outlet box, or on Q651 Subbase	See footnote ^c		46 to 84	8.0 to 29.0	With auto change-over
T6052B1021 ^b			Vertical or horizontal mounting on standard outlet box	See footnote ^c		50 to 77	10 to 25	With auto changeover; Celsius scaleplate

^aDifferential: Stage 1 Heat, Stage 2 Cool—2.5 F [1.4 C] nominal; Stage 2 Heat, Stage 1 Cool—3.2 F [1.8 C] nominal.

^bCelsius scaleplate.

^cDifferential: Stage 1 (heat)—2.5 F [1.4 C] nominal; Stage 2 (cool) 3.2 F [1.8 C] nominal.

continued next page



line voltage and proportional thermostats

T6051, T6052 continued

REPLACEMENT PART:
135499 Setting Knob.

ELECTRICAL RATINGS:

Voltage and Frequency—120 or 240 Vac, 50/60 Hz.

INDUCTIVE CURRENT (amperes)—

T6051A, T6051B2014, T6052A—

		120 V	240 V
Heating (T6051A, T6051B1014) or Stage 1 (T6052A)	Full Load	16.0	8.0
	Locked Rotor	96.0	48.0
Cooling (T6051A, T6051B1014) or Stage 2 (T6052A)	Full Load	8.0	4.0
	Locked Rotor	48.0	24.0

T6051B—

		120 V	240 V
Heating	Full Load	10.2	6.5
	Locked Rotor	61.2	39.0
Cooling	Full Load	7.4	4.0
	Locked Rotor	44.4	24.0

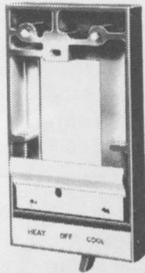
T6052B—

		120 V	240 V
Full Load		16.0	8.0
Locked Rotor		96.0	48.0

RESISTIVE CURRENT (T6051A1016, T6051B1014 only): 22 A at 120, 240 Vac; 19 A at 277 Vac.

Pilot Duty (all models): 125 VA.

Q651A,B,C SUBBASES



PROVIDES MANUAL SYSTEM SWITCHING FOR T6051 AND T6052 THERMOSTATS.

These subbases provide positive OFF switching for the system. They may be mounted vertically or horizontally on a standard outlet box. Refer to order table for application. All

models include pressure sensitive labels to identify switching positions. Approximate Overall Dimensions: 5-13/16 in. [148 mm] high, 3-3/16 in. [81 mm] wide, 11/16 in. [18 mm] deep. Q651 with T6051A and T6052B listed by Underwriters Laboratories Inc.; CSA certified.

ELECTRICAL RATINGS:

Voltage and Frequency—120 or 240 Vac, 60 Hz.

Contact Ratings (amperes)—

	120 Vac	240 Vac
Full Load	16	8
Locked Rotor	96	48

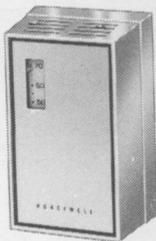
Pilot Duty Rating—125 VA.

TRADELINE model.

Order Number ^a	Application	Switch Labels Included
Q651A1009	T6051A	HEAT-OFF-COOL AUTO-OFF-ON HEAT-OFF-FAN
Q651B1008	T6051A	AUTO-OFF-FAN
Q651C1007	T6052B	AUTO-OFF HEAT-OFF

^aQ651 Subbase CANNOT be used with T6052A 2-stage thermostats.

T92 PROPORTIONAL THERMOSTATS



3-WIRE, LOW VOLTAGE PROPORTIONAL CONTROLLERS FOR VALVE MOTORS, DAMPER MOTORS, AND BALANCING RELAYS USED IN HEATING OR COOLING APPLICATIONS.

Bellows element adjusts 1 or 2 potentiometers in proportion to temperature

changes to regulate motor operation. Removable setting knob prevents unauthorized tampering with set point. Electrical Rating: 24 V to 30 V. Potentiometer Resistance: 135 ohms. Mounting: Furnished screws fasten through three mounting holes to wall, or to adapter plate for outlet box mounting. Calibration Point: 3 F [1.7 C] below set point to offset internal heat from operation. Approximate Dimensions: 5-11/16 in. [144 mm] high, 3-3/8 in. [86 mm] wide, 2-5/8 in. [67 mm] deep.

continued next page

TRADELINE

line voltage and proportional thermostats



T92 continued

REPLACEMENT PARTS:

- 130224 Set Point Knob.
- 23094ZA Cover Assembly, thermometer, clips—T92A,B,D-H,J,M.
- 23176CC Potentiometer, 3/16 in.—T92A,D (63 F to 87 F), T92G,H,J,M.
- 23176CF Potentiometer, 1/4 in.—T92D (48 F to 72 F).

ACCESSORIES:

- 23394B Guard, metal, locking.
- 138541A Mounting Plate—23394B to outlet box.
- See Thermostat Guards in RESIDENTIAL CONTROLS section, pages 96-97.

Order Number	Scale Range		Throttling Range						Potentiometers
			Low		Med		High		
	F	C	F	C	F	C	F	C	
T92B1059	48 to 72	9 to 22	2.5	1.4	2.0	1.1	1.5	0.8	2 (for unison or sequence control)
T92B1067 ^a	59 to 77	15 to 25	2.7	1.5	1.8	1.0	1.3	0.7	
T92B1075	63 to 87	17 to 31	2.5	1.4	2.0	1.1	1.5	0.8	
T92D1048	63 to 87	17 to 31	—	—	3.0 to 20.0	1.7 to 11.1	—	—	1
T92E1029	63 to 87	17 to 31	1.5 to 6.5	0.8 to 3.6	—	—	—	—	2 (for unison or sequence control)

^aCelsius scaleplate.

T42A,B SINGLE STAGE, T42G-P MULTISTAGE THERMOSTATS



FOR LINE VOLTAGE OR LOW VOLTAGE TEMPERATURE CONTROL OF HEATING OR COOLING EQUIPMENT.

Multistage models control 2 or 3 circuits in sequence. Setting knob is removable, to lock setting at desired temperature. Mercury switches are ac-

tuated by vapor-filled bellows element. Die-cast metal cover. Approximate Dimensions: 5-11/16 in. [144 mm] high, 3-3/8 in. [86 mm] wide, 2-1/8 in. [54 mm] deep. Listed by Underwriters Laboratories Inc. (except T42B).

ELECTRICAL RATINGS:

Model Number	Inductive Load			
	(ac)		(dc)	
	120 V	240 V	115 V	230 V
T42A	7.4	3.7	2.4	1.2
T42B	2.0	1.0	2.0	1.0
T42G,H,J,K,L,M,N,P	1.0	0.5	1.0	0.5

Model Number	Resistive Load			
	(ac)		(dc)	
	120 V	240 V	115 V	230 V
T42G,H,J,K,L,M,N,P	2.0	1.0	2.0	1.0

ACCESSORIES:

- 23394B Guard, metal, locking.
- 138541A Mounting Plate—23394B to outlet box.
- See Thermostat Guards in RESIDENTIAL CONTROLS section, pages 96-97.

REPLACEMENT PARTS:

- 130224 Setting Knob.
- 112705 Thermometer.

continued next page

TRADELINE



line voltage and proportional thermostats

T42A,B T42G-P continued

Order Number	Control	Range		Differential			
				Per Stage		Interstage	
		F	C	F	C	F	C
T42A1052	1-stage Heat	40- 80	4-27	2.0-3.0, fixed	1.1-1.7, fixed	—	—
T42B1027	1-stage Cool	60-100	16-38	2.0-3.0, fixed	1.1-1.7, fixed	—	—
T42G1026	3-stage Cool	60-100	16-38	3.0	1.7	2.0 ^a	1.1 ^a
T42H1073	2-stage Heat	60-100	16-38	1.0 ^a	0.6	1.0-5.0	0.6-2.8
T42H1081	2-stage Heat	40- 80	4-27	1.0 ^a	0.6	1.0-5.0	0.6-2.8
T42J1078	2-stage Cool	60-100	16-38	3.0	1.7	1.0-5.0	0.6-2.8
T42J1094 ^C	2-stage Cool	59- 95	15-35	3.0	1.7	1.0-5.0	0.6-2.8
T42K1084	1-stage Heat	60-100	16-38	1.0	0.6	1.0-5.0	0.6-2.8
	1-stage Cool			3.0	1.7		
T42K1092	1-stage Heat	40- 80	4-27	1.0	0.6	1.0-5.0	0.6-2.8
	1-stage Cool			3.0	1.7		
T42L1033	1-stage Heat	40- 80	4-27	1.0	0.6	1.0-5.0	0.6-2.8
	1-stage Cool			3.0	1.7		
T42M1023	3-stage Heat	60-100	16-38	2.0	1.1	2.0 ^a	1.1 ^a
T42M1031	3-stage Heat	40- 80	4-27	2.0	1.1	2.0 ^a	1.1 ^a
T42N1020 ^C	2-stage Heat	59- 95	15-35	2.0	1.1	2.0 ^a	1.1 ^a
	1-stage Cool						
T42N1038	2-stage Heat	60-100	16-38	2.0	1.1	2.0 ^a	1.1 ^a
	1-stage Cool						
T42P1018	1-stage Heat	60-100	16-38	2.0	1.1	b	b
	2-stage Cool						

^aNonadjustable.

^b2 F (1.1 C) between cool stages; 5.5 F (3.1 C) between cool stage 1 and heat stage.

^cCelsius model.

T921A-E PROPORTIONING THERMOSTATS



THREE-WIRE LOW VOLTAGE CONTROLLERS FOR VALVE MOTORS, DAMPER MOTORS, AND BALANCING RELAYS IN HEATING OR COOLING SYSTEM APPLICATIONS.

Bellows element adjusts the potentiometer slider to regulate motor operation. Removable setting knob prevents unauthorized tampering with set point. Refer to the ordering table below for application of models. Approximate Dimensions: 5-11/16 in. [144 mm] high, 3-3/8 in. [86 mm] wide, 2-1/4 in. [57 mm] deep (2-11/16 in. [68 mm] deep on T921C,D models).

AUXILIARY SWITCH DIFFERENTIAL:

T921C—2 F [1.1 C].

T921D—1F [0.6 C].

REPLACEMENT PARTS:

130224 Setting Knob.

100655A-01370 Cover.

ELECTRICAL RATINGS:

Voltage—24 to 30 Vac.

Auxiliary Switch Contact Ratings (in amperes)—

T92C: T92D:	R-W		R-B	
	R-B		R-W	
	120 V	240 V	120 V	240 V
Full Load	8	4	4	2
Locked Rotor	48	24	24	12

Pilot Duty—125 VA.

ACCESSORIES:

34297A Guard, metal.

34297B Guard Assembly (includes mtg. plate and screws).

124355-00047 Adjusting Screw.

127246A Adapter Plate Assembly for mounting all models vertically on horizontal outlet box, or T921A,B,E models horizontally (with horizontal faceplate) on vertical outlet box.

Faceplate for mounting T921A,B,E models horizontally. See ordering table.

Thermostat Guards. See Thermostat Guards in RESIDENTIAL CONTROLS section, pages 96-97.

continued next page

TRADELINE

line voltage and proportional thermostats

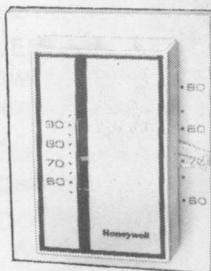


T921A-E continued

TRADELINE model.

Order Number	Application	Range		Accessory Faceplate Adapter For Mounting Horizontally	Throttling Range (Fixed)		Remarks
		F	C		F	C	
T921A1191	For heating or cooling applications.	56 to 84	13 to 29	135135A	2.5	1.4	Includes slotted sides and an add-on faceplate to allow thermostat to be mounted horizontally.
T921A1209		42 to 75	6 to 24	135135C	2.5	1.4	
T921A1340		56 to 84	13 to 29	134990C	2.5	1.4		With blank cover.
T921B1042	For heating or cooling applications. Includes heat-cool changeover switch.	56 to 84	13 to 29	135135A	4.0	1.4	
T921C1009	For heating or cooling applications. Includes spdt line voltage auxiliary switch which operates at low end of throttling range.	56 to 84	13 to 29	135135A	6.0	3.3	Celsius model.
T921C1017		56 to 84	13 to 29	135135B	6.0	3.3	
T921D1008	For heating or cooling applications. Includes spdt line voltage auxiliary switch which operates at high end of throttling range.	56 to 84	13 to 29	135135A	5.0	2.8	Celsius model.
T921D1016		56 to 84	13 to 29	135135B	5.0	2.8	
T921E1007	For heating or cooling applications. Includes switch and heater which provide a night setback of approx. 10 F [5.6 C].	56 to 84	13 to 29	135135A	4.0	2.2	With blank cover.

T7047A,C ELECTRONIC SPACE THERMOSTATS/SENSORS



USED IN SERIES 70 CONTROL SYSTEMS TO PROVIDE MODULATING SPACE TEMPERATURE CONTROL.

Refer to order table for application. Thermistor sensing element. Mounts on wall or 2 x 4 in. vertical outlet box with screws provided. Approximate

Dimensions (for models with thermometer and external setting lever): 4-5/8 in. [118 mm] high, 3-5/8 in. [92 mm] wide, 1-5/16 in. [33 mm] deep.

ACCESSORIES:

S963B1003 Remote Set Point Potentiometer, 360 ohm, for T7047C1009.

S963B1037 Remote Set Point Potentiometer, 480 ohm, for T7047C1025 only.

193120A Universal Wallplate for junction box mounting.

continued next page

TRADELINE



line voltage and proportional thermostats

T7047A,B,C continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Application	Sensor Resistance ^a	Sensitivity Per Degree	Remarks
T7047A1078	2-wire electronic thermostat (W927 sequencers).	1715 ohms nominal with set point at ambient.	15 ohms for each 1 F [0.6 C] temp. change.	Exposed set point; includes thermometer.
T7047A1086				Under cover set point; less thermometer.
T7047C1009	2-wire sensor; for use with M7044, M7045 in applications. Remote set point adjustment required.	1700 ohms nominal at 75 F [24 C].	21 ohms for each 1 F [0.6 C] temp. change.	Remote set point adjustment. Use S963B1003 Remote Set Point Potentiometer.
T7047C1025	2-wire sensor; for use with W973 single zone and W927 sequencers.	1420 ohms nominal at 75 F [24 C].	15 ohms for each 1 F [0.6 C] temp. change.	Use with S963B1037 for remote set point (W927 applications). Use with T7067B1006 (W973 applications).
T7047C1082	2-wire sensor; use with T7080 multizone circuit.	22800 ohms nominal at 77 F [25 C].	675 ohms for each 1 F [0.6 C] at typical room temperatures.	Use with T7080B1017 in W7080 multizone applications.
T7047C1090	2-wire sensor; W9076A Temp. Indicator.	Less sensor.	—	Use with 194950B Sensor supplied with W9076A.

^aResistance increases as temperature falls.

PARTS AND ACCESSORIES

Order Number	Description	Use With
124355	Adjusting Screw.	T42, T921
23394B	Guard, locking, metal.	T42, T92, T6051, T6052
34297A	Guard, metal.	T42, T921
34297B	Guard Assembly (includes mounting plate and screws).	T42, T921

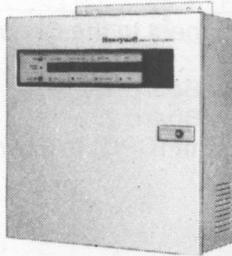
Order Number	Description	Use With
118655	Wall Cover Plate.	T7047 (when replacing T921)
7617Y	Compression Fitting, 1/2 in., mild steel.	
7617DC	Compression Fitting, 1/2 in.	

TRADELINE

load control systems



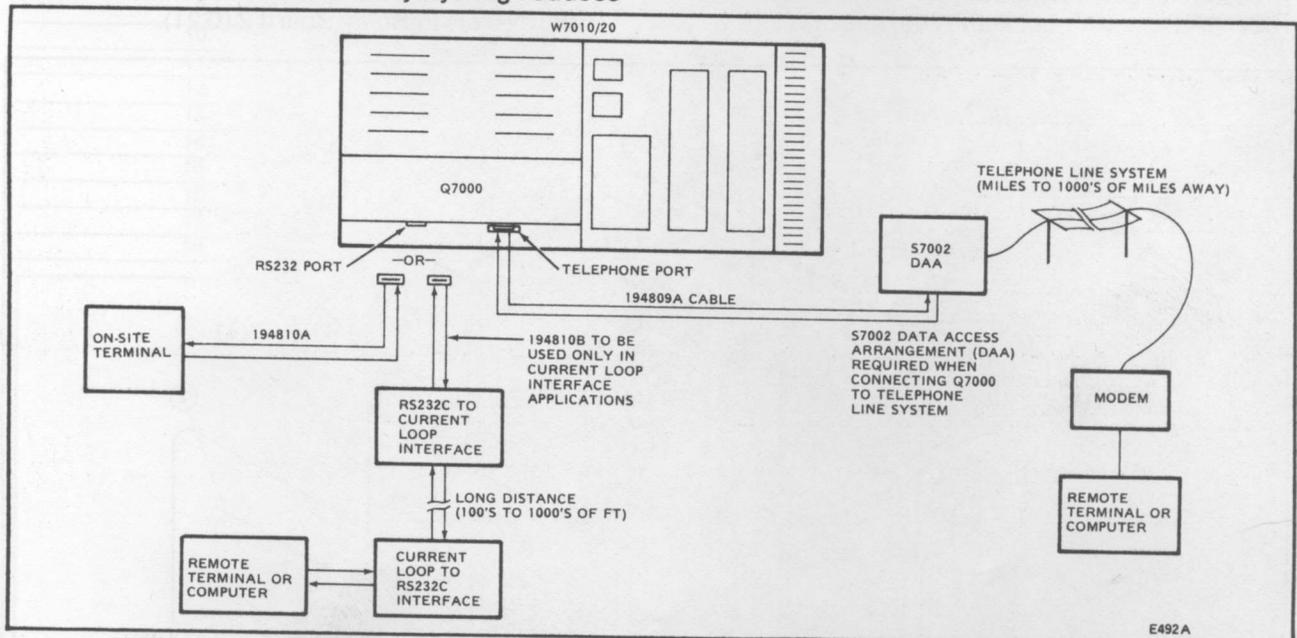
W7010/20C,E,F,G LOAD CONTROL SYSTEMS



PROVIDES THE USER WITH MICRO-PROCESSOR-BASED LOAD CONTROL SYSTEMS FOR AUTOMATED ELECTRICAL ENERGY MANAGEMENT.

The W7010/20 Load Control Systems reduce electrical energy costs by limiting kilowatt (kW) demand and lowering kilowatt-hour (kWh) consumption using three load control functions: Demand Limit Control (DLC), Duty Cycle (DC) and Time-of-day Programmer (TOD). Demand Limit Control monitors kW demand, and automatically sheds and restores loads according to a user-entered program that maintains peak demand below a preset level. Duty cycling reduces

kWh consumption by controlling loads based on outdoor temperature according to a user-entered program. Time-of-day programming reduces kWh consumption by turning loads on and off according to a user-entered program based on time of day. To enhance the operation of the W7010/20, two options are available: Bypass Switch Option and Q7000 Communication Module. Bypass switch option gives the user the flexibility of choosing automatic load control operation or manual control of equipment. All switches are easily set at the W7010/20 panel. The Q7000 Communication Module gives a user the ability to program, monitor energy use, and troubleshoot from a remote terminal. Dimensions (all W7010/20 models): 19-3/16 in. [487 mm] (with mounting bracket) high, 16-1/8 in. [410 mm] wide, 6-3/4 in. [172 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.



W7010/20 communication system diagram.

Additional equipment, accessories, and parts available only through Authorized Honeywell Energy Management Distributors.

ELECTRICAL RATINGS:

Power Input —120 Vac, 60 Hz.

Maximum Power Consumption —80 W.

TEMPERATURE RANGES:

Operating— 32 F to 122 F [0 C to 50 C].

ADDITIONAL EQUIPMENT REQUIRED:

W972B Watt Transducer converts signal from service potential and CT's into a 0 to 100 mV signal proportional to actual building kW. This signal is used as an input to the W7010/20. (For systems with Demand Limit Control.)

C5001 Current Transformers (CT). Three recommended (1 per phase). (For systems with Demand Limit Control.)

Shielded Cable required for wiring watt transducers or pulse-generating demand meter, alternate set point controller, and solid state temperature sensor to the W7010/20 (for systems with Demand Limit and Duty Cycle Controls).

Part No. 4074CAV—50 ft [15 m]

Part No. 4074CAW—100 ft [30 m]

Part No. 4074CAY—200 ft [60 m]

continued next page

TRADELINE



load control systems

W7010/20C,E,F,G continued

ACCESSORIES:

Bypass Switch Option provides manual ON-OFF or AUTO control of connected loads by channel.

194639A 10-Channel Bypass Switch.

194639B 20-Channel Bypass Switch.

Q7000A1003 Communication Module (see page 188). Includes 194809A cable assembly.

194810A RS232 Compatible Cable connects Q7000 at its RS232 port to on-site terminal.

194810B RS232 Compatible Current Loop Interface Cable connects Q7000 at its RS232 port to current loop interface equipment.

CR42A Photo Control (see page 190).

S405A Windup Timer (see page 190).

REPLACEMENT PARTS:

107323A Mounting Shield (for Solid State Temperature Sensor).

192898 Plexiglass Window.

192900A Door with Lock and Plexiglass Window.

193890 Door Key.

194950B Solid State Temperature Sensor.

Ribbon Cables

194706A Display Door Interconnect to the Central Processing Unit (CPU).

194707A Display Door to Relay Board 1.

194707B Display Door to Relay Board 2.

194708A Central Processing Unit (CPU) to Power Supply Board.

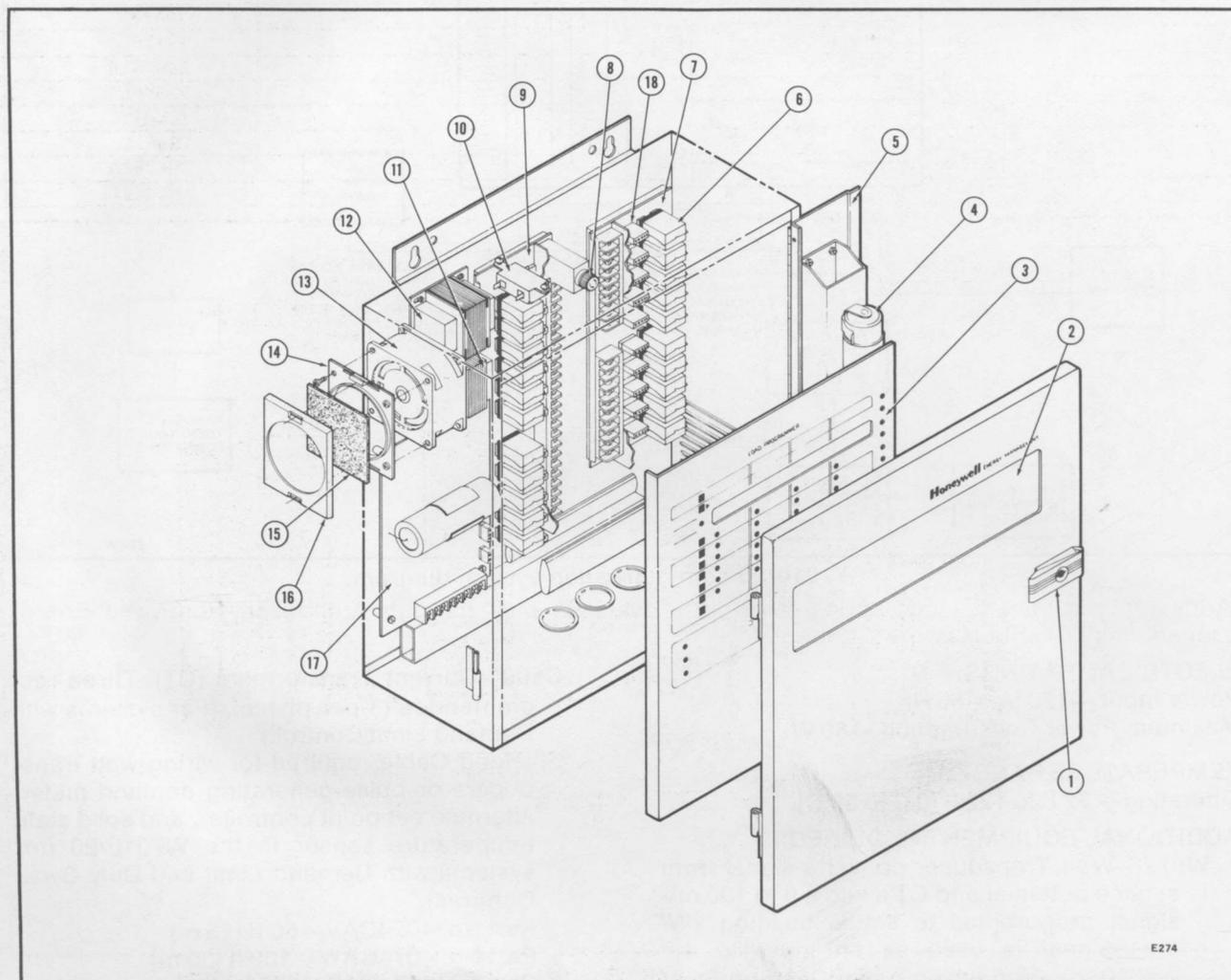
Cable Assemblies

194766A 4-Wire Assembly: From Power Supply Board (P3) to Main Relay Board (B3).

194767A 2-Wire Assembly: From Power Supply Board (P2) to Q7000 Communication Module (F2).

194771A 6-Wire Assembly: From Power Supply Board (P6) to Display Board (H6) and to the Central Processing Unit (CPU) (J6).

194795A 2-Wire Assembly: From Main Relay Board (B21) to Relay Board 2 (G21).



Location of W7010/20 replacement parts.

continued next page

TRADELINE

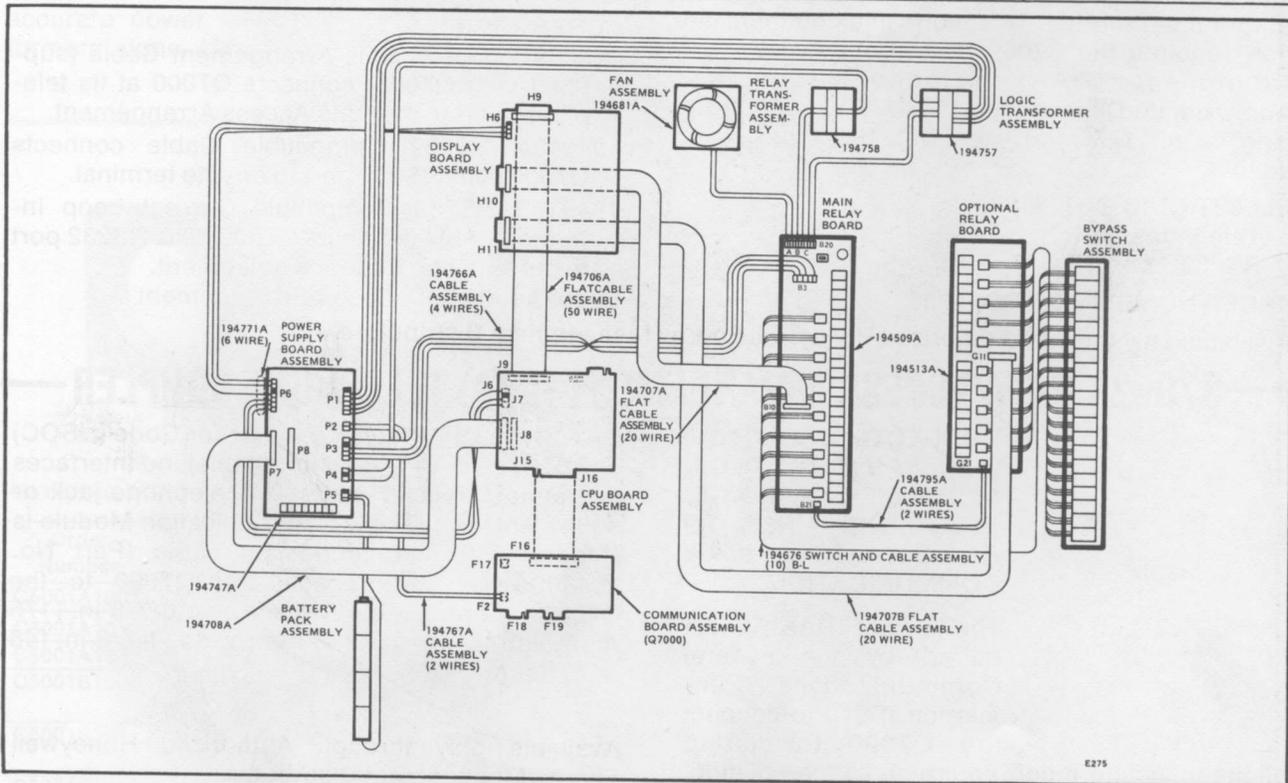
load control systems



W7010/20C,E,F,G continued

REPLACEMENT PARTS:

Item Number	Description	Part Number
1.	Door Lock and Catch Assembly	192893
2.	Plexiglass Window	192898
3.	Display Door Assembly	
	W7010C	194623C
	W7010E	194625C
	W7010F	194626C
	W7010G	194627C
	W7020C	194630C
	W7020E	194632C
4.	Battery (each) size D Nickel Cadmium Rechargeable	194633C
		194634C
5.	Bypass Door Assemblies	
	10 switch blank	194680
	10 switch bypass	194639C
	20 switch blank	194639A
6.	20 switch bypass	194639D
	Relay	194639B
7.	Auxiliary Relay Board Assembly (Relay Board 2)	193470
8.	Fuse (Buss MDL-1, 1 A 250 Vac)	194513A
9.	Main Relay Board Assembly (Relay Board 1)	21233
10.	Line Filter Assembly	194509A
11.	Relay Transformer	195293A
12.	Logic Transformer	194758
13.	Fan Assembly	194757
14.	Filter Plate	194681A
15.	Fan Filter	194673
16.	Filter Cover	194671
17.	Power Supply	194672
18.	NO/NC Relay Jumpers	194747A
		194682A



Location of W7010/20 ribbon cable and cable assembly replacement parts.

continued next page

TRADELINE



load control systems

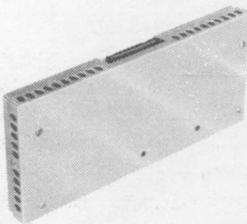
W7010/20C,E,F,G continued

W7010/20 Model Selection Chart

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Demand Limit	Duty Cycle	Time-of-day Program	Number of Channels
W7010C1009			X	10
W7010E1004		X	X	10
W7010F1002	X		X	10
W7010G1000	X	X	X	10
W7020C1007			X	20
W7020E1002		X	X	20
W7020F1000	X		X	20
W7020G1008	X	X	X	20

Q7000A COMMUNICATION MODULE



PROVIDES THE USER WITH THE ABILITY TO PROGRAM AND OPERATE THE W7010/20 LOAD CONTROL SYSTEMS ON-SITE WITH A TERMINAL OR FROM A REMOTE TERMINAL CONNECTED TO THE W7010/20 BY A TELEPHONE LINE AND DATA COUPLER.

Field-installed accessory for all W7010/20 Load Control Systems. The user can program, recall programs, obtain building energy history and troubleshoot from a local or remote terminal. User can select data transmission in either formatted or unformatted modes. Telephone line communication requires the S7002A1007 Data Access Arrangement (DAA) Telephone Coupler. Approximate Dimensions: 11-11/32 in. [288 mm] long, 5 in. [127 mm] wide, 1-1/16 in. [27 mm] deep.

ELECTRONIC OUTPUTS:

Telephone port.
RS232C port.

ORDER NUMBER: Q7000A1003.

Available only through Authorized Honeywell Energy Management Distributors.

SIGNAL CHARACTERISTICS:

Telephone—
Frequency shift keying (FSK)
Bell 103 compatible.
Direct Terminal Hookup—
RS232 compatible.

TRANSMIT/RECEIVE DATA:

Character Code—ASCII.
Transmit/Receive Rate—300 Baud.
Word Length—8 Bits (with parity).
Type of Parity—Even or Odd (automatically selects based on incoming signal).
Stop Bits—One.
Duplex Mode—Full Duplex Mode will be used (user may select half-duplex).

ACCESSORIES:

194809A Data Access Arrangement Cable (supplied with Q7000) connects Q7000 at its telephone port to the Data Access Arrangement.
194810A RS232 Compatible Cable connects Q7000 at its RS232 port to on-site terminal.
194810B RS232 Compatible Current Loop Interface Cable connects Q7000 at its RS232 port to current loop interface equipment.
S7002A1007 Data Access Arrangement.

S7002A DATA ACCESS ARRANGEMENT (DAA) TELEPHONE COUPLER



CONNECTS THE Q7000 COMMUNICATION MODULE TO STANDARD TELEPHONE LINES TO ALLOW TWO-WAY COMMUNICATION.

The S7002 DAA is required by the Federal Communications Commission (FCC) to connect the Q7000 to dial-up

phone lines and meet requirements for isolation, protection, and registration. Directly connectable replacement for a BELL 103-compatible 1001D

DAA with a Universal Service Order Code (USOC) of CBT. The DAA is wall mountable and interfaces to standard RJ11W or RJ12W telephone jack or equivalent. The Q7000 Communication Module is shipped with the connecting cable (Part No. 194809A) which connects the Q7000 to the S7002A. Approximate Dimensions: 6-7/8 in. [175 mm] high, 4-5/8 in. [118 mm] wide, 1-7/8 in. [48 mm] deep.

Available only through Authorized Honeywell Energy Management Distributors.

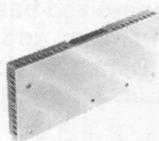
ORDER NUMBER: S7002A1007

TRADELINE

load control systems



Y7002A COMMUNICATION BUILDER PAK



Y-PAK INCLUDES Q7000 COMMUNICATION MODULE, S7002 DATA ACCESS ARRANGEMENT, AND 194809A CABLE.



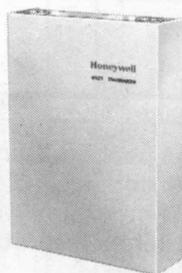
Y7002 provides all the accessories required to hook a W7010/20 panel to local dial-up telephone lines. Q7000 Communica-

tion Module and S7002 Data Access Arrangement (DAA) provide the user with the capability to communicate via telephone lines with W7010/20 Load Control Panels. The 194809A cable interconnects the Q7000 to the S7002 Data Access Arrangement (DAA). See page 188 for Q7000 and S7002DAA data.

Available only through Authorized Honeywell Energy Management Distributors.

ORDER NUMBER: Y7002A1001

W972B WATT TRANSDUCER



CONVERTS CURRENT SIGNALS FROM CURRENT TRANSFORMERS AND VOLTAGE SIGNALS FROM A UTILITY SERVICE TO A MILLIVOLT SIGNAL FOR INPUT TO A DEMAND CONTROL PANEL.

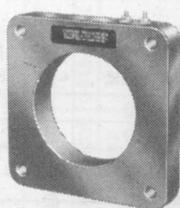
Used with C5001 Current Transformers and W7010/20 Load Control Panels. Provides more accurate power monitoring than current transformers alone. Uses Hall effect to produce milli-

volt output proportional to true power consumption. Can be used with Wye or Delta 208 V, 240 V, or 480 V service. Input Current: 5 A ac full scale. Maximum Output: 100 mVdc full scale. Accuracy: 2 percent (5 percent for 480 Delta service). Ambient Temperature Range: 32 F to 140 F [0 C to 60 C]. Dimensions: 10-1/4 in. [260 mm] high, 7 in. [178 mm] wide, 2-3/8 in. [60 mm] deep. Listed by Underwriters Laboratories Inc.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Voltage Input
W972B1000	120, 240, 277, 480 from single or 3-phase systems.

C5001A,B CURRENT TRANSFORMERS



C5001A



C5001B

PROVIDES A STEPPED-DOWN CURRENT SIGNAL TO W972 WATT TRANSDUCER.

C5001A is donut type; C5001B is split-core type. Current transformer output (0 to 5 A) is directly proportional to current in primary bar or cable. For indoor use only. Maximum Voltage: 600 Vac. Frequency: 50/60 Hz. Binding posts for external connections.

Available only through Authorized Honeywell Energy Management Distributors.

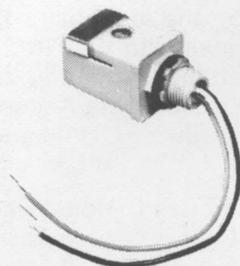
Order Number	Type	Current Ratio (A)	Weight		Window Dimension		Mounting
			lb.	kg	in.	mm	
C5001A1001	Donut	400:5	2.32	1.1	3-1/4 dia.	83 dia.	4 holes at corners of unit.
C5001A1019		800:5	3.32	1.5	4-1/4 dia.	108 dia.	
C5001A1027		1200:5	10.9	4.9	5-3/4 dia.	146 dia.	
C5001B1009	Split-core	400/800/1200:5	1.4	0.6	2 x 5-1/2	51 x 140	2 holes at corners of unit.
C5001B1017		1600/2000/2400:5	8.0	3.6	4 x 7-1/2	102 x 190	
C5001B1025		800/1200/1600	8.0	3.6	4 x 7-1/2	102 x 190	
					4 x 7-1/2	102 x 190	

TRADELINE



load control systems

CR42A PHOTO CONTROL



CONTROLS OUTDOOR LIGHTING LOADS EITHER INDEPENDENTLY OR TO ENHANCE THE EFFICIENCY OF W7010/20 LOAD CONTROL SYSTEM.

The CR42A Photo Control is available in 120, 208, 240 and 277 Vac for compatibility with existing lighting systems. The photo control gives automatic control of lighting depending upon ambient light levels. When used with the W7010/20 Load Control System, the photo control can enhance Time-of-day Programmer (TODP) operation by

permitting lighting loads to be energized based on ambient lighting level, contributing to additional energy savings. Approximate Dimensions: 3 in. [76 mm] (overall) long, 1-9/16 in. [40 mm] wide, 1-9/16 in. [40 mm] deep.

Available only through Authorized Honeywell Energy Management Distributors.

Part No.	Nominal Operating Voltage	Ballast VA ¹	Tungsten Watts ²
CR42A1007	120 Vac	1000	1800
CR42A1015	208 Vac	1700	2000
CR42A1023	240 Vac	2000	2000
CR42A1031	277 Vac	2300	3000

¹ VA rating is based on 50% power factor.

² The wattage of the controlled lights cannot exceed the rated capacity of photo control.

S405A WINDUP TIMER



PROVIDES TEMPORARY TIMED OVERRIDE OF INDIVIDUALLY CONTROLLED LOADS OR ENHANCED CONTROL IN HONEYWELL ENERGY MANAGEMENT SYSTEMS.

Loads are turned off automatically after preset time has expired, which saves

energy as loads are used only as needed. Can be used as a timed, remote override in a comprehensive energy management system. Dimensions: 3-7/8 in. [98 mm] high, 1-13/16 in. [46 mm] wide, 1-7/8 in. [48 mm] deep.

ELECTRICAL RATINGS:

Available only through Authorized Honeywell Energy Management Distributors.

Model	Operating Time Minutes Max.	Timing Accuracy	Voltage Rating Vac	Current A Max.	Motor Rating
S405A1006	15	+/- 10%	24	20	
			125	20	1 hp
			125	7*	
			250	10	1 hp
			277	10	
S405A1014	60	+/- 10%	24	20	
			125	20	1 hp
			125	7*	
			250	10	1 hp
			277	10	

*Tungsten rating only.

Switch type— normally open spst all models.

MOTOR-VALVE SELECTION GUIDE

<div style="display: flex; flex-direction: column; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small;">Actuator Linkage</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small;">Transformer</div> </div>	2-Position Reversing Actuators		2-Position Spring-return Actuators		Proportional Reversing Actuators					Proportional Reversing with Spring-return Actuators			Electronic Voltage Drive Actuators	
	M644A1016 ^a	M644C1014 ^b	M845A1027	M845E1007 C10099	M7044B1003 ^{b,m}	M954A,D M944A1010 ^a	M944C1018 ^b	M944B1175 ^e	M934A1284	M955A,C M945A1017 ^c	M945F1004 ^d	M7045 ^m	M734H,J M744D, M745G,K,L,P	
Valve Order Number	130810B9 Cover	130810B9 Cover	Multitap Cover Mtd. Transformer Included	120-Volt Cover Mtd. Transformer Included	130810B9 Cover	130810B9 Cover	130810B9 Cover	130810B9 Cover	Line Voltage Model	130810B9 Cover	130810B9 Cover	130810B9 Cover	See Motor Valve Selection Guide for electronic controlled actuators page 155	
2-way Screwed Single-seated	●		●	●	●	●		●	●	●	●	●		
V5011A and C 1/2—3 in.														
2-way Screwed Double-seated	● ^h	● ^h	● ^l	● ^l	● ^h	● ^h		● ^h	● ^l	● ^l	● ^l	● ^l		
V5047A 1—2 in.														
2-way Flanged Single-seated	●		●	●	●	●		●	●	●	●	●		
V5011A 2-1/2—3 in.														
V5011A and B 4—6 in.		●					●							
2-way Flanged Cage Valve ^j		● ^j					● ^j							
V5051A 2-1/2—6 in.														
3-way Mixing Screwed	●		●	●	●	●		●	●	●	●	●		
V5013A 1/2—2 in.														
3-way Mixing Flanged	●				●	●		●						
V5013B 2-1/2 and 3 in.														
V5013B 4—6 in. ^k		●						●						
3-way Diverting Flanged	●				●			●						
V5013C 2-1/2 and 3 in. ^k						● ⁿ		●						
V5013C 4—6 in.		●						●						

^aIf using 15-second motor, substitute Q618A1032 Valve Linkage (80 lb. [36.3 kg]).

^bFour-minute timing recommended on larger size valves.

^cController in normally closed position.

^dController in normally open position.

^eLess balancing relay. Use with W902 Reset Panel.

^fIf heating-cooling sequencing is desired, substitute Q601M (80 lb.[36.3 kg]) Valve Linkage.

^gCover-mounted transformer (Part No. 130810B) must be ordered separately; if

remote-mounted transformer is required, use AT72D.

^hUse Q601K1003 in place of listed linkage.

^jUse Q601K1003 in place of Q601E1000.

^kNot recommended where tight close-off is required.

^lQ601L1002 in place of listed linkage.

^mM7044B (nonspring-return) and M7045B (spring-return) for heating, M7045A (spring-return) for cooling.

ⁿProportional motors must be wired for 2-position control.





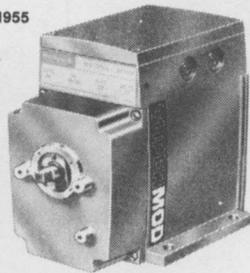
motors

M954A,D: M955A,C SUPER MODUTROL MOTORS

M954



M955



THESE SOLID STATE SUPER MOD MOTORS WITH HYBRID DRIVE CIRCUIT REPLACE MORE THAN 220 HONEYWELL AND COMPETITIVE MOTORS. THEY USE STANDARD MODUTROL MOTOR ACCESSORIES AND ARE IDENTICAL IN OUTPUT TO STANDARD MODUTROL MOTORS.

Refer to the order table for application. Hybrid drive circuit is insensitive to vibration. Each SUPER TRADELINE pack includes a 4074BYK Bag Assembly containing resistors that allow one series 90 controller to drive up to 6 Super Mod

• SUPER TRADELINE models.

motors. Mounting: motor must be mounted with motor shaft in horizontal position.

ELECTRICAL RATINGS:

Power Consumption: M954A,D—18 W, 23 VA; M955A,C—26 W, 32 VA.

Voltage and Frequency: 24 Vac, 50/60 Hz.

Current Draw: M954A,D—0.95 A; M955A,C—1.33 A.

Auxiliary Switch Ratings (amperes):

	120 V		240 V		277 V
	M954D ^a	M955C ^b	M954D ^a	M955C ^b	M954D ^a
Full Load	5.8	7.2	2.9	3.6	—
Locked Rotor	34.8	43.2	17.4	21.6	—
Resistive	11.0	—	11.0	—	11.0

^aAuxiliary switch ratings apply to either N.O. or N.C. contacts, providing the load is selective (one contact)—not simultaneous ratings. Both N.O. and N.C. contacts may be used, but then one contact must be limited to 50 VA.

^bOne contact; 40 VA pilot duty, 120/240 Vac on opposite contact.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

Order Number	Application	Operating Torque		Break-away Torque		Aux. Switch	Timing (sec)	Motor Action on Power Loss	Dead Weight Load on Shaft	Ambient Temp. Ratings	
		lb.-in.	N·m	lb.-in.	N·m					Min.	Max.
*M954A1035	Nonspring-return dual stroke motors. Field-selectable 90 or 160 degree stroke. Replaces most nonspring-return, modulating series 90 or 2-position series 60 motors, or use with W973 Singlezone Logic Panel. Crankshaft tapped for 8-32 UNC screw.	150	17.0	300 ^b	34.0 ^b	—	35 or 60 ^c	None	200 lb. [90.7 kg] at power end; 100 lb. [45.4 kg] at auxiliary end.	-40 F [-40 C]	125 F [52 C]
*M954D1016						2					
*M955A1024	Spring-return adjustable stroke motors allow selection of motor stroke from 90 to 160 degrees. Replaces modulating series 90, or 2-position series 40 or series 80 motors; or use with W973 Singlezone Logic Panel.	50 ^a	5.7 ^a	200 ^b	22.6 ^b	—	35 to 60 ^d	Closes	200 lb. [90.7 kg] at power end; 10 lb. [4.5 kg] at auxiliary end.	15 F [-9 C]	125 F [52 C]
*M955C1014						1					

^aThis torque may be divided between the two end shafts, provided that no more than 25 lb.-in. [2.8 N·m] is applied to the auxiliary end.

^bMax. driving torque available to overcome occasional large loads such as a seized damper or valve; MUST NOT BE USED CONTINUOUSLY AT THIS RATING.

^c35 seconds nominal for 90 degree stroke; 60 seconds nominal for 160 degree stroke.

^dStroke is adjustable from 90 to 160 degrees. Timing is proportional to stroke, 60 seconds for 160 degree stroke.

TRADELINE



M944A-G,J,S MODUTROL MOTORS



REVERSING, PROPORTIONAL MOTORS USED TO OPERATE DAMPERS OR VALVES.

Available with fixed or dual stroke—refer to ordering table. Crankshaft: Double-ended, 3/8 in. [10 mm] square, untapped. Ambient Temperature Rating: Minus 40 F to plus 52 C]. Approximate

125 F [minus 40 C to plus 52 C]. Approximate

AUXILIARY SWITCH RATINGS (amperes):

	120 V	240 V	277 V
Full Load	5.8	2.9	—
Locked Rotor	34.8	17.4	—
Resistive	11.0	11.0	11.0

TRADELINE models.

Order Number	Voltage (50/60 Hz)	Power Consumption		Includes Balance Relay ^a	Timing	Stroke (degrees)	Includes
		Watt	VA				
M944A1010	24 V	20	21	Yes	60 sec	160	
M944A1028				Yes	30 sec	90	
M944A1036				Yes	15 sec	160	
M944B1175	24 V	15	17	No	60 sec	160	
M944B1183				No	15 sec	160	
M944B1191				No	4 min	160	
M944C1000	24 V	20	21	Yes	15 or 30 sec ^b	Adj. 90 or 160	
M944C1018				Yes	2 or 4 min ^b	Adj. 90 or 160	
M944D1017				Yes	30 or 60 sec ^b	Adj. 90 or 160	
M944E1040	24 V	15	17	No	30 or 60 sec ^b	Adj. 90 or 160	2 spdt auxiliary switches
M944F1007	24 V	20	21	Yes	60 sec	160	2 spdt auxiliary switches
M944G1063	120 V	14	16	No	60 sec	160	Auxiliary potentiometer
M944G1071				No	30 sec	90	
M944J1051	24 V	15	17	No	60 sec	160	Auxiliary potentiometer
M944S1019	120 V, 60 Hz	14	16	No	30 or 60 sec ^b	Adj. 90 or 160	2 spdt auxiliary switches

^aModels less balance relay are for use with electronic panels, reset systems, and where external balance relay is required.

^bShorter timing applies when 90 degree stroke is selected.

R927C, R9107A BALANCING RELAYS



USED ON MODUTROL MOTORS (WITHOUT INTEGRAL BALANCING RELAYS) THAT ARE SUBJECT TO EXCESSIVE VIBRATION.

Relay is mounted separately from motor so vibrations will not affect relay. Mounts vertically or

horizontally. Rugged cover protects relay from dirt and physical damage. Switching Action: Spdt. Approximate Dimensions: 6-5/8 in. [168 mm] high, 4-7/16 in. [113 mm] wide, 3-1/2 in. [89 mm] deep.

ELECTRICAL RATINGS: 1 A at 24 V, 50/60 Hz.

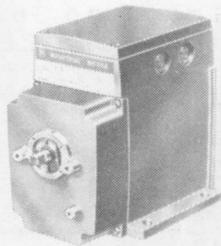
Order Number	Motor Used with	Replacement Relay Assembly Part No.
R927C1000	M944B,E,J M945B,C,G,Y	24337AV
R9107A1000	M941B	24337CB

TRADELINE



motors

M945A-H,L,M,Y MODUTROL MOTORS



MODULATING, SPRING-RETURN MOTORS USED TO OPERATE DAMPERS AND VALVES.

Integral helical spring returns motor shaft to normal position (full open or full closed) on power interruption. Return-spring mechanism field removable for access to

auxiliary switches. Stroke: 160 degree. Timing: 60 sec. Voltage and Frequency: 24 V, 50/60 Hz.

Maximum Operating Torque: 50 lb.-in. [5.7 N·m] (25 lb.-in. [2.8 N·m] max. at auxiliary end). Ambient Temperature Range: Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Crankshaft: Double-ended, 3/8 in. [10 mm] square, untapped. Approximate Dimensions: 7-1/2 in. [191 mm] high, 4-7/8 in. [124 mm] wide, 9-1/4 in. [235 mm] deep. Listed by Underwriters Laboratories Inc.—M945A,C,D,E,F,H,M; CSA certified—M945C,D,H.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

TRADELINE models.

Order Number	Power Consumption		Includes Balance Relay ^a	Motor Action on Power Loss	Includes
	Watt	VA			
M945A1017 ^a	26	30.0	Yes	Closes	
M945A1082 ^b			Yes	Closes	
M945B1057	22	25.5	No	Closes	
M945B1065 ^b	22	25.5	No	Closes	
M945C1015	22	25.5	No	Closes	2 spdt auxiliary switches ^d
M945D1006	26	30.0	Yes	Closes	2 spdt auxiliary switches ^d
M945E1013	26	30.0	Yes	Closes	Auxiliary potentiometer
M945F1004	26	30.0	Yes	Opens	
M945G1037	22	25.5	No	Opens	
M945L1015 ^c	26	30.0	Yes	Closes	Auxiliary potentiometer

^aModels less balance relay are for use with electronic panels, reset systems, and where external balance relay is required.

^b90 degree stroke; 30 sec timing.

^cMotor is run by external relay. Available repair only.

^d5.8 A full load at 120 V; 2.9 A full load at 240 V; 11 A resistive at 120/240 or 277 V.

M644A-F MODUTROL MOTORS



REVERSING 2-POSITION MOTORS USED TO OPERATE VALVES AND DAMPERS.

M644 motors are used with series 60, 2-position controllers (spdt switching). Crankshaft: 3/8 in. [10 mm] square, double-ended, untapped. Ambient Temperature

Range: Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Approximate Dimensions: 7-1/2 in. [191 mm] high, 5-5/8 in. [143 mm] wide, 7-7/16 in. [189 mm] deep. Listed by Underwriters Laboratories Inc.—M644A,B,D,E; CSA certified—M644B,D,E,F.

TORQUE:

Timing		Normal Running Torque		Break-away Torque ^a	
90 deg. stroke	160 deg. stroke	lb.-in.	N·m	lb.-in.	N·m
—	15 sec	37	4.2	75	8.5
15 sec	30 sec	75	8.5	150	17.0
1/2, 1, or 2 min	1,2,4 min	150	17.0	300	34.0

AUXILIARY SWITCH RATINGS (amperes): M644D only—

	120 V	240 V	277 V
Full Load	5.8	2.9	—
Locked Rotor	34.8	17.4	—
Resistive	11.0	11.0	11.0

continued next page

TRADELINE



M644A-F continued

AUXILIARY SWITCH RATINGS (amperes): M644E only—

	120 V	240 V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

See PARTS and ACCESSORIES, page 242.

TRADELINE model.

Order Number	Voltage (50/60 Hz)	Power Consumption		Timing	Stroke (degree)	Includes
		Watt	VA			
M644A1016	24	15	16.6	60 sec	160	
M644A1024				30 sec	90	
M644B1007	120	14	15.6	30 sec	160	
M644C1006	24	15	16.6	15 or 30 sec ^b	Adj. 90 or 160	
M644C1014				2 or 4 min ^b	Adj. 90 or 160	
M644D1005	24	15	16.6	30 or 60 sec ^b	Adj. 90 or 160	2 spdt auxiliary switches
M644E1012 ^c	24	15	16.6	60 sec	90	1 spdt auxiliary switch
M644F1003 ^{a,d}	120	14	15.6	30 sec	180	

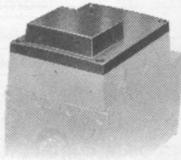
^a75 lb.-in. [8.5 N·m] normal running torque.

^cShipped in 90-degree position.

^bShorter timing applies when 90 degree stroke is selected.

^dRotates in only one direction.

130810 COVER MOUNTED TRANSFORMER



40 VA TRANSFORMER USED TO SUPPLY POWER TO A 24-VOLT MOTOR.

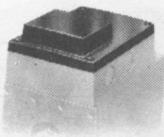
Replaces standard motor top cover on M744, M745, M845, M644, M941, M944, M945, M954, M955, M7044 and M7045.

TRADELINE model.

Order Number	Primary Voltage
130810A	120 V, 60 Hz
130810B	120/208/240 V, 60 Hz
130810C	220 V, 50 Hz
130810H ^a	24 V, 50/60 Hz

^aUse with W936 Multizone Logic Panel.

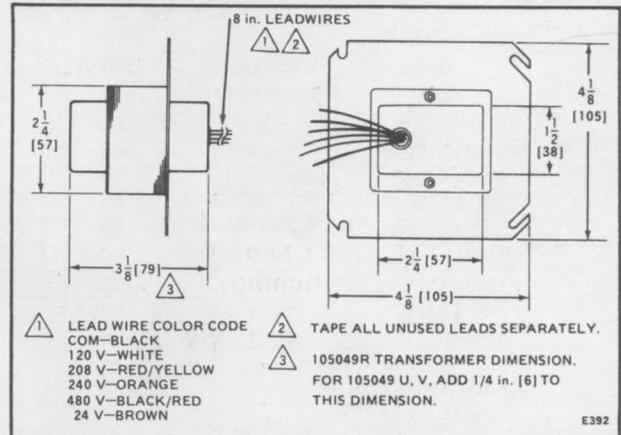
105049 MOTOR MOUNTED TRANSFORMER



TRANSFORMER DESIGNED TO POWER 24 VOLT M734, M934 MODUTROL MOTORS.

Designed with conduit nipple or 4 x 4 in. junction box mount for easy installation with M734, M934 Modutrol Motors. Since designed as accessory to specific Modutrol Motors, general purpose VA ratings are not applicable.

DIMENSIONS:



Since designed as accessory to specific Modutrol Motors, general purpose VA ratings are not applicable.

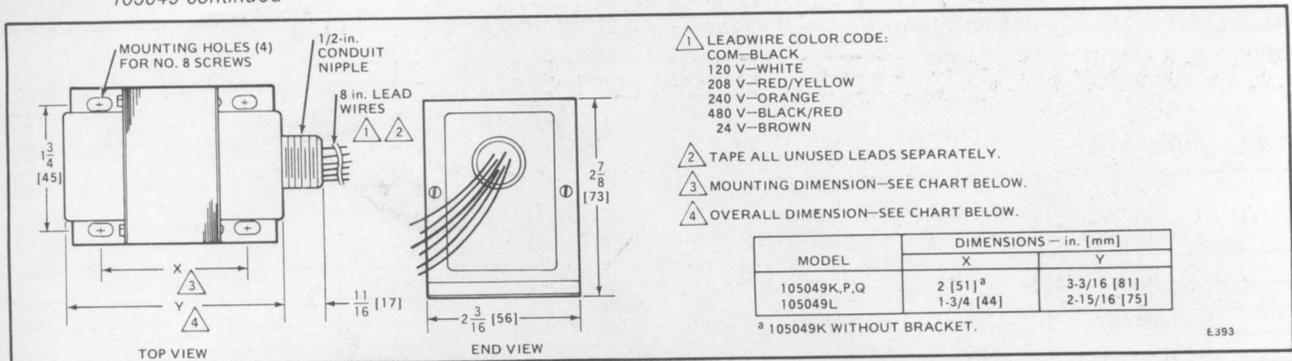
Order Number	Primary Voltage (Vac @ 50/60 Hz)	Mounting Type
105049P	120/208/240	1/2 in. conduit nipple and brackets for foot mounting
105049U	120/208/240	Plate for 4 x 4 junction box

continued next page

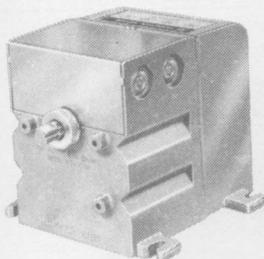


motors

105049 continued



M934A,D MODUTROL MOTORS



REVERSING PROPORTIONAL, SHADED POLE MOTOR PROVIDES MODULATING CONTROL OF VALVES AND DAMPERS IN LOW VOLTAGE SERIES 90 CONTROL CIRCUITS.

Line voltage models have an integral transformer to supply 24 V power to the control circuit. Crankshaft: Double-ended 3/8 in. [10 mm] square, untapped. Ambient Temperature Rating: Minus 30 F to plus 125 F [minus 34 C to 52 C]. Approximate Dimensions: 5-1/2 in. [140 mm] high, 4-3/16 in. [106 mm] wide, 5-11/16 in. [145 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

ELECTRICAL RATINGS: M934A—

Voltage	Frequency	Current	Power	VA
24 Vac	50/60 Hz	1.8 A	27 W	43
120 Vac	50/60 Hz	0.36 A	27 W	43
220 Vac	50 Hz	0.18 A	27 W	40
240 Vac	50/60 Hz	0.18 A	27 W	43

TRADELINE models.

Order Number	Voltage (50/60 Hz)	Timing (sec)	Torque		Stroke (deg)	Includes
			lb.-in.	N-m		
M934A1219	120	60	35	4.0	160	
M934A1227 ^a	24	60	35	4.0	160	
M934A1235	220 (50 Hz)	60	35	4.0	160	
M934A1243 ^a	24	60	35	4.0	160	2 spdt auxiliary switches
M934A1250	120	60	75	8.5	160	2 spdt auxiliary switches
M934A1268	240	60	35	4.0	160	2 spdt auxiliary switches
M934A1284	120	60	35	4.0	160	
M934A1292	120	60	35	4.0	160	2 spdt auxiliary switches
M934A1318	120	35	35	4.0	90	2 spdt auxiliary switches
M934A1326	120	35	35	4.0	90	
M934A1334 ^a	24	35	35	4.0	90	
M934A1342 ^a	24	60	35	4.0	160	
M934D1000 ^b	120	60	75	8.5	160	1 spdt auxiliary switch
M934D1018 ^b	120	60	75	8.5	160	2 spdt auxiliary switches
M934D1026 ^b	120	35	75	8.5	90	1 spdt auxiliary switch
M934D1034 ^b	120	35	75	8.5	90	2 spdt auxiliary switches ^c

^aSeparate transformer.

^bWith heavy duty balancing relay.

M934D—

Voltage	Frequency	Current	Power	VA
24 Vac	50/60 Hz	2.4 A	33 W	58
120 Vac	50/60 Hz	0.48 A	33 W	58
220 Vac	50 Hz	0.24 A	33 W	53
240 Vac	50/60 Hz	0.24 A	33 W	58

AUXILIARY SWITCH RATINGS (amperes)^a:

	120 V	240 V
Full Load	8.0	4.0
Locked Rotor	48.0	24.0

^aIf both normally open and normally closed contacts are used on an individual switch, either contact is rated as shown in the table above, but the opposite contact is rated at 40 VA pilot duty only.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

AT72 Low Voltage Transformer to provide 24 Vac power for low voltage motors.

NOTE: Use accessories which do not require a tapped hole in the end of the motor shaft.

TRADELINE



M445A,C,D; M845A,B,C,E MODUTROL MOTORS



M845 With Cover Mounted Transformer

TWO-POSITION, SPRING-RETURN MOTORS.

Used to operate dampers or valves where desirable to return controlled element to starting position on power failure or interruption. Enclosed spring-return mechanism field removable for access to auxiliary switches. 24 V, 50/60 Hz. Timing: 60 seconds. Stroke: 160 degrees. Maximum Operating Torque: 50 lb.-in. [5.7 N·m]. Crankshaft: Double-ended, 3/8 in. [10 mm] square, untapped. Approximate Dimensions: 7-1/2 in. [191 mm] high

without cover-mounted transformer, 8-5/16 in. [211 mm] high with transformer; 5-5/8 in. [143 mm] wide; 9-1/4 in. [235 mm] deep. Listed by Underwriters Laboratories Inc.—M845A,B,E; CSA certified.

AUXILIARY SWITCH RATINGS (amperes)^a:

	120 Vac	240 Vac
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

^aSwitch rating is for 1 contact only; if both are used, second contact is rated 40 VA.

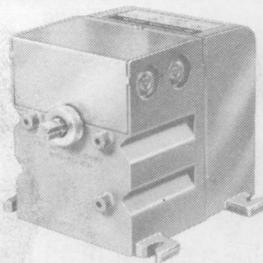
ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

TRADELINE model.

Order Number	Voltage 50/60 Hz	Power Consumption		Motor Action on Power Loss	Ambient Temperature Range		Includes
		Watt	VA		F	C	
M445A1000	120 V	22		Closes	15 to 125	-9 to +52	1 spdt auxiliary switch
M445A1042	240 V	22		Closes	15 to 125	-9 to +52	1 spdt auxiliary switch
M445A1067	220 V	22		Closes	15 to 125	-9 to +52	1 spdt auxiliary switch
M445D1007	120 V	22		Closes	15 to 125	-9 to +52	
M845A1001	24 V	24	30	Closes	15 to 125	-9 to +52	1 spdt auxiliary switch
M845A1027	24 V	24	30	Closes	15 to 125	-9 to +52	120/208/240 V multitap transformer; 1 spdt auxiliary switch
M845C1009	24 V	24	30	Closes	15 to 125	-9 to +52	
M845E1007	24 V	24	30	Opens	15 to 125	-9 to +52	120 V cover transformer, 1 spdt auxiliary switch

M734H,J ELECTRONIC MODUTROL MOTORS



PROVIDES PROPORTIONING CONTROL OF DAMPERS OR GAS, HOT WATER, STEAM, OR CHILLED WATER VALVES WHEN USED WITH A MODULATING DC VOLTAGE SOURCE.

Integral isolation transformer on all models. Power Consumption: 27

W, 43.2 VA. Ambient Temperature Range: Minus

40 F to 150 F [minus 40 C to 66 C] at 25 percent duty cycle. Crankshaft: Double-ended, 3/8 in. [10 mm] square untapped. Approximate Dimensions: 5-1/2 in. [140 mm] high, 4-3/16 in. [106 mm] wide, 5-7/16 in. [138 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

Functional replacement for Ranco LA2 Actuators.

ACCESSORIES:

See PARTS AND ACCESSORIES, page 242.

NOTE: Use accessories which do not require a tapped hole in the end of the shaft.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Voltage (50/60 Hz)	Input Signal Range	Stroke (deg)	Timing (sec)	Torque	
						lb.-in.	N·m
M734H1000	N.O.	120	10.5 to 13.5 Vdc	90	30	35	4.0
M734H1026	N.O.	24	4 to 7 Vdc	160	60	35	4.0
M734J1015	N.C.	24	4 to 7 Vdc	160	60	35	4.0
M734J1056	N.C.	24	10.5 to 13.5 Vdc	90	30	35	4.0

TRADELINE



motors

M744A ELECTRONIC MODUTROL MOTOR



SOLID STATE MOTOR USED IN HONEYWELL ZONE CONTROL SYSTEM TO PROVIDE PROPORTIONING CONTROL OF DAMPERS AND GAS, HOT WATER, STEAM, OR CHILLED WATER VALVES.

Used with W973 (with 4074EAC Resistor Kit)

panel. Normally closed. Separate motor transformer required for proper system operation. Nonspring-return. Ambient Temperature Range: Minus 40 F to plus 130 F [minus 40 C to plus 54 C] at 25 percent duty cycle. Crankshaft: Double-ended, 3/8 in. [10 mm] square, untapped. Power Consumption: 18 W, 21.6 VA. Torque: 150

lb.-in. [17 N·m]. Voltage and Frequency: 24 V, 50/60 Hz. Approximate Dimensions: 7-1/2 in. [191 mm] high, 5-5/8 in. [143 mm] wide, 7-7/16 in. [189 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Stroke (deg)	Timing (sec)
M744A1006	160	60
M744A1014	90	30

M744D ELECTRONIC MODUTROL MOTOR



PROVIDES PROPORTIONING CONTROL OF GAS, HOT WATER, STEAM, OR CHILLED WATER VALVES AND DAMPERS WHEN USED WITH A MODULATING DC VOLTAGE SOURCE.

Use with W7080 panels. Normally closed. Separate motor transformer re-

quired for proper system operation. Nonspring-return. Ambient Temperature Range: Minus 40 F to plus 130 F [minus 40 C to plus 54 C] at 25 percent duty cycle. Crankshaft: Double-ended, 3/8 in. [10 mm] square untapped.

Power Consumption: 18 W, 21.6 VA. Torque: 150 lb.-in. [17 N·m]. Voltage and Frequency: 24 V, 50/60 Hz. Approximate Dimensions: 7-1/2 in. [191 mm] high, 5-5/8 in. [143 mm] wide, 7-7/16 in. [189 mm] deep.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Stroke (deg)	Timing (sec)	Input
M744D1003	160	60	4-7 Vdc

M833A HEAT-ACTUATED DAMPER MOTOR



REGULATES DUCT DAMPER POSITION ACCORDING TO ZONE THERMOSTAT REQUIREMENTS.

Attaches directly to a damper shaft 1/2 in. in diameter or 3/8 in. shaft with adapter provided. Mounts in any position directly on a duct, or in-

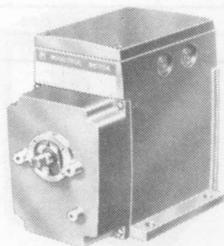
side a standard wiring junction box where Class 1 wiring is required. Voltage: 24 Vac/dc. Nominal Torque: 6 lb.-in. [0.7 N·m], or 3.5 sq ft [0.33 m²] free damper area (or 3 sq ft [0.28 m²] of linked damper). Maximum Ambient Temperature: 140 F [60 C] (for cooling duct, 60 F [16 C] air), or 85 F [29 C] (for heating duct, 150 F [66 C] air). Opening Time: 5 minutes to open damper 30 degrees.

Order Number	Clockwise Rotation	Current Draw
M833A1007	90 degrees	0.72 A at 24 V

TRADELINE



M745G, J, K, L, M, P ELECTRONIC MODUTROL MOTORS



FOR PROPORTIONAL CONTROL OF DAMPERS AND VALVES. MOTORS WITH OPTIONAL LINKAGES ARE SUITABLE FOR USE IN PACKAGED ROOFTOP HVAC APPLICATIONS.

M745 solid state control circuit is controlled by a 2-wire dc voltage input

signal, such as a W7080 control panel. Helical spring returns shaft to mechanically normal posi-

tion when power is interrupted. Separate motor transformer is required for proper system operation. Maximum Operating Torque: 50 lb.-in. [5.7 N·m]. Breakaway Torque: 200 lb.-in. [22.6 N·m]. Crankshaft: Double-ended 3/8 in. [9.5 mm] square, untapped. Approximate Dimensions: 7-1/2 in. [191 mm] high, 4-7/8 in. [124 mm] wide, 9-1/4 in. [235 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified.

Functional replacement for Ranco LA2 Actuators.

ACCESSORIES:

See PARTS and ACCESSORIES, page 242.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Description	Input Range (at 3 mA nominal)	Voltage (50/60 Hz)	Power Consumption		Ambient Temp. Rating		Timing Seconds	Stroke Degrees	Includes
				Watt	VA	F	C			
M745G1007	Normally open (mechanical and electrical)	4 to 7 Vdc	24	26	31.2	15 to 130	- 9 to +54	60	160	
M745J1003	Normally closed (mechanical and electrical)	4 to 7 Vdc	24	27	32.0	15 to 130	- 9 to +54	60	160	11 Vdc 10-32 mA internal power supply for controller.
M745K1002	Mechanical normally closed; Electrical normally open	14 to 17 Vdc	24	26	31.2	15 to 130	- 9 to +54	35	90	
M745L1027	Normally closed (mechanical and electrical)	14 to 17 Vdc	24	26	31.2	15 to 130	- 9 to +54	60	160	
M745L1043	Normally closed (mechanical and electrical)	14 to 17 Vdc	24	26	31.2	15 to 130	- 9 to +54	35	90	
M745M1034	Mechanical normally open; Electrical normally closed	6 to 9 Vdc	24	26	31.2	15 to 130	- 9 to +54	60	160	
M745P1007	Normally closed (mechanical and electrical)	4 to 7 Vdc	24	26	31.2	15 to 130	- 9 to +54	60	160	

Q68B AUXILIARY POTENTIOMETER



DUAL CONTROL POTENTIOMETER FOR UNISON OPERATION OF AUXILIARY MOTORS.

Mounts on power or auxiliary end of a Modutrol motor to operate other motors in unison. Controls motors with a me-

chanical balance relay only. Maximum Wiper Travel: 180 degrees. Power Consumption: 10 W. Approximate Case Dimensions: 3-7/8 in. [98 mm] high, 3-1/4 in. [83 mm] wide, 3-3/8 in. [86 mm] deep.

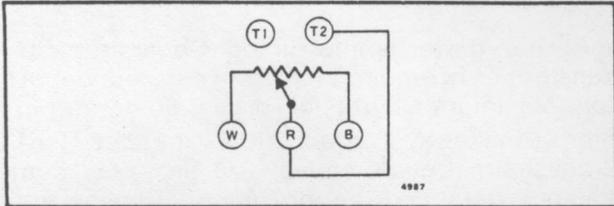
continued next page

TRADELINE



motors

Q68B continued



Internal schematic of the Q68B.

Order Number	No. Auxiliary Motors Controlled	Resistance
Q68B1005	2	86.0 ohm
Q68B1013	3	58.0 ohm

Q181A AUXILIARY POTENTIOMETER



CONTROLS ONE TO FOUR MODUTROL (SERIES 90) MOTORS FROM ONE MASTER MOTOR.

Mounts on master motor and operates controlled motors in unison or in sequence. Throttling Range: Adjustable, 40 to 160 deg. on each 135 ohm potentiometer. Used with 24 V motors. Approximate Dimensions: 3-3/16 in. [81 mm] high, 3-1/4 in. [83

mm] wide, 3-3/8 in. [86 mm] deep.

ACCESSORY:

7640JK Adapter Plate for mounting Q181 on early motors without bosses on gear end or for mounting over an external return spring.

Order Number	Number of Motors Controlled	Cover
Q181A1007	1	Yes
Q181A1015	2	Yes
Q181A1064	3	No

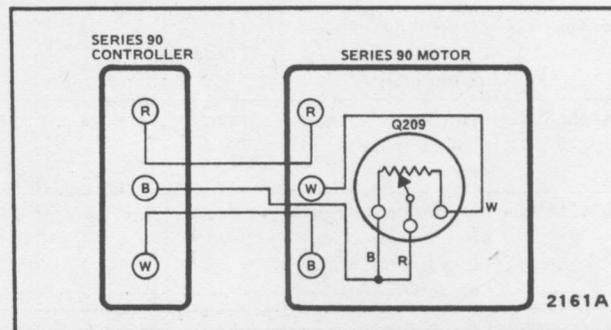
Q209A,B MANUAL POTENTIOMETERS



USED TO LIMIT MINIMUM POSITION OF A SERIES 90 MODUTROL MOTOR.

Refer to order table for application. Mounts directly on motor; all wiring is accomplished within motor wiring compartment. Color-coded leadwires. Approximate Case

Dimensions: 3-7/8 in. [98 mm] high, 3-1/4 in. [83 mm] wide, 3-3/8 in. [86 mm] deep.



Typical hookup diagram for the Q209 and a Modutrol motor (cooling hookup shown).

Order Number	Application	Resistance	Includes
Q209A1022	For M744, M745, M941, M944, M945, M954, M955 Modutrol Motors.	150 ohms ^a	Bracket for mounting inside motor wiring compartment.
Q209A1030		300 ohms ^b	
Q209B1005	For M734, M934 Modutrol Motors.	150 ohms ^a	Wiring compartment cover and screw-on shaft cover.
Q209B1013		300 ohms ^b	
Q209B1021	For M934 Modutrol Motors.	75 ohms ^c	

^aFor 0 to 50 percent minimum setting.

^bFor 0 to 100 percent minimum setting.

^cFor 0 to 25 percent minimum setting.

TRADELINE



S443A MANUAL POTENTIOMETER



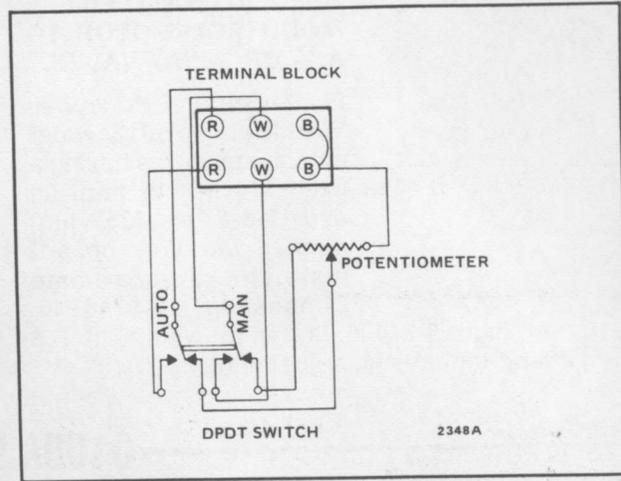
USED FOR REMOTE MANUAL CONTROL OF PROPORTIONING (SERIES 90) MOTORS AND RELAYS.

Use only with motors which have a balancing relay. Not suitable for motors controlled by electronic panels. Dpst toggle switch allows selection of automatic or manual control.

Surface mounted. Conduit outlet on each side of case. Screw terminals. Scale marked OPEN-CLOSE. Approximate Dimensions: 3-3/4 in. [95 mm] high, 3-3/8 in. [86 mm] wide, 3-1/4 in. [83 mm] deep (including knob).

REPLACEMENT PARTS:

- 30121A Knob Assembly.
- 30112A Potentiometer, 135 ohm.



Internal schematic of S443A.

Order Number	Resistance	Use with
S443A1007	135 ohm	M934, M941, M944, M945

Q601E,F,J,K,L,M,N VALVE LINKAGE



FOR CONNECTING A MODUTROL MOTOR TO A WATER OR STEAM VALVE.

Used with 2- or 3-way valves in modulating or 2-position service. Linkage mounts directly on valve bonnet; motor mounts on linkage. Refer to order table for specifications.

Indicator shows valve position. Modutrol motor must have an angular stroke of not less than 160 degrees and a timing of not less than one minute. Includes strain relief.

REPLACEMENT PARTS:

- 34348 Key (crank pin).
- 27473 Spring Clip.

ACCESSORY:

- 34343A Connecting Rod Assembly.

TRADELINE model.

Order Number	Spring Tension ^d		Lift Adjustment		Bonnet Diameter	
	lb.	kg	in.	mm	in.	mm
Q601E1000 ^a	160	72.6	3/8 to 1-1/2	10 to 38	1-7/8	47.6
Q601F1009 ^b	80	36.3	3/8 to 2-1/2	10 to 64	1-7/8	47.6
Q601J1004 ^{a,c}	160	72.6	3/4, fixed	19, fixed	1-3/8	34.9
Q601K1003 ^a	160	72.6	3/8 to 1-1/2	10 to 38	1-3/8	34.9
Q601L1002 ^b	80	36.3	3/8 to 1-1/2	10 to 38	1-3/8	34.9
Q601M1019 ^{b,c}	80	36.3	3/4, fixed	19, fixed	1-3/8	34.9
Q601N1000 ^e	80	72.6	3/8 to 2-1/2	10 to 64	3/4-18 threaded	—
Q601N1018 ^{a,e}	160	72.6	3/8 to 1	10 to 25	3/4-18 threaded	—

^aOperate with 150 lb.-in. [17 N·m] torque motor.

^bOperate with 35 lb.-in. [4 N·m] or 50 lb.-in. [5.7 N·m] motor.

^cHeat-cool sequenced linkage, valve operates in 100 degree of motor stroke leaving 60 degrees for operating auxiliary switch.

^dDoes not represent valve close-off pressure. See individual valve specifications for actual close-off ratings.

^eFor use with Penn valves. Replaces Penn linkages Y20ABA-4, Y20AAA-6, Y20EAA, and Y20ADA-4.

TRADELINE



motors

Q618A VALVE LINKAGE



USED TO CONNECT A MODUTROL MOTOR TO A 2- OR 3-WAY VALVE.

For use on Honeywell V5011 and V5013 water and steam valves having a fixed 3/4 in. [19 mm] lift and 1-3/8 in. [35 mm] bonnet. Requires no adjustment. Approximate Dimensions: 8-9/16 in.

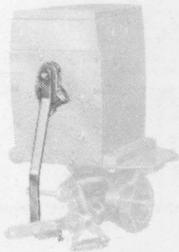
[218 mm] high, 5-3/4 in. [146 mm] wide, 3 in. [76 mm] deep. Requires no adjustment.

TRADELINE models.

Order Number	Seal-off Force on Valve Stem ^a		Use with Motor
	lb.	kg	
Q618A1024	160	72.6	M644, M744, M941, M944, M954
Q618A1032	80	36.3	M445, M634, M644, M734, M744, M745, M845, M934, M944, M945, M954, M955.

^aDoes not represent valve close-off pressure. See pages 234 and 238 for V5011 and V5013 close-off ratings.

Q100A LINKAGE



CONTAINS NECESSARY HARDWARE TO LINK MODUTROL MOTORS TO A V51B BUTTERFLY VALVE.

Adaptable for all sizes of V51B valves. Strain release and stop bracket are provided with V51B.

Order Number	V51 Valve Size (NPT)	Length of Linkage ^a Rod	
		in.	mm
Q100A1007	1-1/2 and 2 in.	6-3/16	157.2
Q100A1015	2-1/2 and 3 in.	6-5/8	168.3
Q100A1023	4 in.	7-1/4	184.2

^aConnecting holes for pins are 5/16 in. [8 mm] in diameter and 1/4 in. [6 mm] from each end of rod.

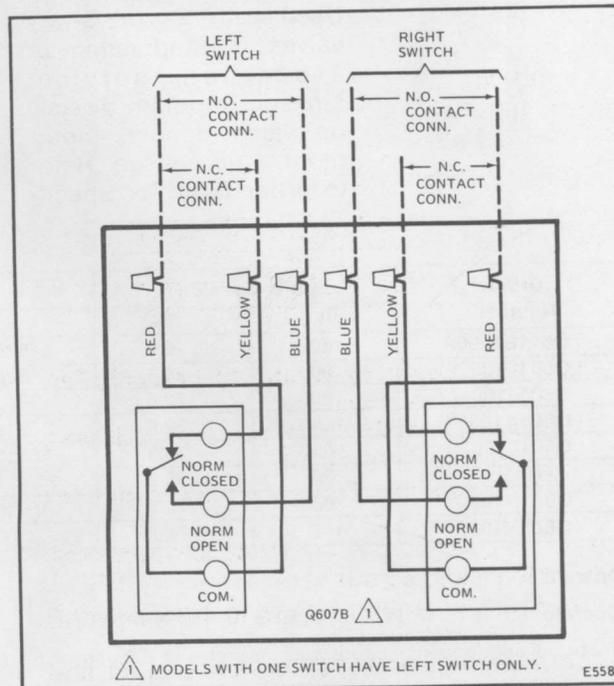
Q607A,B AUXILIARY SWITCHES



FOR CONTROL OF AUXILIARY EQUIPMENT AS A FUNCTION OF MOTOR SHAFT POSITION.

Micro Switch precision switches adjustable. Scale plate, anchored to a common shaft, indicates motor's position and allows Q607 to be adjusted for operational sequence

before mounting. Adapter plate allows universal mounting on either end of motor. Approximate Mounting Dimensions: 6-7/16 in. [164 mm] high, 5-3/16 in. [132 mm] wide, 2-1/8 in. [54 mm] deep (3-7/16 in. [87 mm] required for cover removal). Listed by Underwriters Laboratories Inc.; component recognized by CSA.



Hookup diagram for Q607.

continued next page



Q607A,B continued

ELECTRICAL RATINGS: (amperes):

	120 V	240 V	480 V
Full Load	9.8	4.9	2.45
Locked Rotor	58.8	29.4	14.7

Pilot Duty: 75 VA at 24 V and 277 V.

Resistive Load: 22 A at 24 V, 120 V, 240 V, 277 V;
15 A at 480 V.

REPLACEMENT PART:
127834 Switch.

TRADELINE models.

Order Number	Switches	Use With
Q607A1076 ^a	1 spdt	Honeywell Modutrol motors
Q607B1083 ^a	2 spdt	

^aWith adapter for cover end of spring-return motor and mounting bracket.

M436A, M836A,B DAMPER MOTORS



SPRING-RETURN MOTORS FOR 2-POSITION ZONE OR DAMPER CONTROL.

Used in residential and light industrial applications to operate outdoor air dampers for combustion or makeup air, changeover dampers for heating and cooling systems,

minimum position dampers for ventilation and similar applications. With internal spdt switch for controlling auxiliary equipment, additional motors, or to provide a burner interlock switch. Spring returns motor to start position on power failure. Drive shafts located on both sides of motor. Angular Stroke: 75 degrees. Power Consumption: 27 W opening for M436A, M836A; 20.3 W opening for M836B. Ambient Temperature Range: 32 F to 125 F [0 C to 52 C]. Approximate Dimensions: 4-1/2 in. [114 mm] high, 4-5/8 in. [118 mm] wide, 3-3/4 in. [95 mm] deep. Listed by Underwriters Laboratories Inc.—M436A, M836A; CSA certified—M436A, M836A.

AUXILIARY SWITCH RATINGS (amperes):

	120 Vac	240 Vac
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

ACCESSORIES:

16254AC Bag Assembly. Mounting bracket, Part No. 128499, and screws.

7640JE Bag Assembly. Drive bushings, adapter, and coupling for direct drive.

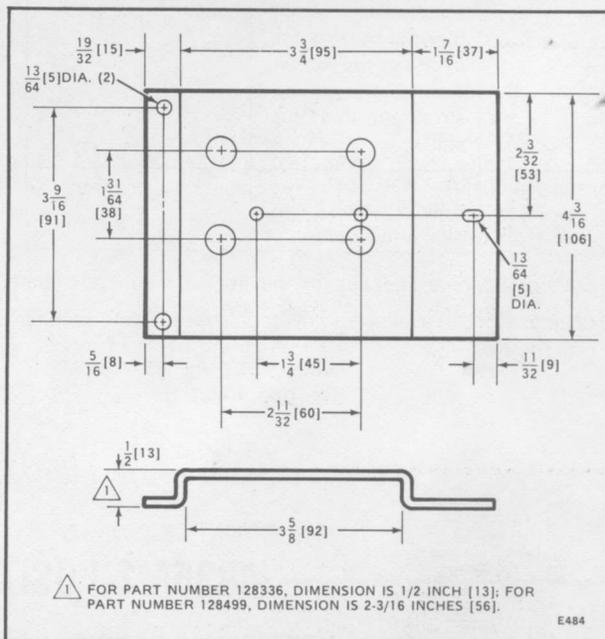
7640JL Bag Assembly. Drive lever and clamp for crank arm drive.

7640JM Bag Assembly. Mounting bracket, Part No. 126809, and screws.

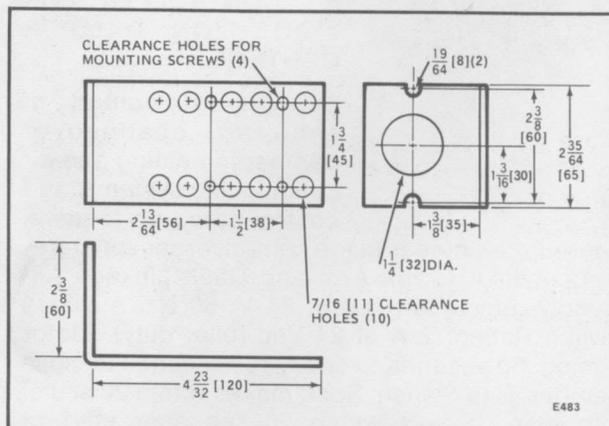
7640JN Bag Assembly. Mounting bracket, Part No. 128336, and screws.

4074BRU Bag Assembly. Extension adapter and screws for mounting Q607 Auxiliary Switch to M436A Damper Motor.

Q298B Linkage. Damper crank arms, bushings, 1/4 in. steel rod, and ball joint assemblies.



Dimensions of 128336 and 128499 Brackets in in. [mm].



Dimensions of 126809 Bracket in in. [mm].

continued next page



M436A, M836A,B continued

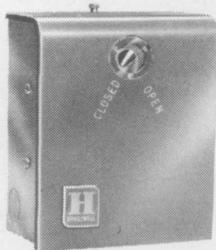
TRADELINE models.

Order Number	Application/Description	Voltage (60 Hz)	Nominal Opening Current (A)	Nominal Opening Time (sec)	Max. Load Torque		Break-Away Torque ^b		Damper Blade Area		Includes
					lb.-in.	N·m	lb.-in.	N·m	sq ft	m ²	
M436A1116	Use with 2-wire thermostats or other spst controllers. With thermal breaker for overload protection during the lifting stroke or if motor stalls.	120	0.37	30	20	2.3	30	3.4	13	1.2	Mounting brackets, Part Nos. 126809, 128336, 128499, and bag assembly containing the drive bushings, adapter, and coupling necessary for direct drive applications and the crank arm lever and clamp necessary for crank arm drive applications.
M436A1124		240	0.19	30	20	2.3	30	3.4	13	1.2	
M836A1042	Use with spst controllers without heat anticipation. With thermal breaker for overload protection during the lifting stroke or if motor stalls.	24	1.85	30	20	2.3	30	3.4	13	1.2	
M8361067 ^a		24	1.85	30	20	2.3	30	3.4	13	1.2	
M836B1033	Use with spst controllers which have heat anticipation.	24	1.34	25	15	1.7	30	3.4	10	0.9	

^aFor flame safeguard application with special mounting bracket and crank arm accessories.

^bMaximum torque available to overcome large loads such as a seized damper or valve. MUST NOT BE USED CONTINUOUSLY AT THIS RATING.

M835A 2-POSITION ZONE MOTOR



USED WITH 2-WIRE, 24 VOLT ROOM THERMOSTAT OR OTHER CONTROLLER FOR 2-POSITION DAMPER CONTROL.

Suitable for control of zone or changeover damper in heating and air conditioning systems, and control gates on feeders.

For remote damper blade control, order separately 121825AA Crank Arm and Q298 Linkage Assembly. Electrical Rating: 24 V, 60 Hz. Auxiliary Switch Rating: 2 A at 24 Vac (pilot duty). Motor Timing: 80 seconds to open, 160 seconds to close damper. End Switch: Spst; makes within 20 sec of full open, breaks within 20 sec after start of closing stroke. Motor Torque: 4 lb.-in. [0.45 N·m] or 400 sq in. [0.26 m²] of bearing-mounted damper. Temperature Rating: Heating applica-

tion—200 F [93 C] duct with 125 F [52 C] ambient maximum; cooling application—140 F [60 C] ambient maximum. Approximate Dimensions: 5-1/2 in. [140 mm] high, 4-1/4 in. [108 mm] wide, 2-5/8 in. [67 mm] deep.

NOTE: A template to assist positioning motor and damper blade is furnished with each M835. Use of 124857A Mounting Plate is recommended.

ACCESSORIES:

D524 Duct Damper Blade.

124857A Mounting Plate.

121825AA Auxiliary Crank Arm Assembly. Attaches to front of motor for remote control of additional dampers.

Q298A Linkage. Variable length linkage rod (10 in. [254 mm] maximum). For use with auxiliary crank arm assembly.

continued next page

TRADELINE



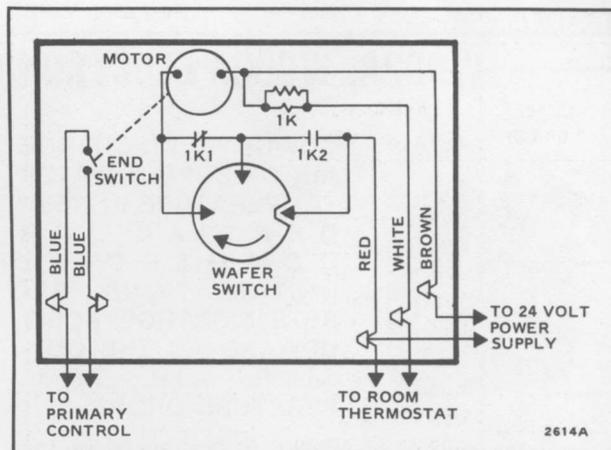
Q298B Linkage. Variable length linkage rod (10, 16, or 24 in. [254, 406, or 610 mm] maximum). For use with Q298A when connecting more than one additional damper.

TRADELINE model.

Order Number	Thermostat Anticipator Setting	Max. No. of M835 Motors Per AT72D Transformer ^a	
		Heating Only	Heating-Cooling
M835A1051	0.18 A	4	3 ^b

^aIf more motors are required, use additional AT72D or AT88A Transformers for adequate power.

^bPlus R8225A Relay.



Internal schematic for M835A.

M847A 2-POSITION DRAFT DAMPER ACTUATOR

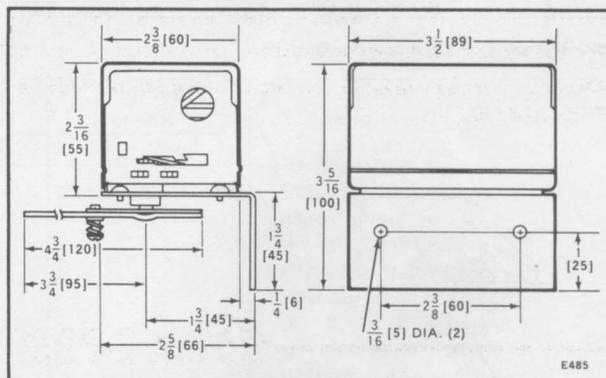


USE WITH 2-WIRE 24 VOLT ROOM THERMOSTAT TO OPERATE THE DRAFT DAMPER ON SOLID FUEL FURNACES OR BOILERS.

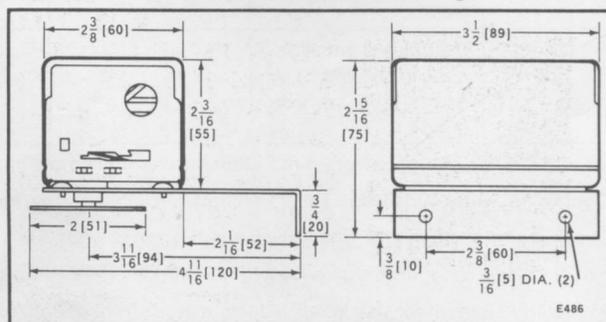
The M847A is a 2-position, low voltage, spring-return damper operator designed for use

with 24 Vac room thermostats, or other low voltage controllers. The actuator operates draft dampers on stoves, furnaces, boilers, and other similar light duty applications.

The damper operator is equipped with a mounting bracket intended for wall, duct, or direct appliance mounting to control a draft damper through an actuator arm or chain linkage arrangement. When energized, the actuator wheel rotates in a clockwise direction (when facing the wheel). Ambient Temperature Rating: 40 F to 125 F [5 C to 50 C]. Maximum Torque at Actuator Wheel: 30 in. oz. [212 m N·m]. Nominal Dimensions: See Figures.



M847A1072 with arm linkage.



M847A1080 with chair linkage.

Order Number	Linkage	Volts 60 Hz	Power Consumption VA	Heat Anticipator Setting A	Nominal Stroke (deg)	Timing (sec)	
						Open (powered)	Closed (spring)
M847A1072	3.8 in. [95 mm] Arm	24	8	.32	45	20 max.	15 max.
M847A1080	38 in. [965 mm] Chain	24	8	.32	45	20 max.	15 max.

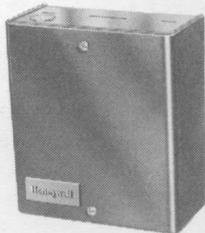
See motor PARTS and ACCESSORIES page 242.



outdoor reset controls

See also W927 in step controllers.

W902A, W903A ELECTRONIC OUTDOOR RESET CONTROLS



CONTROLS DISCHARGE AIR OR SUPPLY WATER TEMPERATURE IN RESIDENTIAL OR COMMERCIAL INSTALLATIONS. RESETS CONTROL POINT UPWARD AS THE OUTSIDE AIR TEMPERATURE DROPS.

Refer to order table for application. Both controllers respond directly to heating or cooling medium temperature and indirectly to outdoor air temperature. An accessory potentiometer (S963B1029) may be added for remote set point capability. Reset Ratio: 100:1 to 1:2. Initial Heating Medium Temperature: 40 F to 140 F [4 C to 60 C]. Approximate Dimensions: 7-1/8 in. [181 mm] high, 6-3/8 in. [162 mm] wide, 3-7/16 in. [87 mm] deep. Listed by Underwriters Laboratories Inc., CSA certified.

ACCESSORIES:

106116BAAB Resistor, 1000 ohm [± 1 percent] used in place of outdoor sensor when reset is not desired.

103755DA Immersion Well, for use with C7031B.

S963B1029 Accessory Potentiometer, calibrated from 40 F to 140 F [4 C to 60 C]. Provides remote set point capability.

ELECTRICAL RATINGS:

Voltage and Frequency—120 V, 50/60 Hz.

Power—2 W (amplifier), 22 W or 26 VA (mod. motor).

Contact Ratings—

W902A: Use with low voltage S684 Step Controller; or M941B; M944B,E,G,J,K,L; M945B,C,G Modutrol Motors less balancing relay.

W903A:

125 VA at 120 V

75 VA at 24 V

Order Number	Description/ Application	Throttling Range		Differential		Motor Position Switch	Load Circuit	Sensor	
		F	C	F	C			Indoor ^a	Outdoor
W902A1016	Controls (1) Modutrol motor which, in turn, drives valves or dampers, (2) S684 Step Controllers which can be used to sequence multiple stages of equipment.	5 to 25 adj.	2.8 to 13.9 adj.	—	—	AUTO, OPEN, CLOSE	—	C7031B1009 ^b C7031C1007 ^c C7031D1005 ^d C7031J1001 ^e C7031K1009 ^f	C7031F1000
W903A1006	Provides 2-position control for a 120 V or 24 V control circuit.	—	—	5 to 25 adj.	2.8 to 13.9 adj.	—	AUTO, ON, OFF		

^aUse S963B1029 Remote Set Point Potentiometer for remote indoor temperature adjustment, if desired. Flush mounting.

^bDuct or hot water—insertion 5 in. [127 mm]. Order well separately for hot water application.

^cDuct—insertion 18 in. [457 mm] or 36 in. [914 mm].

^dHot or chilled water immersion—5 in. [127 mm]. Includes immersion well.

^eAveraging element for use in large ducts where stratification may be a problem.

^fStrap-on mounting eliminates need to drain system.

M7044B,C; M7045A,B ELECTRONIC MODUTROL MOTORS

M7044



M7045



SOLID STATE, PROPORTIONAL ELECTRONIC MODUTROL MOTORS WITH INPUTS FOR BOTH PRIMARY AND SECONDARY SENSORS.

Used to drive valves or dampers in heating, cooling, and ventilating systems. Internal solid

continued next page

TRADELINE

outdoor reset controls



M7044B; M7045A,B continued

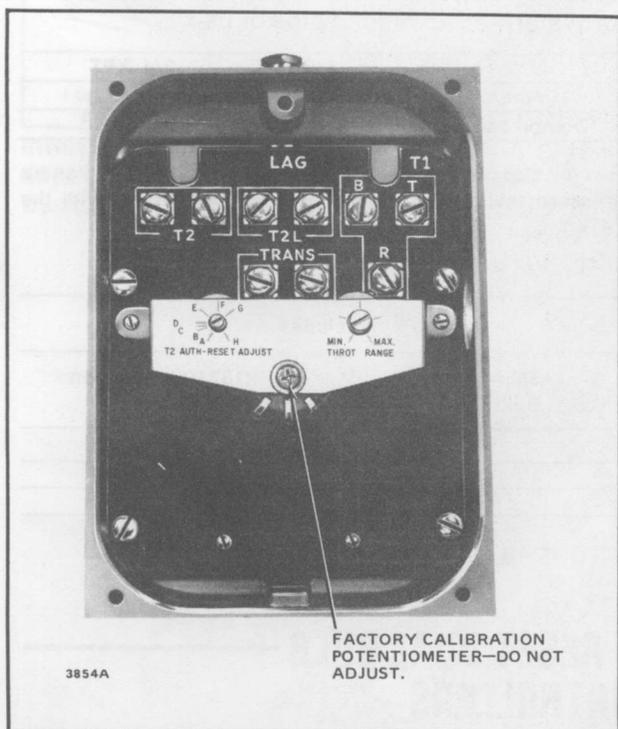
state switching circuits control direction of motor shaft rotation. Voltage and Frequency: 24 V, 50/60 Hz. Stroke: 160 degrees, fixed. Crankshaft: Double-ended, 3/8 in. [10 mm] square, untapped.

USE WITH:

Indoor	Outdoor
C7031B,C,D,J,K ^b Duct or Immersion T7047B Space Sensor	C7031F, T7001F C7031G or C7031E ^a

^aDischarge duct sensor.

^bStrap-on pipe sensor.



M7044B or M7045A,B internal wiring compartment.

M7044, M7045 ACCESSORIES:

T7047B Electronic Thermostat. Used as a primary (T1) sensor with M7044 and M7045.

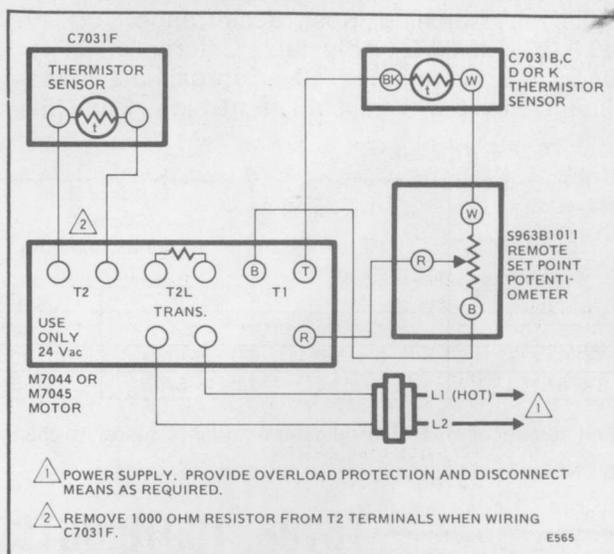
C7031 Electronic Temperature Sensor. Used as primary or secondary (T2) sensor with M7044 and M7045.

134723B Three-conductor Sensor Cable for use with M7045A.

S963B1003 Remote Set Point Potentiometer for use with T7022, T7023, or T7047B Electronic Thermostat. Calibrated in degrees Fahrenheit.

S963B1011 Remote Set Point Potentiometer for use with C7031B,C,D Electronic Temperature Sensor. Calibrated in degrees Fahrenheit.

801967D Remote Set Point Potentiometer for use with C7031B,C,D Electronic Temperature Sensor. Calibrated in degrees Celsius.



M7044 or M7045 wiring diagram with C7031B,C,D, or J; S963B; and C7031F. Discharge air or hot water temperature control with reset from outdoor air temperature.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Application/Description	Power Consumption		Torque		Timing	Ambient Temp. Rating		Approx. Dimensions	
		Watt	VA	lb.-in.	N·m		F	C	in.	mm
M7044B1003 M7044B1011 M7044C1001	For heating. Motor drives closed on temperature rise at primary (T1) sensor.	18	23	150	17.0	60 sec 4 min	-40 to +125	-40 to +52	7-1/2 high, 5-5/8 wide, 7-7/16 deep	191 high, 143 wide, 189 deep
M7045A1004	For cooling and ventilation. Normally closed motor opens on temp. rise at primary (T1) sensor.	27	32	50	5.7	60 sec	15 to 125	-9 to +52	7-1/2 high, 5-5/8 wide, 9-1/4 deep	191 high, 143 wide, 235 deep
M7045B1002	For heating. Normally closed motor closes on temperature rise at primary (T1) sensor.									

TRADELINE



outdoor reset controls

T475A OUTDOOR RESET CONTROL



OPERATING CONTROLLER FOR A HOT WATER OR WARM AIR HEATING SYSTEM.

Suitable for line voltage, low voltage, or millivolt (Powerpile) switching. Maintains proper balance between heating-medium temperature and outdoor temperature. Auto-

atically raises heating medium control point as outdoor temperature falls. Does not replace safety high limit control. Not for use in systems requiring resetting above 70 F [21 C] outdoor temperature. Bulb: 3/8 x 3-9/16 in. [10 x 90 mm]. Capillary Length: Indoor—10 ft [3 m]; outdoor—30 ft [9.1 m]. Switching: Spst. Scale range: 70 F to 140 F [21 C to 60 C]. Adjustable Differential: 6 F to 20 F [3.3 C to 11.1 C]. Approximate Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51

mm] wide, 2-1/4 in. [57 mm] deep. Listed by Underwriters Laboratories Inc.

ELECTRICAL RATING (amperes):

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25 A at 0.25 to 12 Vdc.	

Pilot Duty—125 VA at 120-277 Vac.

ACCESSORIES:

Q615A1004 Weatherproof Enclosure.

107324A Bulb Holder, warm air.

Hot Water—strap bulb to pipe or use:

	1/2 NPT	3/4 NPT
Immersion Well	121371P	121371Q
Compression Fitting	7617ABY ^a	104484B ^a

^aHas a water pressure rating of 50 psi [344.7 kPa] and an air pressure rating of 15 psi [103.4 kPa] when used with the T475A.

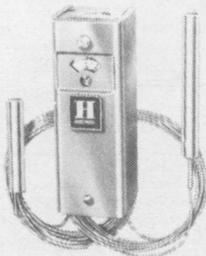
TRADELINE models.

Order Number	Reset Ratio ^a	Outdoor Bulb Length (3/8 in. [9.5 mm] diameter)		Includes	
		in.	mm	34886A Outdoor Bulb Guard	121371P Immersion Well Assembly ^b
T475A1016	1.5 to 1.0	2-1/2	64	Yes	No
T475A1032	1.0 to 1.0	3-9/16	90	Yes	Yes
T475A1057	1.0 to 1.5	5-5/16	135	Yes	Yes

^aFirst number of reset ratio indicates outdoor temperature change; second number represents resulting control point change.

^b1/2 NPT with 1-1/2 in. [38 mm] insulation.

T678B, T991B OUTDOOR RESET DUAL BULB TEMPERATURE CONTROLLERS



AUTOMATIC OUTDOOR RESET CONTROLLERS FOR AIR OR LIQUID.

Refer to order table for application. Automatically resets control point of heating medium upward as outdoor temperature falls. One remote element senses heating medium, the other senses outdoor

air temperature. T991 has 135 ohm potentiometer for proportional heating control. Set Point Range: 70 F to 140 F [21 C to 60 C]. Bulb: 1/2 x 4 in. [13 x 102 mm]. Maximum Bulb Pressure: 50 psi [344.7 kPa], with direct immersion mounting. Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/4 in. [57 mm] deep (T678B is 1-3/8

in. [35 mm] wide). Listed by Underwriters Laboratories Inc.—T678B; CSA certified—T678B.

ELECTRICAL RATINGS (amperes):

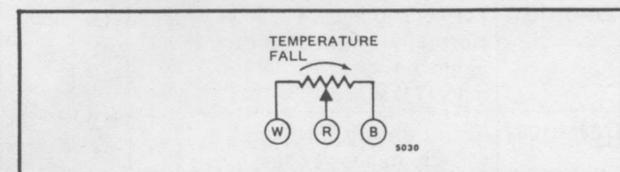
Motor—T678B

0.25 A at 1/4 to 12 Vdc inductive load.

Maximum Connected Load—2000 VA.

T991B—24-30 Vac.

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6



T991B potentiometer action.

continued next page

TRADELINE

outdoor reset controls

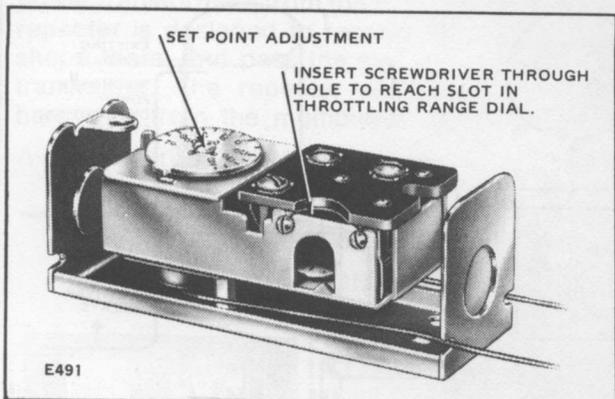


T678B, T991B continued

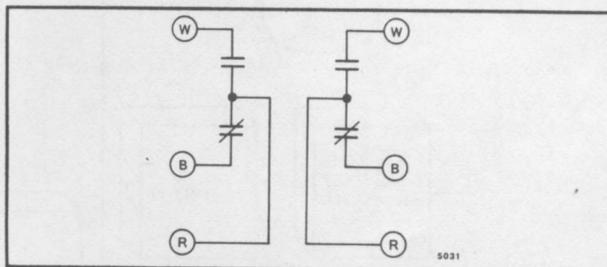
ACCESSORIES:

- 7640HX Averaging Element Mounting Kit.
- 7617ABZ Bracket for standoff mounting.
- 7617ABY Brass Compression Fitting, 1/2 in. NPT.

- 801534-00638 Calibration Wrench.
- 314439 Clip for mounting averaging element in duct.
- 34886A Outdoor Bulb Shield.
- 107324A Warm Air Bulb Holder.
- Q615A1004 Weatherproof Enclosure.
- Separable immersion wells, to be screwed into tank or boiler—
 - 112622AA, 1/2 in. NPT.
 - 112630AA, 3/4 in. NPT.



Internal view of T991B, showing throttling range adjustment dial.



Switch circuit of T678B.

Order Number	Application/Description	Reset Ratio ^a	Capillary Length				Max. Bulb Temp.
			In-door		Out-door		
			ft	m	ft	m	
T678B1006 ^c	For line voltage, low voltage, or millivolt (Powerpile) 2-stage control in heating ducts, tanks, or boilers. 2 spdt switches with 6 F [3.3 C] fixed differential.	1.0 to 1.0	10	3.0	30	9.1	Indoor bulb temp. plus outdoor bulb temp. must not exceed 265 F [129 C].
T678B1014 ^c		1.0 to 1.5	10	3.0	30	9.1	Indoor bulb temp. plus 1.5 times outdoor bulb temp. must not exceed 312 F [156 C].
T678B1022 ^c		1.5 to 1.0	10	3.0	30	9.1	Indoor bulb temp. plus 2/3 times outdoor bulb temp. must not exceed 242 F [117 C].
T678B1030 ^b		1.0 to 1.0	18	5.5	20	6.1	Indoor bulb temp. plus outdoor bulb temp. must not exceed 265 F [129 C].
T991B1003 ^d	With 135 ohm potentiometer for proportional heating control.	1.0 to 1.0	10	3.0	30	9.1	Indoor bulb temp. plus outdoor bulb temp. must not exceed 265 F [129 C].
T991B1011 ^d		1.0 to 1.5	10	3.0	30	9.1	Indoor bulb temp. plus 1.5 times outdoor bulb temp. must not exceed 312 F [156 C].
T991B1029 ^d		1.5 to 1.0	10	3.0	30	9.1	Indoor bulb temp. plus 2/3 times outdoor bulb temp. must not exceed 242 F [117 C].
T991B1037 ^{b,d}		1.0 to 1.0	6	1.8	20	6.1	Indoor bulb temp. plus outdoor bulb temp. must not exceed 265 F [129 C].
T991B1045 ^d		3.5 to 1.0	20	6.1	30	9.1	Indoor bulb temp. plus 0.29 times outdoor bulb temp. must not exceed 206 F [97 C].
T991B1060 ^{b,d,e}	3.5 to 1.0	20	6.1	30	9.1	Indoor bulb temp. plus 0.29 times outdoor bulb temp. must not exceed 206 F [97 C].	

^aFirst number in reset ratio refers to outdoor temperature change; second number refers to corresponding control point change.

^bWith 12 ft [3.7 m] indoor averaging element. Interstage differential set at 3 F [1.7 C].

^cInterstage differential 3 F to 10 F [1.7 C to 5.6 C], adjustable.

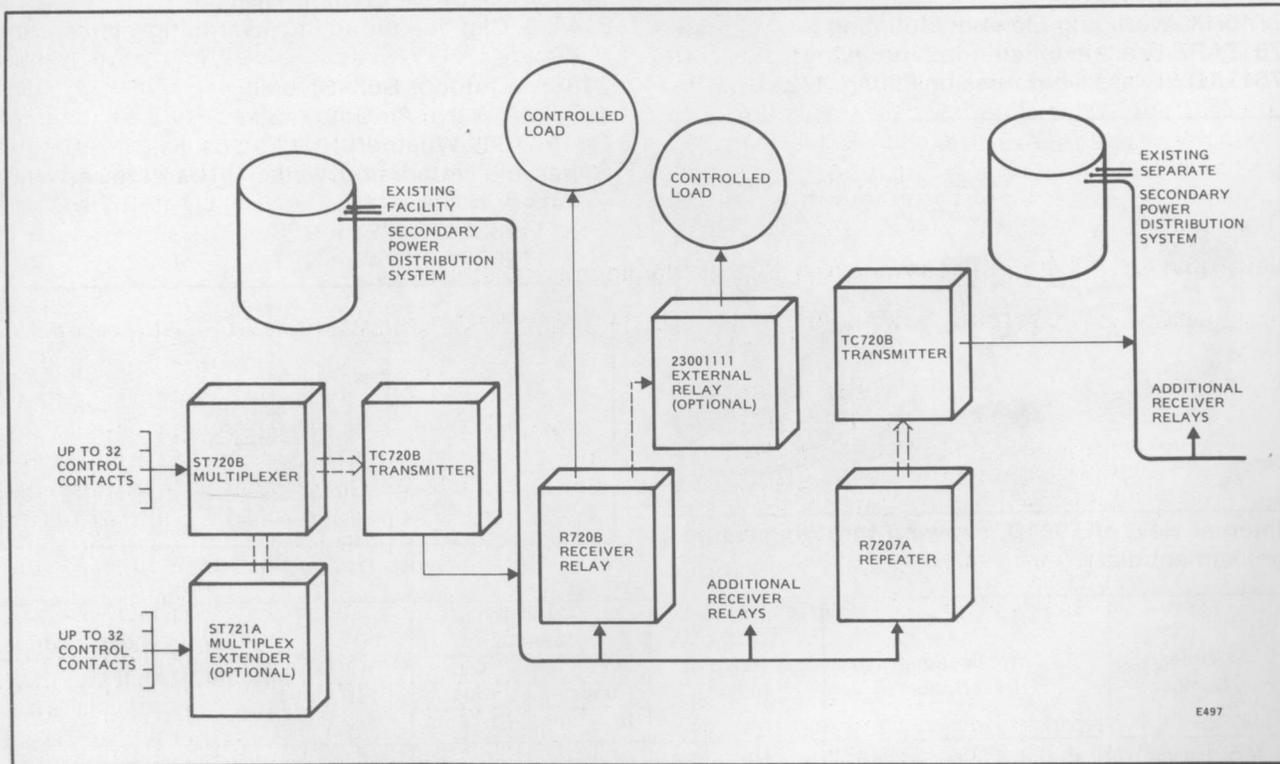
^dThrottling range 3 F to 30 F [1.7 C to 16.7 C], adjustable.

^eRange 50 F to 120 F [10 C to 49 C].



plc system

POWER LINE CARRIER SYSTEM



PLC-720 Power Line Carrier System.

The cost of running wires from one location to another can amount to 75 percent of installation costs when installing an energy management system. The PLC-720 Power Line Carrier System is designed to overcome the problems and expense of hard wiring.

The principle is simple: instead of running wire to connect a controller to various control points, the existing ac power distribution system in the building is used. This is done with an electronic signal which is encoded and sent over the existing wiring to a receiver (decoder) at the device to be controlled.

With PLC-720, your

- installation cost is reduced.
- cost estimates and payback periods are more certain.
- equipment which was not cost effective to hardwire to a control system before may now be economically controlled.
- loads can be added easily, and the whole system can be moved.

HOW IT WORKS

The PLC-720 system consists of three basic components: the ST720B Multiplexer, the TC720B Transmitter, and the R720B Receiver Relay. To expand the flexibility of the PLC-720 system, Honeywell offers the ST721A Multiplexer Ex-

tender, the R7207A Repeater, and the 23001111 External Relay.

The ST720B Multiplexer accepts contact closure information from a controller (such as the W7010/20 Load Management System). The multiplexer converts this information into a digital signal containing encoded information. The multiplexer contains a microprocessor that accepts input from up to 32 unpowered (dry) contacts or channels. When the multiplexer is used with the ST721A Multiplexer Extender, the available channels increase to 64.

The TC720B Transmitter accepts digitally encoded information from the ST720B Multiplexer and converts it into a radio frequency signal. This signal is placed on the secondary of the power distribution system.

A R720B Receiver Relay is connected to each intended control point and receives and decodes the radio frequency signal carried on the power line. If the decoded address of the signal matches the address assigned to the receiver relay, the relay turns the load on or off. An R720B Receiver Relay used with a ST720B Multiplexer has a two-relay output capability when used with the 23001111 External Relay. This enables the receiver relay to independently control two separate

continued next page

TRADELINE



Power Line Carrier continued

loads, such as the fan and compressor in an air conditioning unit. The R720B has 2048 field-selectable addresses available.

The R7207A Repeater is used where electrical service in the PLC-controlled facility is isolated by power transformers from the PLC transmitter. The repeater is designed to receive PLC signals, re-shape them, and pass the signals on to another transmitter. The repeater eliminates having to hard wire from the multiplexer to an additional

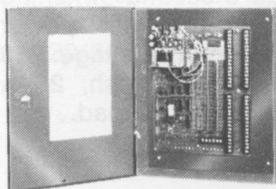
transmitter in a separate secondary power distribution system.

The 23001111 External Relay is a single contact relay with high switching capacity; one hp, 25 A resistive, or 15 A steady state inductive load. The external relay is available for direct chassis mounting. This load duty relay is suitable for air conditioners, dishwashers, central cleaning systems, copiers, and more.

Available through Authorized Honeywell Energy Management Distributors.

ST720B MULTIPLEXER

CONVERTS CONTACT CLOSURE INPUTS FROM A CONTROLLER INTO AN ENCODED MESSAGE TO BE SENT TO THE TC720B TRANSMITTER.



The ST720B Multiplexer is used with a TC720B Transmitter and R720 Receiver Relays in a power

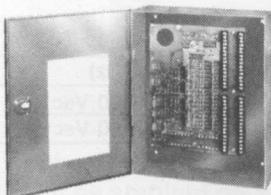
line carrier system to control remote loads over existing power lines. The multiplexer encodes

one- or two-function switching (field selectable) for each R720B Receiver Relay, using continuous and sequential encoding of input terminal conditions. Multiplexer capacity is 32 input terminals which can be expanded to 64 when used with a ST721A Multiplexer Extender.

Order Numbers	Voltage (50/60 Hz)	For Maximum No. of Transmitters
ST720B1005	120 Vac	2
ST720B1013	120 Vac	8
ST720B1047	240 Vac	2
ST720B1054	240 Vac	8

ST721A MULTIPLEXER EXTENDER

EXPANDS THE CAPACITY OF THE ST720B MULTIPLEXER.



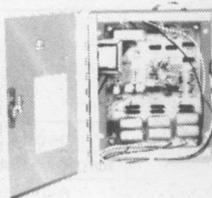
The ST721A Multiplexer Extender provides 32 additional input terminals when used with the ST720B Multiplexer. The extender contains isolated input protection for all 32 input terminals,

and connects with the ST720B Multiplexer through a ribbon cable connector provided.

Order Number	Additional Input Terminals
ST721A1006	32

TC720B TRANSMITTER

GENERATES FREQUENCY SHIFT KEYED (FSK) RADIO SIGNALS WITH THE DIGITAL MESSAGES FROM THE ST720B MULTIPLEXER, AND SENDS THESE SIGNALS OVER STANDARD SECONDARY (120 OR 240 V) POWER LINES.



The TC720B Transmitter provides a signal on all three phases of power distribution. A jumper wire selects line-to-ground, line-to-neutral, or line-to-line transmission modes. Power output depends on line load impedance at the operating frequency; output can be four watt maximum into a matched load.

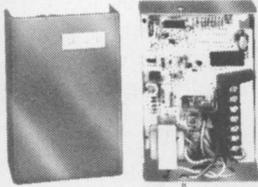
Order Numbers	Supply Voltage (50/60 Hz)
TC720B1004	120 Vac
TC720B1020	240 Vac



plc system

R720B RECEIVER RELAY

RECEIVES AND DECODES CONTROL SIGNALS SENT OVER THE POWER LINES BY A TC720B TRANSMITTER.



Uses the building's existing power distribution wiring to receive control signals. The R720B Receiver Relay contains an internal relay and independent current source to drive an external load relay up to 85 mA at 24 Vac. Up to 2048 different addresses are field selectable in the receiver relay, and the microprocessor-based circuitry has a loss of data safety time-out feature to allow failsafe operation. Compressor short-cycle protection is provided on the internal load relay. The

receiver relay operates on line-to-neutral, line-to-ground, line-to-line, or nonpowered line circuit connections.

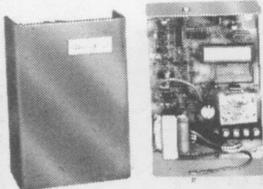
Order Numbers	Voltage (50/60 Hz)	Relay Contact Ratings
R720B1109	120/208/240/277 Vac	20 A resistive, 15 A inductive
R720B1117	480 Vac	20 A resistive, 15 A inductive

ACCESSORY:

23001111 External Relay connects to the R720B Receiver Relay to provide a second switching function. Compact load relay with power switching up to one hp. Maximum Voltage: 250 Vac. Maximum Current: 55 A inrush, 25 A resistive, 15 A steady state inductive load.

R7207A REPEATER

RECEIVES POWER LINE CARRIER SIGNALS FROM A TC720B TRANSMITTER, RESHAPES THEM, AND PASSES THE SIGNALS ON TO ANOTHER TC720B TRANSMITTER ON A DIFFERENT POWER DISTRIBUTION SECONDARY. USING



R7207A REPEATER, SEVERAL POWER DISTRIBUTION SYSTEMS CAN SAFELY CARRY POWER LINE CARRIER SIGNALS TO THEIR PROPER LOADS FROM ONE SOURCE MULTIPLEXER.

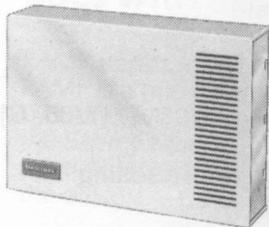
The R7207A Repeater takes power line signals from the ST720B Multiplexer/TC720B Transmitter combination, reshapes them, and passes the signals on to another TC720B Transmitter. The repeater contains a power supply, discriminator, tuned filter and microprocessor, and has an opto-isolated output.

Order Numbers	Voltage (50/60 Hz)
R7207A1003	120/208/240/277/480 Vac
R7207A1045*	120/208/240/277/480 Vac

* For use on nonpowered lines.



H409A ANTICONDENSATE HEATER CONTROLLER



SENSES ACTUAL MOISTURE CONTENT IN THE AIR TO PROVIDE CONTROL OF AN-TICONDENSATE HEAT-ERS.

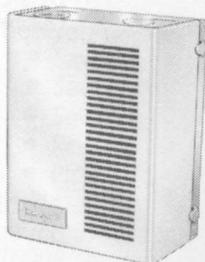
Reduces energy usage by automatically adjusting anticondensate heater cycling in response to changing dew point. Controls one or more refrigerated cases. Adjustable set point. Enclosed snap switch for long, trouble-free operation. Mounts on top or side of display case, or on wall or column. Switch Ratings: 16 A resistive at 120 Vac. Models available for 220/240 V, 50/60 Hz and for 100 V, 60 Hz

operation. Approximate Dimensions: 9-15/16 in. [252 mm] high, 7 in. [178 mm] wide, 2-15/16 in. [75 mm] deep.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Operating Temp. Range		Application
	F	C	
H409A1002	55 to 85	13 to 29	Controls anti-condensate heaters in refrigerated cases.

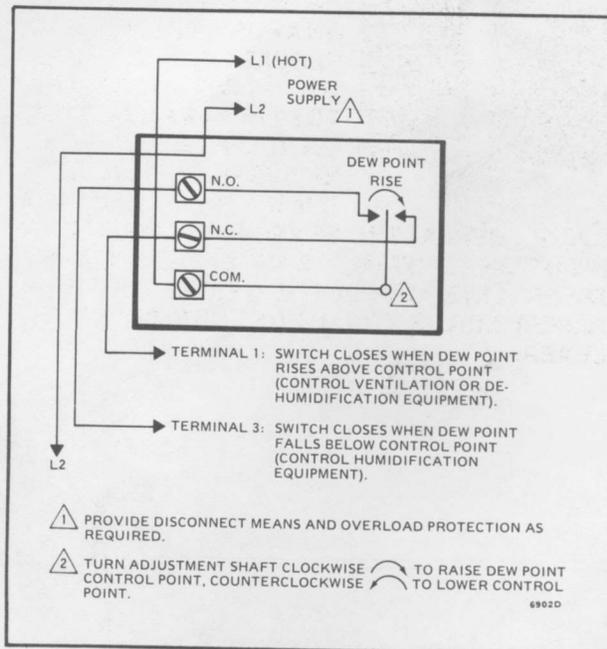
H609A DEW-POINT CONTROLLER



SENSES ACTUAL MOISTURE CONTENT IN THE AIR. COMBINES TEMPERATURE AND HUMIDITY SENSORS FOR MORE ACCURATE DEW-POINT CONTROL.

Provides accurate ON-OFF control of dehumidification. Spdt switch opens or closes

circuit as ambient dew point reaches preset level. Operating Temperature Range: 55 F to 85 F [13 C to 29 C]. Approximate Dimensions: 7-1/16 in. [179 mm] high, 5-1/8 in. [130 mm] wide, 3-3/16 in. [81 mm] deep. Listed by Underwriters Laboratories Inc. Certified by CSA.



Typical H609A wiring hookup.

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Application
H609A1007	Dew-point controller for controlling humidifiers, dehumidifiers, and dryers.

SWITCH RATINGS (amperes):

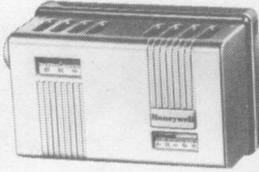
	Terminals 2-1 (N.C.) Make on Dew Point Rise		Terminals 2-3 (N.O.) Make on Dew Point Fall	
	120 Vac	240 Vac	120 Vac	240 Vac
Full Load	5.0	1.5	4.4	2.2
Locked Rotor	18.0	9.0	26.4	13.2
Resistive	3.0	1.5	8.0	4.0

50 VA at 24 Vac for both contacts.



refrigeration

TA420A FRIGISTAT CONTROLLER



PROVIDES TEMPERATURE CONTROL IN COOLING APPLICATIONS SUCH AS WALK-IN COOLERS AND MEAT STORAGE ROOMS.

Can be used in line or low voltage circuits. Removable temperature setting knob can be used as

a key to lock thermostat, preventing tampering. Switching: Spdt. Approximate Dimensions: 2-7/8 in. [73 mm] high, 2-1/16 in. [52 mm] deep, 5 in. [127 mm] wide.

ACCESSORIES:

34297B Thermostat Guard Assembly. Includes adapter plate and screws.

34300-01339 Adapter Plate. Provides thermostat mounting means and base for 34297A Metal Guard.

TG500A1003 Universal Thermostat Guard. Clear plastic cover, beige mounting plate.

TG500A1011 Universal Thermostat Guard. Beige cover, beige mounting plate.

REPLACEMENT PARTS:

100655AE Cover Assembly, 45/95 F [7/35 C] scale.

33399-01334 Indicator, temperature setting.

33408-00021 Mounting Plate.

ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	7.4	6.5
Locked Rotor	44.4	39.0

Dc Rating—0.2 A at 120 Vdc; 0.1 A at 240 Vdc.

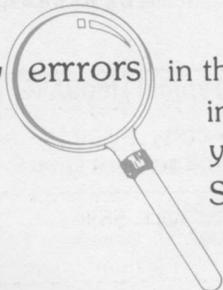
Low Voltage Ratings—2.0 A at 24 Vac; 1.5 A at 32 Vac.

Pilot Duty—125 VA.

Order Number	Range		Scale Marked
	F	C	
TA420A1003	36 to 65	2 to 18	40, 50, 60
TA420A1011	26 to 55	-3 to +13	30, 40, 50

If you detect any **errors** in this catalog, please let us know. We want the information in our catalog to be as accurate as possible; we appreciate your help in making it so.

See page 263.



Who Manages The Energy Management Systems?

The Energy Management Specialist does with assistance from RAMP

RAMP stands for Remote Access Monitoring Program. RAMP is a microcomputer software system designed by Honeywell's Energy Products Center. RAMP permits the Energy Management Specialist to manage multiple W7000/Q7000 Load Control Systems from the office.

Grow with RAMP

RAMP permits you to—

- Expand Your Service Area
- Reduce Installation and Service Costs
- Provide More Services
- Improve Job Profit

With RAMP you can install and service more W7000/Q7000 systems over a wider geography because you can manage them from your office. RAMP reduces the cost of installation and service on many installations because you enter, record and monitor programs using the microcomputer's disk storage system. RAMP maximizes your productivity.

Use RAMP and Save

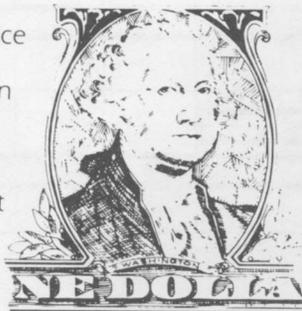
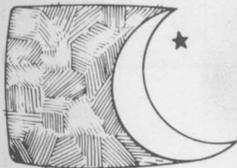
When you use RAMP you—

- Save Money
- Save Energy
- Save Time
- Reduce On-site Service Calls
- Provide Better Service

With RAMP, on-site service calls are no longer required to monitor or change the program of a W7000/Q7000 installation. RAMP allows you to program, monitor and fine tune up to 200 different W7000/Q7000 installations without leaving your office. You can provide documentation of all the energy savings realized on a monthly, daily or hourly basis.

Rest Easy with RAMP

RAMP automatically supervises the operation of and audits the energy used in ten W7000/Q7000 installations on a nightly basis. The next morning this information and the energy history for the same day of the week for the previous four weeks is printed out for your analysis on what we call the MORNING REPORT. The MORNING REPORT helps you manage overall program results.

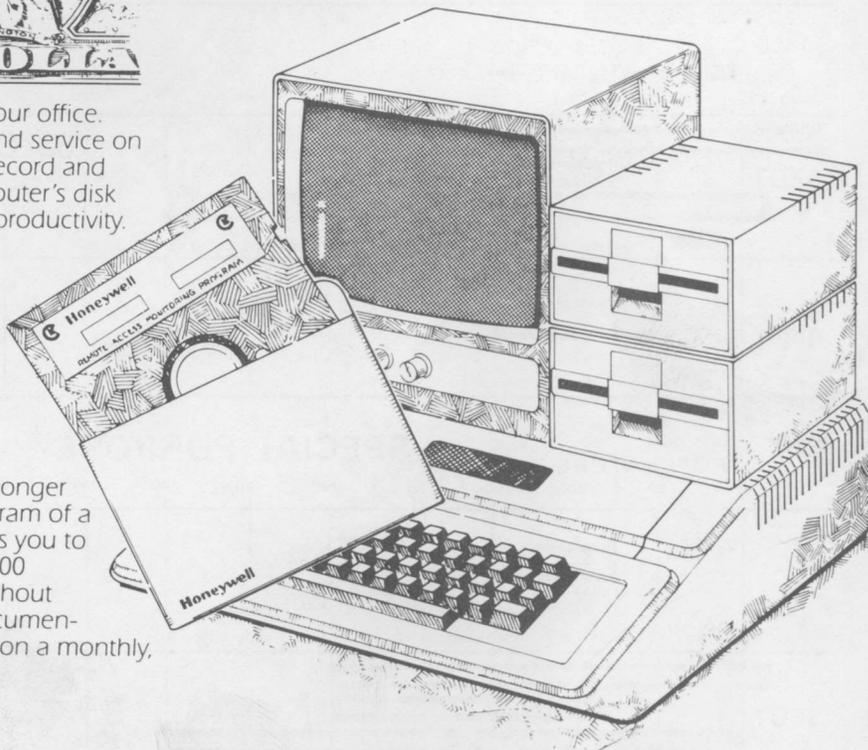


RAMP Keeps Track

RAMP makes an excellent business tool with its cataloging features. RAMP allows you to keep track of the energy information on 200 installations for five years. Additionally, the complete operating program for each W7000/Q7000 installation on the RAMP system is stored in RAMP and is immediately available for inspection, modification or emergency downloading. RAMP is an information management system.

Easy To Use

You don't have to learn a computer "language" to use RAMP, all the instructions and information you need to operate RAMP are provided to you in English. The video monitor automatically provides you with step by step instructions that enable you to use every RAMP function the first time you operate the system. We call this a menu driven program. RAMP is friendly and easy to use.



Honeywell

Energy Products Center
RAMP Order No. ZA7000

For more information on RAMP or other Honeywell products and services write: Honeywell Inc., Energy Products Center, 10400 Yellow Circle Drive, Minnetonka, Mn. 55343.

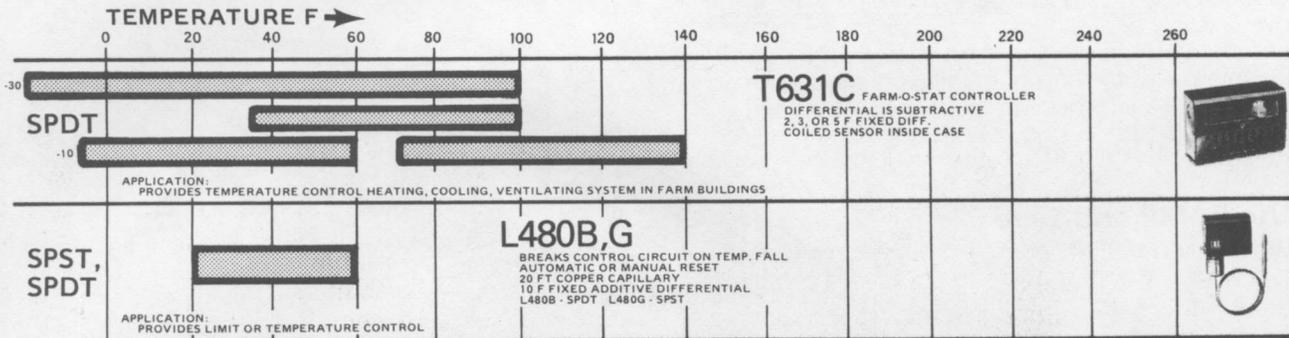
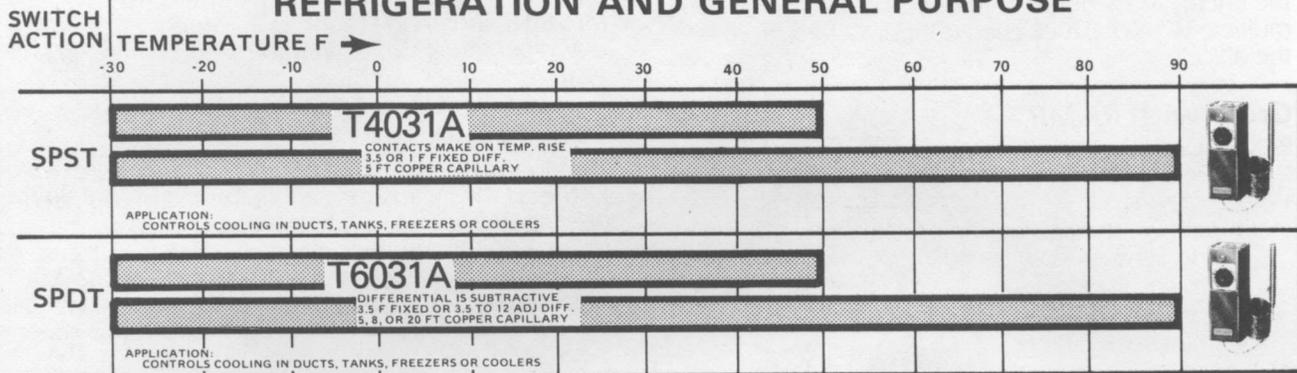


remote bulb temperature controls

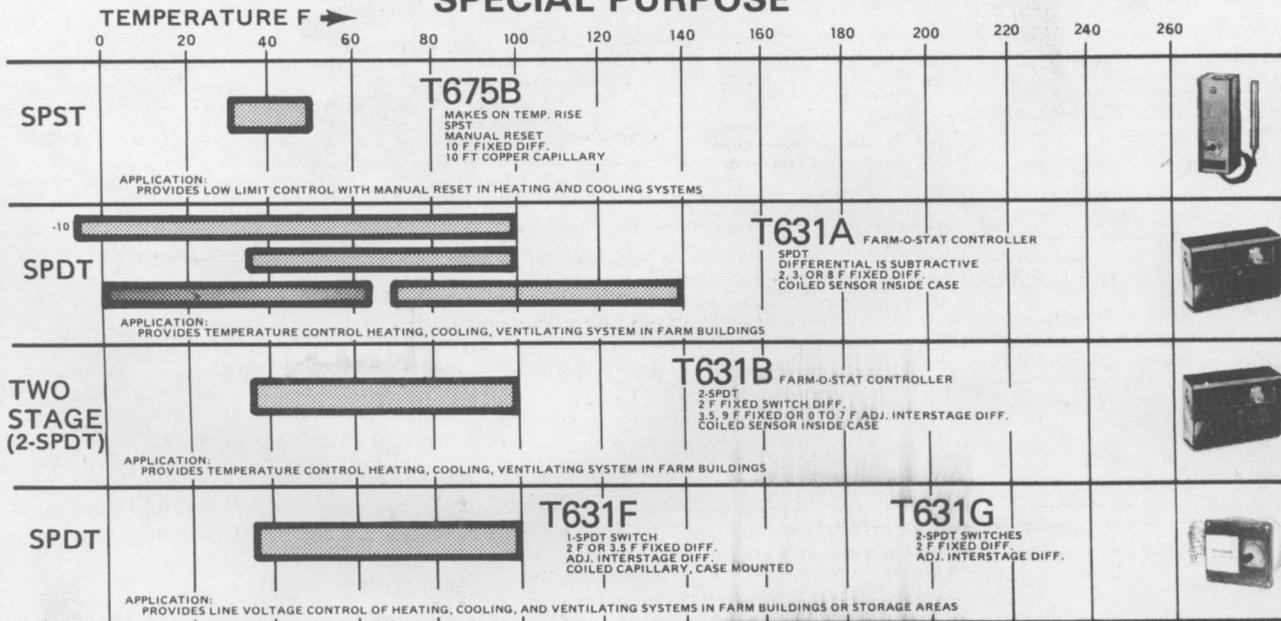
— TWO POSITION TEMPERATURE CONTROLLER SELECTION GUIDE —

BAR GRAPHS REPRESENT AVAILABLE RANGES

REFRIGERATION AND GENERAL PURPOSE



SPECIAL PURPOSE

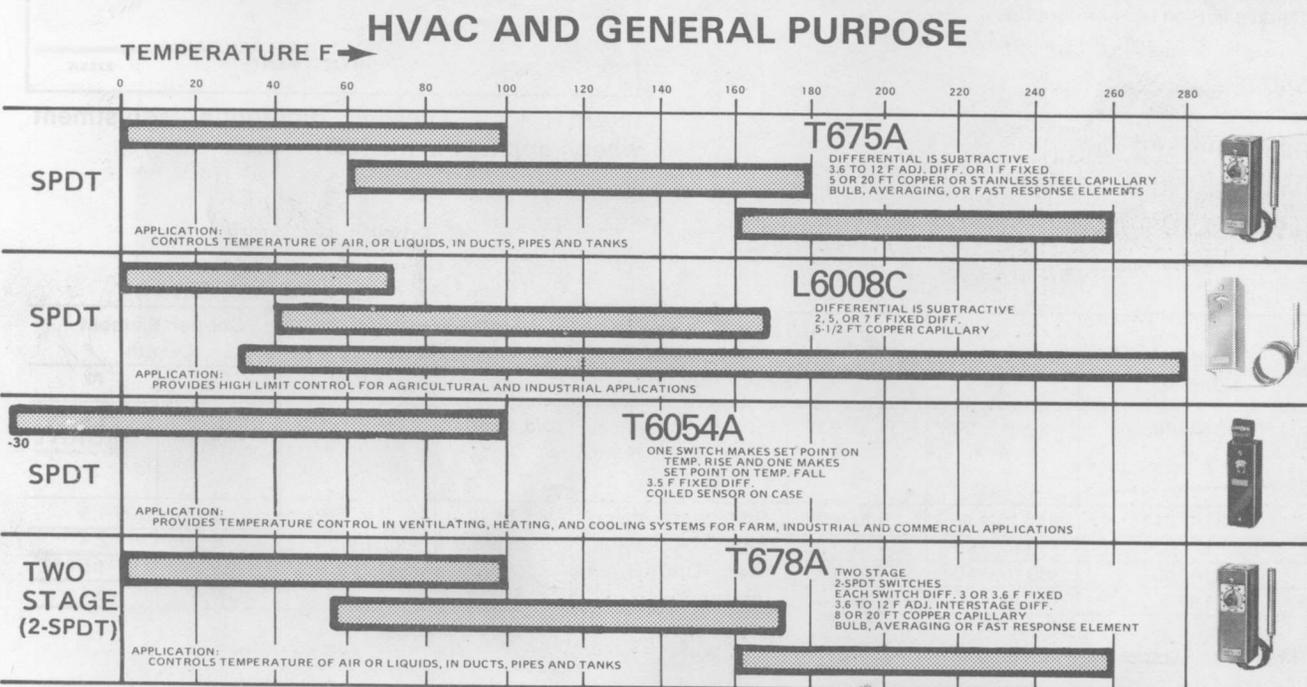
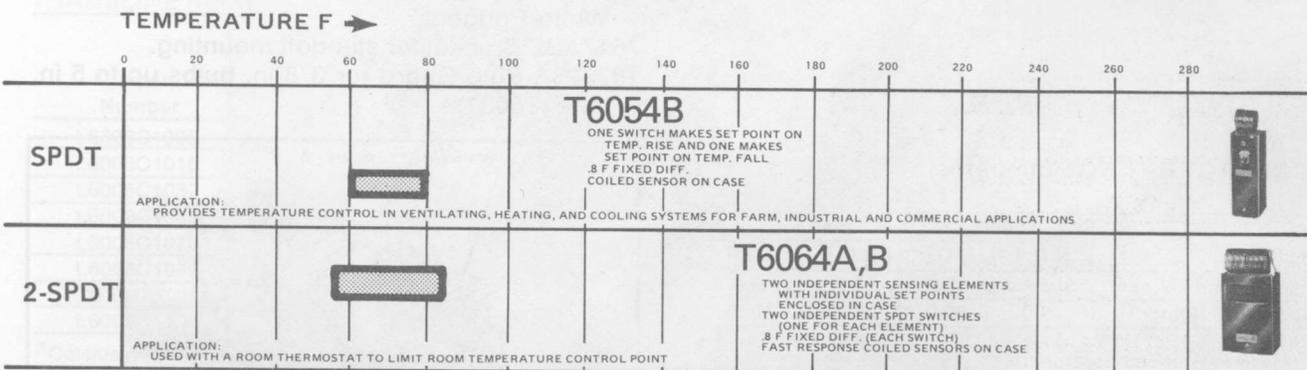
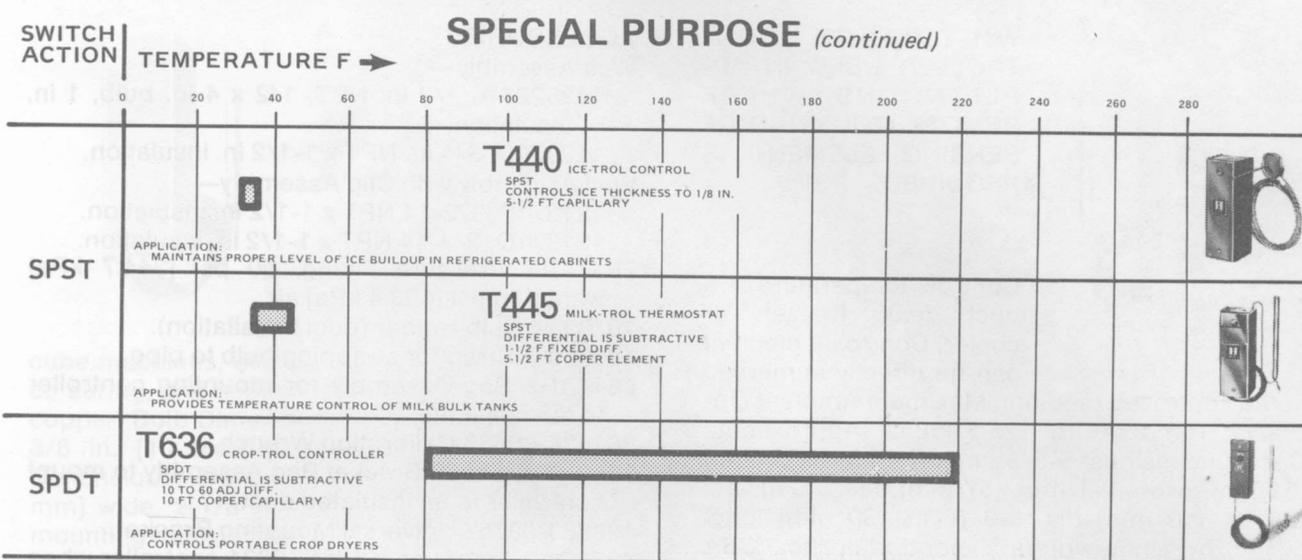


continued next page

remote bulb temperature controls



TWO POSITION TEMPERATURE CONTROLLER SELECTION GUIDE *continued*



TRADELINE



remote bulb temperature controls

T4031A, T6031A REFRIGERATION/TEMPERATURE CONTROLLERS



WIDE-RANGE CONTROLLER USED IN APPLICATIONS WHERE REMOTE MOUNTING OF SENSING ELEMENT IS REQUIRED.

Controls temperature in a duct, tank, freezer, or cooler. Controller element can be directly immersed

in the controlled medium. Maximum Ambient Operating Temperature: 125 F [52 C]. Approximate Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/4 in. [57 mm] deep. Capsule: 3/8 in. [10 mm] dia. 3-9/16 in. [90 mm] long. Listed by Underwriters Laboratories Inc.; CSA certified.

ACCESSORIES:

Well Assembly—

112622AA, 1/2 in. NPT, 1/2 x 4 in. bulb, 1 in. insulation.

123870D, 3/4 in. NPT x 1-1/2 in. insulation.

Well Assembly with Clip Assembly—

121371P, 1/2-14 NPT x 1-1/2 in. insulation.

121371Q, 3/4-14 NPT x 1-1/2 in. insulation.

7617ABY Pressure Fitting, 50 psi [344.7 kPa] water, 15 psi [103.4 kPa] air.

107324A Bulb Holder (duct installation).

105900 T-Strap for strapping bulb to pipe.

7617ABZ Bag Assembly for mounting controller to fan coil units.

801534-00638 Calibration Wrench.

7640HY Standoff Bracket Bag Assembly to mount controller to an insulated duct.

130883-00767 Universal Mounting Bracket.

4074CAB Mounting Kit for T6031 controller when replacing Ranco, Penn-Johnson, White-Rodgers.

7617ABZ Bracket for standoff mounting.

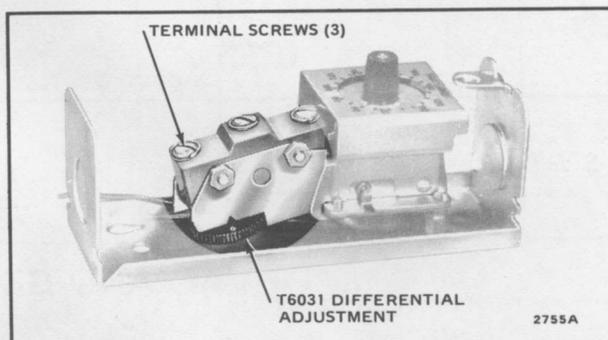
107323A Bulb Guard for 3/8 in. bulbs up to 5 in. long (T6031).

CONTACT RATINGS (amperes):

	120 Vac		240 Vac	
	N.C. ^b	N.O. ^a	N.C. ^b	N.O. ^a
Full Load	8.0	16.0	5.1	8.0
Locked Rotor	48.0	80.0	30.6	40.0

^aMakes R-W on temperature rise.

^bMakes R-B on temperature fall.



Internal view showing differential adjustment wheel (applicable models).

Pilot Duty: 125 VA.

• SUPER TRADELINE model.

Order Number	Range		Switch Action	Differential (Subtractive)		Copper Element Length	
	F	C		F	C	ft	m
T4031A1008	-30 to +50 ^a	-34 to +10	Spst switch makes R to W on temp. rise.	3.5, fixed.	1.9, fixed.	5	1.5
T6031A1011	+15 to +90 ^b	-9 to +32	Spdt switch makes R to W on temp. rise; R to B on temp. fall.	3.5 to 12, adjustable.	1.9 to 6.7, adjustable.	5	1.5
•T6031A1029	-30 to +90 ^a	-34 to +32				8	2.4
T6031A1037	-30 to +50 ^a	-34 to +10				5	1.5
T6031A1060	-30 to +90 ^a	-34 to +32				20	6.1

^aMaximum Temperature at Element: 130 F [54 C].

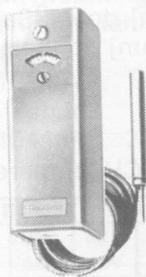
^bMaximum Temperature at Element: 140 F [60 C].

TRADELIN

remote bulb temperature controls



L6008C AQUASTAT CONTROLLER



AMBIENT COMPENSATED, HIGH LIMIT CONTROLLERS FOR AGRICULTURAL AND INDUSTRIAL APPLICATIONS.

Suitable for line voltage, low voltage, or millivolt (Powerpile) control of bulk milk tanks, beverage dispensing machines, ice

cube machines, dishwashers, crop drying, tobacco curing, and similar applications. Remote bulb, copper. Bulb Dimensions: 2-7/8 in. [73 mm] long, 3/8 in. [10 mm] diameter. Approximate Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/8 in. [54 mm] deep. Mounting: 3 mounting holes in rear of case for screw mounting to vertical surface. Pressure Rating: Capillary bulb

TRADELINE model.

(direct immersion)—200 psi [1379 kPa]; immersion well—255 psi [1758 kPa]. Listed by Underwriters Laboratories Inc.; CSA certified.

ELECTRICAL RATINGS:

Models with Nominal 2 F [1.1 C] Fixed Differential:
L6008C—150 VA at 120 or 240 Vac.

Models with Nominal 5 F [2.8 C] Differential:

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6

0.25 A at 1/4 to 12 Vdc.

MAXIMUM AMBIENT TEMPERATURE AT ELEMENT:

Range		Max. Temp.	
F	C	F	C
40-180	4- 82	205	96
0- 70	-18- 21	170	77
30-270	- 1-132	305	152

Order Number	Range		Mid-Scale Diff.		Switch Action	Capillary Length		Includes	
	F	C	F	C		ft	m		
L6008C1008	0 to 70	-18 to + 21	5	2.8	Spdt	5-1/2	1.7	External adjustment knob	
L6008C1016	0 to 70	-18 to + 21	2	1.1		5-1/2	1.7		
L6008C1032	40 to 180	4 to 82	5	2.8		7-1/2	2.3		
L6008C1065	40 to 180	4 to 82	2	1.1		5-1/2	1.7		
L6008C1073 ^a	41 to 176	5 to 80	2	1.1		5-1/2	1.7		
L6008C1099	40 to 180	4 to 82	5	2.8		5-1/2	1.7		
L6008C1107	40 to 180	4 to 82	2	1.1		5-1/2	1.7		107324A Bulb Holder
L6008C1206	30 to 270	- 1 to + 132	7	3.9		5-1/2	1.7		

^aCelsius scale.

T6054A INDUSTRIAL LINE VOLTAGE THERMOSTAT



PROVIDES SPST OR SPDT HEAVY DUTY LINE VOLTAGE TEMPERATURE CONTROL IN VENTILATION, HEATING, OR COOLING SYSTEMS.

Useful in a variety of farm, industrial, or commercial applications. Wall or duct mount in any position. Rugged case, tin-plated

element not affected by adverse environment. Fast response, hydraulic element. Mounts on flat surface with 3 screws. Listed by Underwriters Laboratories Inc.; CSA certified.

ELECTRICAL RATINGS (amperes):

Voltage	120 Vac	240 Vac
T6054A		
Full Load	7.4	3.7
Locked Rotor	44.4	22.2
Resistive	10.0	5.0

TRADELINE model.

Order Number	Switching	Temp. Range		Differential		System Controlled	Dimensions					
		F	C	F	C		Height		Width		Depth	
							in.	mm	in.	mm	in.	mm
T6054A1005 ^a	Spdt. Can be used in heating-cooling systems with external changeover switch.	-30 to +100	-34 to +38	3.5, fixed	1.9, fixed	Heating-Cooling	7-1/4	194	2-5/8	67	2	51

^aTin-plated element.

TRADELINE



remote bulb temperature controls

T6054B; T6064A,B RETURN AIR CONTROLLERS



USED WITH A STANDARD ROOM THERMOSTAT TO LIMIT TEMPERATURE CONTROL POINT ON HEATING AND COOLING.

T6054B and T6064A provide fast response with hydraulic temperature sensing elements mounted on the unit. Sensor elements consist of two capillaries; one for heating, one for cooling. T6064B sensor design permits mounting of sensors in return air path in packaged air conditioning units. Thermostats mount in any position. Set points are concealed under cover. Temperature Setting Range: (T6064A) 60 F to 80 F [16 C to 27 C]; (T6064B) 55 F to 85 F [13 C to 29 C]. Differential: 0.8 F [0.4 C]. Approximate Dimensions: (T6064A,B) 5-5/8 in. [143 mm] high, 4 in. [102 mm] wide, 2-1/8 in. [54 mm] deep. (T6054B) 5-5/8 in. [143 mm] high, 2 in.

[51 mm] wide, 2-1/8 in. [54 mm] deep.^aSensing element adds 1-1/2 in. [38 mm] to height of T6064A.

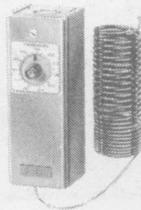
ELECTRICAL RATING PER SWITCH (amperes):

	T6054B, T6064A			T6064B		
	24 Vac	120 Vac	240 Vac	120 Vac	240 Vac	277 Vac
Pilot Duty	1.5 A	125 VA	125 VA	—	—	—
Full Load	—	—	—	16	8	6.7
Locked Rotor	—	—	—	80	40	33.5
Resistive	—	—	—	18	18	18

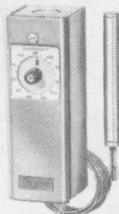
Order Number	Switching ^a	Control Temp. Range		Differential		Application
		F	C	F	C	
T6054B	1-spdt	60-80	16-27	0.8	0.4	Heating/cooling
T6064A	2-spdt	60-80	16-27	0.8	0.4	Heating/cooling
T6064B		55-85	13-29	3	1.7	

^aSwitches make R-W on temperature rise and make R-B on temperature fall.

T675A,B; T678A CONTROLLERS



Fast Response



Standard

REMOTE BULB, TEMPERATURE COMPENSATED THERMOSTATS REGULATE TEMPERATURE OF AIR OR LIQUIDS IN DUCTS, PIPES, TANKS, AND BOILERS.

For applications requiring accurate temperature control of air or liquids

where controller must be placed outside the sensing area. Typical uses include control of dampers and valves in heating, cooling, and heating-cooling systems. Fast response models available for use in return air duct operate approximately 4 times faster than standard models. Bulb Size: 1/2 x 4-3/16 in. [13 x 106 mm] for standard models, 1/2 x 3-9/16 in. [13 x 90 mm] available for 55 F to 175 F [13 C to 79 C] models. Approximate Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-5/8 in. [67 mm] deep. Listed by Underwriters Laboratories Inc.; CSA certified—T675A, T678A.

T678A—

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6

T675A nonadjustable differential models—125 VA at 120/208/240 Vac.

T675B—125 VA at 240 Vac pilot duty.

T678A—Maximum Connected Load: 2000 VA.

REPLACEMENT PART:

131524A Capillary Holder, for mounting a fast-response sensing element in an air duct.

ACCESSORIES:

107324A Capillary Holder for mounting a sensing bulb in an air duct; 8-3/8 in. [213 mm] long.

311266D Duct Bulb Holder.

Immersion Well Assembly. To protect sensing bulb from mechanical or chemical damage when mounting in a boiler or storage tank; copper; 4-3/4 in. [121 mm] insertion length; includes 112721 Tube Clip for clamping capillary tube to immersion well.

112622AA, 1/2-14 NPT external threads on spud.

112630AA, 3/4-14 NPT external threads on spud.

ELECTRICAL RATINGS (amperes):

T675A adjustable differential models and

continued next page

TRADELINE

remote bulb temperature controls



T675A,B; T678A continued

Capillary Compression Fitting. To provide sealoff when mounting sensing bulb directly in a boiler or storage tank; brass; 5/8 in. [16 mm] thread length.

104484A, 1/2-14 NPT external threads on spud.

104484B, 3/4-14 NPT external threads on spud.

105900 T-strap for clamping sensing bulb to a pipe or similar mount.

7640HY Bag Assembly with standoff bracket for mounting the controller to an insulated duct.

Q615A Weatherproof Enclosure.

7617ABZ Bracket for standoff mounting.

801534-00638 Calibration Wrench.

TRADELINE models.

Order Number	Control Range		Capillary Length and Material	Max. Temp. ^f		Differential		Switching
	F	C		F	C	F	C	
T675A1045	0 to 100	-18 to +38	20 ft [6.1 m] st. steel	125	52	3 to 10 adj.	1.7 to 5.6 adj.	Spdt switch breaks R-B and makes R-W at set point on a temperature rise.
T675A1102	160 to 260	71 to 127	20 ft [6.1 m] copper	280	138			
T675A1136	0 to 100	-18 to +38	20 ft [6.1 m] copper	125	52	1 fixed	0.6 fixed	
T675A1425	55 to 175	13 to 79	20 ft [6.1 m] copper	200	93	3.6 to 12 adj.	2.0 to 6.7 adj.	
T675A1441	55 to 175	13 to 79	20 ft [6.1 m] st. steel	200	93			
T675A1458	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	1 fixed	0.6 fixed	
T675A1508 ^a	0 to 100	-18 to +38	5 ft [1.5 m] copper	125	52	3 to 10 adj.	1.7 to 5.6 adj.	
T675A1516 ^a	0 to 100	-18 to +38	5 ft [1.5 m] copper	125	52	1 fixed	0.6 fixed	
T675A1524	55 to 175	13 to 79	20 ft [6.1 m] copper	200	93			
T675A1532 ^a	160 to 260	71 to 127	5 ft [1.5 m] copper	280	138	3 to 10 adj.	1.7 to 5.6 adj.	
T675A1540 ^a	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	3.6 to 12 adj.	2.0 to 6.7 adj.	
T675A1565 ^a	0 to 100	-18 to +38	20 ft [6.1 m] copper	125	52	3 to 10 adj.	1.7 to 5.6 adj.	
T675A1706 ^b	0 to 100	-18 to +38	5 ft [1.5 m] copper	125	52			
T675A1722 ^b	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	3.6 to 12 adj.	2.0 to 6.7 adj.	
T675A1771 ^b	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	1 fixed	0.6 fixed	
T675B1002 ^d	30 to 50	-1 to +10	10 ft [3.0 m] copper	125	52	Manual reset ^g		Spst switch breaks at set point on a temperature fall.
T678A1015	0 to 100	-18 to +38	20 ft [6.1 m] copper	125	52	Each switch fixed at 3 F [1.7 C]. Adj. diff. between switches 3 to 10 F [1.7 to 5.6 C].	2 spdt switches operating in sequence. Right switch breaks R-B and makes R-W at set point on a temperature rise, left switch breaks R-B and makes R-W if temperature continues to rise through interstage differential.	
T678A1080	160 to 260	71 to 127	5 ft [1.5 m] copper	280	138			
T678A1361	55 to 175	13 to 79	20 ft [6.1 m] copper	200	93	Each switch fixed at 3.6 F [2 C]. Adj. diff. between switches 3 to 10 F [1.7 to 5.6 C].		
T678A1437 ^a	0 to 100	-18 to +38	5 ft [1.5 m] copper	125	52	Each switch fixed at 3 F [1.7 C]. Adj. diff. between switches 3 to 10 F [1.7 to 5.6 C].		
T678A1445 ^a	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	Each switch fixed at 3.6 F [2 C]. Adj. diff. between switches 3.6 to 12 F [2 to 6.7 C].		
T678A1478 ^b	0 to 100	-18 to +38	5 ft [1.5 m] copper	125	52	Each switch fixed at 3 F [1.7 C] Adj. diff. between switches 3 to 10 F [1.7 to 5.6 C].		
T678A1494 ^b	55 to 175	13 to 79	5 ft [1.5 m] copper	200	93	Each switch fixed at 3.6 F [2 C]. Adj. diff. between switches 3.6 to 12 F [2 to 6.7 C].		
T678A1627 ^e	0 to 100	-18 to +38	10 ft [3.0 m] copper	125	52			

^aIncludes 107324A Bulb Holder.

^bFast response element. Includes 131524A Bulb Holder.

^cDual scale, showing Fahrenheit and Celsius set point.

^dFactory-set and locked at 37 F [3 C]. Maximum ambient temperature 100 F [38 C]. Switch may be manually reset at 10 F [5.6 C] above set point.

^e12 ft [3.7 m] averaging element.

^fAt element.

^gTemperature should rise 10 F [5.6 C] above set point before resetting.

TRADELINE

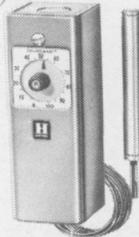


remote bulb temperature controls

T991A PROPORTIONAL TEMPERATURE CONTROLLERS



Fast Response



Standard

FOR MODULATING CONTROL OF WATER OR AIR TEMPERATURE IN DUCTS, TANKS, AND SIMILAR APPLICATIONS.

All models compensated for ambient temperature effects on case and tubing. Fast response models (for duct mounting), have coiled sensing element giving at least 4 times faster response than standard. Bulb Pressure Rating: 50 psi [344.7 kPa]. Element: Liquid filled. Electrical Rating: 24 to 30 Vac. Approximate Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/4 in. [57 mm] deep. Maximum Temperature at Element: 125 F [52 C] for 0 F to 100 F [minus 18 C to plus 38 C] range; 280 F [138 C] for 160 F to 260 F [71 C to 127 C] range;

200 F [93 C] for 55 F to 175 F [13 C to 79 C] range.

ACCESSORIES:

Separable immersion wells, to be screwed into tank or boiler.

112622AA, 1/2 in. NPT.

112630AA, 3/4 in. NPT.

7617ABY Pressure Fitting, 1/2 in. NPT, rated at 50 psi [344.7 kPa] water or 15 psi [103.4 kPa] air pressure.

107324A Duct Bulb Holder.

105900 T-Strap for strapping bulb to a pipe.

7640HY Bracket Assembly (standoff bracket for mounting T991A to insulated duct).

7640HX Assembly for mounting T991A with averaging element when access into duct is not available.

801534-00638 Calibration Wrench.

Q615A Weatherproof Enclosure.

801737A Potentiometer Wiper and Bracket Assembly, 140 ohms.

801373B Potentiometer Wiper and Bracket Assembly, 280 ohms.

TRADELINE models.

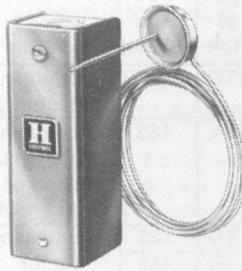
Order Number	Set Point Range		Adj. Throttling Range		Capillary Length & Material	Bulb		Pot. Res. (ohms)	Includes
	F	C	F	C		in.	mm		
T991A1012	0 to 100	-18 to +38	3.0 to 30.0	1.7 to 16.7	20 ft [6.1 m] copper	1/2 x 4-3/16	13 x 107	135	
T991A1061	160 to 260	71 to 127	3.0 to 30.0	1.7 to 16.7	5 ft [1.5 m] copper	1/2 x 4-3/16	13 x 107	135	
T991A1079	160 to 260	71 to 127	3.0 to 30.0	1.7 to 16.7	20 ft [6.1 m] copper	1/2 x 4-3/16	13 x 107	135	
T991A1194	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	20 ft [6.1 m] copper	1/2 x 3-9/16	13 x 90	135	
T881A1202	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	20 ft [6.1 m] st. steel	1/2 x 3-9/16	13 x 90	135	
T991A1244	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	5 ft [1.5 m] copper	1/2 x 3-9/16	13 x 90	135	107324A Duct Bulb Holder
T991A1269	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	20 ft [6.1 m] copper	1/2 x 3-9/16	13 x 90	280	
T991A1343	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	5 ft [1.5 m] copper	1/2 x 3-9/16	13 x 90	280	107324A Duct Bulb Holder
T991A1350	55 to 175	13 to 79	3.5 to 36.0	1.9 to 20.0	24 ft [7.3 m] copper	Averaging		135	
T991A1426	0 to 100	-18 to +38	3.0 to 30.0	1.7 to 16.7	5 ft [1.5 m] copper	1/2 x 4-3/16	13 x 106	135	197324A Duct Bulb Holder
T991A1715	0 to 100	-18 to +38	3.0 to 30.0	1.7 to 16.7	5 ft [1.5 m] copper	Fast Response		135	131524A Duct Coil Holder
T991A1731	160 to 260	71 to 127	3.0 to 30.0	1.7 to 16.7	5 ft [1.5 m] copper	Fast Response		135	131524A Duct Coil Holder
T991A1756	55 to 175	13 to 79	3.5 to 36.0	1.0 to 20.0	5 ft [1.5 m] copper	Fast Response		135	131524A Duct Coil Holder
T991A1764	0 to 100	-18 to +38	3.5 to 36.0	1.0 to 20.0	24 ft [7.3 m] copper	Averaging		135	
T991A2044	-30 to +70	-34 to +21	3.0 to 30.0	1.7 to 16.7	5 ft [1.5 m] copper	3/8 x 3-1/2	10 x 89	135	
T991A2069	0 to 100	-18 to +38	3.0 to 30.0	1.7 to 16.7	20 ft [6.1 m] copper	Fast Response		135	131524A Duct Coil Holder

TRADELINE

remote bulb temperature controls



T440A ICE-TROL CONTROL



USED IN REFRIGERATION CABINETS TO MAINTAIN PROPER LEVEL OF ICE BUILDUP ON THE REFRIGERATION EVAPORATOR COIL.

Distance between evaporator coil and control element determines ice thickness. Element

Length: 5-1/2 ft [1.7 m]. Switching: Spst, cycles compressor to maintain desired ice level within 1/8 in. [3 mm]. Approximate Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/8 in. [54 mm] deep. Component recognized by CSA.

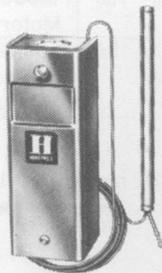
ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	9.2	8.3
Locked Rotor	55.2	49.2

Low Voltage Rating—2 A at 24 Vac.

Order Number	Range	Differential		Case and Cover
		in.	mm	
T440A1002	To 1-1/2 in. [38 mm] ice thickness.	1/8, fixed.	3, fixed.	No
T440A1010				Yes

T445B MILK-TROL THERMOSTAT



FOR AMBIENT-COMPENSATED TEMPERATURE CONTROL OF MILK OR SIMILAR LIQUIDS IN DIRECT-EXPANSION BULK TANKS.

Ambient compensation and narrow differential make exact temperature control of bulk storage

possible. Switch Action: Spst, makes on temperature rise. Range: 35 F to 45 F [2 C to 7 C]. Element: 5-1/2 ft [1.7 m] copper. Bulb Size: 3/8 x 6 in. [10 x 152 mm]. Maximum Bulb Temperature: 160 F [71 C]. Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-1/4 in. [57 mm] deep. Listed by Underwriters Laboratories Inc.—T445B1018; component recognized by Un-

derwriters Laboratories Inc.—T445B1000. CSA certified.

ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	2.3	2.3
Locked Rotor	13.8	13.8

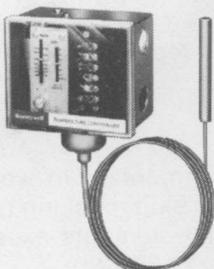
50 VA at 24 Vac pilot duty.

ACCESSORIES:

34886A Bulb Shield for protecting sensing bulb.
107408 Heat-conductive Compound for coating bulb to shield from ambient temperature effects.

Order Number	Midscale Differential		Case and Cover
	F	C	
T445B1000	1-1/2	0.8	No
T445B1018	1-1/2	0.8	Yes

T915 PROPORTIONAL TEMPERATURE CONTROLLER



PROPORTIONAL REMOTE BULB CONTROLLERS FOR DUCTS, TANKS, BOILERS, PIPES, AND OTHER HEAT EXCHANGERS.

Provides proportioning control of 3-wire, low voltage (24 V) valve or damper motors. All models ambient com-

pensated. Temperature setting scale markings in both Fahrenheit and Celsius. Approximate Overall Dimensions: 6-11/16 in. [170 mm] high, 3-9/16 in. [90 mm] wide, 2-11/16 in. [68 mm] deep.

ELECTRICAL RATING:

Low voltage ac only.

ACCESSORIES:

33312B Knurled Adjustment Knob.
311266D Bulb Holder for mounting sensing bulb in an air duct.

continued next page

TRADELINE



remote bulb temperature controls

T915 continued

Order Number	Scale Range		Throttling Range ^a		Max. Bulb Temp.		Cap. (Copper)		Size of Bulb		Type of Fill ^b	Pot. Res. (ohms)	Controls
	F	C	F	C	F	C	ft	m	in.	mm			
T915A1177	15 to 90	-9 to +32	3, fixed	1.7, fixed	200	93	5	1.5	1/2 x 4	13 x 102	LTD	135	1 Modulating Motor
T915B1002	15 to 90	-9 to +32	3, fixed	1.7, fixed	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	135	2 Modulating Motors in Unison or Sequence ^c
T915C1019	-50 to +10	-46 to -12	16 to 91	8.9 to 50.6	200	93	20	6.1	1/2 x 4	13 x 102	LTD	135	1 Modulating Motor
T915C1407	15 to 90	-9 to +32	7 to 38	3.9 to 21.1	200	93	20	6.1	1/2 x 4	13 x 102	LTD	135	
T915C1449	15 to 90	-9 to +32	7 to 38	3.9 to 21.1	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	280	
T915C1928	80 to 210	27 to 99	6 to 32	3.3 to 17.8	230	110	5	1.5	1/2 x 4	13 x 102	HT	135	
T915C1936	80 to 210	27 to 99	6 to 32	3.3 to 17.8	230	110	20	6.1	1/2 x 4	13 x 102	HT	135	
T915D1083	15 to 90	-9 to +32	7 to 38	3.9 to 21.1	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	135	2 Modulating Motors in Unison
T915D1091	15 to 90	-9 to +32	7 to 38	3.9 to 21.1	130	54	20	6.1	11/16 x 17-1/2	17 x 445	CA	135	
T915D1273	80 to 250	27 to 121	9 to 39	5.0 to 21.7	270	132	5	1.5	1/2 x 4	13 x 102	HT	135	
T915F1008	15 to 90	-9 to +32	8 to 52	4.4 to 28.9	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	135	2 Modulating Motors in Sequence
T915F1016	15 to 90	-9 to +32	8 to 52	4.4 to 28.9	130	54	20	6.1	11/16 x 17-1/2	17 x 445	CA	135	
T915M1018 ^d	15 to 90	-9 to +32	3, fixed	1.7, fixed	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	135	1 Modulating Motor and
T915P1007 ^e	15 to 90	-9 to +32	3, fixed	1.7, fixed	130	54	5	1.5	11/16 x 14-1/2	17 x 368	CA	135	1 series 20 Motor or Relay

^aThrottling range adjustable except where noted.

^bLTD—Limited-fill elements require that controller, including all of capillary (except bulb and adjacent 4 in. [102 mm] of capillary) be in an ambient temperature at least 10 F [5.6 C] above bulb temperature. These controllers become inoperative when temperature of controlled air or liquid is above 120 F [49 C].

^cFactory set for unison control.

^dSpdt contacts operate approx. 1 F [0.6 C] above the throttling range (0.5 F [0.3 C] differential at midscale).

^eSpdt contacts operate approx. 1 F [0.6 C] below the throttling range (0.5 F [0.3 C] differential at midscale).

L480B,G REFRIGERATION CONTROLLERS



USED TO LIMIT OR CONTROL TEMPERATURE IN AIR CONDITIONING SYSTEMS OR REFRIGERATED ENCLOSURES.

Suitable for applications such as freezer cabinets, milk cooling tanks, and air conditioners. May also be used as frost alarm opera-

tor in storehouses, or orchards where frost would damage crops or equipment. Fixed Additive Differential: 10 F [5.6 C]. Ambient Temperature Range: 20 F to 140 F [minus 7 C to 60 C]. Maximum Sensor Range: 225 F [107 C]. Approximate Case Dimensions: 3-5/16 in. [84 mm] high, 3-11/16 in. [94 mm] wide, 2-5/16 in. [59 mm]

deep. Listed by Underwriters Laboratories Inc.—L480B; component recognized by Underwriters Laboratories Inc.—L480G. CSA certified.

ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	10.2	6.5
Locked Rotor	61.2	39.0

Dc Rating: 0.2 A at 120 Vdc; 0.1 A at 240 Vdc.
Pilot Duty: 125 VA at 600 Vac.

ACCESSORIES:

7617M Pressure Fitting for immersion in water coil. Includes 1/2 inch boiler plug, packing nut, washers and packing for all elements except those with 1/4 inch bulb. For L480B.

continued next page

TRADELINE

remote bulb temperature controls



L480B,C continued

314439 Clips for mounting capillary inside duct.

4074BKT Bag Assembly. Lever assembly and knob shield.

7640HX Assembly Kit for installing tubing when access into duct is not possible.

Order Number ^a	Application	Type of Reset	Capillary Range		Length		Switch Action
			F	C	ft	m	
L480B1239	Acts as frost alarm in storehouses, orchards, or other locations where frost would damage crops or equipment.	Automatic—spdt switch can be wired to make an alarm circuit at the set point.	20 to 60	-7 to 16	20 ^b	6.1 ^b	Spdt—breaks control circuit and makes another circuit (makes R-B and breaks R-W) on temp. fall.
L480G1044	For temperature or limit control of air conditioning systems and refrigeration units.	Manual.	20 to 60	-7 to 16	20 ^b	6.1 ^b	Spst—breaks control circuit on temp. fall.

^aDual temperature scaleplate.

^bNo bulb.

T636A CROP-TROL CONTROLLER



USED TO CONTROL AN OIL BURNING, PORTABLE CROP DRYER.

Suitable for line voltage, low voltage, or millivolt (Powerpile) switching. Mounts directly on dryer with sensing bulb in discharge air duct. Range: 80 F to 220 F [27 C to 104 C].

Bulb Size: 3/8 x 3 in. [107 x 76 mm]. Element: Copper. Maximum Bulb Temperature: 245 F [118 C]. Maximum Case Temperature: 150 F [66 C]. Case Dimensions: 5-5/8 in. [143 mm] high, 2 in. [51 mm] wide, 2-5/8 in. [67 mm] deep.

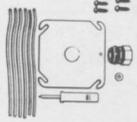
ELECTRICAL RATINGS (amperes):

	120 Vac	240 Vac
Full Load	8.0	5.1
Locked Rotor	48.0	30.6
Millivoltage	0.25 A at 1/4 to 12 Vdc.	

Order Number	Capillary Length		Switching	Midscale Diff. (adj.)	
	ft	m		F	C
T636A1005	10	3.1	Spdt	10 to 60	5.6 to 33
T636A1021 ^a	10	3.1		3 to 18	1.7 to 10

PARTS AND ACCESSORIES

Order Number	Description	Use With
7640HX	Averaging Element Mounting Kit.	T678, T991, L480



Order Number	Description	Use With
7617ABZ	Bracket for standoff mounting.	T675, T678, T4031, T6031
*130883-00767	Bracket, universal mounting	T4031, T6031

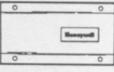
continued next page

TRADELINE



remote bulb temperature controls

Parts and Accessories continued

Order Number	Description	Use With
311266D 	Bulb Holder Assembly. For use with copper elements only in 0/70, 15/90, 60/100 F ranges.	T615A, T675, T678, T915A-F,M, L643, W655
107323A 	Bulb Guard for 3/8 in. bulbs up to 5 in. long.	L6018B,C,F; T835A; T6031
23949ACE	Capillary, 5 ft copper. 1/2 x 4 capsule. 105/220 F.	T415A, T615D, T915C,D,F,M
23949GCS	Capillary, 5 ft copper. 11/16 x 4 capsule. 15/90 F.	T414, T614, T415, T615, T915, L426
107324A 	Capillary Holder. For inserting remote bulb into plenum furnace area. 8-3/8 in. long.	TA418, T4031, T6031, T678B, T991B, T475, T636; T675
105900	Clamp, mounting—element to pipe.	L4021A, L6021A, L6018B,C; T675, T678A, T4031, T6031
7617ABY	Compression Fitting. Brass. 1/2 NPT plug. For bulb sizes up to 4 in.	T414, L480, T4031, T6031, T675, T678, T415
7617M	Compression Fitting. Brass. 1/2 NPT plug. Plug opening for bulb up to 1/2 in. dia. For 1/8 in. dia. capillary.	These fittings for sealing capillary of remote bulb controllers into controlled medium.
7617P	Compression Fitting. Brass. 3/4 NPT plug. Plug opening for bulb up to 11/16 in. dia. For 1/8 in. dia. capillary.	
7617BE	Waste Nut. Cast iron. 1/2 NPT threaded opening. Provides solid mounting for a compression fitting base on duct or plenum.	
130821C	Horizontal Mounting Kit.	T7047C1025
S963B1008	Remote Potentiometer.	T7047C1009, 1017
S963B1037	Remote Potentiometer.	T7047C1025
129168A	Locking Cover Bag Assembly.	T694
7617Y	Compression Fitting, 1/2 in. mild steel.	T694
7617DC	Compression Fitting, 1/2 in. stainless steel.	

Order Number	Description	Use With
Q615 	Weatherproof Enclosure.	T675/T678/T999
83312B	Set Point Adjusting Knob.	T615
131524A 	Capillary Holder for duct.	
112622AA 	Well Assembly.	T4031/T6031/T675/T991
114509AA	Stainless Steel Well Assembly.	L480B
4074BKT	Lever Assy. and knob shield.	L480
314439 	Capillary Mounting Clips.	
23904A	Well Plug and 4 in. tube.	L6018
130821C	Horizontal Mount Kit.	T7067A,B
4074EAM	Set Point Locks.	T8082
191127B	Battery Replacement Pack.	
192075A	Battery Quick-Charge Kit.	
4074DAY	Program Pins Assembly.	
4074EAY	Knob Assembly.	T8084
311266D	Bulb Holder for scale ranges between minus 40 F and plus 100 F.	T414/T426
124355	Adjusting Screw.	TA42, T921, T473.
130821C	Horizontal Mounting Kit.	T451/T651
23394B	Locking Guard.	T6051/T6052/T4051
106033A	Mounting Plate to mount 23394B to outlet box.	
118655	Wall Cover Plate for replacing T921 with T7047.	T7047

continued next page

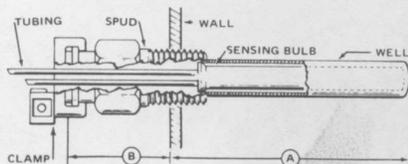
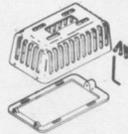
remote bulb temperature controls



Parts and Accessories continued

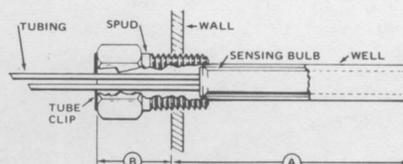
Order Number	Description	Use With
106033A	Mounting Plate for 23394B.	T991
131524A	Duct Coil Holder.	
135135A	Horizontal Faceplate, 56 F to 84 F.	T921A,B
135135B	Horizontal Faceplate, 13 C to 29 C.	T921A
135135C	Horizontal Faceplate, 42 F to 75 F.	
135135D	Horizontal Faceplate, 66 F to 95 F.	
134990C	Horizontal Faceplate, Blank.	
133722A	Thermostat Guard, clear plastic cover.	T445B, W655, separable wells.
133723A	Thermostat Guard, beige plastic cover.	
107408	Heat Conductive Compound; for coating bulb to shield from ambient temperature effects.	

Order Number	Description	Use With
34886A	Shield Assembly, capsule.	T835, T678B, T445B, T991B, L6018
112631AA	Spud Assembly and Clip. 3/4 NPT. Mild steel.	T444, T644, T668
106776B	Backplate Mounting. 3 terminal—for round thermostat. Includes terminals marked Y 5-4.	T87A
7671A	Cable, thermostat, 20 ft 2-wire, No. 18; 10 staples.	24 V wiring
23394B	Guard, metal. Locking.	T42, T62, T92, T109, T209, T220, T420, T820
34297A	Guard, metal.	T473, T921, TA42, TA420



A - INSERTION LENGTH. B - INSULATION LENGTH.

FIG. 1—INCLUDES TUBE CLAMP NO. 121371 FOR 1/2 OR 3/4 NPT.



A - INSERTION LENGTH. B - INSULATION LENGTH.

FIG. 2—INCLUDES TUBE CLIP NO. 112721 (1/2 NPT) OR 112720 (3/4 NPT).

IMMERSION WELL TABLE

BULB LENGTH	BULB DIA.	WELL DIMENSIONS				SELECT WELL MATERIAL AND ORDER NO. BELOW						
		SEE FIG.	A	B		COPPER	STAINLESS STEEL					
in.	mm	in.	mm	in.	mm	1/2 NPT	3/4 NPT	1/2 NPT	3/4 NPT			
3	76.2	3/8	9.5	1	3-3/8	85.7	1-1/2	38.1	121371A	121371B	121371E	121371F
3	76.2	3/8	9.5	1	3-3/8	85.7	3	76.2	121371L	121371M	—	—
3	76.2	3/8	9.5	1	5-3/8	136.5	4	101.6	*122554B ^a	—	—	—
3	76.2	3/8	9.5	1	3-3/8	85.7	4	101.6	*122554A ^a	*122555A ^a	—	—
3-9/16	90.5	3/8	9.5	1	3-5/8	85.7	1-1/2	38.1	121371P	*121371Q	—	—
4	101.6	1/2	12.7	2	4-3/4	120.7	1	25.4	112622AA	112630AA	112624AA	112632AA
4	101.6	1/2	12.7	2	4-3/4	120.7	4-1/4	108.0	112626AA	—	112628AA	—
4	101.6	3/8	9.5	2	4-1/4	108.0	1-1/4	31.8	112620AA	—	114509AA	—
5	127.0	3/8	9.5	2	6	152.4	1-1/4	31.8	112620BB	—	—	—

^aHAS PLASTIC SLEEVE ON INSERTION WELL.

NOTE: FOR ADDITIONAL INFORMATION ON SEPARABLE WELLS, PRESSURE FITTINGS AND BULB HOLDERS, SEE HONEYWELL DATA SHEET 90-1018.

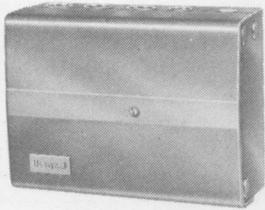
E574



step controllers

S684D,F; S984D,F,K,P STEP CONTROLLERS

USED FOR SWITCHING MULTIPLE LOADS IN A PREDETERMINED SEQUENCE.



Consists of a reversible motor-driven cam and step switch assembly with limit switches, feedback potentiometer, recycle relay, multiple tapped transformer, power supply, and

terminal strips for connecting to the control circuit. Provides up to 10 adjustable switches. Refer to order table for applications. Mounts in any position. Maximum Power Consumption: S684—17 W; S984—23 W. Power Supply Voltage (multitapped transformer): 120, 208, and 240 V, 60 Hz; 220 V, 50 Hz. Control Circuit: 24 Vac. Adjustable Differential (each switch): 5 angular degrees minimum. Ambient Temperature Rating:

Minus 40 F to plus 125 F [minus 40 C to plus 52 C]. Approximate Dimensions: 8-1/8 in. [206 mm] high, 10-9/16 in. [268 mm] wide, 4-9/16 in. [116 mm] deep. Listed by Underwriters Laboratories Inc., CSA certified.

REPLACEMENT PARTS:

Note: Measure the diameter of the shaft on which the cams rotate. Step controllers with 1/8 in. dia. shaft motors must be completely replaced. No replacement motors are available.

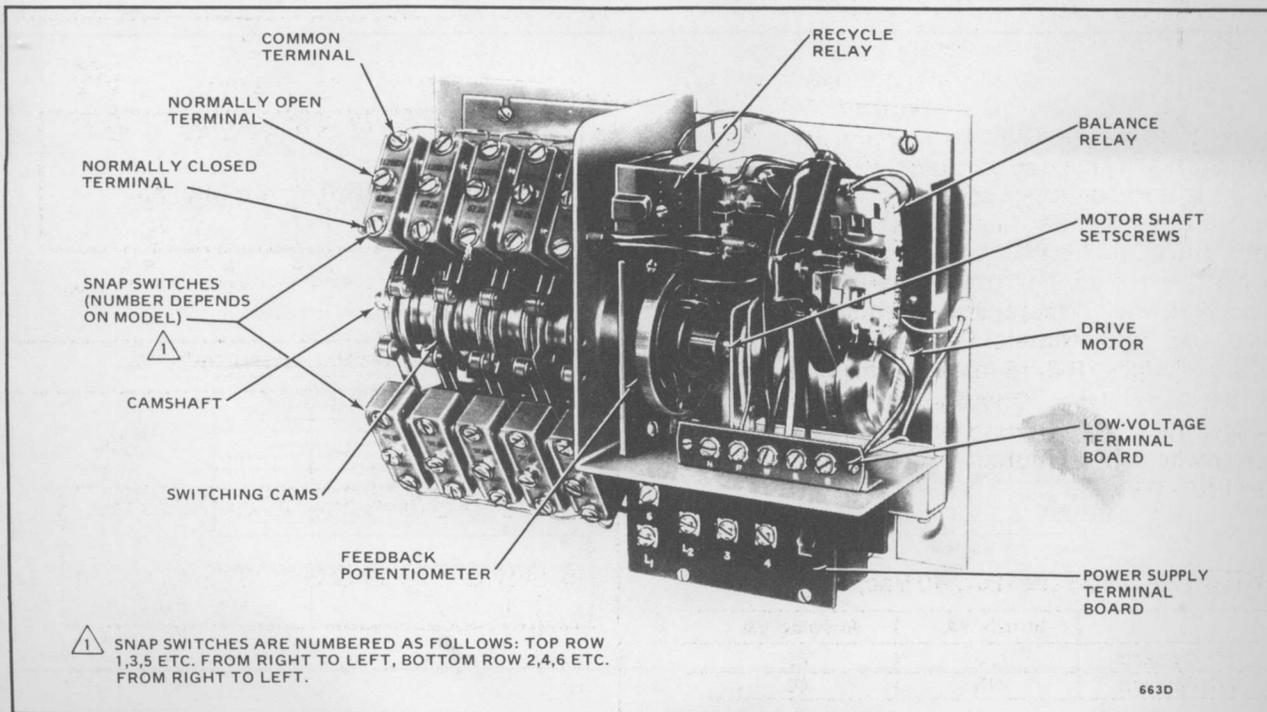
Motors—1/4 in. dia. shaft motors for S684, S984 models.

Part No.	Rotation Timing
190094	1-1/2 min
190093	5 min
190092	8 min
190091	13-1/2 min
190090	22 min

128860A Balance Relay Assy.—S984 models only.

128874A Snap Switch Assy.—S684, S984 models.

Switch Ratings (Per Switch)		Max. Connected Load (N.O. and N.C. Contacts Combined)		Max. Connected Load (All N.C. Contacts)	
Sealed	Inrush	Resistive	Inrush	120 V	208/240 V
570 VA	5700 VA	1800 VA	10,800 VA	800 VA	1000 VA



Location of parts on S984 with single potentiometer.

continued next page

step controllers

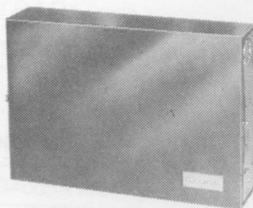


S684D,F; S984D,E,F,J,K,P continued

Order Number	Application	Number of Switches	Rotation Timing
S684F1001	Floating control used with a series 60 controller. It includes a feedback potentiometer for use with W902, W903 electronic reset panels.	10	1-1/2 min
S684F1019		10	5 min
S984D1049	With integral proportioning (series 90) motor. Used with series 90 controller.	5	1-1/2 min
S984D1056		5	5 min
S984D1064 ^a		5	13-1/2 min
S984F1070		10	1-1/2 min
S984F1088		10	5 min
S984F1096 ^a		10	13-1/2 min
S984K1017	Special auxiliary potentiometer for control of outdoor air dampers. Used in cold deck sequencing applications.	4	22 min
S984P1038	Special auxiliary potentiometer for control of outdoor air dampers and cooling stages. Without recycle relay.	6	13-1/2 min

^aRated for 150 F [66 C] maximum ambient temperature; suitable for electric duct heater applications.

W927C,F,J ELECTRONIC SEQUENCERS



PROVIDES ELECTRONIC SEQUENCING CONTROL OF HEATING ONLY OR HEATING-COOLING EQUIPMENT IN COMMERCIAL AND INDUSTRIAL APPLICATIONS.

Refer to order table for application. Controls up to 8 stages of heating. Resets to all-stages-off when power is interrupted; reenergizes with time delay between stages on power restoration. Spdt pilot duty relays. Ambient Temperature Range: Minus 40 F to plus 150 F [minus 40 C to plus 66 C]. Mounts directly on wall or panel with 4 screws through keyhole mounting slots in base. Voltage and Frequency: 120 V, 50/60 Hz. Approximate Dimensions: 7-1/16 in. [179 mm] high, 10-3/16 in. [259 mm] wide, 2-7/16 in. [62 mm] deep. Component recognized by Underwriters Laboratories Inc.—W927C; listed by Underwriters Laboratories Inc.—W927C,F,J; CSA certified—W927C,F,J.

SWITCH RATINGS (at 120/240 Vac):

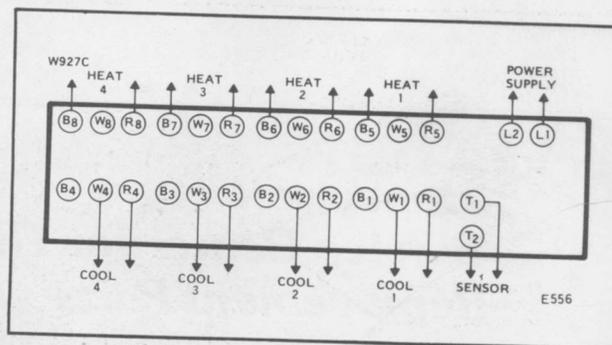
	Inrush VA	Running VA
N.O. Contacts	750	75
N.C. Contacts	240	40

Power Consumption:

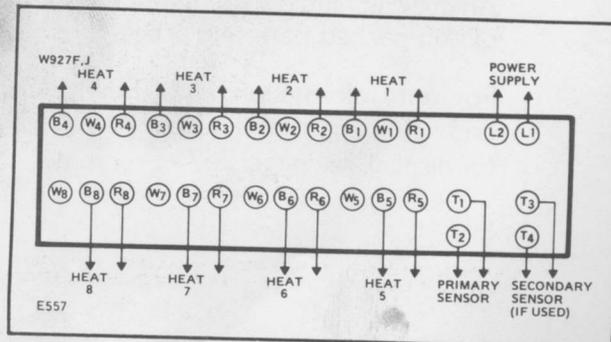
W927C—6.5 W W927F,J —8.5 W

ACCESSORIES:

Remote Set Point Potentiometers—
S963B1037, 480 ohms, for W927C,F.
S963B1060, 600 ohms, for W927C,F,J (40 F to 140 F [27 C to 110 C] range only).
S963C1002 Thermostat Simulator for bench-checking W927C,F.



W927A terminal designations.



W927F,J terminal designations.

continued next page

TRADELINE



step controllers

W927C,F,J continued

Available only through Authorized Honeywell Energy Management Distributors.

Order Number	Application	No. of Stages	Control Point Reset Capability ^a	Set Point Range ^b		Throttling Range (adjustable)		Integral Set Point
				F	C	F	C	
W927C1045	Controls 4 heating and 4 cooling stages in computer rooms and similar applications.	4 heat, 4 cool	No	55 to 95	13 to 35	2.0 to 10.0	1.1 to 5.6	No
W927F1042	Provides space or return air temperature control of 8 stages of duct heat.	8 heat	Yes	55 to 95	13 to 35	3.0 to 14.0	1.7 to 7.8	No
W927J1047	Provides discharge air or water control of 8 stages of heating in multiple boiler or duct heater applications.	8 heat	Yes	40 to 140	4 to 60	6.0 to 30.0	3.3 to 16.7	Yes

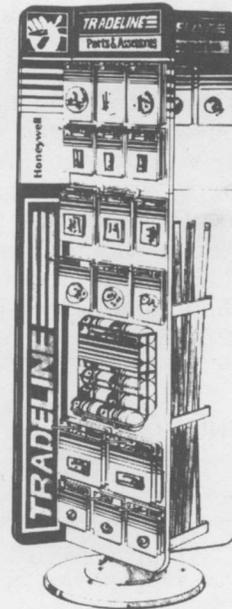
^aDual sensors required if reset feature will be used. Second sensor is placed in discharge air duct when W927F is used and outdoors when W927J is used.

^bW927C is calibrated to center of deadband; W927F is calibrated to the break of the stage 1 R-B contacts.

Honeywell Service Center for TRADELINE Replacement Parts

An eye-catching display featuring a wide assortment of skin-packed parts and accessories.

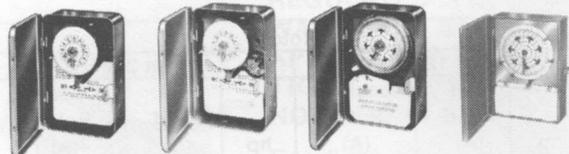
For more information on the Service Center and a list of parts and accessories available for display, see page 262.



TRADELINE



S4005A; S6005A-F ENERGY MANAGEMENT TIMERS



S4005A,
S6005A

S6005B

S6005C

S6005E,F

PROVIDES AUTOMATICALLY TIMED, ELECTRICAL SWITCHING.

See order table for specifications. Settings can be changed as desired. Snapout, replaceable time clock mechanism. Surface-mounted in any position. Listed by Underwriters Laboratories Inc.; CSA certified.

REPLACEMENT PARTS:

- 192512 Motor, 120 V for S4005A; S6005A,B.
- 192513 Motor, 208/277 V for S4005A; S6005A,B.
- 192514 Motor, 120 V for S6005C.
- 192515 Motor, 208/277 V for S6005C.
- 192698 Motor, 120 V for S6005E.

- 195700 Motor, 208/277 V for S6005E.
- 192607 Motor, 120 V for S6005F.
- 192608 Motor, 208/277 V for S6005F.
- 192543 Set of Trippers for S4005A, S6005A,B (1-ON, 1-OFF).
- 192544 Skipping Screws (3) for S6005B.
- 195697 Clock Drive less motor for S6005E,F.
- 195705 Trippers (14) for S6005E,F.
- 195773 Panel Mounting Bracket for S4005A, S6005A,B,C.

APPROXIMATE CASE DIMENSIONS:

	Height		Width		Depth	
	in.	mm	in.	mm	in.	mm
S4005A; S6005A-C	7-3/4	197	5	127	3-7/16	87
S6005E,F	12	305	8-1/8	206	3-7/8	98

TRADELINE models.

Order Number	Voltage (60 Hz)	Switching	Dial Duration	Timing Range (Hours)				Maximum ON-OFF Operations		Includes
				On-Time		Off-Time		Per Day	Per Week	
				Min.	Max.	Min.	Max.			
S4005A1001	120	spst	24 hours	1	23	1	23	12 ^a	—	Skip-a-day feature allows you to omit operation on any selected day(s) of the week.
S6005A1006	120	spdt	24 hours	1	23	1	23	12 ^a	—	
S6005B1004	120	spdt	24 hours	1	23	1	23	12 ^a	—	
S6005C1002	120	spdt	7 days	2	22	2	22	6	42 ^b	Spring-wound carryover mechanism to keep timer on schedule during power failure of up to 16 hours; mechanism automatically rewinds when power is restored.
S6005E1007	120	4pdt	7 days	3.5	166	3.5	166	3	21 ^c	
S6005F1005	120	4pdt	7 days							

^aBasic timer includes 1 set of trippers to provide 1 ON-OFF operation. A set of trippers must be added for each additional ON-OFF operation.

^bBasic timer includes 84 permanent trippers; no additional trippers needed.

^cBasic timer includes 7 sets of trippers to provide 7 ON-OFF operations per week. A set of trippers must be added for each additional ON-OFF operation.

TRADELINE



timers

S4005A; S6005A-F continued

SWITCH CONTACT RATINGS PER POLE:

Model No.	Pilot Duty ^a (VA)	Lighting (Amperes)		Motor					
				at 120 V			at 240 V		
		Inductive	Tungsten	hp	Full Load (A)	Locked Rotor (A)	hp	Full Load (A)	Locked Rotor (A)
S4005A; S6005A,B	690	40	35	2	24	144	3	20	102
S6005C	345	20	20	1/2	8	48	1	8	48
S6005E,F	420	15	5	1/2	10	60	1/2	5	30

^aAt 24 Vac: 125 VA maximum; 1 VA minimum.

Honeywell Tradeline and Super Tradeline Controls

Honeywell **TRADELINE** and **SUPER TRADELINE** controls eliminate unnecessary inventory duplication and save you money. These controls are specifically designed and equipped with accessories to meet all your replacement needs. You get maximum controlability with a minimum number of devices. Fewer replacement controls to learn and stock means faster on-the-job replacement, and more jobs completed effectively and quickly.

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value.

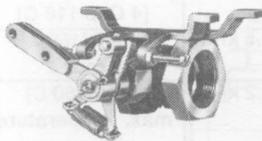
SUPER TRADELINE controls offer features not available on **TRADELINE** or standard models. Added features and installation accessories such as special adapters, universal mounting, and extra-wide control ranges, give Honeywell **SUPER TRADELINE** controls a built-in versatility—one **SUPER TRADELINE** model can quickly and easily replace a wide range of Honeywell and competitive controls.

Both **SUPER TRADELINE** and **TRADELINE** models provide a picture of the control, critical specifications, and cross-reference information **on the box label** where it is highly visible. This enables the service technician to quickly and accurately choose and install the correct replacement control.

TRADELINE



V51B BUTTERFLY VALVE

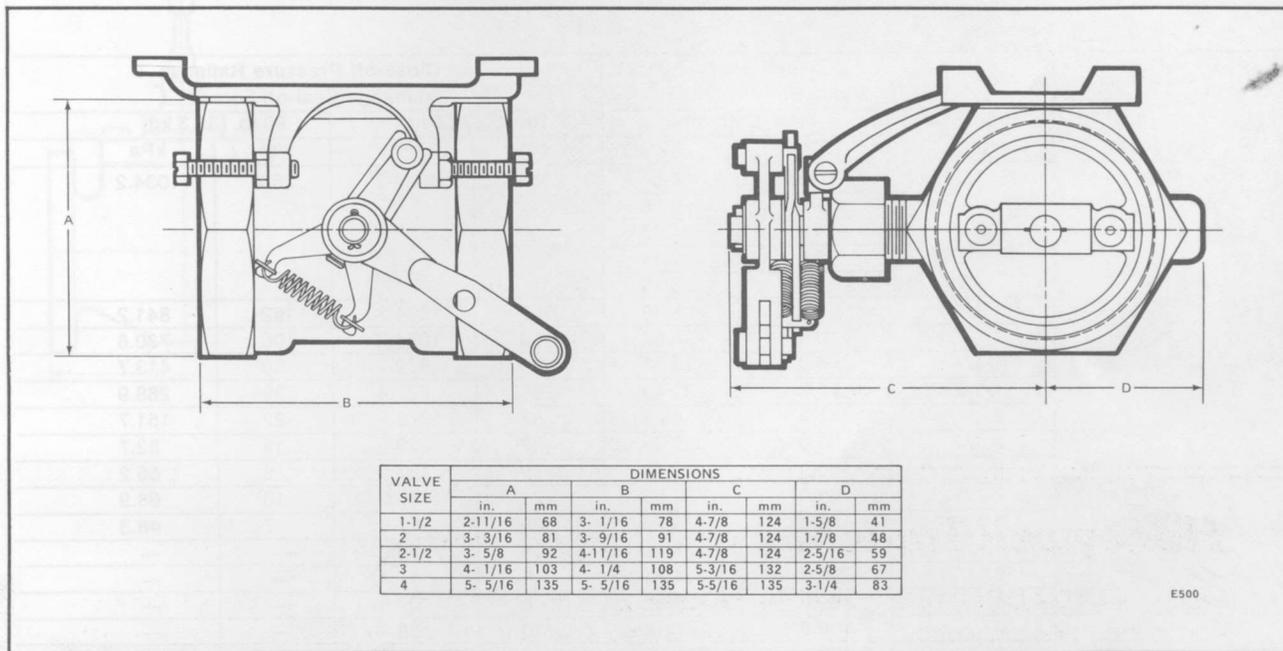


REGULATES FLOW OF WATER OR STEAM ON APPLICATIONS WHERE TIGHT CLOSEOFF IS NOT REQUIRED.

For tight closeoff, a final shutoff valve must also be used. Typical applications include zone control of gravity hot water or low pressure steam heating systems. V51B valves are suitable for use with 90 degree stroke Modutrol motors and Q100

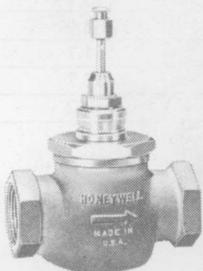
Linkage. With strain release and stop bracket. Body Pattern: Straight-through, screwed. Body Material: Brass. Maximum Operating Temperature: 250 F [121 C]. Maximum Operating Pressure: 20 psi [138 kPa].

Order Number	Valve Size (NPT)	Remarks
V51B1007	1-1/2 in.	With metaseal coating and Teflon packing.
V51B1023	2 in.	
V51B1221	2-1/2 in.	
V51B1239	3 in.	
V51B1247	4 in.	



Dimensions in in. [mm] of V51B.

V501 1A,B,C SINGLE-SEATED VALVES



USED FOR 2-POSITION OR MODULATING CONTROL OF STEAM AND WATER IN HEATING OR COOLING SYSTEMS.

Operating motor and Q618 or Q601 linkage must be ordered separately (see Motor/Valve Selection Guide). Body Pattern: Straight-through.

Body Material: Bronze (screwed) or cast-iron (flanged ends). Valve Stem: Stainless steel. Valve Seat: Brass, removable on screw end models; bronze, removable on flanged end models. Valve Disc: Composition for all bodies and sizes (except as noted) removable. Disc Holder: Brass (screwed bodies); bronze (flanged bodies). Maximum Pressure Differential for Quiet Water Service: 20 psi [137.9 kPa].

continued next page



valves

V5011A,B,C continued

VALVE BODY RATINGS:

	Maximum Temperature	Maximum Pressure
Screw End	366 F [186 C]	150 psi [1034.2 kPa]
Flanged End	353 F [178 C]	125 psi [861.8 kPa]

PACKING LIMITS:

	Maximum Pressure	Temperature Range
Water Service	150 psi [1034.2 kPa]	40 F to 240 F [4 C to 116 C]
Steam Service	100 psi [689.5 kPa]	337 F [169 C] max.
Alternating Hot and Cold Water Service	150 psi [1034.2 kPa]	140 F [60 C] max. temperature difference

Model Number	Valve Body			Close-off Pressure Ratings Linkage Seal-off Force ^a			
	Pipe Size (in.) ^c	Flow Capacity		160 lb. [72.6 kg]		80 lb. [36.3 kg]	
		Cv	kv	psi	kPa	psi	kPa
V5011A Screwed	1/2	0.63	0.54	150	1034.2	150	1034.2
		1.0	0.86				
		1.6	1.37				
		2.5	2.14				
		4.0	3.43				
	3/4	6.3	5.40	150	1034.2	122	841.2
	1	10.0	8.57	150	1034.2	106	730.8
	1-1/4	16.0	13.71	141	972.2	60	413.7
	1-1/2	25.0	21.43	91	627.4	39	268.9
	2	40.0	34.28	55	379.2	22	151.7
	2-1/2	63.0	53.99	32	220.6	12	82.7
V5011A Flanged	3	100.0	85.70	20	137.9	8	55.2
	2-1/2	63.0	53.99	26	179.3	10	68.9
	3	100.0	85.70	20	137.9	7	48.3
	4	160.0	137.12	10	68.9	—	—
	5	250.0	214.25	6	41.4	—	—
V5011B	6	360.0	308.52	4	27.6	—	—
	4	160.0	137.12	10	68.9	—	—
	5	250.0	214.25	6	41.4	—	—
V5011C Screwed	1/2 ^b	360.0	308.52	4	27.6	—	—
		0.40	0.34	150	1034.2	150	1034.2
0.63		0.54					
1.0		0.86					
1.6		1.37					
2.5	2.14						
4.0	3.43						
3/4 ^b	6.3	5.40	150	1034.2	122	841.2	
1 ^b	10.0	8.57	150	1034.2	106	730.8	
1-1/4 ^b	16.0	13.71	141	972.2	60	413.7	
1-1/2 ^b	25.0	21.43	91	627.4	39	268.9	
2	40.0	34.28	55	379.2	22	151.7	
2-1/2	63.0	53.99	32	220.6	12	82.7	
3	100.0	85.70	20	137.9	8	55.2	

^aMax. linkage seal-off force on valve stem, which is equivalent to strain relief spring tension. Either 160 or 80 lb. [72.6 or 36.3 kg] depending on valve linkage used, as follows:

160 lb. [72.6 kg]: Q618A; Q601E,J,K.

80 lb. [36.3 kg]: Q618A; Q601F,L,M.

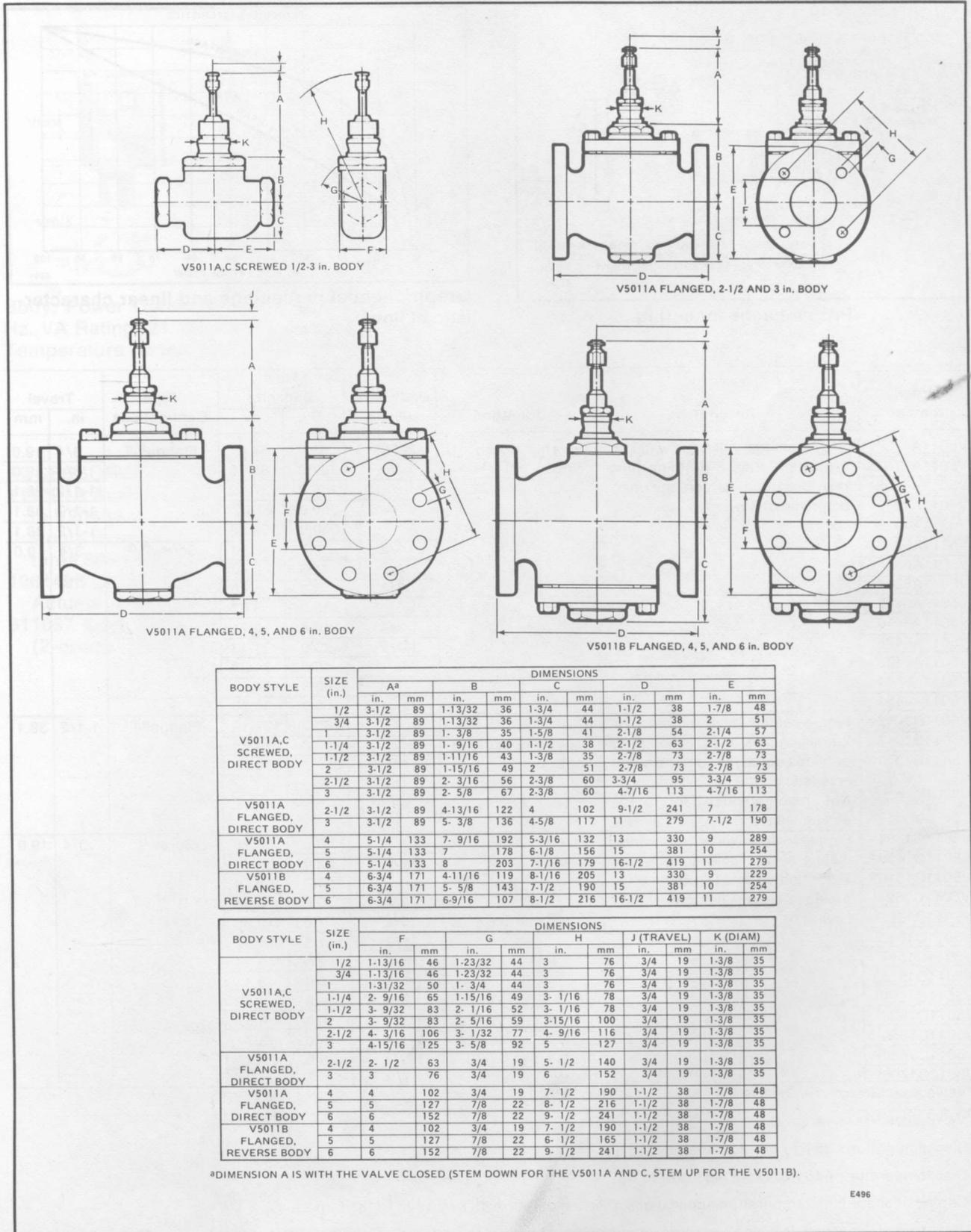
^bStainless steel seats and trim. NOT RECOMMENDED FOR WATER.

continued next page

TRADELINE



V5011A,B,C continued



E496

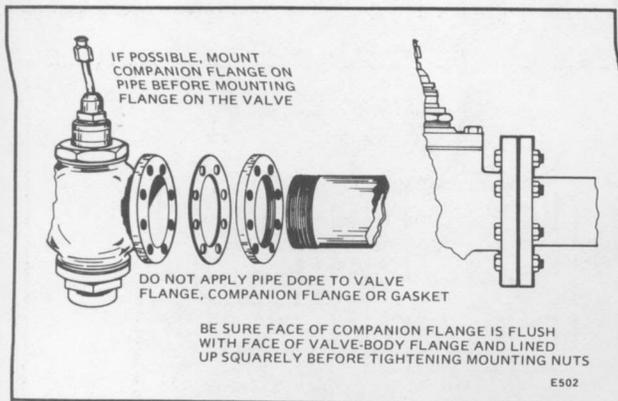
Body dimensions for V5011A,B,C.

continued next page

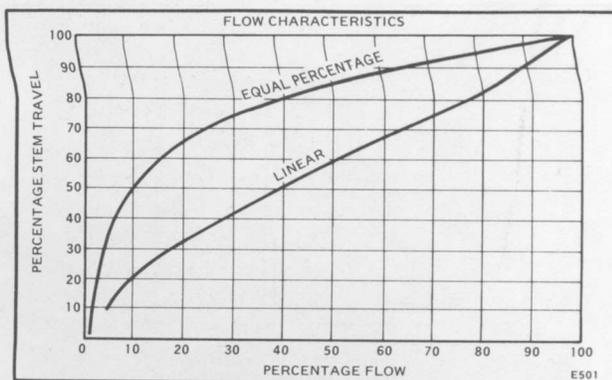


valves

V5011A,B,C continued



Proper flange mounting.



Graph of equal percentage and linear characteristic of flow.

Order Number	Description	Operation	Body Size (NPT)	Flow Capacity		Pipe Connections	Travel	
				Cv	kv		in.	mm
V5011A1734	Single-seated valve for water or 2-position stem. Throttling plug provides equal percentage characteristic of flow.	Push down to close.	2-1/2	63.0	54.0	Flange ^{a,c}	3/4	19.0
V5011A1767			3	100.0	85.70		3/4	19.0
V5011A1858			4	160.0	137.12		1-1/2	38.1
V5011A1882			5	250.0	214.2		1-1/2	38.1
V5011A1916			6	360.0	308.52		1-1/2	38.1
V5011A6378			1/2	2.5	2.14		Screw ^{b,d}	3/4	19.0
V5011A6386			1/2	4.0	3.43			
V5011A6394			3/4	6.3	5.40			
V5011A6402			1	10.0	8.57			
V5011A6410			1-1/4	16.0	13.71			
V5011A6428			1-1/2	25.0	21.43			
V5011A6436			2	40.0	34.28			
V5011A6444			2-1/2	63.0	54.00			
V5011A6451			3	100.0	85.70			
V5011B1013			Single-seated valve for water or 2-position steam. Throttling plug provides equal percentage characteristic of flow. Not recommended for modulating steam.	Push down to open (reverse operating).	4	160.0	137.12	Flange ^{a,c}	1-1/2	38.1
V5011B1047	5	250.0			214.25			
V5011B1070	6	360.0			308.52			
V5011C1391 ^e	Single-seated valve for modulating steam; also suitable for 2-position steam. Throttling plug provides linear characteristic of flow.	Push down to close.	2	40.0	34.28	Screw ^b	3/4	19.0
V5011C1458 ^e			2-1/2	63.0	54.00			
V5011C1516 ^e			3	100.0	85.70			
V5011C1524 ^f			1/2	0.63	0.53			
V5011C1532 ^f			1/2	1.0	0.86			
V5011C1540 ^f			1/2	1.6	1.37			
V5011C1557 ^f			1/2	2.5	2.14			
V5011C1565 ^f			1/2	4.0	3.43			
V5011C1599 ^f			3/4	6.3	5.40			
V5011C1623 ^f			1	10.0	8.57			
V5011C1656 ^f			1-1/4	16.0	13.71			
V5011C1680 ^f			1-1/2	25.0	21.43			
V5011C1706 ^f			1/2	0.40	0.34			

^aValve Seat: Bronze, removable.

^bValve Seat: Brass, removable.

^cDisc temperature: 35 F to 275 F [2 C to 135 C].

^dDisc temperature: 115 F to 275 F [46 C to 135 C].

^eComposition for high temperature applications. Disc temperature: 275 F to 425 F [135 C to 218 C].

^fMetal-to-metal seating for high pressure applications. Max. press. diff: 100 psi [689.5 kPa]. Max. temp: 337 F [169 C]. Not recommended for water.

TRADELINE



V2045A MOTORIZED VALVE POWERHEAD



TWO-POSITION ACTUATOR FOR V5045A VALVE BODY.

With position indicator. May be manually opened during power-off periods and will automatically return to the command of controller when power is restored. Mounts directly to bonnet of V5045A Valve

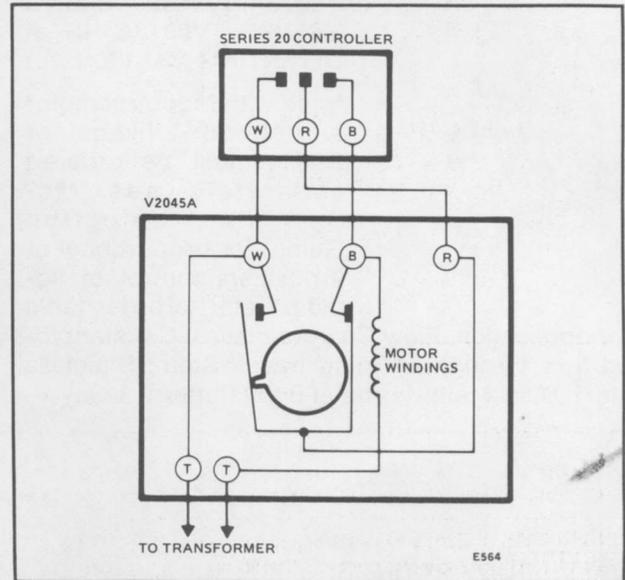
Body. Power Consumption: 12 W nominal at 60 Hz. VA Rating: 21 VA nominal at 60 Hz. Ambient Temperature Range: 32 F to 125 F [0 C to 52 C].

ACCESSORIES:

114191A Auxiliary Switch Assembly, field addable to V2045A to control an additional valve from a single thermostat. 10 A for 120 to 240 Vac; with three 30 in. [762 mm] leads.

126149B Adapter Kit for using V2045A Valve Actuator with V5011 valve.

311057 Special Lubricant for repacking V2045A (2-ounce tube enough for 25 packings).



V2045A schematic.

TRADELINE model.

Order Number	Control Circuit	Required Thermostat
V2045A1038	Spdt 3-wire, 24 V	Low voltage spdt thermostat, such as T87F1859, T222

V5047A DOUBLE-SEATED GLOBE VALVE



DOUBLE-SEATED VALVE FOR CONTROL OF HIGH PRESSURE STEAM, LIQUIDS, AIR, OR NONCOMBUSTIBLE GASES WHERE POSITIVE FINAL SHUTOFF IS NOT REQUIRED.

Used for 2-position or modulating duty. Q601L or K Valve Linkage and a Modutrol motor are required for operation. Equal percentage characteristic of flow. Packing: Nonlubricated Teflon asbestos or spring-loaded Teflon cones, selectable. Packing Limits: 100 psi [689.5 kPa], 337 F

[169 C] (steam); 150 psig [1034.2 kPa], 240 F [116 C] (water). Seat: Bronze, replaceable. Valve Body: Cast-iron. Pattern: Straight-through, screwed. Close-off Rating: 125 psig [861.9 kPa]. See Motor/Valve Selection Guide for linkage and motor.

Order Number	Pipe Size (NPT)	Flow Capacity		Lift	
		Cv	kv	in.	mm
V5047A1005	1	13	11.1	9/16	14.3
V5047A1013	1-1/4	20	17.1	9/16	14.3
V5047A1021	1-1/2	30	25.7	9/16	14.3
V5047A1039	2	50	42.9	3/4	19.1



valves

V5013A,B,C 3-WAY VALVES



V5013A,B ARE MIXING VALVES; V5013C IS A DIVERTING VALVE.

Used with Modutrol motor and Q618 Linkage or Q601 (must be ordered separately—see Motor/Valve Selection Guide) for proportional or 2-position control of liquids. Refer to order table

for application. Flow Characteristics: Constant total flow through full plug travel. Stem: Stainless steel. Disc: Metal-to-metal Body Pattern: 3-way.

VALVE BODY RATINGS:

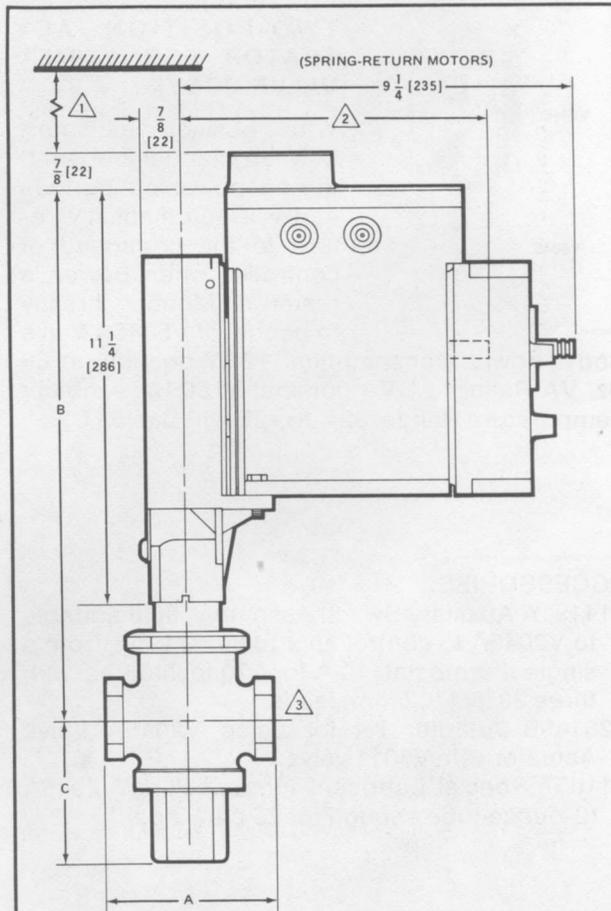
	Maximum Temperature	Maximum Pressure
V5013A (bronze)	366 F [186 C]	150 psig [1034.2 kPa]
V5013B,C (iron)	353 F [178 C]	125 psig [861.9 kPa]

For quiet water service—20 psig [137.9 kPa] max. differential at any position.

CLOSE-OFF RATINGS^a WHEN USED WITH LINKAGES:

Model	Q618A (80 lb. [36.3 kg])		Q618A (160 lb. [72.6 kg])		Q601E	
	psi	kPa	psi	kPa	psi	kPa
V5013A1187	130	869.3	150	1034.2	—	—
V5013A1195	120	827.4	150	1034.2	—	—
V5013A1203	70	482.6	150	1034.2	—	—
V5013A1211	50	344.7	146	1006.6	—	—
V5013A1229	35	241.3	98	675.7	—	—
V5013A1237	20	137.9	67	462.0	—	—
V5013B1003	—	—	32	220.6	—	—
V5013B1011	—	—	22	151.7	—	—
V5013B1029	—	—	—	—	9	62.1
V5013B1037	Not for tight closeoff					
V5013B1045	Not for tight closeoff					
V5013C1001	—	—	32	220.6	—	—
V5013C1019	—	—	22	151.7	—	—
V5013C1027	—	—	—	—	9	62.1
V5013C1035	Not for tight closeoff					
V5013C1043	Not for tight closeoff					

^aRepresents max. pressure difference between the outlet and either of the 2 inlets (or between the inlet and either of the 2 outlets).



VALVE SIZE	DIMENSIONS					
	A		B		C	
	in.	mm	in.	mm	in.	mm
1/2	3-1/8	79	14-3/4	451	2- 3/4	70
3/4	3-3/8	86	14-5/8	448	2- 5/8	67
1	3-7/8	98	15	457	2- 7/8	73
1-1/4	4-1/4	108	15-1/8	460	2- 3/4	70
1-1/2	4-3/4	121	15-1/2	470	2- 7/8	73
2	5-7/8	149	16-1/8	487	3- 1/4	83
2-1/2	9-1/2	241	15-7/8	500	6- 7/16	164
3	11	279	16-1/2	516	6- 5/8	168
4	13	330	18-3/4	573	8-11/16	221
5	15	381	19-1/4	586	9- 5/8	245
6	16-1/2	419	20-1/16	606	10-11/16	272

- ① ALLOW APPROXIMATELY 4-in. CLEARANCE FOR REMOVAL OF LINKAGE.
- ② M634A, M934A, M7034 8 in. OTHER NONSPRING-RETURN MOTORS 7-3/4 in.
- ③ 2-1/2 THROUGH 6-in. VALVES HAVE FLANGED ENDS.

E495

Mounting dimensions of V5013A and Q618 linkage.

PACKING LIMITATIONS:

	Hot Water ^a		Alternate Hot and Cold Water	
	Max. Press.	Max. Temp.	Max. Press.	Max. Temp. ^b
V5013A	150 psi [1034.2 kPa]	240 F	150 psi	240 F
V5013B,C	100 psi [689.5 kPa]	[116 C]	[1034.2 kPa]	[116 C]

^a40 F [4 C] min. temperature.

^b140 F [60 C] maximum temperature differential.

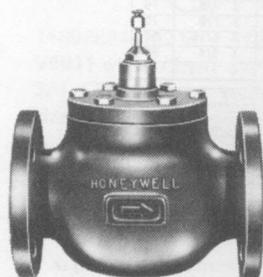
continued next page



V5013A,B,C continued

Order Number	Application/Description	Body Size (NPT)	Flow Capacity		Lift		Seat	Plug
			Cv	kv	in.	mm		
V5013A1187	Screwed body. 2 inlets; 1 outlet. Mixing valve—must not be used to divert flow from a common inlet to 2 outlets.	1/2	4.0	3.43	3/4	19	Brass; integral	Brass
V5013A1195		3/4	6.3	5.40	3/4	19		
V5013A1203		1	10.0	8.57	3/4	19		
V5013A1211		1-1/4	16.0	13.71	3/4	19		
V5013A1229		1-1/2	25.0	21.43	3/4	19		
V5013A1237		2	40.0	34.28	3/4	19		
V5013B1003	Flanged body. 2 inlets; 1 outlet. Mixing valve—must not be used to divert flow from a common inlet to 2 outlets.	2-1/2	63.0	53.99	3/4	19	Bronze; removable	Bronze
V5013B1011		3	100.0	85.70	3/4	19		
V5013B1029		4	160.0	137.12	1-1/2	38		
V5013B1037		5	250.0	214.25	1-1/2	38		
V5013B1045		6	360.0	308.52	1-1/2	38		
V5013C1001	Flanged body. Diverting valve—with common inlet to either of 2 outlets. Must not be used to mix flow of 2 inlets to one outlet.	2-1/2	63.0	53.99	3/4	19	Bronze; removable	Bronze
V5013C1019		3	100.0	85.70	3/4	19		
V5013C1027		4	160.0	137.12	1-1/2	38		
V5013C1035		5	250.0	214.25	1-1/2	38		
V5013C1043		6	360.0	308.52	1-1/2	38		

V5051A SINGLE-SEATED VALVE



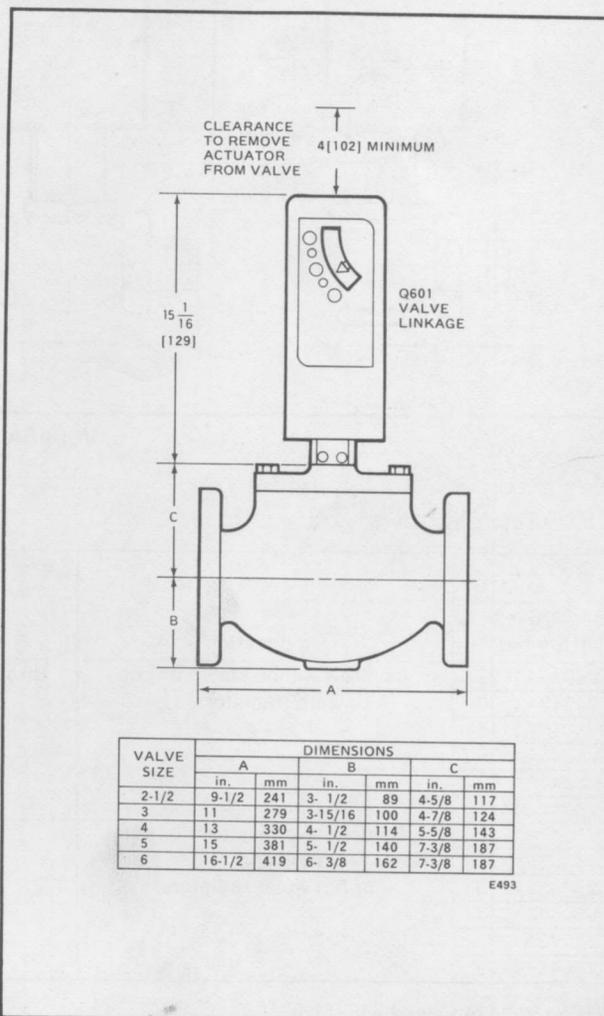
CAGE TYPE, SINGLE-SEATED VALVES FOR CONTROL OF STEAM, AIR, LIQUIDS, OR NON-COMBUSTIBLE GASES IN 2-POSITION OR PROPORTIONAL SYSTEMS REQUIRING A TIGHT SHUTOFF.

Q601K Valve Linkage and a Modutrol motor required for operation. Body Pattern: Straight-through, nonoffset, flanged end. Packing: Spring-loaded, nonadjustable Teflon cone. Maximum Temperature: 300 F [149 C]. Flow Characteristics of Cage Opening: Modified linear. Internal Parts: Bronze. Rated Leakage: 0.01 percent of Rated Cv, 0.03 percent in 5- and 6-in. valves. Valve Travel: 1-1/2 in. [38 mm]. Close-off Rating: 50 psig [344.7 kPa].

Valve Ratings:

Liquids		Steam	
Maximum Pressure	Maximum Temperature	Maximum Pressure	Maximum Temperature
140 psig [960 kPa]	300 F [149 C]	55 psig [379 kPa]	300 F [149 C]
150 psig [1034 kPa]	100 F [38 C]		

Order Number	Pipe Size (NPT)	Flow Capacity	
		Cv	kv
V5051A1008	2-1/2	75	64.3
V5051A1016	3	116	99.4
V5051A1024	4	178	152.6
V5051A1032	5	318	272.6
V5051A1040	6	390	334.2



VALVE SIZE	DIMENSIONS					
	A		B		C	
	in.	mm	in.	mm	in.	mm
2-1/2	9-1/2	241	3-1/2	89	4-5/8	117
3	11	279	3-15/16	100	4-7/8	124
4	13	330	4-1/2	114	5-5/8	143
5	15	381	5-1/2	140	7-3/8	187
6	16-1/2	419	6-3/8	162	7-3/8	187

E493

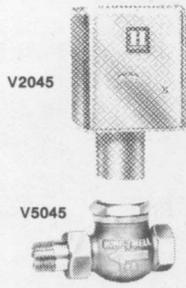
Valve mounting dimensions.

TRADELINE



valves

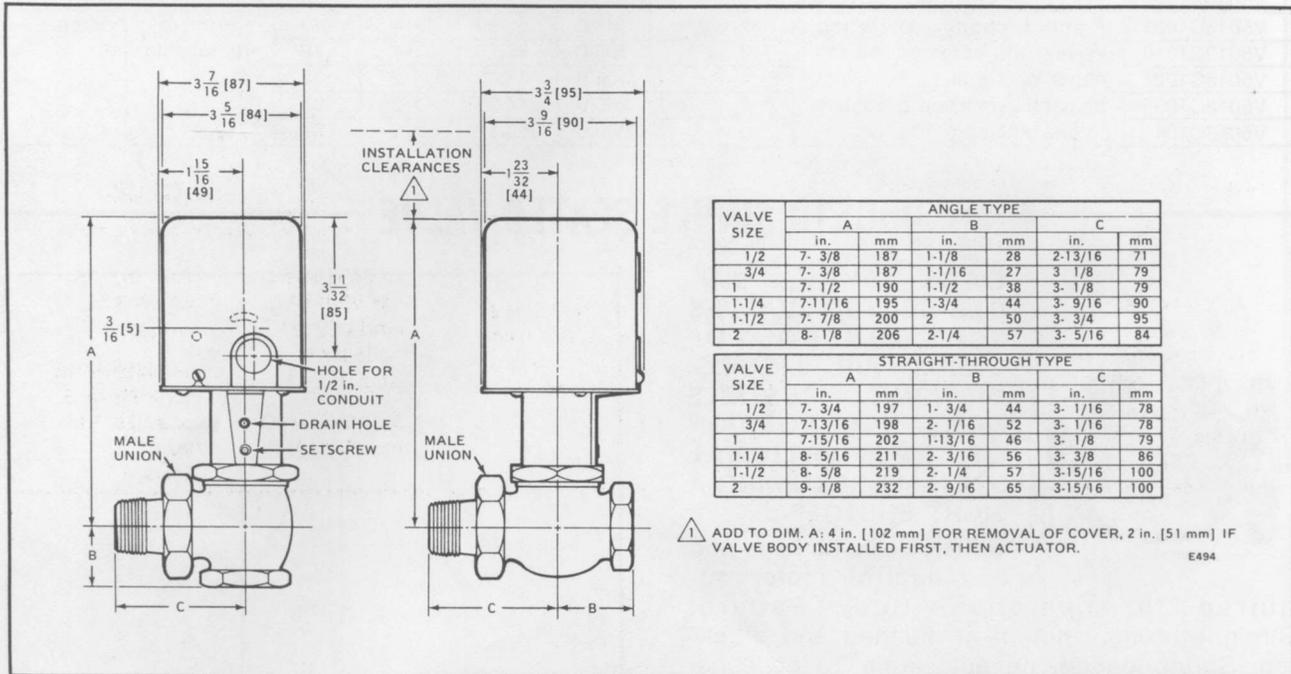
V5045A VALVE BODY



SINGLE-SEATED VALVE FOR 2-POSITION CONTROL OF HOT WATER OR STEAM RADIATORS, AND FOR RESIDENTIAL ZONE CONTROL.

Requires a V2045A operator. Body Material: Brass. Pipe Connections: Female inlet, male union outlet.

Disc: Composition, replaceable. Fluid Temperature: 250 F [121 C] maximum. Steam Pressure: 15 psi [103.4 kPa] maximum. Seat: Integral, brass. Packing: Molded Teflon cones, spring-loaded, self-adjusting.

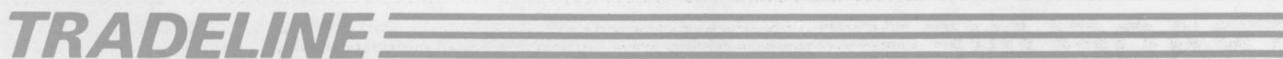


V5045A dimensions.

TRADELINE models.

Order Number	Application	Valve Pattern	Size (NPT)	Flow Capacity		Close-off Rating for Water ^a	
				Cv	kv	psi	kPa
V5045A1122	Controls 2-pipe steam or hot water radiators.	Straight-through	1/2	3.8	3.3	100	689.5
V5045A1130			3/4	5.4	4.6	85	586.1
V5045A1148			1	10.8	9.3	45	310.3
V5045A1155			1-1/4	16.0	13.7	25	172.4
V5045A1163			1-1/2	25.0	21.4	18	124.1
V5045A1171			2	40.0	34.3	12	82.7
V5045A1189	Controls 2-pipe steam or hot water radiators and 1-pipe steam or hot water radiators.	Angle	1/2	3.8	3.3	100	689.5
V5045A1197			3/4	5.4	4.6	85	586.1
V5045A1205			1	10.8	9.3	45	310.3
V5045A1213			1-1/4	16.0	13.7	25	172.4
V5045A1221			1-1/2	25.0	21.4	18	124.1
V5045A1239			2	40.0	34.3	12	82.7

^aUsing V2045A powerhead.

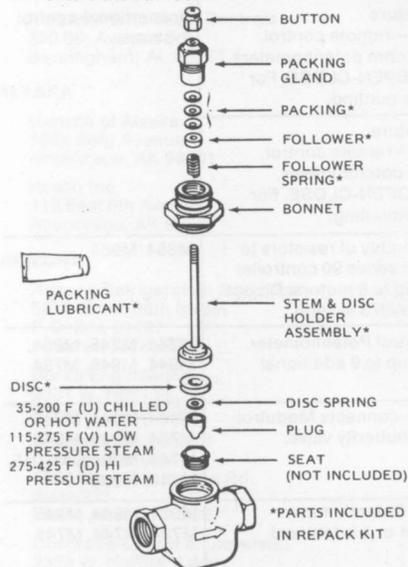




PARTS AND ACCESSORIES

V5011 AND V5013 SINGLE-SEATED VALVES

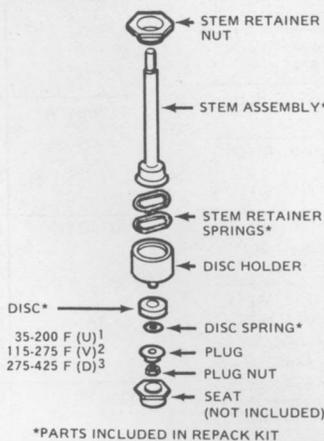
Valve Repack and Rebuild Kit for 1/2 to 1-1/4 in. valves.



14002694-002 for V5011 with 1/2, 3/4, 1 in. pipe size; 4.0 or less C_v ; 1/4 in. stem; 1/2 in. disc

14002695-002 for V5011 with 3/4, 1, 1-1/4 in. pipe size; 6.3 or 10.0 C_v ; 1/4 in. stem; 3/4 in. disc

Valve Repack and Rebuild Kit for 1-1/2 to 3 in. valves



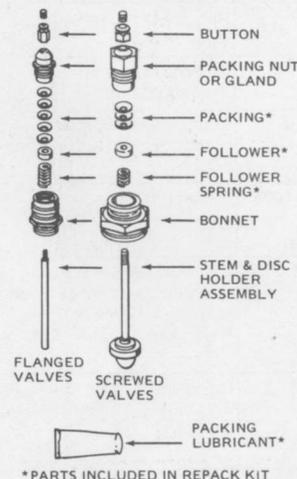
14003109-002 for V5011 with 1-1/4 in. pipe size; 16.0 C_v ; 1/4 in. stem; 1 in. disc

14003110-002 for V5011 with 1-1/2, 2, 2-1/2 in. pipe size;

25.0 C_v ; 3/8 in. stem; 1-1/4 in. disc

14003111-002 for V5011 with 2, 2-1/2, 3 in. pipe size; 40.0 C_v ; 3/8 in. stem; 1-1/2 in. disc

Valve Repack Kit containing cone, cup, spring, and packing lubricant. Instructions on package back.



14003294-002 for V5011A,C and V5013A with 1/4 in. stems

14003295-002 for V5011A,C

and V5013A with 3/8 in. stems

14003296-002 for V5011A,B and V5013A with 1/2 in. stems

Let us tell you more. . .

Honeywell supplies a wide variety of systems and components to help you save energy without sacrificing efficiency or comfort. Find out what we can do for you. Contact your local Honeywell Energy Management Distributor TODAY. . . or write directly to:

Honeywell

ENERGY PRODUCTS CENTER • 10400 YELLOW CIRCLE DRIVE • MINNETONKA, MINNESOTA 55343

TRADELINE



motor

PARTS AND ACCESSORIES

See MOTOR pages 191-205

Order Number	Description	Use With
S443A ^a	Manual Potentiometer. Includes dpdt toggle switch.	M934, M941, M944, M945
S963A ^a	Remote Minimum Potentiometer.	M944, M945, M734, M744, M745
S963B ^a	Remote Minimum Potentiometer.	Electronic Modutrol motors.
W859A-D ^a	Economizer. Controls outdoor return air damper system.	M944, M945, M954, M955
R927C-1000	Balance Relay.	Modutrol motors without internal balance relay.
DHE-94	Explosion-proof Housing for use with dampers or lever operated valves only. Requires Honeywell coupling 7617DM.	M634, M734, M744, M644, M944, M745, M945, M7044, M941, M7045, M445, M845, M934, M954, M955
7617DM	Coupling.	Modutrol motors requiring explosion-proof housing.
7640JS	Weatherproofing Kit.	M941, M944, M954, M644, M744, M7044
7640JT	Weatherproofing Kit.	M945, M445, M845, M745, M7045
110126A	Motor Crank Arm.	M940A
7616BR	Motor Crank Arm. (Included with Q605 but not with the motor.)	M634, M644, M934, M941, M944, M945, M955, M734, M445, M845, M744, M745, M7044, M7045
		
24468	Flange Gasket.	Modutrol motors.
7640JL	Crank Arm Assembly.	M436, M836
112894FB	Manual Potentiometer. 270 ohm, surface mounting. For remote control.	Proportional control systems.
		
112894FD	Manual Potentiometer. 135 ohm, flush mounting. For remote control.	
112894FE	Manual Potentiometer. 270 ohm, flush mounting. For remote control.	
112894GB	Manual Potentiometer. 72 ohm, surface mounting. For remote control.	

Order Number	Description	Use With
112894EA	Temperature Selector—remote control. Two 135 ohm potentiometers. Marked OPEN-CLOSE. For surface mounting.	Proportional control systems.
112894FA	Temperature Selector—remote control. 135 ohm potentiometer. Marked OPEN-CLOSE. For surface mounting.	
4074BYK	Bag Assembly of resistors to allow one series 90 controller to drive up to 6 motors. Do not use with W973 system.	M954/M955
Q68 ^a	Dual Control Potentiometer. Controls up to 9 additional motors.	M744, M745, M934, M944, M945, M734
Q100 ^a	Linkage—connects Modutrol motor to butterfly valve.	M934, M644, M941, M734, M944, M945, M745, M7044, M7045, M744, M634
Q181A ^a	Auxiliary Potentiometer. Controls 1 or 2 additional motors.	M934, M944, M945, M734, M744, M745
Q209 ^a	Potentiometer. Limits minimum position of motor.	M934, M944, M945, M744, M745
Q601 ^a	Valve Linkage. Connects Modutrol motor to water or steam valve.	M445, M644, M845, M634, M934, M941, M944, M734, M945, M7044, M744, M7045, M745
Q605 ^a	Damper Linkage. Connects motor to damper. Includes motor crank arm.	M445, M644, M845, M934, M941, M944, M734, M945, M7044, M745, M7045, M744, M634
Q607 ^a	Auxiliary Switch. Controls auxiliary equipment as a function of motor position.	M445, M644, M845, M634, M941, M944, M945, M734, M934, M7044, M744, M7045, M745
Q618 ^a	Valve Linkage. Connects Modutrol motor to water or steam valve.	M445, M634, M644, M845, M934, M944, M734, M945, M941, M744, M7044, M7045, M745
4074EAU	Resistor Kit for operating 2 or 3 motors in unison with W973 Economizer, mod heat, mod cool outputs.	M954/M955
4074BPQ	Mounting Accessories.	Q607
7640JK	Mounting Accessories for motors with power end bosses.	Q607
101662A	External Mounting Bracket.	Q605
102931-00021	Adapter Arm to motor crank arm.	Q605
		
24336A	Balance Relay Armature Assy.	M945/R927

^aConsult Index for page number of specifications and descriptions.

EXPLOSION-PROOF HOUSING
 Order all Explosion-Proof Housing from:
 Crouse-Hinds Co. P.O. Box 131
 Syracuse, New York 13201

authorized energy management distributors



This listing is assembled for the convenience of our customers and is not necessarily in alphabetical order.

ALABAMA

Alabama Wholesale Controls
300 6th Avenue S.W.
Birmingham, AL 35211

ALASKA

Gensco of Alaska
1824 Ship Avenue
Anchorage, AK 99501

Hasco Inc.
119 East 6th Avenue
Anchorage, AK 99501

ARIZONA

Arizona Refrigeration Supplies
5020 South 36th Street
P.O. Box 21127
Phoenix, AZ 85036

Burke Engineering
2331 W. Holly St.
Phoenix, AZ 85009

Energy Management
Consultants Inc.
1325 West Guadalupe Rd.
Suite 227
Mesa, Arizona 85202

Cosgrove-Lowrie & Cleveland
2333 W. Northern Ave.
Phoenix, AZ 85021

Service Supply Company
734 W. Highland
Phoenix, AZ 85013

Southwest Refrigeration Supply
1315 E. 17th Street
Tucson, AZ 85719

Energy Management Systems Co.
3422 Roeser Rd.
Phoenix, AZ 85034

ARKANSAS

Arkansas Control Systems Inc.
10412 Mabelvale West—Suite B
Mabelvale, AR 72103

A. W. Johnson Co.
900 East Markham Street
P.O. Box 1579
Little Rock, AR 72203

CALIFORNIA

AMFAC Electrical Supply Company
1001 Bing Street
San Carlos, CA 94070

AMFAC Electrical Supply Company
255 Sonoma Street
P.O. Box 26367
San Jose, CA 95159

AMFAC Electrical Supply Company
7919 South Paramount Blvd.
Pico Rivera, CA 90660

Automatic Controls Engineering
470 Third Street
San Francisco, CA 94107

Burke Engineering Company
1824 Burlington Avenue
Los Angeles, CA 90006

Burke Engineering Company
2400 Magnolia Avenue
Long Beach, CA 90806

Burke Engineering Company
2530 3rd Street
Riverside, CA 92507

Burke Engineering Company
4001 Market Street "E"
San Diego, CA 92102

Burke Engineering Company
1530 S. Lyon Street
Santa Ana, CA 92705

Burke Engineering Company
9700 Factorial Way
S. El Monte, CA 91733

Burke Engineering Company
16122 Covello Street
Van Nuys, CA 91406

Controlco Inc.
2100 E. Howell Avenue #102
Anaheim, CA 92806

Controlco Inc.
320 Kentucky St.
Bakersfield, CA 93305

Controlco Inc.
210 Van Ness
Fresno, CA 93721

Controlco Inc.
1662 Callens Road
Ventura, CA 93003

Controltech Company
4219 South Market Court, Suite E
Sacramento, CA 95834

Control Instrument Regulator
1701 30th Street
Sacramento, CA 95816

George T. Hall Company
1850 South Anaheim Blvd.
P.O. Box 300
Anaheim, CA 92805

George T. Hall Company
5623 West Washington Blvd.
Los Angeles, CA 90016

George T. Hall Company
1257 Goodrich Blvd.
Los Angeles, CA 90022

George T. Hall Company
900 Colton Ave.
Colton, CA 92324

George T. Hall Company
814 W. Willow Street
Long Beach, CA 90806

George T. Hall Company
1891 San Diego Avenue
San Diego, CA 92110

George T. Hall Company
2126 Knoll Drive Suite E
Ventura, CA 93003

Martcon Inc.
904 So. Alta Vista
Monrovia, CA 91016

National Environmental Systems
13749 Victory Blvd.
Van Nuys, CA 91401

Jack Ray Inc.
1060 East Macy Street
Los Angeles, CA 90033

Stove Plumbers Supplies Company
70-4th Street
P.O. Box 330
Oakland, CA 94607

COLORADO

Colorado Controls Inc.
490 Bryant Street
Denver, CO 80204

Charles D. Jones & Company
300 Bryant Street
Denver, CO 80219

Denver Energy Controls, Inc.
2466 W. Second Avenue
Denver, CO 80223

CONNECTICUT

Connecticut Air Conditioning
5 Connair Road
Orange, CT 06477

N.W. Day Supply Company
748 Wethersfield Avenue
Hartford, CT 06114

Tower Equipment Company Inc.
1320 West Broad Street
Stratford, CT 06497

Connecticut Air Conditioning
37 Jerome Avenue
Bloomfield, CT 06002

DELAWARE

Bells Supply Company Inc.
301 South West Street
Wilmington, DE 19801

FLORIDA

Baker Brothers Inc.
422 College Street
P.O. Box 2312
Jacksonville, FL 32204

Baker Brothers Inc.
558 Stuart Lane
P.O. Box 2954
Jacksonville, FL 32203

Baker Brothers Inc.
860 Eppes Drive
P.O. Box 2095
Tallahassee, FL 32304

Bowen Wholesale Supplies Inc.
2121 Edison Avenue
P.O. Box 2438
Jacksonville, FL 32203

Modern Control and Supply
1500 West Washington Street
P.O. Box 5926
Orlando, FL 32805

Suncoast Energy Controls Inc.
12945 Seminole Blvd.
Largo, FL 33540

Jim Wells & Associates Inc.
76 East 9 Mile Road
P.O. Box 7064
Pensacola, FL 32504

Burt Woodruff Inc.
601 Brookhaven Drive
Orlando, FL 32803

GEORGIA

Controlled Energy & Equipment
275 Tillman Rd.
Fayetteville, GA 30214

Energy Conservation Controls
3970-B Thurman Road
Conley, GA 30027

Faulkner Company
600 Turso Way South West
P.O. Box 11287
Atlanta, GA 30310

Robert Kohl Associates Inc.
4122 Old Dixie Road
P.O. Box 223
Mountain View, GA 30070

Metro Refrigeration Supply
3901 Green Industrial Way
P.O. Box 80306
Chamblee, GA 30341

Mingledorffs Inc.
159 Armour Drive Northeast
P.O. Box 13031
Atlanta, GA 30324



authorized energy management distributors

Stromquist & Company
3605 Northeast Expressway
P.O. Box 47098
Atlanta, GA 30340

William J. Wesley Company
5036 South Atlanta Road
Smyrna, GA 30080

RKD & Associates
1701 Cleveland St.
Atlanta, GA 30904

HAWAII

ATECS Corp.
156 Mokauea Street
Honolulu, HI 96819

IDAHO

Heating and Cooling Distributors, Inc.
301 West Myrtle Street
Boise, ID 83702

Refrigeration Wholesalers Inc.
3100 Pleasanton Avenue
Boise, ID 83702

ILLINOIS

Robert Barclay Inc.
2323 West Fulton Street
Chicago, IL 60612

Robert Barclay Inc.
730 East Sangamon
Decatur, IL 62521

Robert Barclay Inc.
118 E. Main Street
Round Lake Park, IL 60073

G & O Thermal Supply Company
5435 North Northwest Highway
Chicago, IL 60630

Mid-Way Heating Supply Company
2502 Deborah Avenue
Zion, IL 60099

Jim Otis & Associates
209 55th Street
Moline, IL 61265

Sheet Metal Products Company
2501 Southwest Washington
P.O. Box 768
Peoria, IL 61652

South Side Control Supply
488 North Milwaukee Avenue
Chicago, IL 60610

INDIANA

AC & H Supply Company Inc.
615 West Franklin Street
P.O. Box 3727
Evansville, IN 47734

G.W. Berkheimer Company Inc.
1011 East Wallace
Fort Wayne, IN 46803

G.W. Berkheimer Company Inc.
2310 West 35th Avenue
Gary, IN 46408

Duncan Supply Company Inc.
910 North Illinois Street
Indianapolis, IN 46204

Energy Management Engineering
4241 Hogue Road
Evansville, IN 47712

The Hedback Corporation
1835 North New Jersey Street
Indianapolis, IN 46202

Indiana Supply Corporation
3835 East 21st Street
Indianapolis, IN 46218

Jackson Control Company Inc.
1280 West Southport Road
Indianapolis, IN 46217

F.H. Langsenkamp Company
2514 S. Calhoun Street
P.O. Box 10996
Fort Wayne, IN 46855

F.H. Langsenkamp Company
333 Hydraulic Avenue
South Bend, IN 46617

IOWA

Cedar Rapids Sheet Metal Company
406 Ninth Avenue Southeast
P.O. Box 2025
Cedar Rapids, IA 52401

Climate Distributors Inc.
401 and One Half S.E. 6th Street
P.O. Box CB
Des Moines, IA 50306

Nichols Controls & Supply Inc.
120 S.W. 6th
P.O. Box 1437
Des Moines, IA 50305

Quota Control Company
2124 East Fourth Street
Sioux City, IA 51101

KANSAS

Superior Supply Company Inc.
215 Laura
P.O. Box 11447
Wichita, KS 67211

KENTUCKY

Brock McVey Company Inc.
Midland Avenue Extended
P.O. Box 321
Lexington, KY 40501

SWH Supply Company Inc.
242 East Main Street
Louisville, KY 40202

American Electric Supply Inc.
817 Nandino Blvd.
Lexington, KY 40511

LOUISIANA

Factory Parts Inc.
3940 Toulouse
New Orleans, LA 70119

Industrial Electronic Supply
2424 Greenwood Road
P.O. Box 3902
Shreveport, LA 71103

Southern Heater Company Inc.
844 Baronne Street
New Orleans, LA 70113

Tag Industries Inc.
1818 Wooddale Blvd. Suite 35
Baton Rouge, LA 70806

MAINE

W.L. Blake and Company
79-85 Commercial Street
Portland, ME 04111

MARYLAND

Conservation and Controls Inc.
7200 Rutherford
Baltimore, MD 21207

Hagerstown Automatic Control
21 North Mulberry Street
P.O. Box 1122
Hagerstown, MD 21740

William E. Kingswell Inc.
11931 Tech Road
Silver Spring, MD 20904

Roche & Hull Inc.
1107-19 Maryland Avenue
Baltimore, MD 21201

MASSACHUSETTS

Automatic Temperature Control
235 Bear Hill Road
Waltham, MA 02154

Burner Supply Company Inc.
364 Rantoul Street
Beverly, MA 01915

Energy Control Systems Inc.
105 Salem Street
Woburn, MA 01801

Interstate Electric Equipment
30 Vineland Street
Brighton, MA 02135

C.P. Payson Company Inc.
36 Martone Place
Springfield, MA 01109

MICHIGAN

Behler-Young Company
4900 Clyde Park S.W.
Wyoming, MI 49509

Cochrane Supply & Engineering
19300 Beech Daly Road
Detroit, MI 48240

George L. Johnston Company
1305 Monroe N.W.
Grand Rapids, MI 49505

George L. Johnston Company
1200 Holden Avenue
Detroit, MI 48202

Michigan Brass & Electric
1901 West Saginaw Street
Lansing, MI 48902

Leo Tilford Inc.
411 East Mansion Street
Jackson, MI 49203

Wilson-Brinker Associates Inc.
2918 Portage Street
P.O. Box 2736
Kalamazoo, MI 49003

Young Supply Company
888 West Baltimore
Detroit, MI 48202

Young Supply Company
2101 South Saginaw Street
Flint, MI 48503

MINNESOTA

Minnesota Air, Inc.
9610 James Avenue South
Bloomington, MN 55431

Minvalco Inc.
3340 Gorham Avenue
Minneapolis, MN 55426

National Temperature Control
2025 West First Street
Duluth, MN 55806

MISSISSIPPI

Climatrol Supply of Jackson
930 High Street
P.O. Box 3156
Jackson, MS 39207

continued next page

TRADELINE

authorized energy management distributors



MISSOURI

General Heating & Cooling
820 Atlantic
N. Kansas City, MO 64116

Charles D. Jones & Company
114 West Linwood Blvd.
Kansas City, MO 64111

Lark Refrigeration Inc.
2001 S. Hanley Road
St. Louis, MO 63144

Progressive Wholesale Supply
11880 Lackland Road
St. Louis, MO 63141

Superior Supply Company
621 East 14th Avenue
P.O. Box 7500
N. Kansas City, MO 64116

MONTANA

ABCO Supply Inc.
400 South First
P.O. Box 30557
Billings, MT 59107

National Temperature Control
108 Moore Lane
Billings, MT 59103

National Temperature Control
601 3rd Avenue South
Great Falls, MT 59401

National Temperature Control
223 East Main
Missoula, MT 59801

NEBRASKA

Air Conditioning Utilities Inc.
2450 St. Marys Avenue
Omaha, NE 68105

Belknap Company
2330 North 11th Street
P.O. Box 80697
Lincoln, NE 68501

Albert O. Jensen
515 N. 18th Street
Omaha, NE 68102

NEVADA

Burke Engineering
3675 S. Highland
Las Vegas, NV 89103

NEW JERSEY

Industrial Controls Distributor
1776 Bloomsburg Ave.
Wanamassa, NJ 07712

Universal Engineering Company
344 Wagaraw Road
Hawthorne, NJ 07506

NEW MEXICO

Airco Supply Company
111 Marble Avenue Northwest
Albuquerque, NM 87102

Electrical Energy Management
10,000 Trumbell S.E.
Albuquerque, NM 87123

NEW YORK

ABCO Refrigeration Supply Company
240 Old Country Road
Hicksville, NY 11801

ABCO Refrigeration Supply Company
49-70 31st Street
Long Island City, NY 11101

DBM Control Distributors Inc.
1277 Military Road
Buffalo, NY 14217

Denton Refractory Service Company
140-142 Dickerson Street
P.O. Box 237
Syracuse, NY 13201

Eastern Mechanical Supply Company
521 East 3rd Street
Mount Vernon, NY 10553

Hagle Supply Company
60-64 Mill Street
Newburgh, NY 12550

Hasko Utilities Company
248 West 60th Street
New York, NY 10023

R.D. Marshall Company Inc.
One Marshall Place
P.O. Box 1676
Albany, NY 12201

Ward Heating Supply Company
700 Clinton Avenue South
Rochester, NY 14620

Wholesale Distributors Inc.
698 10th Avenue
New York City, NY 10019

NORTH CAROLINA

W.A. Brown & Son Inc.
2001 S. Main Street
P.O. Box 1408
Salisbury, NC 28144

Energy Control Engineering Company
2150 Hawkins Street
P.O. Box 3467
Charlotte, NC 28203

Energy Controls Corporation
1046 E. Wendover Avenue Ste. 149
P.O. Box 6269
Greensboro, NC 27405

Ihrle Supply Company
1501 Cargill Avenue
P.O. Box 1629
Wilson, NC 27893

Sturdivant Supply Company Inc.
626 Winslow St.
Fayetteville, NC 28306

System Energy Man Management Inc.
3333 Interstate 85 South
P.O. Box 66816
Charlotte, NC 28266

NORTH DAKOTA

Environmental Control Inc.
209 16th Street North
P.O. Box 2751
Fargo, ND 58108

National Temperature Control
12 North 12th Street
Fargo, ND 58102

OHIO

All Weather Supplies
767 McClurg Road
Youngstown, OH 44512

Allied Supply Company
460 South Main Street
Lima, OH 45804

Allied Supply Company
1100 East Monument Avenue
Dayton, OH 45402

Atlantic Tempco Inc.
4000 Washington Blvd. Ball Bldg.
P.O. Box 70
Belpre, OH 45714

Columbus Automatic Sprayer
25 East Goodale Street
Columbus, OH 43215

Columbus Temperature Control
1053 East 5th Avenue
P.O. Box 8368
Columbus, OH 43201

Controls Center Inc.
1640 East Kemper Road
Cincinnati, OH 45246

Habegger Supply
4995 Winton Road
Cincinnati, OH 45232

George L. Johnston Company
1440 Jackson Street
Toledo, OH 43624

Morrow Control Supply Inc.
1410 5th Street Northeast
Canton, OH 44704

Thomas C. Nash Inc.
115 Brown Street
Dayton, OH 45402

Refrigeration Sales Corp.
3405 Perkins Avenue
Cleveland, OH 44114

United Automatic Heating Supply
2125 Superior Avenue
Cleveland, OH 44114

F.E. Winstel Company
3129 Spring Grove Avenue
Cincinnati, OH 45225

W.R. Control Panels, Inc.
6403 Retton Court
Reynoldsburg, OH 43068

OKLAHOMA

O'Connor-Oklahoma Company Inc.
5427 South 99th East Avenue
Tulsa, OK 74145

Swan Air Conditioning Company
4601 North Santa Fe
P.O. Box 18476
Oklahoma City, OK 73118

Waugh Brothers Supply Company
2015 Northwest 7th Street
P.O. Box 60308
Oklahoma City, OK 73106

OREGON

Industrial Control Company
1617 East Burnside Street
Portland, OR 97214

Isotherm Inc.
16460 Southwest 72nd—Bldg. 6
Portland, OR 97223

PENNSYLVANIA

Allegheny Engineering Company
798 North Washington Road
McMurray, PA 15317

B & H Associates Inc.
12th & Green Streets
Allentown, PA 18102

Broudy Precision Equipment
25th & York Streets
Philadelphia, PA 19132

T.F. Campbell Company
1521 Saw Mill Run Blvd.
Pittsburgh, PA 15210

Capp Inc.
6129-35 Market Street
Philadelphia, PA 19139

D.W. Supply Company
2035 E. Glenwood Avenue
Philadelphia, PA 19124

Environmental Equipment
728 S. Cameron Street
P.O. Box 2047
Harrisburg, PA 17105



authorized energy management distributors

Industrial Controls Inc.
902 Market Street
P.O. Box 228
Lemoyne, PA 17043

RHODE ISLAND

Automatic Heating Equipment
400 Charles Street
Providence, RI 02904

Commercial Temperature Control
877 Waterman Avenue
E. Providence, RI 02914

SOUTH CAROLINA

Harris Sales & Services Inc.
304 Parnell Street
P.O. Box 286
West Columbia, SC 29169

TENNESSEE

A.T. Distributors
802 Roselle
Memphis, TN 38104

Ed's Supply Company Inc.
711 6th Avenue South
Nashville, TN 37203

Ener-Tech Industries
4304 Charlotte Avenue
P.O. Box 90325
Nashville, TN 37209

Leinarts Inc.
1400 5th Avenue Northeast
P.O. Box 508
Knoxville, TN 37901

7-11 Equipment Company
1101 Grundy Street
P.O. Box 23310
Nashville, TN 37202

TEXAS

Airtrol Supply Company
2701 Agnes Street
P.O. Box 9490
Corpus Christi, TX 78408

Control Sales & Supply Company
2500 North Fitzhugh
Dallas, TX 75204

Cosyco Company Inc.
5933 Bellaire Blvd, Suite 10
P.O. Box 35663
Houston, TX 77035

Industrial Equipment Company
1515 Central Park Drive
Hurst, TX 76053

Inscos Distributing, Inc.
2403 Freedom Drive
P.O. Box 17345
San Antonio, TX 78217

Paschal-Harper-Evans, Inc.
300 E. Huntland Drive
Austin, TX 78752

Pinkston Sales & Service
2017 Young Street
Dallas, TX 75201

Paul Scheurer Engineering
1318 Eighth
Wichita Falls, TX 76301

Slack Buckner Systems Inc.
13426 Floyd Circle
Dallas, TX 75243

Snook & Aderton Inc.
514 Crockett Street
Amarillo, TX 79106

Snook & Aderton Inc.
1702 Avenue F
P.O. Box 2665
Lubbock, TX 79408

Temperature Control Systems
3219 Forest Lane
Garland, TX 75042

UTAH

Applied Automation Inc.
395 Lawndale Drive
Salt Lake City, UT 84115

Sabol & Rice Inc.
1834 South 900 West
Salt Lake City, UT 84104

VIRGINIA

Air Conditioning Suppliers Inc.
3100 West Clay Street
P.O. Box 6576
Richmond, VA 23230

Automatic Equipment Sales of Norfolk
3501 Progress Road
P.O. Box 5764
Norfolk, VA 23516

Automatic Equipment Sales of Roanoke
3517 Aerial Way Drive South
P.O. Box 4248
Roanoke, VA 24155

Control Wholesalers Inc.
5405-C Port Royal Road
Springfield, VA 22151

Southern Refrigeration Corp.
2026 Salem Avenue Southwest
P.O. Box 12646
Roanoke, VA 24027

Virginia Refrigeration Supply
4605 E. Princess Anne Road
Norfolk, VA 23502

WASHINGTON

Blacks-Industrial Inc.
North 401 Helena Street
P.O. Box 3286
Spokane, WA 99220

Mortemp Company
6516 5th Place South
P.O. Box 24967
Seattle, WA 98124

WEST VIRGINIA

Appalachian Controls Company
401 Fourth Avenue
P.O. Box 8246
S. Charleston, WV 25303

Automatic Equipment Sales of Charleston
1428 Pennsylvania Avenue
P.O. Box 3507
Charleston, WV 25334

Tri-State Controls Inc.
1401 8th Avenue
Huntington, WV 25701

WISCONSIN

Auer Steel & Heating Supply
2935 W. Silver Spring Drive
Milwaukee, WI 53209

Climatic Control Company
5061 West State Street
Milwaukee, WI 53208

Gustave A. Larson Company
2669 Industry Court
Green Bay, WI 54304

Gustave A. Larson Company
2613 Seifirch Road
Madison, WI 53716

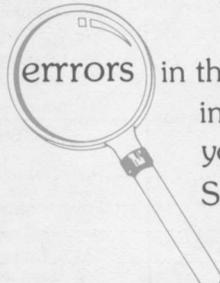
Gustave A. Larson Company
2425 South 162nd St.
New Berlin, WI 53151

MacIntyre Company Inc.
1009 Jonathon Drive
Madison, WI 53713

Milwaukee Stove & Furnace Supply
5070 W. State Street
Milwaukee, WI 53208

WYOMING

National Temperature Control
242 North Lincoln
Casper, WY 82601

If you detect any  errors in this catalog, please let us know. We want the information in our catalog to be as accurate as possible; we appreciate your help in making it so.

See page 263.

reference information

SI METRIC UNITS

In this catalog, we've included dual dimensions—standard and metric—wherever applicable. We have used conversions from the Systeme International d'Unites or International System of Units (SI).

Some measurements are nominal and are not converted. EXAMPLE: 4 x 4 in. junction box; 1/2 NPT.

The table below lists the units used for conversion, and the conversion factors.

Where SI metric units are listed for temperature and other controls, it is *not* meant to indicate that the scaleplates on these controls are in standard and SI metric units. Unless otherwise indicated, SI metric units are listed for reference only.

Quantity	Standard Unit	SI Unit	SI Symbol	Multiplier to Convert from Standard Unit to SI Unit
Temperature	Degrees Fahrenheit	Degrees Celsius	C	5/9 (F-32)
Length	Inches/feet	Millimetres/metres	mm/m	25.4/0.304.8
Capacity—Gas Valves	Cubic feet per hour	Cubic metres per hour	m ³ /hr	0.0283168
Control Valve Coefficient	C _v ^a	k _v ^b	k _v	0.857
Fluid Capacity	Gallons per hour	Litres per second	L/S	0.001052
Heat	Btu per cubic foot	Megajoules per cubic metre	MJ/m ³	0.0671
Pressure Drop	Inch of water column	Kilopascals	kPa	0.2486
Pressure	Inch of mercury	Kilopascals	kPa	3.3741
Pressure	Pounds per square inch	Kilopascals	kPa	6.8948
Power (electric)	Horsepower	Watts/kilowatts	W/kW	746/0.746
Weight	Pounds	Kilograms	kg	0.4536

^aC_v of 1 is defined as 1 USGPM water flowing through valve with pressure drop of 1 psig.

^bk_v of 1 is defined as 1 m³/h water flowing through valve with pressure drop of 1 atmosphere (101.325 kPa).

CONVERSION OF PRESSURE UNITS

Convert by multiplying value in known pressure units by factor listed under required pressure unit.

Known Pressure Unit	Required Pressure Unit								
	Kilo-pascals	Pounds per Sq. In.	Ounces per Sq. In.	Millimetres of Mercury	Kilograms per Sq. Cm	Inches of Water	Inches of Mercury	Feet of Water	Centimetres of Water
Centimetres of Water	0.0981	0.0142	0.227	0.735	0.000999	0.394	0.0289	0.0328	—
Feet of Water	2.99	0.433	6.94	22.4	0.0305	12.0	0.883	—	30.5
Inches of Mercury	3.39	0.491	7.86	25.4	0.0345	13.6	—	1.13	34.6
Inches of Water	0.249	0.0361	0.578	1.87	0.00254	—	0.0735	0.0833	2.54
Kilograms per Sq. Cm.	98.1	14.2	228.0	735.0	—	394.0	29.0	32.8	1000.0
Millimetres of Mercury	0.133	0.0193	0.308	—	0.00136	0.535	0.0394	0.0446	1.36
Ounces per Sq. In.	0.431	0.0625	—	8.24	0.00439	1.73	0.128	0.144	4.40
Pounds per Sq. In.	6.89	—	16.0	51.7	0.0703	27.7	2.04	2.31	70.4
Kilopascals	—	0.145	2.32	7.52	0.010	4.02	0.295	0.334	10.2

Absolute Pressure=Gauge Pressure + 14.74 psi.

CAPACITIES

Most gas capacities listed in this catalog are stated for Nat. gas, based on 1,000 Btu per cu ft, 0.64 sp gr Nat. gas, at a pressure drop of 1.0 in. wc [37.3 MJ/m³, 0.64 sp gr at a pressure drop of 0.25 kPa].

To calculate the Btuh capacity for other gases, multiply the listed Btuh capacity by the conversion factor.

Total Heating Value for Gas X		At sp gr	Conversion Factor (multiply)
Btu/cu ft	MJ/m ³		
500 to 800	18.7 to 29.8	0.60	0.516 ^a
800 to 950	29.8 to 35.4	0.70	0.765 ^a
2500	93.3	1.53 [LP gas]	1.62

^aNominal conversion factor for range of total heat value.

continued next page

TRADELINE

reference information

CAPACITIES *continued*

For gases not listed in table, use one of the following formulas:

$$\left(\frac{\text{Listed—Btuh Capacity}}{(0.64 \text{ sp gr})} \right) \left(\sqrt{\frac{0.64}{\text{sp gr gas X}}} \right) \left(\frac{\text{Btu/cu ft [MJ/m}^3\text{] gas X}}{1000 \text{ Btu/cu ft [37.3 MJ/m}^3\text{]}} \right) = \text{Btuh Capacity gas X}$$

$$\left(\frac{\text{Btuh Capacity}}{(\text{Gas A})} \right) \left(\sqrt{\frac{\text{sp gr Gas A}}{\text{sp gr Gas B}}} \right) \left(\frac{\text{Btu/cu ft [MJ/m}^3\text{] gas B}}{\text{Btu/cu ft [MJ/m}^3\text{] gas A}} \right) = \text{Btuh Capacity gas B}$$

WEIGHT & VOLUME

1 gal (U.S.)	231 cu. in.
	0.13368 cu ft
1 barrel (petroleum)	42 gal (U.S.)
	9702 cu. in.
1 cu ft	7.4805 gal
	1728 cu. in.
1 cu ft water	
—at 60 F	62.37 lb
—at 212 F	59.82 lb
1 lb avdp	16 oz
	7000 grains (gr)
	453.59 grams (g)
1 gram	0.035274 oz

POWER & HEAT

1 Btu	776 ft-lb
	0.293 Watt-hr
	252 cal
1 cal	0.003968 Btu
	0.0011619 Watt-hr
1 Btuh	0.293 Watt
	4.2 cal/min
1 Watt	3.413 Btuh
1 Watt-hr	3.413 Btu
1 kW (1000 Watts)	3413 Btuh
1 kW-hr	3413 Btu
1 hp	0.746 kW
	2544.65 Btuh
	33,000 ft-lb/min
1 Bohp ^a	9.809 kW
	33,479 Btuh
	34.5 pounds of steam per hour

^aBoiler Output Horsepower is the equivalent of the heat required to evaporate 34.5 pounds of water per hour into dry, saturated steam at 212 F.

Btu CONTENT OF FUELS

Grade or Type	Unit	Btu
No. 1 Oil	Gallon	137,400
No. 2 Oil	Gallon	139,600
No. 3 Oil	Gallon	141,800
No. 4 Oil	Gallon	145,100
No. 5 Oil	Gallon	148,800
No. 6 Oil	Gallon	152,400
Nat. Gas	Cu ft	950 to 1,150
Propane	Cu ft	2,550
Butane	Cu ft	3,200

HORSEPOWER RATINGS

Ratings of Honeywell controls herein listed are in amperes, and correspond generally to the values for various horsepowers as shown in this chart. Full load ratings are taken from the National Electrical Code, 1981 edition; locked motor ratings are 6 times full load rating (ac) or 10 times full load rating (dc).

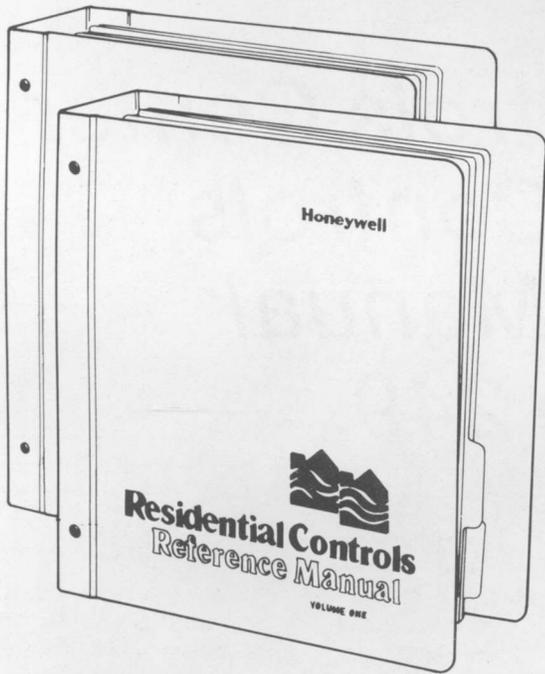
All motors do not necessarily come within the maximum ampere ratings shown in the table, and control devices must be used which have a rating equal to, or greater than, the actual motor running and starting currents. Current ratings given are for single phase ac motors and dc motors.

Approximate Horsepower	120 V		240 V	
	Full Load	Locked Rotor	Full Load	Locked Rotor
1/6 ac	4.4	26.4	2.2	13.2
dc	—	—	—	—
1/4 ac	5.8	34.8	2.9	17.4
dc	3.1	31.0	1.6	16.0
1/3 ac	7.2	43.2	3.6	21.6
dc	4.1	41.0	2.0	20.0
1/2 ac	9.8	58.8	4.9	29.4
dc	5.4	54.0	2.7	27.0
3/4 ac	13.8	82.8	6.9	41.4
dc	7.6	76.0	3.8	38.0
1 ac	16.0	96.0	8.0	48.0
dc	9.5	95.0	4.7	47.0
1-1/2 ac	20.0	120.0	10.0	60.0
dc	13.2	132.0	6.6	66.0
2 ac	24.0	144.0	12.0	72.0
dc	17.0	170.0	8.5	85.0
3 ac	34.0	204.0	17.0	102.0
dc	25.0	250.0	12.2	122.0

TRADELINE

Honeywell

RESIDENTIAL CONTROLS CENTER RESIDENTIAL CONTROLS REFERENCE MANUAL (71-99024 Volumes One & Two)



If you sell, install, or service residential heating and/or air conditioning equipment, you'll want this Honeywell Residential Controls Reference Manual. Two permanent poly binders contain information about controls and systems manufactured by Honeywell's Residential Controls Center, as well as some products built by other Centers.

Specification sheets and current catalogs are standard. Plus, Honeywell will mail you current literature to update your Controls Reference Manual about every six months for a \$40 annual subscription charge.

The entire cost to you for the standard Residential Controls Reference Manual, including the first year's update mailings, is \$75 for both volumes. If you do not wish to receive the poly binders, the manual is available separately (\$60). You may prefer a steel stand with the material (\$85) or an expandable steel stand (\$95). The manual is also available on space-saving microfiche cards (\$25).

Honeywell

RESIDENTIAL CONTROLS CENTER Residential Controls Reference Manual Order Form

AMOUNT ENCLOSED \$ _____

Please send my RCC Residential Controls Reference Manual(s) in the following quantities and options:

Standard _____ @ \$75 ea.

With Steel Stand _____ @ \$85 ea.

Without Binders _____ @ \$60 ea.

With Expandable Steel Stand _____ @ \$95 ea.

Microfiche _____ @ \$25 ea.

With Leather Carrying Case _____ @ \$105 ea.



Firm Name: _____

Manual Holder's Name: _____

Address: _____ City, State: _____ Zip: _____

Orders must include a check or money order (for each two-volume manual) payable to Honeywell Inc. First year's updates are included in initial order price. An annual subscription charge of \$40 will be made to you for maintaining regular (approximately every six months) updates.

Please mail to:

HONEYWELL INC.

Residential Controls Center

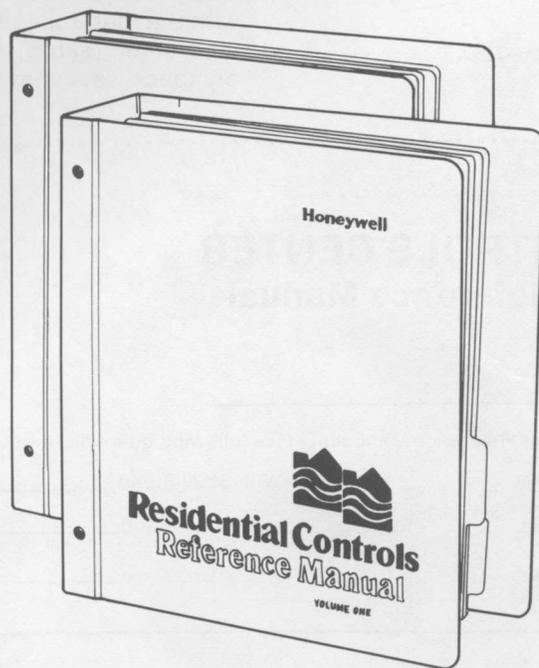
10400 Yellow Circle Drive

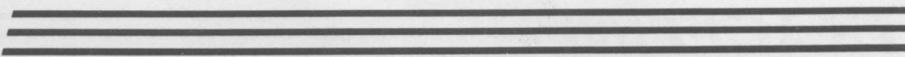
Minnetonka, MN 55343

ATTN: Information Service Coordinator, MN38-4122

TRADELINE _____

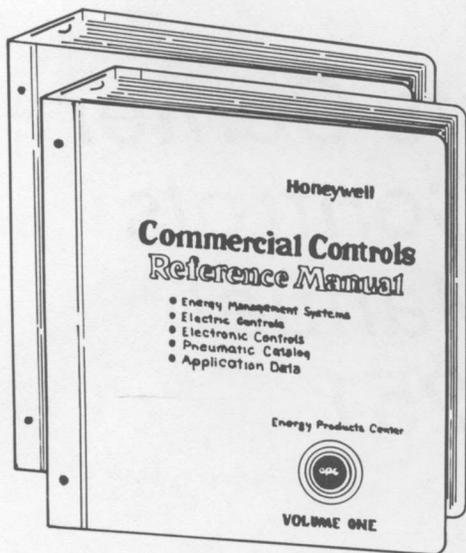
*For Information about
the
Residential Controls Center
Residential Controls
Reference Manual
see page 249.*



TRADELINE 

Honeywell

ENERGY PRODUCTS CENTER COMMERCIAL CONTROLS REFERENCE MANUAL (63-9000 Volumes One & Two)

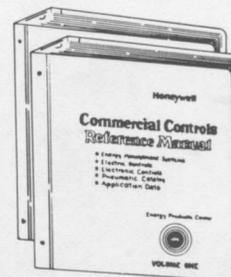


If you sell, install, or service Honeywell energy management systems, you'll want this Commercial Controls Reference Manual. Two permanent poly binders contain information about controls and systems manufactured by Energy Products Center, as well as some products produced by our other centers.

Specification sheets, selection guides, survey forms for utility rate analysis, guide specifications, promotional and training literature—all this and more. Plus, Honeywell will mail you current information to update your Commercial Controls Reference Manual approximately every six months for a \$40 annual subscription charge.

Honeywell

ENERGY PRODUCTS CENTER Commercial Controls Reference Manual Order Form



AMOUNT ENCLOSED \$ _____

Please send my EPC Commercial Controls Reference Manual(s) in the following quantities and options:

Standard _____ @ \$75 ea.	With Steel Stand _____ @ \$85 ea.
Without Binders _____ @ \$60 ea.	With Expandable Steel Stand _____ @ \$95 ea.
Microfiche _____ @ \$25 ea.	With Leather Carrying Case _____ @ \$105 ea.

Firm Name: _____
 Manual Holders Name _____
 Address: _____ City, State: _____ Zip: _____

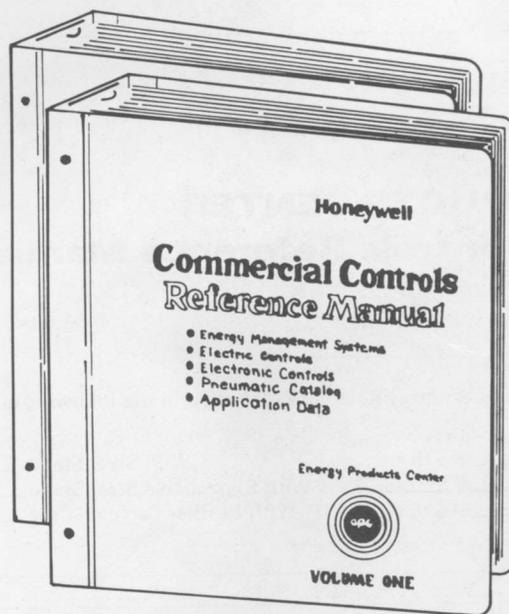
Orders must include a check or money order (for each two-volume manual) payable to Honeywell Inc. First update is included in initial order price. An annual subscription charge of \$40 will be made to you for maintaining regular (approximately every six months) updates.

Please mail to:

HONEYWELL INC.
Energy Products Center
Information Service Coordinator—MN38-5122
10400 Yellow Circle Drive
Minnetonka, MN 55343

TRADELINE 

*For Information about
the
Energy Products Center
Commercial Controls
Reference Manual
see page 251.*



TRADELINE 

Honeywell

ENERGY PRODUCTS CENTER

SPECIFYING ENGINEER'S REFERENCE

(71-6218)



This reference is designed to provide the design professional with a comprehensive data file on Honeywell Energy Products Center products and systems. The reference contains sections on:

- Control System Guide Specifications
- Control Theory and Fundamentals
- Control Component Specifications
- Submittal Specifications

Honeywell

ENERGY PRODUCTS CENTER

Specifying Engineer's Reference

Order Form



Amount enclosed \$ _____

Please send me _____ copies of Specifying Engineer's Reference (71-6218) at \$30 each to:

Name: _____

Company: _____

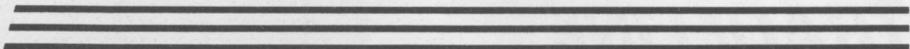
Address: _____

City, State: _____ Zip: _____

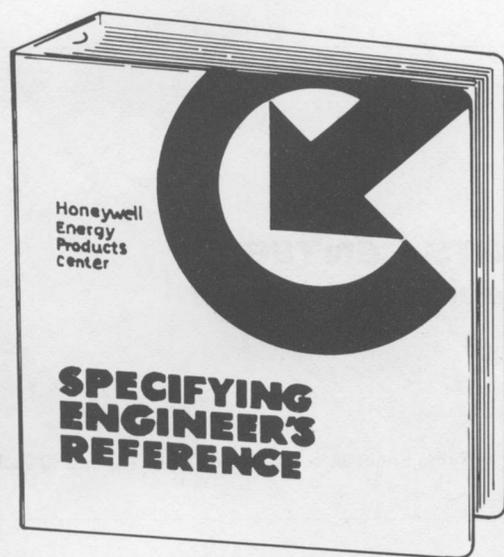
Orders must include a check or money order made payable to Honeywell Inc., for \$30.00 per manual (which also covers mailing and handling).

Please mail to:

HONEYWELL INC.
Energy Products Center
Information Service Coordinator—MN38-5122
10400 Yellow Circle Drive
Minnetonka, MN 55343

TRADELINE 

*For Information about
the
Energy Products Center
Specifying Engineer's
Reference
see page 253.*



training materials

TRAINING MATERIALS

Honeywell has a complete line of training materials and educational aids for the instructor and/or student in the Heating, Ventilating, and Air Conditioning field. These materials cover a wide range of topics and are available in several formats.

TRAINING AIDS AVAILABLE INCLUDE

- Handbooks
- Programmed Self-instruction Texts
- Reference Manuals
- Complete Training Kits (including student workbooks and Vugraph slides)
- Honeywell Demonstrators, Testers, and Displays
- Audiovisual Programs

TO ORDER TRAINING MATERIALS, USE THE ORDER FORM ON PAGE 259.

FOR MORE INFORMATION, SEE THE DESCRIPTIONS BELOW OR WRITE TO:

Honeywell Inc.
10400 Yellow Circle Drive
Minnetonka, Minnesota 55343
ATTN: Training Administrator, MN38-1126

TRAINING BOOKLETS

These soft cover books on a variety of control subjects are authoritative references based on the knowledge and experience of our engineering and marketing experts.

Really Basic Electricity

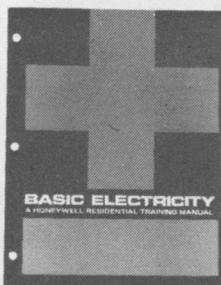
A new reference, written for the person with no background in electricity. Introduces basic concepts of ac and dc electricity. Includes pictures and diagrams. 96 pages.



71-97004 Really Basic Electricity\$4.00 ea.

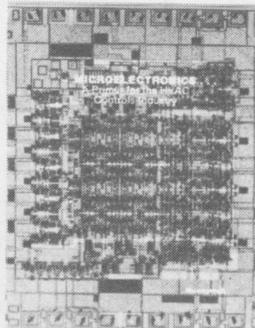
Basic Electricity

Introduction to basic electrical concepts. Only arithmetic and simple algebra are required for understanding. 40 pages.



70-6714 Basic Electricity\$1.50 ea.

Microelectronics . . . A Primer for the HVAC Controls Industry



This new booklet describes just what microelectronics is in functional, layman's terms. It covers the development and operation of microelectronics and some of its applications in the controls industry. Includes diagrams and pictures. 14 pages.

71-97769 Microelectronics . . . A Primer for the HVAC Controls Industry\$2.00 ea.

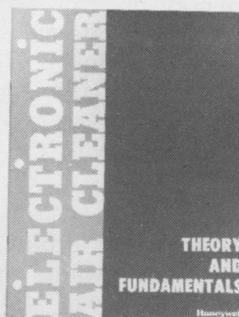
Burners and Boilers



Describes various types of commercial and industrial gas, oil, and coal burners and their operation. Also, boilers are classified by construction and size. A comprehensive and understandable introduction to the subject. 68 pages.

70-8701 Burners and Boilers\$1.50 ea.

Electronic Air Cleaner Theory and Fundamentals



Includes an introduction to air pollution, its classification and sources, plus methods of air cleaning: filters and two-stage precipitation. Honeywell electronic air cleaner design and components, and efficiency measurement. 33 pages.

70-9719 EAC Theory and Fundamentals\$1.00 ea.

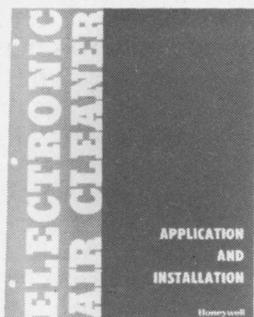
continued next page

TRADELINE

training materials

TRAINING BOOKLETS *continued*

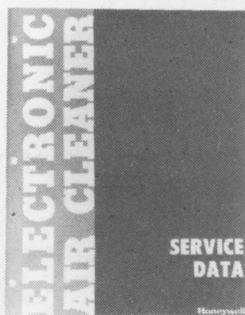
Electronic Air Cleaner Application and Installation



Includes selection and application data plus installation considerations (electrical, multiple unit). Planning for future installations. 31 pages.

70-9723 EAC Application and Installation\$1.00 ea.

Electronic Air Cleaner Service Data



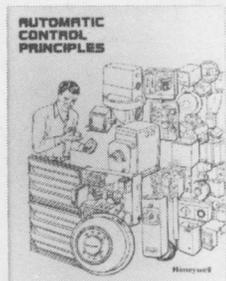
Helps service technicians provide rapid and accurate diagnosis for servicing electronic air cleaners. Includes replacement parts, model number identification, service tools and equipment, plus description, checkout and troubleshooting guide, and parts

list for Honeywell electronic air cleaners. 101 pages.

70-9724 EAC Residential Service Data\$2.00 ea.

Automatic Control Principles

Explains the theory upon which modern heating and air conditioning control systems are based. The main emphasis is on heating, ventilating and air conditioning controls. Major topics covered:

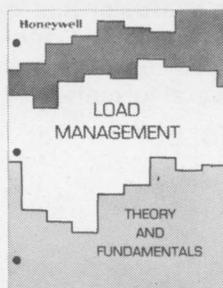


- Components of a control system.
- Modes of control.
- Types of control systems.
- Disturbance sensing elements.
- Controllers.
- Final control elements.

It's a booklet that should help to explain a broad range of control subjects to anyone who wants a thorough introduction to HVAC controls. 45 pages.

71-97152 Automatic Control Principles\$2.00 ea.

Load Management Theory and Fundamentals

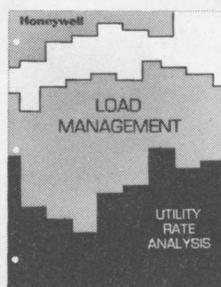


Load management is the control of electrical loads in a building to reduce overall consumption as well as lowering peak usage. The *Load Management Theory and Fundamentals* booklet explains how this is possible and shows the hardware required to do it. This is a timely and im-

portant topic for anyone concerned with electrical usage and conservation. 22 pages.

71-97432 Load Management Theory and Fundamentals\$1.25 ea.

Load Management—Utility Rate Analysis

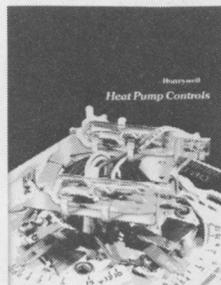


An extensive discussion of how electric utility rates are structured. Explains the basic components of the rate: consumption charge, fuel adjustment charge, and demand charge. It goes on to show examples with calculations necessary to analyze potential savings

on energy bills with load management. 52 pages.

71-97433 Load Management—Utility Rate Analysis\$1.50 ea.

Heat Pump Controls



Heat pumps are being used more frequently all the time but they do have a number of special control requirements. This useful new booklet explains the "why" and "how" of controlling auxiliary heat, compressor switching, defrost cycle, emergency heat, safety

controls, and fault indication. Includes diagrams and pictures. 48 pages.

71-97735 Heat Pump Controls\$2.00 ea.

continued next page

TRADELINE

training materials

TRAINING BOOKLETS *continued*

Flame Safeguard Controls Textbook



A comprehensive and readable text on the subject of controls for large burners and boilers. It covers primary and programming type controls, as well as all the auxiliary equipment used on large systems. 355 pages.

71-97558 Flame Safeguard Controls
Textbook\$7.00 ea.

Control Reference Manuals

A number of reference booklets are available covering a broad range of heating and air conditioning control subjects. Write for current listings.

PROGRAMMED SELF-INSTRUCTION TEXTS

A programmed instruction course presents information in small, carefully developed steps. At each step, the learner is required to apply the new information he has just received by answering a question or solving a problem. Each step or frame builds on material already presented and prepares the learner for information to follow.

Honeywell Nomenclature and Series Operation

Originally designed to be used in our own employee training program, this programmed instruction text contains general information on types of controls, so it is useful to other training situations too. Includes information on:



- Honeywell model numbering system.
- Types of control switching.
- Basic control circuits.
- Types of control motors and their operation.
- Electric modulating control principles.

71-97159 Honeywell Nomenclature
and Series Operation\$2.25 ea.

Fundamentals of Residential Controls

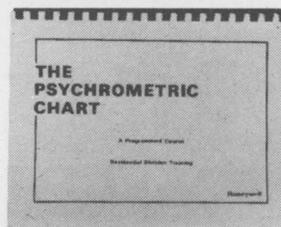


Students work at their own speed while learning the "basics" for further study in controls. Topics include: nature of electricity, rules governing electricity, inductive and capacitive circuits, principles of motor operation, transformer principles, relay principles, analyzing

control circuits. 250 pages.

71-97083 Fundamentals of Residential
Controls\$6.50 ea.

The Psychrometric Chart



Teaches relationships between the various characteristics of air—temperature, humidity, moisture current, etc. Illustrates, with examples, how to use the charts. A valuable reference for prob-

lem solving in the heating, ventilating and air conditioning industry. 101 pages.

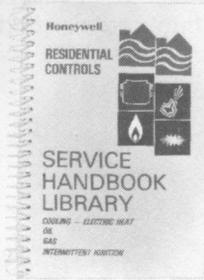
71-97444 The Psychrometric Chart\$2.75 ea.

TRADELINE

training materials

—SERVICE HANDBOOK LIBRARY—

Residential Controls Service Handbook Library

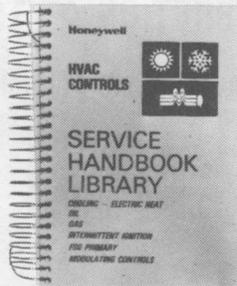


The **Residential Controls** service handbook library covers controls for electric heat and air conditioning, oil burners, gas heating systems and Intermittent Pilot Ignition devices.

71-97740 Residential Controls Service Handbook Library\$5.25 ea.

HVAC Controls Service Handbook Library

The commercial version, **HVAC Controls**, includes the subjects from the residential edition plus electronic controls, valves and dampers, control motors, economizer controls, reset controls and step controllers. In addition it includes the **RA890/R4795 Service Handbook** covering the most used Flame Safeguard primary controls.



71-97741 HVAC Controls Service Handbook Library\$6.50 ea.

Service Handbooks

Individual service handbooks are also available. Write for current titles and prices.

—DEMONSTRATORS AND TESTERS—

Some heating and air conditioning control systems are difficult to demonstrate in a classroom setting. Demonstrators can make an effective contribution to the understanding of how systems work. Honeywell has a number of demonstrators and testers that will be a helpful part of any instruction. Write for the latest information on demonstrators.

—AUDIOVISUAL PROGRAMS—

Honeywell has several dozen audiovisual programs, describing controls for typical heating and air conditioning equipment. Programs are available in three general categories:

1. Residential heating and cooling controls.
2. Flame Safeguard Controls (commercial and industrial burner and boiler controls).
3. Energy control systems for light commercial heating and cooling equipment.

For current titles and prices, write:

Honeywell Inc.
10400 Yellow Circle Drive
Minnetonka, Minnesota 55343
ATTN: Training Administrator, MN38-1126

—CLASSROOM TRAINING KITS—

If your responsibility includes putting on training programs for people in the HVAC business (or for students), you will quickly recognize the benefit of having professionally made visuals and presentation material. Honeywell has developed programs on all our controls. Write for complete descriptive literature and prices. A typical kit includes:

1. Instructor's manual.
2. Visuals—8 x 10 in. color transparencies for the overhead projector.
3. Student notebooks (review questions).
4. Reference manual.

—SEMINARS—

Honeywell Energy Products Center conducts a number of seminars, some in Minneapolis and others at selected field locations, on Energy Management (Load Control and Environmental Control). They are intended for employees of Honeywell distributors and contractors desiring to get into the energy management business. Contact your Honeywell Energy Products Center Sales Representative for additional information. See the list of Honeywell field offices in this catalog (page 261).

TRADELINE

training materials

INSTRUCTIONAL MATERIALS ORDER FORM

SHIP TO:

School or Company Name _____
Attention _____
Address _____
City _____ State _____ Zip _____

BILL TO:

School or Company Name _____
Address _____
City _____ State _____ Zip _____
Authorized Signature _____
Customer PO No. _____ Order Date _____

Qty.	Form No.	Description	Unit Price ^a	Subtotal

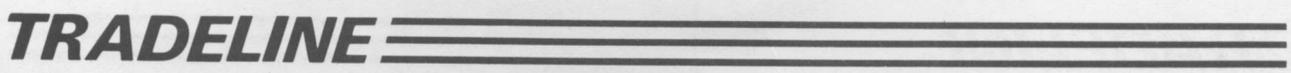
Please send me a copy of the "Training Materials Catalog," form 50-0882.

Send to:
Honeywell Inc.
10400 Yellow Circle Drive
Minnetonka, Minnesota 55343
ATTN: Training Administrator, MN38-1126

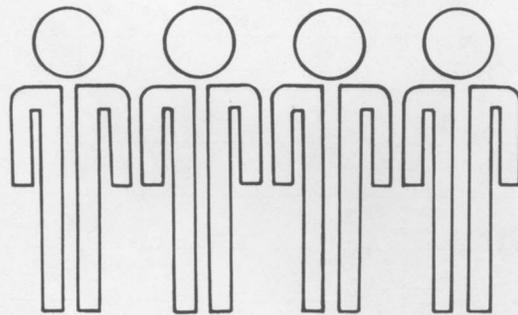
Total Order \$ _____
State Sales Tax^b \$ _____
Total Amount of Entire Order \$ _____

^aLiterature prices are subject to change.
^bTax exempt institutions must include a copy of tax exempt certificate.

Please send payment with your order unless otherwise noted. Allow 3 to 6 weeks for delivery.



*For Information about
Honeywell
Training Materials
see pages
255 through 258*



SALES OFFICES

The following cities have sales branches only. Check your local telephone directory for phone number and address. Factory shipments should be sent to Honeywell, 1885 Douglas Drive North, Minneapolis, Minnesota 55422. For international sales branches not listed below call (612)931-4175.

At Your Service

From Coast to Coast

ALABAMA
Birmingham (RCC only)
EPC contact Nashville TN

ALASKA
Contact Bellevue WA

ARKANSAS
Contact Nashville TN

ARIZONA
Phoenix

CALIFORNIA
Los Angeles
Walnut Creek

COLORADO
Englewood

CONNECTICUT
Hartford

DELAWARE
Contact Bala Cynwyd PA

DISTRICT OF COLUMBIA
Contact Dorsey MD

FLORIDA
Miami
Orlando

GEORGIA
Atlanta

HAWAII
Contact Los Angeles CA

IDAHO
Contact Salt Lake City UT

ILLINOIS
Lansing (EPC only)
Park Ridge

INDIANA
Indianapolis

IOWA
Des Moines

KANSAS
Contact Kansas City MO

KENTUCKY
Louisville

LOUISIANA
Metairie (RCC only)
EPC contact Memphis TN

MAINE
Contact Newton Highlands MA

MARYLAND
Dorsey

MASSACHUSETTS
Newton Highlands

MICHIGAN
Grand Rapids
Southfield

MINNESOTA
Edina

MISSISSIPPI
Contact Dallas TX

MISSOURI
Kansas City
St. Louis

MONTANA
Contact Englewood CO

NEBRASKA
Omaha

NEVADA
Las Vegas area contact Los Angeles CA
Reno area contact Walnut Creek CA

NEW HAMPSHIRE
Contact Newton Highlands MA

NEW JERSEY
Westfield

NEW MEXICO
Contact Englewood CO

NEW YORK
Amherst
Liverpool
New Hyde Park

NORTH CAROLINA
Charlotte

NORTH DAKOTA
Contact Edina MN

OHIO
Cincinnati (RCC only)
Cleveland
Columbus
Dayton (RCC only)

OKLAHOMA
Oklahoma City

OREGON
Portland (RCC only)
EPC contact Bellevue WA

PENNSYLVANIA
Bala Cynwyd
Harrisburg (RCC only)
Pittsburg

RHODE ISLAND
Contact Newton Highlands MA

SOUTH CAROLINA
Contact Charlotte NC

SOUTH DAKOTA
Contact Edina MN

TENNESSEE
Memphis
Nashville

TEXAS
Dallas
Houston (RCC only)

UTAH
Salt Lake City

VERMONT
Contact Liverpool NY

VIRGINIA
Richmond (EPC only)
RCC contact Dorsey MD

WASHINGTON
Bellevue
Spokane (RCC only)

WEST VIRGINIA
Charleston (RCC only)
EPC contact Columbus OH

WISCONSIN
Brookfield

WYOMING
Contact Englewood CO

Across Canada

ALBERTA
Calgary
Edmonton

BRITISH COLUMBIA
Vancouver

MANITOBA
Winnipeg

NEW BRUNSWICK
Moncton

NEWFOUNDLAND
Contact Halifax, Nova Scotia

NOVA SCOTIA
Halifax

ONTARIO
Hamilton
London
Ottawa
Toronto

PRINCE EDWARD ISLAND
Contact Moncton, New Brunswick

QUEBEC
Montreal
Quebec City

SASKATCHEWAN
Contact Calgary, Alberta

And in Latin America

ARGENTINA
Buenos Aires

BRAZIL
Belo Horizonte
Rio de Janeiro
Salvador
Sao Paulo

DOMINICAN REPUBLIC
Santo Domingo

MEXICO
Guadalajara
Merida
Mexico City
Monterrey

PUERTO RICO
San Juan

URUGUAY
Montevideo

VENEZUELA
Caracas
Maracaibo
Valencia

TRADELINE

HONEYWELL'S "SERVICE CENTER" FOR TRADELINE REPLACEMENT PARTS

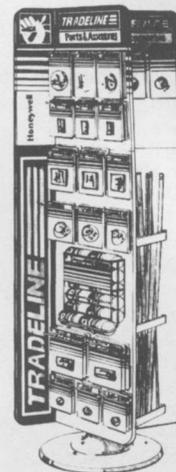
A versatile and practical display to help you sell a wide assortment of TRADELINE parts and accessories, skin-packed on cards marked with the "Service Center" logo. This high visibility display stops the eye and starts the sale of parts and accessories dealers might otherwise forget to buy. See-through packaging shows your customers exactly what they're getting. The back of the card includes installation data, or other technical information. In some cases an instruction sheet is packaged with the product.

TRADELINE Replacement Parts available for the "Service Center" are:

- 121371A Aquastat Controller Well—1/2 in. NPT, copper for 3 in. bulb, 1-1/2 in. insulation depth.
- 121371B Aquastat Controller Well—3/4 in. NPT, copper for 3 in. bulb, 1-1/2 in. insulation depth.
- 121371L Aquastat Controller Well—1/2 in. NPT, copper for 3 in. bulb, 3 in. insulation depth.
- 121371M Aquastat Controller Well—3/4 in. NPT, copper for 3 in. bulb, 3 in. insulation depth.
- 121708 Black Rectification Flame Simulator. (No test jack or jack in "F" circuit.)
- 123514A Brown Rectification Flame Simulator. (Test jack in "G" circuit.)
- 123514B Purple Minipeeper Flame Simulator.
- 129044A Adapter Plate Assembly, to cover unpainted or damaged surface T26, T86F, TS86, T87, and Q539.
- 130224A Setting Knob, T220, T42, T473, T92, T921, H400 and H600.
- 130367 Plug-in Cadmium Sulfide Photocell for use in C554.
- 130441UA Powerhead, V8043A Zone Valve.
- 130810A Cover-mounted Transformer. 120 V, 60 Hz for Modutrol motors.
- 130810B Cover-mounted Transformer. 120/208/240 V, 60 Hz for Modutrol motors.
- 132569 Contact Cleaner. For all relays and programmers.
- 139278B Auxiliary Switch. Spdt for 25/30/40/50 amp contactors.
- 7640JT Weatherproofing Kit for M945, M445, M845, M745, and M7045.
- 802344A Body O-Ring for V4043,4 and V8043,4; contains two.
- 802360JA Replacement Motor—V8043, V8044 Zone Valves.
- TG502A1027, T872 Key Lock Cover.
- TG502A1035, T872 Key Lock Cover.
- 102988 Vacuum Tube for RA890E flame safeguard relays; RA190B; R478A,B; R4074B1008 and R4074B1032.
- 103598A Ball Joint Assembly for 1/4 in. pushrods (Q257A, Q298B).
- 104643A Adapter Assembly to control 2 dampers from one motor.
- 104994A Calibration Wrench, low voltage thermostats.

- 107403 Heat-conductive Compound.
- 111332A Packing Cone for V5045; contains three.
- 112622AA Aquastat Controller Well for 4 in. bulb, 1/2 in. NPT, 1 in. insulation depth.
- 112630AA Aquastat Controller Well for 4 in. bulb, 3/4 in. NPT, 1 in. insulation depth.
- 113236 Vacuum Tube for C7012.
- 114191A Auxiliary Switch Assembly for V2045.
- 115330 Vacuum Tube for C7012, C7020.
- 26025BA Damper Crank Arm for 3/8 in. shaft; contains two.
- 26025GA Damper Crank Arm for 1/2 in. shaft with 5 in. radius arm; contains two.
- 27518A Universal Ball Joint Assembly for 5/16 in. pushrod; contains four.
- 311266D Bulb Holder Assembly for use with T615; T675; T678; T915A-F,M; L643; W655.
- 314439 Clip for capillaries.
- 34886A Outdoor Bulb Shield.
- 37356 Connector.
- 38316 Rectification Photocell for C7003, C7010, C7013, and C7014 detectors.
- 4074ACC Normally Open Contacts for R4210/R8210 series contactors.
- 4074BPD Normally Closed Contacts for R4210/R8210 series contactors.
- 4074BPE 40 amp Contact Assembly for R8212, R8214.
- 4074BPV 25/30 amp Contact Assembly for R8212, R8214.
- 4074BVS 50 amp Contact Assembly for R4220/R8220.
- 4074EAC Modutrol Motor Resistor Kit.
- 7616BRA Motor Crank Arm; contains two.
- 27520C Pushrod, 12 in.
- 27520D Pushrod, 15 in.
- 27520E Pushrod, 18 in.
- 27520G Pushrod, 24 in.
- 27520K Pushrod, 36 in.
- 27520L Pushrod, 48 in.

To order a Honeywell "Service Center" and replacement parts, contact your Honeywell Sales Representative.



TRADELINE

Honeywell

RESIDENTIAL GROUP WARRANTY POLICY

Honeywell warrants its Residential Group products (except those parts designated on Honeywell's price lists as not covered by this warranty) to be free from defects due to workmanship or materials, under normal use and service, for twelve (12) months from date of installation. If a product is defective due to workmanship or materials, is removed within twelve (12) months after installation, and is returned to Honeywell in accordance with the procedure described below, Honeywell will, at its option, either repair, replace or credit the customer for the purchase price of the product, in accordance with the procedure described below. This warranty extends only to persons or organizations who purchase Honeywell's Residential Group products for resale.

The express warranty above constitutes the entire warranty of Honeywell with respect to Residential Group products and IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL HONEYWELL BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

INSTRUCTIONS—INSTALLING OR SERVICING CONTRACTOR OR DEALER

When replacing a Honeywell product under warranty, including those products furnished on original heating and/or cooling equipment, you should rely on your local Honeywell Wholesaler or Distributor for prompt and efficient product replacement service.

A Honeywell Returned Goods Identification Tag (form 81-2586-060) must be completed and signed by the servicing dealer/contractor prior to submitting the product to the Honeywell Wholesaler or Distributor. (Tags may be obtained from the Wholesaler or Distributor in advance.) No warranty claim for product replacement or credit will be honored by the Wholesaler/Distributor without a completed warranty tag attached.

INSTRUCTIONS—WHOLESALE OR DISTRIBUTOR

The following will apply to the return of any product to Honeywell under this warranty:

Any products which are:

- (i) identified with Honeywell's Returned Goods Identification Tag (form 81-2586-060);
- (ii) are listed individually with Return Goods ID Tag numbers and date codes listed on Honeywell's Returned Goods Order (form 71-96024) or a similar form;

- (iii) are protected from shipping damage;
- (iv) have certification by the installer or servicing dealer that the product was removed, due to failure, within twelve (12) months after date of installation;
- (v) are received transportation prepaid at:
Honeywell Inc.
Decatur Warehouse
8941 10th Avenue North
Golden Valley, Minnesota 55427; and
- (vi) are found by Honeywell's inspection to be defective in workmanship or materials under normal use and service

will be handled in accordance with one of the two following procedures, as specified by the customer making the return:

1. **CREDIT PROCEDURE.** Honeywell will issue credit, at Honeywell's lowest wholesaler net price in effect at the time of the return (as set forth on Honeywell's then current price sheet) within ten (10) working days from receipt by Honeywell of the return. (TRADELINE Replacement Exchange Products will be credited at Honeywell's lowest replacement exchange net price in effect at the time of such return, as shown on Honeywell's then current price sheet, and the Wholesaler's Salvage Value balance will be adjusted to reflect the return.) Honeywell reserves the right to disallow this credit option in cases

of warranty abuse. Credit will not be given on returns of the T8082 Chronotherm Thermostat.

2. **REPAIR OR REPLACEMENT PROCEDURE.** Honeywell will, at its option, either repair or replace the product free of charge and return it or its replacement lowest cost transportation prepaid. The replacement will be, at Honeywell's option, either a functionally equivalent new or replacement exchange product or an equivalent TRADELINE product. Premium transportation will be used at customer's request and expense.

Final disposition of any warranty claim will be determined solely by Honeywell. If inspection by Honeywell does not disclose any defect covered by the warranty, the product will be returned, scrapped, repaired, or replaced as instructed by the customer and Honeywell's regular service charges will apply. Products returned to the customer will be sent shipping charges collect.

If you have any questions relative to product returns to Honeywell, call or write:

Honeywell Inc.
Warranty Account Manager
8941 Tenth Avenue North
Golden Valley, MN 55427
(612) 542-7649

SPECIAL MESSAGE TO INDUSTRIAL USERS AND BUILDING OWNERS

Thank you for using Honeywell products.

As a user, when you purchase a Honeywell Residential Group product, you should expect performance from the product and, if it fails, replacement of the product from the installing dealer.

Typically, you will have purchased a Honeywell product under the following circumstances:

1. To modernize or refurbish your existing commercial and/or process control system.

2. You have purchased new commercial and/or process heating, cooling, air cleaning or humidification equipment that is furnished with Honeywell controls or components (refer to your owner's manual furnished with the equipment).
3. A control has failed on your existing commercial and/or process heating and/or cooling equipment and is replaced by a Honeywell TRADELINE product.

With few exceptions, you utilize the services of a competent plumbing, heating and/or cooling dealer/contractor for new or replacement work performed.

Although our warranty does not extend to you, Honeywell protects your supplier with a (1) year product warranty. Your supplier can rely on its local Honeywell Wholesaler/Distributor or Honeywell for prompt replacement.

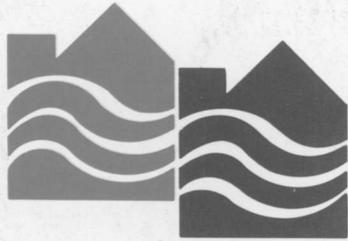
If you have any questions, need additional information or would like to comment on Honeywell's products or services, please write or phone:

Honeywell Inc.
Customer Service MN10-1872
1885 Douglas Drive North
Minneapolis, Minnesota 55422
(612) 542-7500

or check your telephone directory (white pages) for one of many Honeywell field sales offices (ask for the Residential Group).

HONEYWELL

Controls and Systems for Residential and Commercial Applications



RESIDENTIAL CONTROLS

Including Electric Heating Controls, Gas Burner Controls, Electronic Air Cleaners, Humidity Controllers, Hydronic Controls, Oil Burner Controls, Pressure Controllers, Relays and Contactors, Special Switches, Stoker Controls, Test Instruments, Thermostat Guards, Chronotherm Thermostats, Single-stage and Multistage Thermostats, Transformers, Warm Air Controls.



ENERGY PRODUCTS

Including Auxiliary Equipment, Chiller Controls, Dampers, Economizers, Environmental Control Systems, Hydronic Zone Controls, Line Voltage and Proportional Thermostats, Load Control Systems, Motors, Outdoor Reset Controls, PLC System, Refrigeration, Remote Bulb Temperature Controls, Step Controllers, Timers, Valves.

From Your Honeywell Wholesaler/Distributor

Manufacturer's Representatives and Distributors

MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

Interstate Hwy. 85-S—Mail Route 7, Box 170
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
GREENSBORO, NORTH CAROLINA 27407-9799

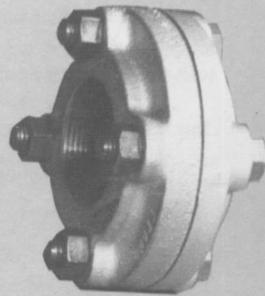
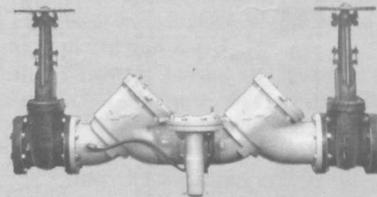
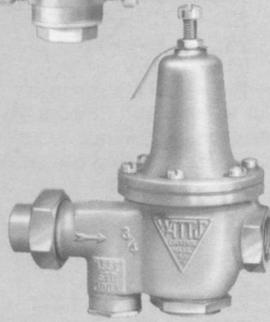
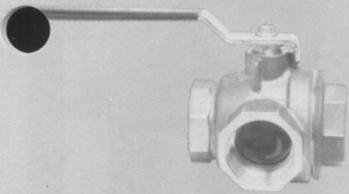
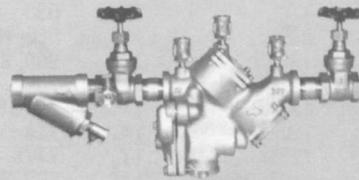
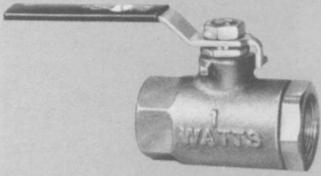


Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

CATALOG
C-85b



BALL VALVES

**WATER/STEAM
REGULATORS**

**BACKFLOW
PREVENTERS**

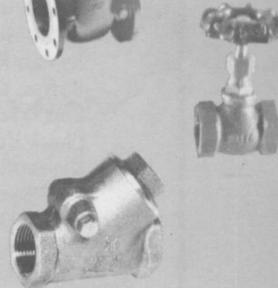
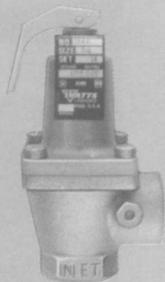
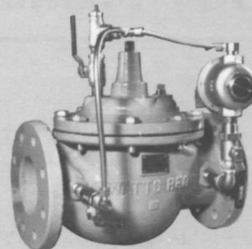
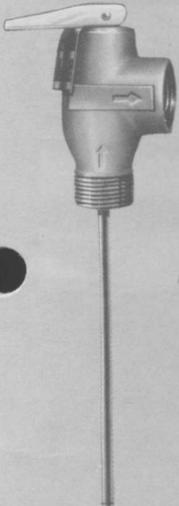
**DIELECTRIC
UNIONS/FITTINGS**

**TEMPERATURE/
PRESSURE
RELIEF VALVES**

STRAINERS

**AUTOMATIC
CONTROL VALVES**

**GATE, GLOBE
CHECK VALVES**



WATTS
REGULATOR

PRODUCT NUMBER INDEX

Series No.	Page	Series No.	Page	Series No.	Page	Series No.	Page
1L, 1XL	18	PB56	20	406, 407, 408	23	B-6010, 6011,	
HB-1	10	PV70	13	410	25	6012, 6015	5
2	22	70A	21	415	19	B-6080	4
3L	18	77F	16	N501 Series	21	B-6081	4
P3	20	77S	15	530	18	B-6300, 6301	4
U5, U5B	12	88S	15	560, H560	11	B-6400	4
7	9	100XL	18	600, 601	22	B-6780	5
TK-7, TK9A	8	N101 Series	21	709	7	B-6781	5
8	10	123LP	11	709DDC	7	B-6800	3
NF8	10	127	14	740	19	B-6801	3
9BD	9	127W	13	777S, 745	15	7771	15
9D	9	140S, 140X	17	800, 800M	8	BD	24
N9	9	T145B	20	805	23	CV, CVY	25
NLF9	9	150A	22	806	25	GV, GVS	23
PV10	13	152A	14	807	24	GLV	24
10L	18	T156B	20	890	21	MV	13
FS10-C	16	N170-M1	21	909	6	PVC, CPVC	27
FS10-F	16	174A	19	909AG, C, F, K, M	8	SC Series	24
15	27	A200	22	909EL-C, F	8	SS, SWS	24
17	15	210	17	1156F	20	ST, SWT	24
PV20	13	215	11	1450F	20	TC	22
25AUB	11	223, 223S	12	2000	19		
26A	11	N223	12	2300	13		
27	15	N240X, N241X	17	3000 Series	26		
30L	18	252A	14	G4000	23		
BP30	19	263A	11	5040A	22		
36A	18	276H300	11	5300A	19		
40L, 40XL	17	288A	10	B6000, 6001	3		
N50 Series	21	315	19	EMV II-6400-SS	5		
53, 53L	18	340, 342	17	B-6002	3		
IR56	11	388ASC	10	B-6004	3		

PRODUCT FAMILY INDEX

Product	Page
A.S.M.E. Water Pressure Relief Valves	19
Automatic Control Valves	13
Ball Valves	3, 4, 5
Plastic Ball Valves	27
Backflow Preventers	6, 7, 8, 9, 10
Backflow Preventer Test Kits	8
By-Pass Relief Valves	19
By-Pass Control Valves	19
Cast Brass Specialties	24
Check Valves	25
Dielectric Unions	26
Feed Water Pressure Regulators	20
Flow Switch	16
Gate and Globe Valves	23, 24
Hydronics and Tempering Valves	21
Low Water Cut-offs	21
Motorvalves	5
Miscellaneous Plumbing Products	22
Process Regulators for Steam	14
Steam Pressure Regulators	14
Strainers	15, 16
Temperature and Pressure Relief Valves	17, 18
Vacuum Breakers	10
Water Hammer Arrestors	22, 27
Water Pressure Regulators	11, 12, 13

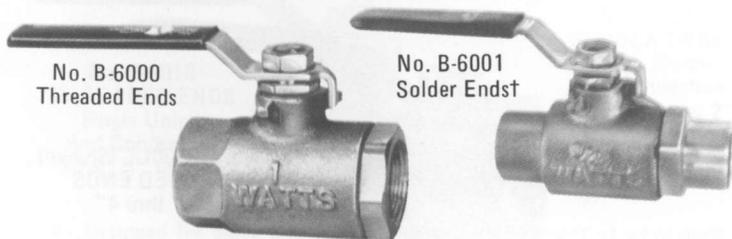
NEW - Butterfly Valves - Sizes 2" - 12" - Consult factory for availability BF-03, 04 Series.

INDEX

WATTS BALL VALVES

No. B-6000 Series

2 Piece Bronze Ball Valves, Standard Port
For Residential, Commercial and Industrial Use



No. B-6000
Threaded Ends

No. B-6001
Solder Ends†

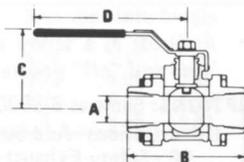
- Glass reinforced Durafill valve seats are standard, for longer lasting seats in high or low temperature applications. Suitable for full range of liquids and gases, consult factory for specific requirements.
- Hard chrome plated brass ball standard, for smooth, durable finish.
- Minimal pressure drop due to large ports.
- Bottom loaded, pressure retaining stem.
- Sizes ¼"-2" pressure rated at 600 psi WOG (non-shock) and 150 psi saturated steam. Sizes 2½"-4"; 400 psi WOG, 150 psi saturated steam.
- Suitable for temperatures from -55°F to +450°F.
- Adjustable stem packing gland.

OPTIONS - Add Suffix:

- *GS - Ground washer
- *TH - Tee handle
- *RH - Round handle - sizes ¼"-2"
- *SS - Stainless steel ball and stem
- *SH - Stainless steel handle and nut
- *XH - Extended handle
- *CL - Chain lever kit - sizes ¾"-1"
- *BS - Balancing stop
- SC - Rough chrome - sizes ¼"-2"
- *04 - Mineral filled TFE seats and seals (available in all 316SS ball and stem option valves)
- *Z15 - Less lever and nut

MODELS: B-6000UL

- U.L. - U.L. Flammable Liquids (YRBX)
- U.L. - U.L. Compressed Gas (YQNZ)
- U.L. - U.L. Fire Protection (HNFJ)
- U.L. - U.L. LP Gas (YSOT)
- U.L. - U.L. Natural/Manufactured Gas (YRPV)
- U.L. - U.L. for #1/#2 Fuel Oils (MHKZ)



B-6004 - Size ½" - 1" single hose connection. Ideal for applications where flexible hose will be used downstream of valve

DIMENSIONS (Inches) B-6000

Size	Ball Orifice	End to End	Center to Handle	Radius of Handle	Weight (Lbs.)
¼"	3/8	2 1/16	1 3/4	3 1/16	.58
3/8"	3/8	2 1/16	1 3/4	3 1/16	.60
½"	½	2 3/16	1 3/4	3 3/4	.63
¾"	1 1/16	2 13/16	2	3 3/4	1.19
1"	7/8	3 7/16	2 5/16	4 1/2	2.13
1 ¼"	1	3 7/8	2 15/16	5 1/2	3.25
1 ½"	1 ¼	4 ¼	2 15/16	5 1/2	4.13
2"	1 ½	4 13/16	3 5/8	8 1/8	6.38
2 ½"	2	4 1/4	6 1/2	8 1/8	12.75
3"	2 ½	6 13/16	4 1/2	8 1/8	17.75
4"	3	7 11/16	5	11	24.94

†B-6001

3/8", 1/2"	1/2	2 3/8	1 3/4	3 3/4	.63
¾"	1 1/16	3 5/16	2	3 3/4	1.13
1"	7/8	3 13/16	2 5/16	4 1/2	1.81
1 ¼"	1	4 1/2	2 15/16	5 1/2	2.88
1 ½"	1 ¼	5	2 15/16	5 1/2	4.25
2"	1 ½	6 ¼	3 5/8	8 1/8	6.81
2 ½"	2	7 5/8	4 1/2	8 1/8	13.00
3"	2 ½	8 3/16	4 1/2	8 1/8	18.00

Designed to be soft soldered without disassembly, using a low temperature solder; 50/50 tin lead (420°F). Other solders, 95/5 tin antimony (460°F) or 96/4 tin silver (430°F) can be used, however, extreme caution must be used to prevent seat damage. Higher temperature solders will damage the seat material. ANSI B.16.18 stated that the maximum operating pressure of 50/50 solder sweat connections is 200 PSI at 100°F and decreases with higher temperatures.

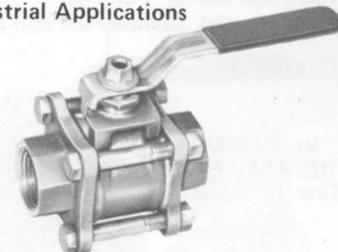
For Additional Information, send for F-B6000.

No. B-6800 Series

3 Piece Bronze Ball Valves/Full Port
For Commercial and Industrial Applications

No. B-6800
Threaded Ends

No. B-6801
Solder Ends



- Three piece lift-out design is ideal where maintenance is a must.
- High cycle life reinforced TFE stem packing seal and thrust washer.
- Excellent for throttling and balancing applications of non-abrasive fluids where minimum flow is 20% to 100% of valve capacity.
- Each valve individually tested, air under water, in the opened and closed position.
- Patented "Latch-Lok" feature is an available option.
- ¼" - 1" pressure rated at 600 psi WOG, 1 ¼" - 2" at 400 psi WOG (non-shock) and 150 psi saturated steam.
- Suitable for temperatures from -55°F to 450°F at 50 psi.
- Other features same as B-6000.

OPTIONS: See * on B-6000 plus:

- LL - Latch-Lok
- SE - Safety exhaust

DIMENSIONS (Inches) B-6800

Size	Ball Orifice	End to End	Center to Handle	Radius of Handle	Weight (Lbs.)
¼", 3/8", 1/2"	1/2	2 3/8	1 3/4	3 7/8	1.12
¾"	3/4	3 1/4	2 1/4	4 1/2	2.50
1"	1	3 7/8	2 3/4	5 1/2	4.12
1 ¼"	1 ¼	4 1/2	3	5 1/2	6.25
1 ½"	1 ½	5	3 1/2	8 1/8	9.25
2"	2	5 5/8	3 7/8	8 1/8	13.75

†B-6801

½"	1/2	2 3/8	1 3/4	3 7/8	1.12
¾"	3/4	3 1/4	2 1/4	4 1/2	2.50
1"	1	3 7/8	2 3/4	5 1/2	4.12
1 ¼"	1 ¼	4 1/2	3	5 1/2	6.25
1 ½"	1 ½	5	3 1/2	8 1/8	9.25
2"	2	6 5/8	3 7/8	8 1/8	13.75

For Additional Information, send for ES-B6800.

No. B-6002 Series

Male x Female Bronze Ball Valves, Standard Port
For Industrial Applications



No. B-6002
Male x Female
THREADED ENDS
Sizes: ¼" thru 1"

- Same features at B-6000.

OPTIONS:

Same as B-6000 except SC, U.L. and OC.

DIMENSIONS (Inches) B-6002

Size	Ball Orifice	End to End	Center to Handle	Radius of Handle	Weight (lbs.)
¼", 3/8"	3/8	2 1/2	1 3/4	3 1/16	.56
½"	1/2	2 7/8	1 3/4	3 13/16	.69
¾"	1 1/16	3 7/16	2 1/16	3 13/16	1.25
1"	7/8	4 1/8	2 3/8	4 9/16	2.12

For Additional Information, send for ES-B6002.

BALL VALVES

No. B-6080 Series

Bronze Ball Valves, Full Port
For Residential, Commercial and Industrial Applications



No. B-6080
THREADED ENDS
Sizes: 1/2" thru 2"

No. B-6081
SOLDER ENDS*
Sizes: 1/2" thru 2"

- Full port
- Virgin TFE valve seats are standard. Suitable for full range of liquids and gases, consult factory for specific applications.
- Bottom loaded, pressure retaining stem.
- Pressure rated at 400 psi WOG (non-shock)
- Handle can be positioned 180°.
- High cycle life reinforced TFE stem packing seal and thrust washer.
- Excellent for throttling and balancing applications of non-abrasive fluids where minimum flow is 20% to 100% of valve capacity.
- Adjustable stem packing gland.
- Each valve individually tested, air under water, in the opened and closed position.

OPTIONS - Add Suffix: (See page 3 for description)
GS, TH, RH, SS, SH, XH

No. B-6300 Series BALL and WASTE

Ball and Waste Bronze Valves, Full Port
For Residential, Commercial and Industrial Applications

Same as B-6080 and B-6081 except furnished with drain cock for draining or venting of downstream line when valve is in the off position.

No. B-6300
THREADED ENDS
Sizes 1/2", 3/4", 1"



No. B-6301
SOLDER ENDS*
Sizes 1/2", 3/4", 1"

DIMENSIONS (Inches)

Size	A Ball Orifice	B End to End	C Center to Handle	D Radius of Handle	Weight (lbs.)
B-6080					
1/2	1/2	29/32	15/8	33/4	.63
3/4	3/4	23/16	13/4	33/4	1.00
1	1	39/16	21/16	33/4	1.75
1 1/4	1 1/4	41/8	2 13/16	5 1/2	4.00
1 1/2	1 1/2	47/16	3	5 1/2	5.50
2	2	53/8	4	8	10.00

*B-6081

1/2	1/2	25/16	15/8	33/4	.63
3/4	3/4	33/16	13/4	33/4	1.00
1	1	37/8	21/16	33/4	1.75
1 1/4	1 1/4	45/16	2 13/16	5 1/2	4.00
1 1/2	1 1/2	43/4	3	5 1/2	5.50
2	2	6	4	8	10.00

B-6300

1/2	1/2	23/16	13/4	33/4	.63
3/4	3/4	2 13/16	2	33/4	1.00
1	1	37/16	25/16	4 1/2	1.75

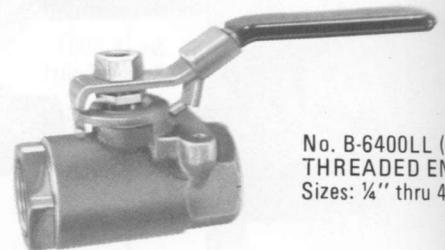
*B-6301

1/2	1/2	23/8	13/4	33/4	.59
3/4	3/4	35/16	2	33/4	.88
1	1	3 13/16	25/16	4 1/2	1.68

*See solder instructions per B-6000.

No. B-6400 Series

Bronze Ball Valves, Standard Port
For Commercial and Industrial Applications



No. B-6400LL (Shown)
THREADED ENDS
Sizes: 1/4" thru 4"

- Actuator mounting pads.
- Latch-Lok handle (optional "LL") - open and closed position (1/4"-3")
- Glass reinforced Durafill valve seats are standard, for longer lasting seats in high or low temperature applications. Suitable for full range of liquids and gases, consult factory for specific applications.
- Hard chrome plated brass ball is standard, for smooth and durable finish.
- Bottom loaded, pressure retaining stem.
- Pressure rated at 600 psi WOG (non-shock) 1/4" to 2" and 400 psi WOG (non-shock) 2 1/2" and 4"; 150 psi saturated steam.
- Suitable for temperatures from -55°F to +450°F at 50 psi.
- High cycle life reinforced TFE stem packing seal and thrust washer.
- Excellent for throttling and balancing applications of non-abrasive fluids where minimum flow is 20% to 100% of valve capacity.
- Adjustable stem packing gland.
- Each valve individually tested, air under water, in the opened and closed position.
- Available as a safety exhaust valve with locking in "off" only, or "on" and "off" positions.

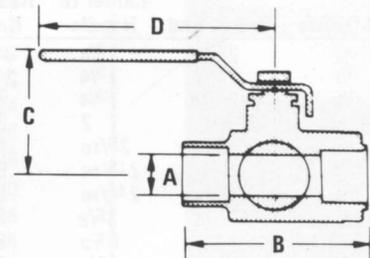
OPTIONS: Same as B-6000 except SC.

Other Options - Add Suffix:

- SE - Safety Exhaust
- SLC - Lock Closed Only (S.S.)
- LL - Latch-Lok

MODELS:

B-6400-UL - Listed U.L. approval; YRBX, YQNZ, HNFY, YRPV, YSDT and MHKZ



DIMENSIONS (Inches) B-6400LL

Size	A Ball Orifice	B End to End	C Center to Handle	D Radius of Handle	Weight (lbs.)
1/4"	1/2	2 1/4	13/4	33/4	.58
3/4"	1 1/16	27/8	2	33/4	1.19
1"	7/8	3 1/2	2 3/8	4 1/2	2.13
1 1/4"	1	37/8	3	5 1/2	3.25
1 1/2"	1 1/4	4 1/4	3	5 1/2	4.13
2"	1 1/2	47/8	35/8	8	6.38
2 1/2"	2	6 1/2	4 1/4	8	12.75
3"	2 1/2	6 13/16	43/8	8	17.75
4"	3	7 11/16	5	11	24.94

†Does not have latch-lok option.

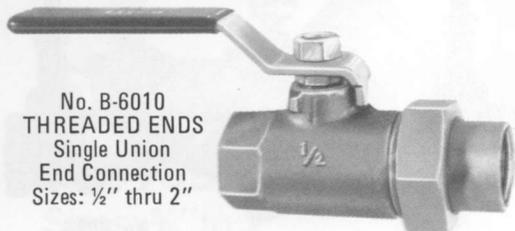
BALL VALVES



ELECTRIC MOTORVALVES

No. B-6010 Series

Single Union End Bronze Ball Valves, Standard Port
For Residential, Commercial and Industrial Applications



No. B-6010
THREADED ENDS
Single Union
End Connection
Sizes: 1/2" thru 2"

No. B-6011
SOLDER ENDS
Single Union
End Connection
Sizes: 1/2" thru 2"

- Designed for quick and easy cleaning or replacement of worn parts without dismantling pipe line.
- Pressure rated at 600 psi WOG (non-shock) 1/2" thru 2".
- Suitable for temperatures from -55°F to +225°F at 50 psi.
- High cycle life reinforced TFE stem packing seal and thrust washer.
- Excellent for throttling and balancing applications of non-abrasive fluids where minimum flow is 20% to 100% of valve capacity.
- Each valve individually tested, air under water, in the opened and closed position.
- Other features same as B-6000 page 3.

OPTIONS:

Same as B-6000 on page 3 except SC, U.L. and OC.

OTHER MODELS:

B-6012 - Sweat x Union Female Threaded Connections.

B-6015 - Threaded x Union Sweat Connections.

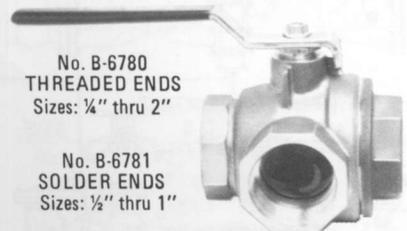
DIMENSIONS (Inches)

Size	A		B		C		D		Weight (lbs.)	
	Ball	Orifice	End to End	*B-6010	Center to Handle	Radius of Handle	B-6010	*B-6011	B-6010	*B-6011
1/2	1/2	23/16	23/8	13/4	33/4	.63	.63			
3/4	11/16	213/16	35/16	2	33/4	1.19	1.13			
1	7/8	37/16	313/16	25/16	41/2	2.13	1.81			
1 1/4	1	51/8	41/2	215/16	51/2	4.00	2.88			
1 1/2	1 1/4	511/16	5	215/16	51/2	5.65	4.25			
2	1 1/2	61/8	61/4	35/8	6	8.25	6.81			

*See solder instructions per B-6000.

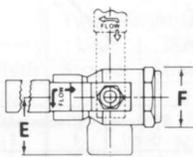
No. B-6780 Series

Three-Way Diverter Bronze Ball Valves, Full Port
For Residential, Commercial and Industrial Applications



No. B-6780
THREADED ENDS
Sizes: 1/4" thru 2"

No. B-6781
SOLDER ENDS
Sizes: 1/2" thru 1"



- Suitable for full range of liquids and gases, consult factory for specific applications.
- Pressure rated at 400 psi WOG (non-shock) and 125 psi saturated steam.
- Suitable for temperatures from -55°F to +350°F at 50 psi.
- Excellent for throttling and balancing applications of non-abrasive fluids where minimum flow is 20% to 100% of valve capacity.

DIMENSIONS (Inches) B-6780

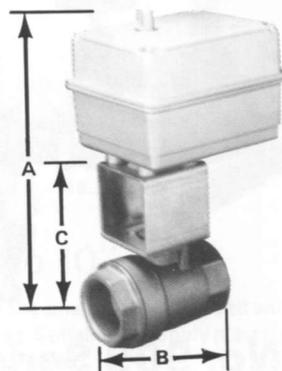
Size	A		B		C		D		E		F		Weight (lbs.)
	Ball	Orifice	End to End	Center to Handle	Radius of Handle	Center to Side	Diameter	B-6780	B-6781	B-6780	B-6781		
1/4, 3/8, 1/2	1/2	29/32	15/8	33/4	1 1/4	1 1/4	1 1/4	.66					
3/4	3/4	213/16	13/4	33/4	19/16	1 1/8	1 1/8	1.00					
1	1	39/16	21/16	33/4	1 7/8	1 1/8	1 1/8	1.88					
1 1/4	1 1/4	41/8	213/16	51/2	2 1/16	2 3/4	4.00						
1 1/2	1 1/2	47/16	3	51/2	2 7/32	2 3/16	5.50						
2	2	53/8	4	8	2 11/16	4 1/16	10.00						
*B-6781													
1/2	1/2	25/16	15/8	33/4	1 1/8	1 1/4	.66						
3/4	3/4	33/16	13/4	33/4	19/16	1 1/8	1.00						
1	1	37/8	21/16	33/4	1 15/16	2 1/8	1.88						

For Additional Information, send for ES-B6010 or ES-B6780.

No. EMV II Series 1/4" - 3"

Electric Motorvalves

EMV II Series combines our positive shut-off, quarter-turn ball valves with a highly efficient, reliable, electric operator. A compact high performance package. Completely assembled for positive fit and fast installation. 100 PSIG steam working pressure, 600 PSI WOG for 1/4", 2", 400 PSI WOG for 2 1/2" and 3". Maximum operator temperature 150°F. 24 VAC and 115 VAC models. 100 lb. steam rating.



- 100% duty cycle
- Mountable any position
- Completely self-contained
- Zone control valve for space heating with hot water or steam
- Zone control valve for air conditioning with chilled water
- Remotely operated valve for control of process liquids or gases, i.e. steam, water, air
- Can be used as a drain or blow-down valve to eliminate water from compressed air lines and systems
- Optional timer available to allow "Programming" on-off cycle period and frequency

Size (Inches)	Number	Operator Voltage (AC)	Operator Cycle (Sec.)
1/4, 3/8, 1/2	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
3/4	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
1	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
1 1/4	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
1 1/2	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
2	EMV II-6400-SS	115	35
	EMV II-6400-SS	115	8
	EMV II-6400-SS	24	40
2 1/2	EMV II-6400-SS	115	45
	EMV II-6400-SS	24	45
	EMV II-6400-SS	115	45
3	EMV II-6400-SS	115	45
	EMV II-6400-SS	24	45
	EMV II-6400-SS	24	45

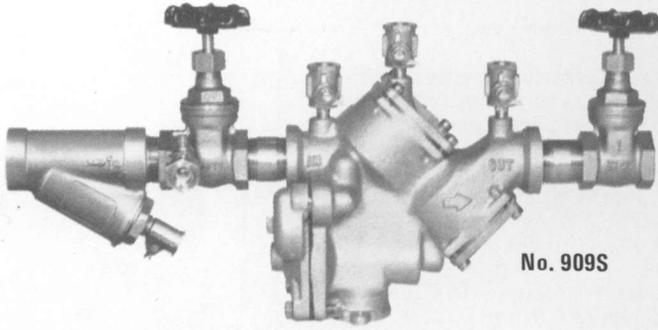
Note: A 40VA transformer will handle all 24 volt operators shown above.

APPROX. DIMENSIONS (Inches)

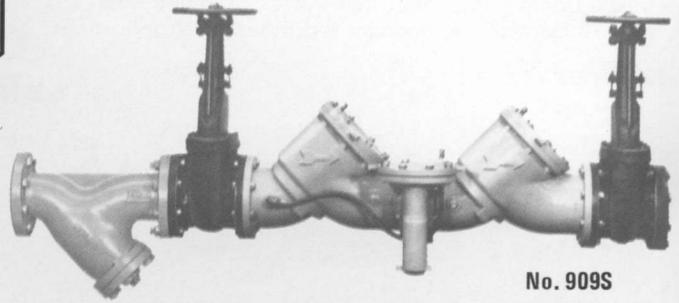
Size	A	B	C	CV Factor	Weight (lbs.)
1/4, 3/8	7.83	2.23	3.09	6.3	8.75
1/2	7.83	2.23	3.09	9.0	8.75
3/4	7.99	2.88	3.25	24.5	9.25
1	8.18	3.41	3.44	33.5	10.25
1 1/4	8.91	3.96	4.17	45.5	10.75
1 1/2	9.11	4.33	4.37	73.0	11.75
2	9.47	4.85	4.73	102.0	14.25
2 1/2	12.06	6.50	5.21	200.0	23.00
3	12.35	6.81	5.50	300.0	27.50

For voltage and operating cycles, send for F-EMV II.

Reduced Pressure Principle BACKFLOW PREVENTERS



No. 909S



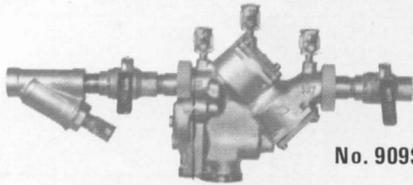
No. 909S

No. 909 Series Sizes: 3/4" to 2"

Provides superior cross connection protection control for cold and hot water installations. Unique patented design of "air-in/water-out" principle, provides substantially improved relief valve discharge performance during the emergency conditions of combined back-siphonage and backpressure with both checks fouled. Standardly furnished with NPT connections and non-rising stem (NRS) gate valves.*

Tested and certified under the following standards for reduced pressure backflow preventers: A.S.S.E. No. 1013; AWWA C506; CSA B64.4; FCCCHR of USC Manual Section 10; U.L. Classified File No. EX3185. Accepted by IAPMO (UPC); SBCCI (Standard Plumbing Code).

- Bronze body construction
- Modular design, replaceable seats
- Ball valve test cocks
- Horizontal or vertical (up) installation



No. 909S-QT

OPTIONS: (Can be combined) Use suffix:

- S - with bronze strainer.
 - HW - with stainless steel check modules for hot water and harsh water conditions.
 - QT - with full port Watts bronze ball valves.
- Prefix U - (3/4" and 1" sizes only) with bronze body unions.
- Air Gap/Elbow see page 8.

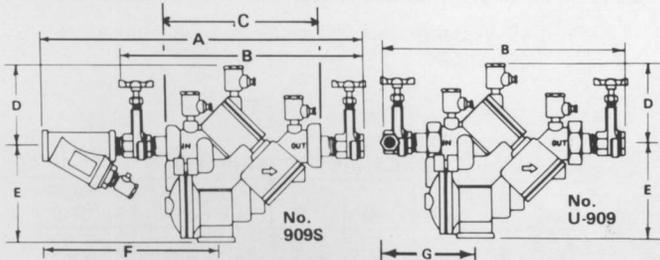
PRESSURE-TEMPERATURE

No. 909 suitable for supply pressure up to 175 PSI and water temperatures up to 140°F.

No. 909HW suitable for supply pressure up to 175 PSI and water temperatures up to 210°F.

CONNECTIONS

Sizes 3/4" and 1" have NPT connections.
Sizes 1 1/4", 1 1/2" and 2" have screwed end flange connections.

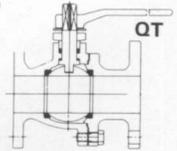


Size	DIMENSIONS (Inches)									Total Weight (lbs.)	
	A	B	C	D	E	F	G	Width	Less Strainer	With Strainer	
3/4"	19	13	75/16	4	43/4	93/4	5 1/4	37/8	14	15 5/8	
1"	20 1/2	13 1/2	75/16	4 3/8	43/4	11 1/2	5 1/2	37/8	15	17 1/2	
1 1/4"	26 5/8	15 7/8	10 3/8	5	6 5/8	12 1/2	6	5 1/4	40	42 3/4	
1 1/2"	26 3/4	16 1/4	10 3/8	5 1/2	6 5/8	13 1/2	6	5 1/4	40	44	
2"	27 1/8	16 3/4	10 3/8	6 3/8	6 5/8	14 1/2	6 1/4	5 1/4	40	47 3/8	

No. 909 Series Sizes: 2 1/2" to 10"

These larger size No. 909's are similar to the smaller sizes providing the same protection in cross connection control, with its unique patented design incorporating the "air-in/water-out" principle. Furnished with non-rising stem (NRS) gate valve shut-offs.*

- Body construction; epoxy coated cast iron (2 1/2"-10")
Optional bronze body construction on 2 1/2" and 3"
- Removeable bronze seats
- Stainless steel internal parts

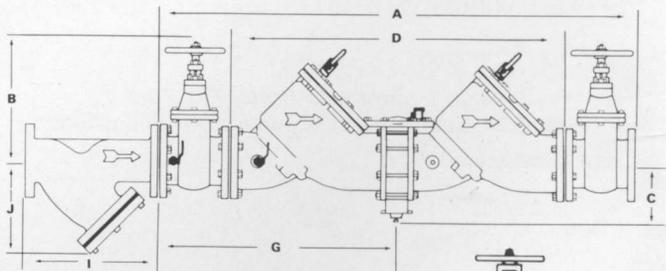


OPTIONS: (Can be combined) Use Suffix:

- S - with strainer, FDA approved epoxy coating.
- OS&Y - with outside stem & yoke gate valve shut-offs.
- QT - with 1/4-turn ball valve shut-offs 2 1/2" - 6" (consult factory)
- LF - without gate valves
- Air gaps see page 8.

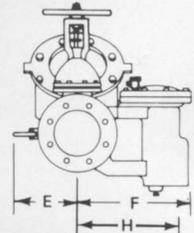


With OS&Y gate valves



Strainer (Size)	Dimensions I	J	Weight (lbs.)
2 1/2"	12	8 1/2	40
3"	14	10	52
4"	16 1/2	11 1/2	77
6"	20 1/4	15	108
8"	23	19 3/4	275
10"	26 3/4	23	413

END VIEW



SIZE	DIMENSIONS (Inches)										Weight (Lbs.)	
	A	NRS	O.S.&Y.	C	D	E	F	G	H	NRS	O.S.&Y.	
2 1/2"	4 1/4	1 1/8	1 5/8	5 1/4	2 1/8	4	9	20 5/8	7 5/8	195	198	
3"	4 2 1/4	1 3/8	1 8 1/2	5 1/4	2 1/8	5	9	21 1/4	7 5/8	225	230	
4"	5 5 1/8	1 5/8	2 3 3/4	6	37	6	13 5/8	27 5/8	11 3/4	455	470	
6"	6 5 1/2	1 9 3/4	3 2 1/2	6	44 1/2	11	13 5/8	32 3/4	11 3/4	718	798	
8"	7 8 3/4	2 1 1/2	3 9 1/4	9 3/4	5 5 1/4	11 1/4	18 1/2	39 3/8	16 3/8	1,350	1,456	
10"	9 3 5/8	2 9 1/4	4 8	9 3/4	6 7 3/8	12 1/2	18 1/2	46 7/8	16 3/8	2,160	2,230	

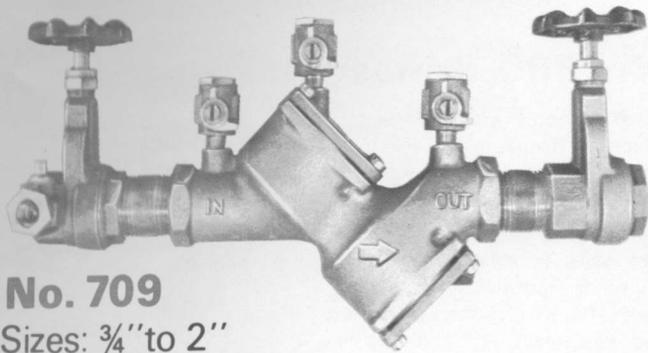
SIZE	QT		OS&Y		QT	
	A	B	C	D	E	F
2 1/2"	39	6	5 1/4	2 1/8	4	9
3"	40	7	5 1/4	2 1/8	5	9
4"	52	9	6	37	6	13 5/8

Patent #4,241,752

*Resilient Seated Shut-off Valves available for 709, 800, 909 Series Backflow Preventers. Send for ES-RSV.

WATTS

DOUBLE CHECK VALVE ASSEMBLY



No. 709
 Sizes: 3/4" to 2"

No. 709 Series features a modular design concept which facilitates complete maintenance and assembly by retaining the spring load access. The first and second check modules are interchangeable. All sizes are standardly equipped with (NRS) gate valves and ball type test cocks. All sizes can be installed horizontally or vertically. Supply pressures up to 175 PSI and temperatures to 140°F.

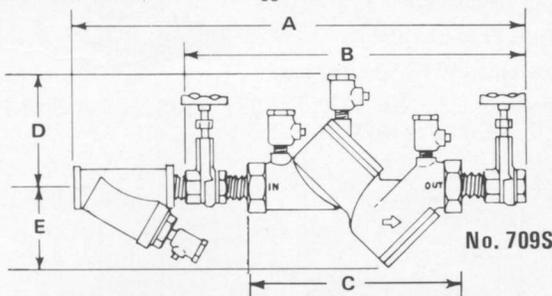
709 - 3/4" thru 2" sizes have NPT body connections and NRS gate type shut-off valves.*

Tested and certified under the following standards for double check valve backflow preventers: A.S.S.E. No. 1015, AWWA C506, CSA B64.5, FCCCHR of USC Manual Section 10, U.L. Classified File No. EX3185. Accepted by IAPMO (UPC), SBCCI (Basic Plumbing Code).

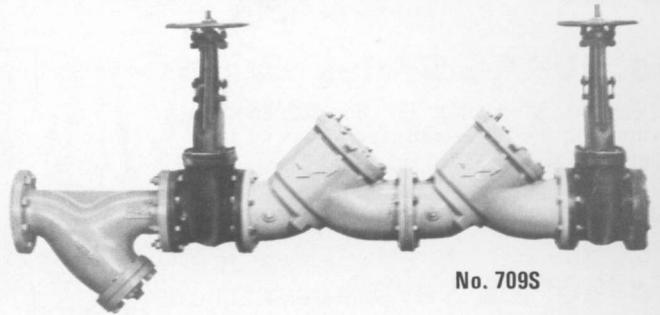
- Bronze body construction
- Modular construction with replaceable seats
- Ball valve test cocks

OPTIONS: (Can be combined) Use Suffix:

- S** - for bronze strainer, all models 3/4" thru 2"
- HW** - for hot water to 210°F and aggressive water conditions.



SIZE	DIMENSIONS (Inches)						Total Weight (Lbs.)	
	A	B	C	D	E	Width	Less Strainer	With Strainer
3/4"	16	12 1/4	7 1/8	4	2 7/8	2 3/4	7 1/4	9
1"	17 3/4	13 3/4	7 1/8	4 3/8	2 7/8	2 3/4	8 1/2	11 1/2
1 1/4"	21 3/4	16 1/2	10 1/8	5	4 7/8	4 1/4	22	26
1 1/2"	23	16 3/4	10 1/8	5 1/2	4 7/8	4 1/4	22 3/4	27 1/4
2"	24 3/4	17 3/4	10 1/8	6 3/8	4 7/8	4 1/4	24 1/2	32 1/2



No. 709S Sizes: 2 1/2" to 10"

These larger size No. 709's are similar to the smaller sizes equipped with (NRS) gate valves* and ball type test cocks. Suitable for supply pressures up to 175 PSI and water temperatures to 110°F.

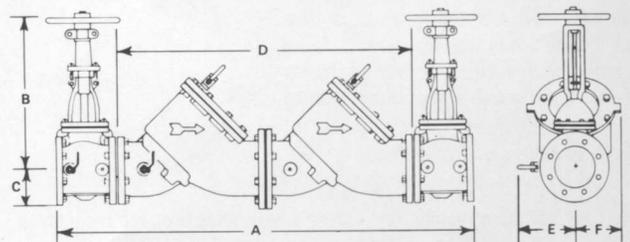


With OS&Y gate valves

- Body construction; epoxy coated cast iron (2 1/2"-10")
 Optional bronze body construction on 2 1/2" and 3"
- Removeable bronze seats
- Stainless steel internal parts

OPTIONS: (Can be combined) Use Suffix:

- S** - with epoxy coated strainer, FDA approved epoxy coating.
- OS&Y** - for outside stem and yoke gate valves 2 1/2"- 10".
- LF** - without gate valves.
- QT** - for 1/4-turn ball valve shut-off valves 2 1/2"- 6" (Consult factory)



Strainer dimensions and weight same as 909 page 6.

SIZE	DIMENSIONS (Inches)							WEIGHT (Lbs.)	
	A	NRS	OS&Y	C	D	E	F	NRS	OS&Y
2 1/2"	39	11 3/8	15 7/8	3 1/2	24	4	3	167	170
3"	40	12 3/4	18 1/2	3 3/4	24	5	3	167	170
4"	52	15 3/8	23 3/4	4 1/2	34	6	6	368	383
6"	62 1/2	19 3/4	32 1/2	5 1/2	41 1/2	11	7 1/2	627	707
8"	75	24 1/2	39 1/4	6 1/2	52	11 1/4	9	1201	1307
10"	90	29 1/4	48	8	64	12 1/2	10 1/4	2003	2073

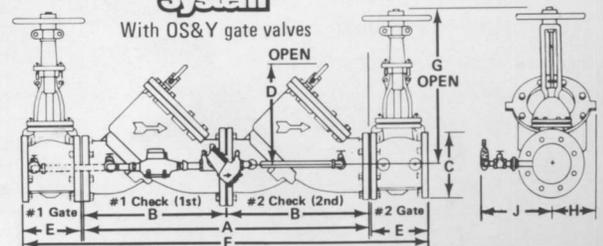
For Additional Information, send for C-BPD.

No. 709 DDC/OS&Y Double Detector Check Valve Assembly

Equipped with a CFM meter and double check valve assembly. Used to prevent the backflow of non-potable fluids into the potable water supply system and to detect leaks underground or unauthorized use of the water supply. Typical application would be to prevent the backflow of non-potable fluids found in fire protection systems into the potable water supply.

Suffix CFPM for cu. ft./min. or Suffix GPM for gal./min. meter

Size	DIMENSIONS (Inches)										WEIGHT (Lbs.)	
	A	B	C	D	E	F	G	H	J	LF	OS&Y	
3"	24	12	7 1/2	7	8	40	12 3/4	3	14	-	170	
4"	34	17	9	9 1/2	9	52	15 3/8	6	15	159	383	
6"	41 1/2	20 3/4	11	14 1/2	10 1/2	62 1/2	19 3/4	7 1/2	16	375	707	
8"	52	26	13	18 1/2	11 1/2	75	24 1/2	9	17	687	1307	
10"	64	32	16	21 1/2	13	90	29 1/4	10 1/4	18	1089	2073	



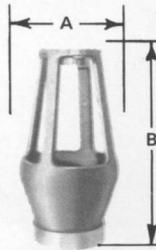
For Additional Information, send for ES-709DDC.

BACKFLOW PREVENTER AIR GAPS - TEST KITS

No. 909AG Series AIR GAPS

For use with 3/4" through 10" No. 909 Backflow Preventers on horizontal installations. Can be easily mounted to body.

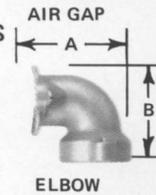
For: 3/4", 1" 909-AG-C 4" thru 6" 909-AG-K
1 1/4" thru 3" 909-AG-F 8" thru 10" 909-AG-M



No. 909EL Series VENT ELBOWS

Used with Series 909-AG Air Gap for connections to 3/4" through 3" No. 909 Backflow Preventers on vertical installations.

Specify: No. 909-EL-C for 3/4" and 1".
No. 909-EL-F for 1 1/4" through 2".



Iron Body No.	Desc.	For No. 909 Sizes	Drain Outlet Size	Dimensions		Weight
				A	B	
909-AG-C	Air Gap	3/4" and 1"	1"	3 1/4"	4 7/8"	1 1/2 lbs.
909-EL-C	Elbow	3/4" and 1"	—	2 3/8"	2 3/8"	3/8 lbs.
909-AG-F	Air Gap	1 1/4" thru 3"	2"	4 3/8"	6 3/4"	3 1/4 lbs.
909-EL-F	Elbow	1 1/4" thru 2"	—	3 5/8"	3 5/8"	2 lbs.
*909AG-K	Air Gap	4" thru 6"	3"	6 5/16"	9 9/16"	6 1/4 lbs.
*909AG-M	Air Gap	8" thru 10"	4"	7 5/16"	11 1/4"	15 1/2 lbs.

*Epoxy coated

No. TK-9A

Backflow Preventer Test Kit

This test kit is made especially for testing all Reduced Pressure Principle Backflow Prevention Devices. It is easily connected to any RPZ device enabling accurate testing of "zone" and relief valve opening differential fouled check valves or similar problems that visual inspections cannot locate.

- Max. working pressure - 175 psi
- Max. working temperature - 210°F

The test kit contains: gauge, test valves, hoses, adaptors, securing strap, instruction guide and lightweight case.

For Additional Information, send for S-FT-TK-9A.

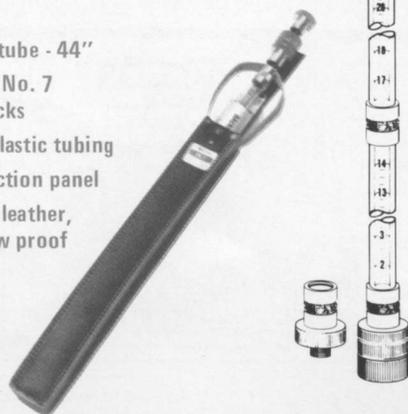


No. TK-7

Backflow Preventer Test Kit

Especially made to test the individual check modules of the Watts No. 7 Residential Dual Check and can also be used to test No. 709 and any standard double check valve. The test kit contains three segments of durable shatterproof tubing, two brass adaptors used to assemble the three tubing segments and test hardware to enable testing of No. 7 Check Modules and standard double checks.

- Total working height of tube - 44"
- Adaptors - (2) Brass, for No. 7 modules and double checks
- Tubing - 3 segments of plastic tubing
- Moisture resistant instruction panel
- Case - durable simulated leather, weatherproof and mildew proof



PRESSURE TYPE VACUUM BREAKERS

No. 800 Series

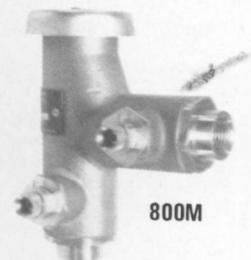
Anti-Siphon Pressure Type Vacuum Breakers

This valve is designed to prevent back-siphonage of contaminated water into a potable water supply. The valve is ideally suitable for continuous pressure piping systems applications where the water enters the equipment at or below the flood rim. The disc float and check valve are suitable for temperatures up to 210°F. The durable silicone disc on the float and the check valve have high heat and water hammer shock resistance.



*For resilient seated shut-off valves, send for spec. sheet.

- Bronze body and accessory construction
- Easy in-line maintenance of internal parts
- Serves as both an anti-siphon and check valve
- Ball valve test cocks for trouble-free operation
- Stainless steel hood
- Tightly seating shut-off valves



No. 800M, 800CM

Compact design model, ideal for OEM and other applications requiring minimum space. Features built-in ball valve shut-offs. Sizes 1/2", 3/4".

No. 800M - bronze body.

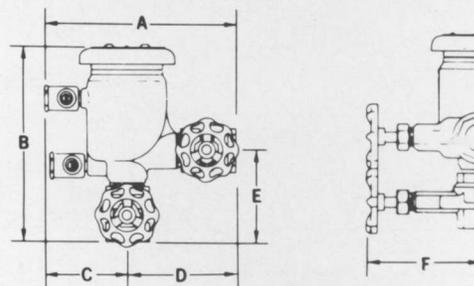
No. 800CM - chrome finish.

Working Temperature - 33°F - 210°F

Maximum Pressure - 150 PSI

Pressure Loss - 10 PSI at rated flow

Approvals - A.S.S.E. No. 1020, FCCCHR of USC, C.S.A. B.64.1.2
Listed by IAPMO.



DIMENSIONS (Inches)

No.	Size	A	B	C	D	E	F	Weight
800	1/2	7 3/4	7 3/4	3 1/8	4 5/8	4 1/16	4 1/8	5 1/16 lbs.
800	3/4	7 1/8	7 1/8	3 1/8	4	3 7/16	4 1/8	5 1/16 lbs.
800	1	7 1/8	7 1/8	3 1/8	4	3 11/16	4 1/8	6 lbs.
800	1 1/4	10 3/16	10 15/16	4 1/8	6 1/16	5 15/32	3 15/16	16 lbs.
800	1 1/2	10 3/16	10 15/16	4 1/8	6 1/16	5 3/4	4 15/16	17 3/8 lbs.
800	2	10 3/8	11 1/8	4 1/8	6 1/4	6 1/8	6 3/8	19 5/8 lbs.
800M, CM	1/2, 3/4	4 1/2	5 1/4	1 1/4	3 1/4	2 3/4	2	2 1/2 lbs.

For Additional Information, send for F-800 or ES-800M.

WATTS

BACKFLOW PREVENTERS

No. N9

Backflow Preventer
Continuous Pressure Type
with Atmospheric Vent
For Exposed Serviceable Installations

- Double check design providing dependable protection against both back-siphonage and backflow
- Suitable for use under continuous pressure
- All brass construction

Female inlet and outlet connections 1/4" or 3/8". Maximum pressure 125 psi.

No. N9C - Furnished with polished chrome finish



No. N9

No. N-LF9

Laboratory Faucet Vacuum Breaker

- Furnished with 3/8" male inlet connection for use on laboratory faucets and similar hose fixture installations
- Standardly furnished with polished chrome finish
- 3/8" male inlet connection fits standard pipe outlet or standard gooseneck spout thread
- 3/8" female outlet fits standard laboratory hose nipple or aspirator

Not for continuous pressure. Max. pressure 125 psi.

Tested and certified under ANSI/ASSE Standard No. 1035 "Laboratory Faucet Vacuum Breakers". Listed by IAPMO.



No. N-LF9

No. 7 Dual Check Backflow Preventer for Water Supply Service or Individual Outlets

Tested and certified under ANSI/ASSE Standard No. 1024 "Dual Check Valve Type Backflow Preventers".

- Two compact replaceable check modules, with buna "N" seals and stainless steel springs
- One union and "O" ring union seal
- Installed horizontally or vertically
- For installations immediately downstream from residential water meters
- Bronze body construction



Ordering Code: No. 7 can be ordered with various combinations of inlet/outlet (A) sizes, (B) thread types, (C) connection types. A letter "U" is used in prefix to the thread/connection designation and denotes union connection. **Example:** (3/4"x 3/4" - 7-U2-2) valve has 3/4" NPT thread female union inlet connection x 3/4" NPT thread female outlet connection.

Sizes: 1/2", 3/4", 1", 1 1/4"

Thread/Connection Designation

- 2 = NPT thread female 1/2", 3/4", 1"
- 3 = NPT thread male 1/2", 3/4", 1"
- *4 = Meter thread female 3/4", 1", 1 1/4"
- *5 = Meter thread male 3/4", 1"
- 6 = Pack joint thread female 3/4", 1"
- 7 = Pack joint thread male 3/4"

*Order one size larger than the water meter size.



Height	Length	Weight (lbs.)
2"	4 1/4"	1 3/4

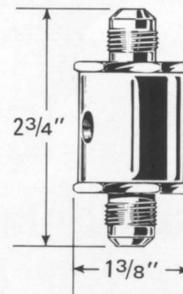
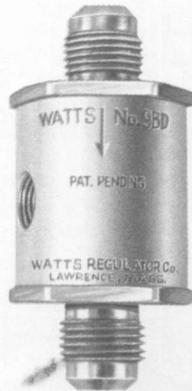
For Additional Information, send for S-7-AP or ES-7.

No. 9BD

Backflow Preventer for Vending Machine
Water Supply Lines

- Prevent backflow of carbon dioxide gas and carbonated water into the water supply system
- Double-check valve assembly to assure positive, dependable seating protection
- Equipped with a ball check valve which is a third-check member
- Stainless steel body and internal metal parts, and all rubber compounds comply with FDA food additive regulations

Size 3/8" F.C.T. inlet and outlet.



No. 9D Tested and certified under A.S.S.E. Std. 1012 and CSA Std. B64.3.

Backflow Preventer Continuous Pressure Type
with Intermediate Atmospheric Vent

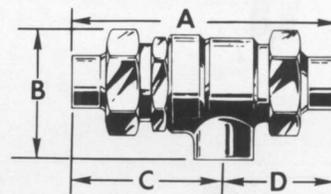
- For smaller supply lines
- Ideally suited for laboratory equipment, processing tanks, sterilizers, dairy equipment and other low hazard applications
- Particularly recommended for boiler feed lines to prevent backflow when supply pressure falls below system pressure
- Suitable for use on hot or cold water and can be used under continuous pressure
- Brass body with stainless steel working parts, integral strainer and durable rubber discs

No. 9DSC - Furnished with satin chrome finish.

Female union inlet and outlet connections.
Sizes 1/2" and 3/4". Maximum emergency backflow temperature 250°F. Maximum pressure 175 psi.



No. 9D
(May also be installed vertically down)



Size (Inches)	DIMENSIONS (Inches)				Weight
	A	B	C	D	
1/2, 3/4	4 7/8	2 1/2	2 7/8	2 1/32	1 3/4 lbs.

For Additional Information, send for C-BPD.

BACKFLOW PREVENTERS, VACUUM BREAKERS

Nos. 8 - 8A

Tested and certified under A.S.S.E. Std. 1011 and CSA Std. B64.2. Listed by IAPMO.

Hose Connection Vacuum Breakers For Back-siphonage Protection

Watts Series 8 are brass bodied devices which provide back-siphonage protection for portable hoses connected to hose thread faucets. Prevents the reverse flow of contaminated water back into the potable water supply. Suitable for either inside or outside use. Maximum pressure 125 psi.

No. 8C — Same as above but with chrome finish body.

Inlet Connection - 3/4" standard female hose thread.

Outlet Connection - 3/4" standard male hose thread.

No. 8A — Same operational construction as No. 8 except furnished with an exclusive patented "non-removable" feature to prevent unauthorized removal from sill-cock or hose hydrant.

No. 8AC - Available with chrome finish.

No. S8C - Specially made for tub and shower hand spray sets. Chrome finish.

For UPC (IAPMO) listed, specify No. 8A, 8B or NF8.

No. 8 Series is tested and certified under ANSI A112.1.3 (ASSE 1011), which precludes use under continuous pressure.

IMPORTANT: This valve should only be used in areas where spillage of water could not cause damage.



No. 8

Pat. No. 3,171,423



No. 8A

Pat. Nos. 3,459,443
3,171,423

No.	Size	Height	Width	Weight
8, 8C, 8A	3/4" HT	1 1/2"	1 3/8"	1/4 lb.
S8C	1/2"	1 1/2"	1 3/8"	1/4 lb.

This series not suitable for frost-free hydrant, see NF8 below.

No. NF8

Tested and certified under A.S.S.E. Std. 1011 and CSA Std. B64.2. Listed by IAPMO.



Hose Connection Vacuum Breaker For Wall and Yard Hydrants Subject to Freezing Conditions

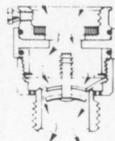
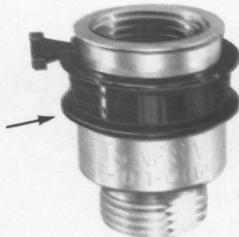
Especially made for wall and yard hydrants. Designed to permit manual draining for freezing conditions by simply pushing up a valve ring which allows collected water to drain from the outlet line during non-use freezing periods.

Furnished with a "non-removable" feature to prevent unauthorized removal from the faucet or hydrant application.

Inlet Conn. - 3/4" standard female hose thread.

Outlet Conn. - 3/4" standard male hose thread.

No. NF8C - Same as above, but furnished with chrome finish body.



No.	Size	Height	Width	Weight
NF8	3/4" HT	2"	1 1/2"	1/3 lb.
NF8C	3/4" HT	2"	1 1/2"	1/3 lb.

For Additional Information, send for ES-8.

No. 288A Series

Anti-Siphon Vacuum Breakers For Hot or Cold Water

Series 288A vacuum breakers are designed to prevent back-siphonage of contaminated water into a potable water supply.

Sizes 1/4" to 1" are available in either plain brass or polished chrome finish.

Sizes 1 1/4" to 3" standardly furnished with plain brass finish.

Maximum temperature 210°F at 125 lbs. working pressure.

No. 388ASC Sizes 1/4", 3/8". Features bottom inlet and outlet connections. Satin chrome.

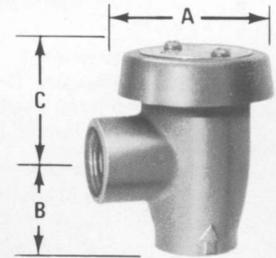
- Bronze body and internal trim
- Full size orifice for maximum flow
- Lightweight, durable "disc float" suitable for temperatures up to 210°F which closes the atmospheric vent to prevent spilling under low rates of flow

This device is not to be used under continuous pressure. For continuous pressure application, specify Watts No. 800 Series pressure type vacuum breakers. Vacuum breakers are not designed, tested or approved to protect against backpressure backflow. For protection against backpressure backflow, install Watts No. 909 Series reduced pressure principle backflow preventers.

Tested and certified under A.S.S.E. Std. 1001 (ANSI Z112.1.1) and CSA Std. B64.1.1. Listed by IAPMO.



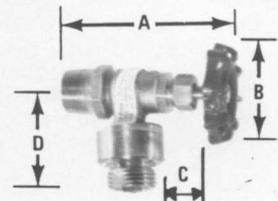
No.	Size	Dimensions			Weight
Plain Brass	Polished Chrome	A	B	C	
288A	288A-C	1/4"	1 1/16"	1 1/16"	3/8 lb.
288A	288A-C	3/8"	1 1/16"	1 1/16"	3/8 lb.
288A	288A-C	1/2"	2"	1 3/16"	1/2 lb.
288A	288A-C	3/4"	2 1/4"	1 1/2"	1 1/8 lbs.
288A	288A-C	1"	2 7/8"	1 11/16"	1 3/4 lbs.
288A	288A-C	1 1/4"	2 7/8"	1 13/16"	2 1/8 lbs.
288A	288A-C	1 1/2"	3 5/8"	2 3/16"	3 5/8 lbs.
288A	288A-C	2"	4 1/8"	2 1/2"	5 1/4 lbs.
288A	288A-C	2 1/2"	6 3/8"	3"	16 lbs.
288A	288A-C	3"	6 3/8"	3 3/8"	17 1/8 lbs.
388ASC	1/4, 3/8"	1 3/4"	—	7/8"	3/4 lbs.



No. HB-1 Brass Body

Hose Bibb Type Boiler Drain with Built-in Vacuum Breaker

Vacuum breaker provides back-siphonage protection against portable hoses connected to hose thread faucets.



- Drainable in cold weather — pull knob to drain.
- Meets ASSE Standard 1011.

No.	Size	Description	Dimensions (Inches)				Weight (lbs.)
			A	B	C	D	
HB-1	1/2"	Male I.P. or copper connection	3 5/8	2 1/8	1	2 3/16	1 1/2

WATTS

WATER PRESSURE REGULATORS

No. IR-56 Bronze Body

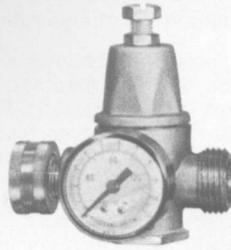
Drip Irrigation Regulator

Dependable, low-cost water regulation for grid systems. Female inlet and male outlet hose connections. Maximum water supply pressure 150 psi, adjustable from 10 to 60 psi. Delivery capacity up to 250 gallons per hour. Each system can be controlled for the necessary and desirable water pressure required. Also used for recreational vehicles.

- Sealed cage construction
- Integral stainless steel strainer screen

OPTIONS:

Suffix G - with pressure gauge.



No. IR-56G

No.	Size	Height	Length	Weight (ounces)	
				w/gauge	
IR-56, IR-56G	3/4" H.T.	3 1/4"	4"	5 1/2	7 1/4

For Additional Information, send for IS-IR-56.

No. 560, H560 Brass Body

Water Pressure Regulators

No. 560 - Compact general purpose regulator for special industrial process/plumbing applications and O.E.M. equipment. Consult factory for modified or special option requirements. Initial pressure up to 300 psi. Operating temp. range 0°F to 140°F. 1/8" gauge port (plugged).

Reduced pressure ranges:

- Suffix A for 0 - 25 psi
- Suffix B for 0 - 60 psi
- Suffix C for 0 - 125 psi

No. H560 with Hose Thread Connections - Water regulation for grid systems. Female inlet and male outlet hose connections. Max. pressure 150 psi, adjustable from 10 to 60 psi. Delivery capacity up to 250 gallons per hour. Also used for recreational vehicles.



No. 560



No. H560G

OPTIONS:

Suffix G - with pressure gauge

No.	Size	Height	Length	Weight (ounces)	
				w/gauge	
560, 560G	1/8", 1/4"	2"	1 1/2"	4 3/4	6 1/2
H560, H560G	3/4" H.T.	2"	3"	5 1/2	7 1/4

For Additional Information, send for ES-560 or IS-H560.

No. 25AUB Bronze Body

A.S.S.E. 1003

Water Pressure Regulator

For supply water pressures up to 300 lbs. and can be adjusted from 25 to 75 lbs. The standard setting is 50 lbs. The by-pass feature, incorporated into these valves, accurately controls build-up of system pressure and thermal expansion by equalizing the system and supply pressure when relief setting is in excess of available supply main pressure.

- Renewable stainless steel seat
- Stainless steel integral strainer
- High temperature resisting reinforced diaphragm for hot or cold water

OPTIONS:

Suffix

- S - with sweat tailpiece
- G - with gauge tapping
- GG - with gauge tapping and 160 lb., 0-160 gauge
- GS - with gauge tapping and sweat tailpiece
- Z3 - with stainless steel screws for rural waterworks installations or outside and pit applications
- SC - with sealed cage

25AUB
with Gauge
Suffix GG



No.	Size (Inches)	DIMENSIONS (Inches)				Weight
		A	B	C	D	
25AUB	1/2, 3/4	5 1/2	1 1/4	3 7/8	2 1/2	3 1/2 lbs.
25AUB	1	6	2	4	2 1/2	6 1/2 lbs.
*25AUB	1 1/4, 1 1/2	8 3/4	2 1/4	5 1/2	2 1/2	10 lbs.
*25AUB	2	9 3/8	3 1/4	6 3/4	2 1/2	15 lbs.

*Consult factory for availability.

For Additional Information, send for ES-25.

No. 276H300 Water Pressure Test Gauge

Hose connection pressure gauge with high pressure indicator hand used for testing water supply pressure within a building. 3/4" H.T. connection. 0-300 psi.



No. 215

Super Sensitive Low Pressure Regulator For Water, No. 2 Fuel Oil and Other Liquids

It is especially engineered for precision regulation and features an extra large diaphragm to assure close control of reduced pressure. Forged brass body.

Initial pressures up to 300 lbs.

Max. Temperature 120°F

Reduced pressure ranges:

- Suffix A for 0-8 psi
- Suffix B for 0-20 psi
- Suffix C for 0-50 psi

No.	Size	Height	Length	Weight
215	1/4", 3/8"	6"	4 1/4"	2 1/2 lbs.

No. 123LP - High performance low pressure water regulator. Reduced pressure range 10-30 lbs. Size 1/2" or 3/4".



No. 26A, 263A Brass Body

Water Pressure Regulators

For Water, No. 2 Fuel Oil and Other Liquids

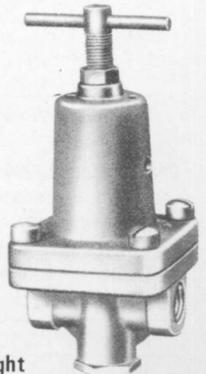
Medium capacity regulator for water. Readily meets requirements for beverage dispensing equipment, paint spraying, drinking fountains and many other services.

Initial pressures up to 300 lbs. Female inlet and outlet connections. Max. temperature 120°F.

Reduced pressure ranges: Suffix C for 10-125 psi
Suffix B for 3-50 psi Suffix D for 50-175 psi

No. 263A - has extra 1/4" low pressure side tapping. For gauge, specify Suffix G.

No.	Size	Height	Length	Weight
26A	1/8", 1/4", 3/8"	4 3/8"	2 1/8"	1 lb.
26A	1/2"	4 3/8"	2 1/8"	1 lb.
263A	1/4", 3/8"	4 3/8"	2 1/8"	1 lb.
263A	1/2"	4 3/8"	2 1/8"	1 lb.



For Additional Information, send for ES-560-26A.

Series U5 and 223 are tested and certified under American Society of Sanitary Engineers (Std. 1003) and meets all regional and local codes.

SAVE WASTEWATER SAVE ENERGY SAVE WATER

WATER PRESSURE REGULATORS

No. U5, U5B Series

STANDARD CAPACITY Water Pressure Reducing Valves with Integral Strainer

For residential, commercial and industrial applications. Furnished with union inlet connection with threaded tailpiece, for sizes 1/2" through 2". Suitable for initial pressures up to 300 lbs. Reduced pressure range 25-75 lbs. Set for 50 lbs. no flow pressure unless otherwise specified. Max. temperature 160°F.

Suffix GG - with gauge tapping and 160 lb., 0-160 gauge.

Suffix LP - low pressure range 10-35 lbs. Set for 30 lbs. no flow pressure. Max. pressure 200 lbs. Max. temp. 200°F.

Suffix HP - high pressure range 75-100 lbs. Set for 90 lbs. no flow pressure.

Suffix Z3 - sealed spring cage, corrosion-resistant cage and adjusting screws for water works and pit installations. Size 1/2" - 1".

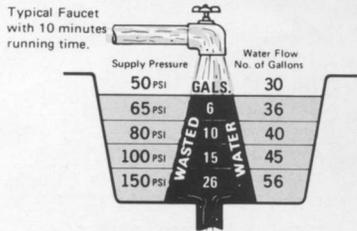
Suffix SC for sealed spring cage.

- Bronze body construction
- Stainless steel integral strainer
- Renewable stainless steel seat
- High temperature resisting diaphragm for hot or cold water

No. U5B - furnished with built-in thermal expansion by-pass equalizing feature which stops unnecessary relief valve drippage due to thermal expansion in closed systems.

However, to be effective, the pressure relief setting of a relief valve must be higher than the available supply main pressure to the reducing valve. Latest allowable working pressure standards for gas and electric water heaters is 150 lbs. which exceeds the majority of supply pressures.

Note: Almost twice as much water flows at 150 psi than 50 lbs., most of which is wasted. Reducing the water pressure will result in saving because less water flows at lower pressure.



For further information: Write for our "23 Q & A" brochure on water and energy savings.

Size	Inlet Connection	DIMENSIONS				Weight
		A	B	C		
1/2"	Union	5 3/4"	1 7/8"	5"	4 lbs.	
3/4"	Union	6 3/8"	1 7/8"	5 3/8"	5 lbs.	
1"	Union	6 3/4"	2"	6"	6 lbs.	
*1 1/4"	Union	8"	2 1/4"	6 1/8"	9 3/8 lbs.	
*1 1/2"	Union	9 1/2"	3"	6 3/4"	14 3/8 lbs.	
*2"	Union	11"	3 1/4"	9"	23 lbs.	

*Standardly supplied as U5B, U5BLP.

FLOW CAPACITIES

Chart shows the flow capacities in gallons per minute based on average conditions and reduced pressure fall-off due to demand. For specific capacities under various flow conditions, refer to F-U5.

Capacities shown are based on a difference of 50 lbs. or more between the initial pressure and the regulator lock-up pressure. Where this difference is less than 50 lbs., deduct 20% from capacity shown.

Series	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
U5	16	24	30	50	56	92	-	-	-
223	22	33	42	79	120	149	156	-	-
N223	-	-	-	-	-	-	-	185	-
127W	-	-	-	-	-	-	-	-	265

No. 223S, 223 Series

High Performance Capacity Water Pressure Reducing Valves With and Without Separate Strainers

For commercial, institutional or industrial applications. Initial pressures up to 300 lbs. Reduced pressure range 25-75 lbs. Set for 50 lbs. delivery pressure unless otherwise specified. Maximum temperature 160°F.

Suffix LP - low pressure range 10-35 lbs. Set for 30 lbs. delivery pressure

Suffix HP - high pressure range 1/2", 3/4", 1" 50-145; 1 1/4" 50-120; 1 1/2" - 2 1/2" 50-95 lbs.

Suffix B - for by-pass feature same as U5B, specify 223B - 223SB, etc.

Suffix Z3 - sealed spring, corrosion cage and adjusting screws for water works and pit installations. Size 1/2" - 1".

No. 223 - reducing valve only.

No. 223S - reducing valve with separate bronze strainer attached with nipple.

- Water-tight cage assembly standardly furnished.



Size	Body	Dimensions					Weight	
		A	B	C	D	E	223	223S
1/2"	Bronze	9"	2"	6 1/4"	1 1/4"	4 1/4"	5 1/4 lbs.	6 3/4 lbs.
3/4"	Bronze	9"	2"	6 1/4"	2"	4 1/4"	5 1/4 lbs.	6 3/4 lbs.
1"	Bronze	10 15/16"	2 1/8"	6 1/2"	3 3/16"	4 3/4"	7 7/8 lbs.	15 lbs.
1 1/4"	Bronze	11 15/16"	2 3/4"	6 3/4"	3 11/16"	5"	9 5/8 lbs.	16 lbs.
1 1/2"	Bronze	14 3/4"	2 3/4"	9 7/8"	4 7/16"	6 3/4"	20 lbs.	33 lbs.
2"	Bronze	16 3/4"	3 1/4"	10 3/4"	5 3/8"	8"	33 lbs.	49 lbs.
2 1/2"	Iron	20 1/8"	3 1/4"	10 3/4"	6 1/4"	9"	35 lbs.	63 lbs.

No. N223 Series - 3"

SUPER CAPACITY Water Pressure Reducing Valves

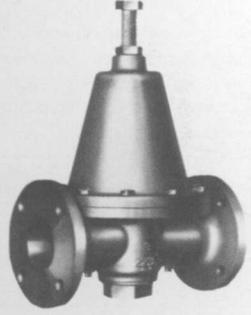
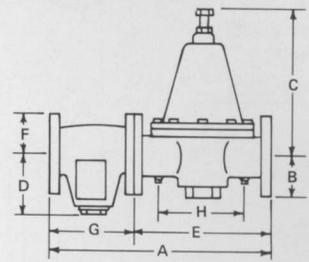
A semi-balanced piston assures rapid response to reduced pressure demands. Iron bodies, "triple-coated" with special corrosion-preventative materials superior to hot dip galvanizing. Initial pressure up to 175 lbs. Reduced pressure range 25 to 75 lbs. Set for 50 lbs. unless otherwise specified. Maximum temperature 160°F.

Suffix S - furnished with a separate F-27 strainer.

No. F-27 strainer is available for commercial/industrial use.

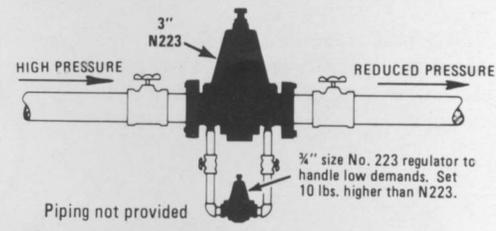
Suffix WR - has 3/4" No. 223 auxiliary regulator. Piping not provided.

- Stainless steel piston and seat
- Dependable control of reduced pressure
- 3/4" tappings for auxiliary regulator



No.	Size	Dimensions						Weight		
		A	B	C	D	E	F	G	H	
*N223	3"	-	3 3/4"	14 1/2"	12 1/2"	-	-	-	7 1/2"	86 lbs.
*N223S	3"	9 3/8"	3 3/4"	14 1/2"	12 1/2"	24 1/2"	3 3/4"	12"	7 1/2"	160 lbs.
F-27	3"	9 3/8"	Strainer	-	-	-	3 3/4"	12"	-	74 lbs.

*Install horizontally only with supply connected to valve inlet and arrow on the body pointing in the direction of flow.



WATER PRESSURE REGULATORS

Strainers are recommended to be used with Series 127W regulators. See page 15 and 16 for strainers.

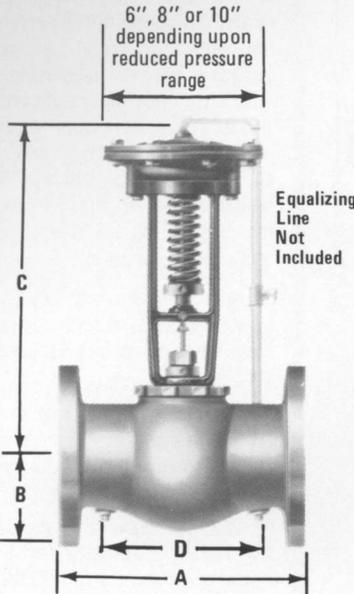
No. 127W - 3", 4"

Remote Control,
High Capacity,
Water Pressure Reducing Valve

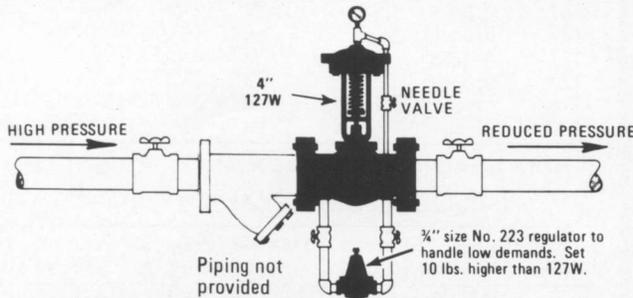
Single seated water regulator for close pressure regulation. Iron body flanged 3", 4" and bronze body on 3" screwed connections. Initial pressure up to 250 lbs. Reduced pressure range 25-100 lbs. depending on supply pressure.

Suffix WR - provided with 3/4" No. 223 auxiliary regulator. Piping is not provided.

- Renewable stainless steel seat
- Tough rubber disc
- Durable high temperature resisting diaphragm
- Outstanding maintenance features
- Close control of reduced pressure
- 4" only tapped for by-pass installation



No.	Size	Connections	Body	Dimensions				Weight
				A	B	C	D	
127W	3"	Screwed	Bronze	8"	23/8"	161/8"	-	40 lbs.
127W	4"	Flanged	Iron	121/8"	41/2"	163/4"	71/2"	84 lbs.
F127W	3"	Flanged	Iron	8"	33/4"	163/4"	-	42 lbs.



The companion flange size connection for regulators and strainers is 125 lbs. WSP.

For Additional Information, send for ES-127W.

No. 2300 Series 3", 4", 5", 6"

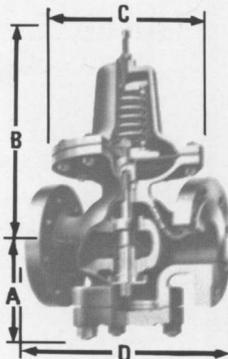
Direct Operated Water Pressure
Reducing Valves

Single seated, balanced design water regulator designed for dead-end water service where the flow is intermittent and changes rapidly, such as flushometers and snap cocks.

Initial pressure up to 200 psi max.
Temperature 150°F max. Reduced pressure range 30 to 80 psi. Flanged 125 lb.

- Accurate regulation
- Dependable service
- Ease of installation and maintenance

Size	Dimensions				Weight
	A	B	C	D	
3"	10	6	213/4	9	108 lbs.
4"	117/8	65/8	265/8	111/4	198 lbs.
5"	135/8	75/8	331/8	141/4	352 lbs.
6"	151/8	91/8	357/8	16	500 lbs.



For Additional Information, send for F-2300.

AUTOMATIC CONTROL VALVES

(Pilot Operated Liquid Service Regulators)
(Send for descriptive literature)

MV Series

Basic Pilot Operated Control Valve

A diaphragm actuated, globe or angle pattern, hydraulically operated valve used as the main valve component for control applications.

Globe: 1 1/2" - 3" Threaded, 1 1/2" - 6" Flanged

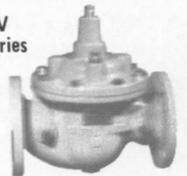
Angle: 1 1/2" - 3" Threaded, 2" - 6" Flanged

Pressure rating: 125 class, 175 PSI max.

250 class, 300 PSI max.

Temperature ratings: Water and light petroleum to 180°F (80°C). For details, send for F-POR.

MV Series



PV10 Series



PV10 Series

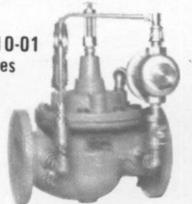
Pilot Operated Pressure Reducing Valve

The PV10 Pressure Reducing Valve provides desired constant downstream pressure regardless of a changing flow rate or varying inlet pressure. It is hydraulically operated, single seated and controlled by a direct acting spring loaded, diaphragm pilot valve. PV10 is extremely sensitive to changing downstream pressures and reacts to modulate the main valve to hold the downstream pressure accurately at the set point.

Adjustment range 0-35, 25-75, 50-150.

For details, send for F-PV10.

PV10-01 Series



PV10-01 Series

Pressure Reducing and Check Valve

Same as PV10 plus check valve.
For details, send for F-PV10-01.

PV10-02 Series

Pressure Reducing Sustaining Valve

Same as PV10 plus pressure sustaining control.
For details, send for F-PV10-02.

PV10-03 - Pressure reducing, sustaining & check

PV10-04 - Pressure reducing & solenoid shut-off

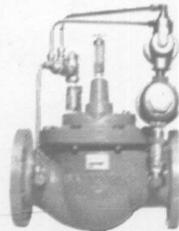
PV10-05 - Pressure reducing, solenoid shut-off & check

PV10-06 - Pressure reducing & low flow by-pass

PV10-07 - Pressure reducing & check

with low flow by-pass

PV10-02 Series



PV20 Series

Pressure Relief, Sustaining and Backpressure Valve

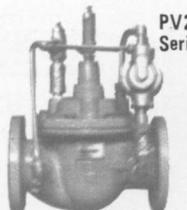
Same as PV10-02 plus backpressure control.
For details, send for F-PV20.

PV20-01 - Pressure relief & check

PV20-02 - Pressure sustaining, solenoid & shut-off

PV20-03 - Pressure sustaining, solenoid & check

PV20 Series



PV70-01 Series

Hydraulic Check Valve with Speed Controls

MV Series with hydraulic check valve and speed controls. For details, send for F-PV70-01.

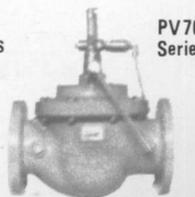
PV30 Series - Altitude and lever control

PV40 Series - Flow control valves

PV60 Series - Pump control valves

PV90 Series - Solenoid control valves

PV70-01 Series



STEAM PRESSURE REGULATORS

Strainers are recommended to be used with regulators. See page 15 and 16 for strainers.

No. 152A, 252A Series

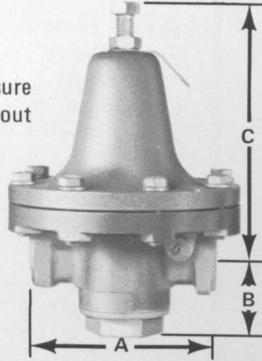
Iron and Bronze

Process Regulators for Steam

Highly sensitive response to reduced pressure changes and fullest possible volume without appreciable reduced pressure drop. Used successfully on oil lines, testing fixtures, autoclaves, steam tables, steam irons, single radiators, vulcanizers, sterilizers and process lines.

An exclusive feature is a "sensitivity adjuster" which eliminates any vibrating condition which may arise from critical flow requirements.

- Stainless steel strainer screen
- Renewable stainless steel seat and valve disc
- Standardly furnished with stainless steel disc and stem guide



No. 152A - for pressures up to 200 psi.

No. 252A - sizes 1/2" and 3/4" identical to No. 152A except furnished in bronze body for pressures up to 300 psi.

No. 152AT or No. 252AT - tight seating model for dead end and liquid service. Operating temperatures are 300°F at 300 psi and 400°F at 200 psi. When utilizing a teflon valve disc in the 252AT, the maximum operating temperatures are 300°F at 300 psi and 400°F at 200 psi.

ADJUSTING SPRING RANGE CHART

Size	*Adjustable Ranges	Spring and Model No. SERIES 152A-252A
1/2"	3 lbs. - 15 lbs.	145
	10 lbs. - 50 lbs.	146
	30 lbs. - 140 lbs.	141
3/4"	3 lbs. - 15 lbs.	145
	10 lbs. - 50 lbs.	146
	30 lbs. - 140 lbs.	141
1"	3 lbs. - 15 lbs.	146
	10 lbs. - 30 lbs.	128
	30 lbs. - 140 lbs.	142
1 1/4"	3 lbs. - 15 lbs.	146
	10 lbs. - 30 lbs.	128
	30 lbs. - 140 lbs.	142
1 1/2"	5 lbs. - 40 lbs.	276
	30 lbs. - 100 lbs.	299
	2"	5 lbs. - 40 lbs.	276
	30 lbs. - 100 lbs.	299

*The minimum reduced pressure ranges shown are recommended only when very sensitive regulation service is needed for specific requirements. However, all valves may be adjusted below the working range minimums shown for lower regulation or complete shut-off.

No.	Size	Dimensions			Weight
		A	B	C	
152A or 252A	1/2", 3/4"	45/8"	13/4"	67/8"	12 lbs.
152A	1", 1 1/4"	55/8"	2"	71/4"	19 lbs.
152A	1 1/2", 2"	65/8"	2 3/4"	11 1/2"	30 lbs.

No. 127 Series

Steam Pressure Regulators

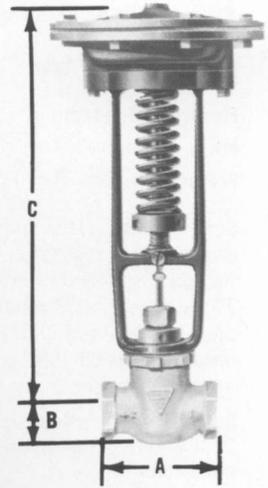
A single seated, large capacity, remote control, diaphragm type steam reducing valve for main line and high capacity process regulation service. Also, for heating applications and suitable for dead end service. For institutional, industrial and commercial applications. Valve is simple to adjust. Reduced pressure range 5-150 lbs. depending on size of regulator and supply pressure.

Standardly furnished with composition disc construction in sizes 1/2" thru 1 1/4" and stainless steel disc sizes 1 1/2" thru 3".

Renewable stainless steel seat is standardly furnished for either superheated or saturated steam service. Standardly furnished with bronze body, female screwed connections, sizes 1/2" thru 3". Iron body with flange connections, 3" and 4".

No. 127SC - sizes 1/2" thru 1 1/4", initial pressures up to 150 lbs.

No. 127SS - sizes 1/2" thru 3" have stainless steel valve disc for initial pressures up to 250 lbs.



No.	Material	Size	Dimensions			Weight
			A	B	C	
127	Bronze	1/2"	4"	1"	15"	23 lbs.
127	Bronze	3/4"	4"	1"	15"	23 lbs.
127	Bronze	1"	4 1/4"	1 1/8"	15"	23 1/2 lbs.
127	Bronze	1 1/4"	4 1/2"	1 1/4"	15 1/8"	24 lbs.
127	Bronze	1 1/2"	5 1/4"	1 1/2"	15 1/4"	28 lbs.
127	Bronze	2"	6"	1 3/4"	15 3/8"	32 lbs.
127	Bronze	2 1/2"	7 1/4"	2 1/8"	15 3/4"	34 lbs.
127	Bronze	3"	8"	2 3/8"	16 1/8"	40 lbs.
F-127	Iron	*3" (Flgd.)	8"	3 3/4"	16 3/4"	42 lbs.
F-127	Iron	*4" (Flgd.)	12 1/8"	4 1/2"	16 3/4"	84 lbs.

*Flange size connections 125 lbs. W.S.P.

QUICK REFERENCE CAPACITY CHART

Initial Pressure Reduced Pressure		From 50	From 100	From 150	From 200	From 250
		Up to 20	Up to 50	Up to 70	Up to 90	Up to 125
MAXIMUM CAPACITIES IN LBS. OF STEAM PER HOUR						
127	1/2"	218	387	555	731	900
127	3/4"	492	875	1255	1653	2037
127	1"	878	1560	2237	2946	3631
127	1 1/4"	1370	2436	3493	4599	5668
127	1 1/2"	1973	3508	5030	6623	8163
127	2"	3518	6253	8967	11807	14553
127	2 1/2"	5494	9766	14006	18442	22730
127	3"	7906	14054	20154	26538	32709
F-127	4"	8301	14756	21161	27864	34344
252A-152A	1/2"	80	143	205	270	332
252A-152A	3/4"	285	506	726	956	1178
152A	1"	402	715	1025	1349	1663
152A	1 1/4"	442	786	1127	1484	1830
152A	1 1/2"	665	1120	1600	2230	2725
152A	2"	765	1285	1840	2564	3134

EXAMPLE: Initial pressure is 100 lbs., reduced pressure is 50 lbs. and capacity required is 1,500 lbs. of steam per hour. By referring to the proper initial reduced pressure column (100 up to 50), 1560 lbs. per hour is closest to Required Capacity and corresponds to a 127 1" size valve.

NOTE: For reduced pressures above those shown for each initial pressure column, refer to Detailed Capacity Table, Folder F-127. Be sure to specify both initial pressure and reduced pressure setting or range required.

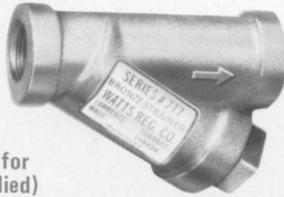
WATTS STRAINERS

No. 777S Series Bronze

"Y" Type Strainers
For Water and Steam Service
Sizes: 1/2" thru 3"

- 20 mesh stainless steel screen
- 3" has 3/64" perf. screen
- Standard tapped bronze retainer cap for a closure plug (closure plug not supplied)
- WWP 250 psi @ 210°F and WSP 125 lbs. @ 400°F.

No. 777 - Same as 777S except not tapped for closure plug.

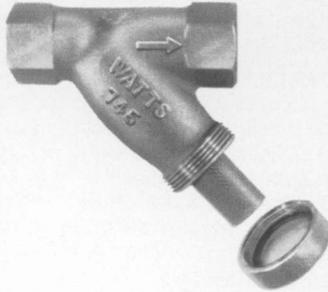


No. 7771, 745 Series Bronze

"Y" Type Strainers
For Water and Steam Service
Sizes: 1/4", 3/8", 1/2"

- Screwed end connections
- 24 mesh stainless steel screen
- WWP 250 lbs. @ 210°F and WSP 125 lbs. @ 400°F.

No. 745 - Size 3/4". 80 mesh screen.
Hand removable clean-out plug.
WWP 250 psi @ 210°F and WSP
50 lbs. @ 300°F.



No.	Size	Dimensions			Weight
		A	B	C	
777 or 777S	1/2"	3 13/32"	3 3/4"	3/8" NPT	11 1/2 lbs.
777 or 777S	3/4"	3 3/4"	3 1/4"	1/2" NPT	15 1/8 lbs.
777 or 777S	1"	4 9/16"	3 7/8"	3/4" NPT	21 1/2 lbs.
777 or 777S	1 1/4"	4 3/4"	4 1/16"	3/4" NPT	23 1/4 lbs.
777 or 777S	1 1/2"	5 11/16"	4 5/8"	1" NPT	4 lbs.
777 or 777S	2"	6 11/16"	5 5/8"	1 1/4" NPT	7 3/8 lbs.
777 or 777S	2 1/2"	8 1/8"	4 15/16"	1 1/4" NPT	12 lbs.
777 or 777S	3"	10 1/8"	6 11/16"	1 1/2" NPT	24 lbs.
7771	1/4"-1/2"	3 5/16"	2 1/4"		15 1/8 lbs.
745	3/4"	4"	3 5/8"	2 7/8" NPT	15 1/8 lbs.

For Additional Information, send for F-77.

No. 17 Series Bronze

Union End, Compact In-Line
Water Strainer
Sizes: 3/4", 1"
Screwed Connections

- 40 mesh stainless steel strainer screen
- 250 lbs. WOG @ 180°F

Height 2 3/8", Width 4 3/8", Weight 13/4 lbs.
Optional model - 50 psi @ 250°F, consult factory.



For Additional Information, send for F-77.

No. 27 Series Bronze

"V" Type Water Strainer
Sizes: 1/8" thru 1/2"
Screwed End Connections

- Stainless steel strainer screen
- Up to 300 lbs. pressure
- Cast bronze body



No.	Size	Width	Height	Weight	Screen Mesh
27	1/8"	1 3/4"	1 7/16"	3/8 lb.	40
27	1/4"	2 1/16"	1 11/16"	5/8 lb.	30
27	3/8"	2 1/2"	2 3/16"	3/4 lb.	24
27	1/2"	2 3/4"	2 5/8"	1 lb.	24

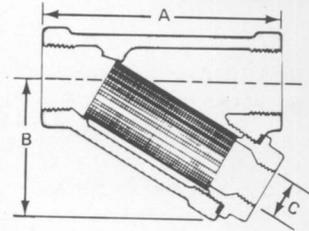
For Additional Information, send for F-77.

No. 77S Series Iron

"Y" Type Strainers
Sizes: 1/4" thru 2 1/2"

Screwed End Connections

For liquid or steam service. They are furnished with 250 lb. extra heavy iron body. Install strainers upstream to protect valves, regulators, solenoids and meters from dirt, rust and pipe scale. Self-cleaning can be accomplished by opening the valve or plug connected to the blow-off outlet. Iron retainer cap and asbestos gasket, straight threads and tapped for closure plug. (Closure plug not normally furnished). Standardly furnished with 20 mesh stainless steel screen. 2 1/2" has 3/64 perf. screen. Other screens available.



Working Pressures - Non-Shock

Steam - 250 psi @ 406°F • Water, Oil, Gas - 400 psi @ 100°F.

No.	Size	DIMENSIONS			Weight
		A	B	C	
77S	1/4", 3/8", 1/2"	3 3/4"	2 1/4"	3/8"	15 1/8 lbs.
77S	3/4"	5"	2 5/8"	1/2"	3 lbs.
77S	1"	5 11/16"	3 3/16"	3/4"	4 3/4 lbs.
77S	1 1/4"	6 1/2"	3 11/16"	3/4"	6 3/4 lbs.
77S	1 1/2"	7 1/2"	4 7/16"	1"	11 lbs.
77S	2"	8 5/8"	5 3/8"	1 1/4"	15 1/2 lbs.
77S	2 1/2"	10 1/2"	6 1/2"	1 1/2"	26 1/2 lbs.

For Additional Information, send for F-77.

No. 88S Series Stainless Steel

600 Lb. ANSI "Y" Type Strainers
For Steam and Liquid Service
Sizes: 1/4" thru 2"
Screwed End Connections

- Bottom cap sealed off from media
- Bottom cap tapped for closure plug
- .057 perforations, stainless steel screen
- Pressure-temperature rating in accordance with ANSI B.16.34.



Strainers have stainless steel construction. Bodies ASTM A-316 Grade CF8M. Bottom cap 1/4"- 1/2" 316 stainless steel, 1/4"- 2" CF8M. Steam 600 psi @ 905°F. Liquids 1440 psi @ 100°F.

No.	Size	CV	DIMENSIONS (Inches)			Weight
			A	B	C	
88S	1/4"	3.5	3	2 1/4	1/4	1.3 lbs.
88S	3/8"	6.0	3	2 1/4	1/4	1.3 lbs.
88S	1/2"	10.5	3 13/16	2 5/8	1/4	2.1 lbs.
88S	3/4"	17.0	4 3/8	3 3/16	3/8	3.0 lbs.
88S	1"	28.0	5 3/16	3 3/4	1/2	4.5 lbs.
88S	1 1/4"	45.0	5 5/8	4 7/8	3/4	5.8 lbs.
88S	1 1/2"	60.0	6 1/4	5	3/4	7.0 lbs.
88S	2"	100.0	7 1/2	6 1/8	1	10.0 lbs.

When other than standard mesh screen is required, consult factory. Install strainers upstream of valves, meters and regulators.

For Additional Information, send for F-77.

STRAINERS/ FLOW SWITCH

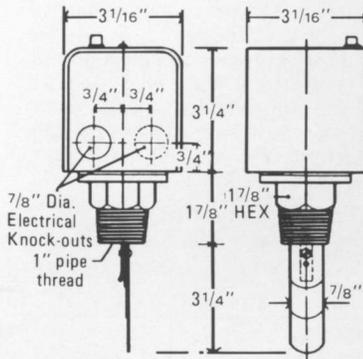
Series FS10-C

Flow Switch actuated by liquid flow for automatic control or safety devices.

Flow switch to monitor liquid flow in pipelines servicing water systems, heating systems, air conditioning and processing installations. Used as an automatic control or safety device, will start/stop a motor when a flow or no flow condition exists or actuate an alarm when flow is inadequate. Max. pressure 150 psi. Max. temperature 300°F. 1" NPT connection. Weight 2.5 lbs.

- No. FS10-C - standard unit.
- No. FS10-CL - with indicator light

- 3 in 1 paddle - segmented beryllium copper
- Paddle adaptable for 1" to 3" pipe
- Extended paddle for large pipe sizes up to 6"



For Additional Information, send for F-FS10-C.

Series FS10-F

Water Flow Indicators for Sprinkler Fire Protection Service and Branch Piping

Watts waterflow indicators provide a positive way of detecting the flow of water in any distribution, branch or mainline piping of a sprinkler system. Underwriters Laboratories listed for automatic sprinkler for protection service and signalling systems in branch piping or mainline sprinkler systems. It immediately indicates the location of an open head(s).

For pipe size 1", 1 1/4" or 1 1/2" standard ASTM tees. Factory set and sealed for a minimum alarm flow rate of 4 to 10 GPM. Max. pressure 175 psi. Max. temp. 300°F. 1" NPT connection. Weight 2.5 lbs.

- No. FS10-F - with indicator light.

- 3 in 1 paddle - segmented beryllium copper
- Paddle adaptable for 1", 1 1/4" or 1 1/2" pipe
- High and low sensitivity adjustment
- Single cover retainer screw



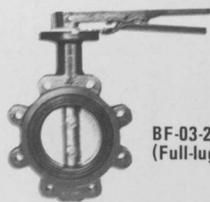
For Additional Information, send for F-FS10-F.

Series BF-03, BF-04

Butterfly Valves for HVAC applications
Sizes 2" - 12"

The Watts BF-03, BF-04 Series Butterfly Valves are ideally suited for all on/off or modulating HVAC applications. Along with the inherent advantages of butterfly valves - lightweight, compact, 90° operation - the BF-03 (full-lug) and BF-04 (wafer) incorporate a 200 psi rating, ASTM A126 cast iron body, 300 series stainless steel shaft, a choice of discs: aluminum, bronze or 316 stainless steel. Seat choice of EPDM or Buna-N. Standard operator is ten-position handle. Optional operator is ten-position handle, memory stop, infinite position stop and locking devices.

BF-03, BF-04 butterfly valves are designed, manufactured and tested to API 609 and MSS-SP67 for use with ANSI Class 125 and 150.

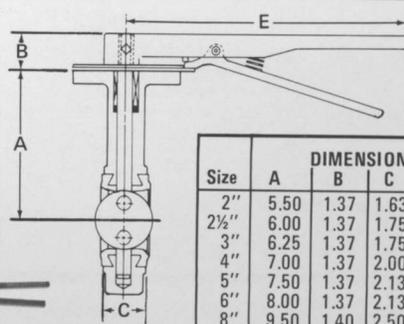


BF-03-221-13 (Full-lug)



BF-04-221-13 (Wafer)

(4) Tapped holes provided on flange (BF-03 only)



- Lightweight
- Stainless steel shaft
- Optional handle
- Fast 1/4-turn open or closed operation

Size	DIMENSIONS (Inches)					Weight (lbs.)	
	A	B	C	D	E	BF-03	BF-04
2"	5.50	1.37	1.63	4.00	10.50	9	6
2 1/2"	6.00	1.37	1.75	4.00	10.50	10	8
3"	6.25	1.37	1.75	4.00	10.50	13	9
4"	7.00	1.37	2.00	4.00	10.50	17	13
5"	7.50	1.37	2.13	4.00	10.50	21	15
6"	8.00	1.37	2.13	4.00	10.50	26	19
8"	9.50	1.40	2.50	6.00	14.00	42	31
10"	10.75	1.40	2.56	6.00	14.00	65	47
12"	12.25	2.15	3.00	6.00	N/A	108	88

SEATING TORQUE - Buna-N or EPDM

Size	Normal Conditions (In.-Lbs.)	CV Rating (Full Open)
2"	260	220
2 1/2"	310	320
3"	400	500
4"	600	820
5"	850	1300
6"	1300	1900
8"	2300	3200
10"	3500	5100
12"	5100	8000

No. 77F-125, 77F-250 Series Cast Iron No. 77F-FDA-125 Series Epoxy Coated

Flanged End "Y" Type Strainers
For Liquid and Steam Service
Sizes: 2" thru 12"

Constructed of high-tensile ASTM A-126, Class B cast iron with blow-off connections and self-aligning cylindrical screens. May be installed in horizontal or vertical pipe lines. Blow-off outlets are tapped FIPT. Stainless steel screens.

No. 77F-125, 77F-250 complies to MIL-S-16293 Type II.

Working Pressures - Non-shock

Class 125 - Steam 125 psi @ 350°F; Cold water, oil, gas - 200 psi @ 210°F.
Class 250 - Steam 250 psi @ 450°F; Cold water, oil, gas - 500 psi @ 150°F.

No. 77F-FDA-125 has a double coated electrostatically applied heat fused epoxy coating on the interior and exterior. FDA approved suitable for potable water and food contact.

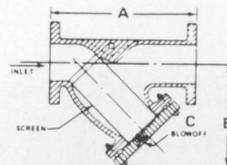
Ideal for liquid service where a non-corrosive construction/clean cosmetic appearance is required.

Working Pressures - Non-Shock

ANSI 125 lb. Pressure rating 125 psi WSP/200 WOG
Cold water, oil, gas - 200 psi @ 210°F.

Standard Screens:

- 2" - 5" - 1/16" perforation
- 6" - 8" - 1/8" perforation
- 10" - 12" - 3/16" perforation



	DIMENSIONS (Inches)									
	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	
A	10 1/8	12	14 1/4	16 3/8	19	21	25 5/8	30 3/4	33 1/2	
B	7 1/2	8 3/4	10 1/4	11 7/8	13 1/2	15 3/8	20 1/8	27 3/8	28 3/8	
C	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	2	2 1/2	3	
Screen Area Sq. In.	32	52	76	108	152	201	301	441	685	
Weight (lbs.)	29	40	52	77	108	168	275	413	529	

For Additional Information, send for F-77.

WATTS

TEMPERATURE & PRESSURE RELIEF VALVES

No. 40, 140, 240, 340 Series

A.S.M.E. RATED, ANSI Z21.22 "Relief Valves and Automatic Gas Shut-off Devices", DESIGN CERTIFIED by A.G.A. and C.G.A. Listed. Meets Military Spec. MIL-V-136-12D, Type I.

For gas, electric or oil-fired storage water heaters from 180,000 to 200,000 BTU/Hr. rating:
Use 3/4" No. 40, 140 Series tested under ANSI Z21.22 with ratings as certified and listed by A.G.A. and C.G.A.

For gas or oil-fired storage water heaters between 200,000 and 730,000 BTU/Hr. rating and for compliance with any applicable water heater labeling requirements:

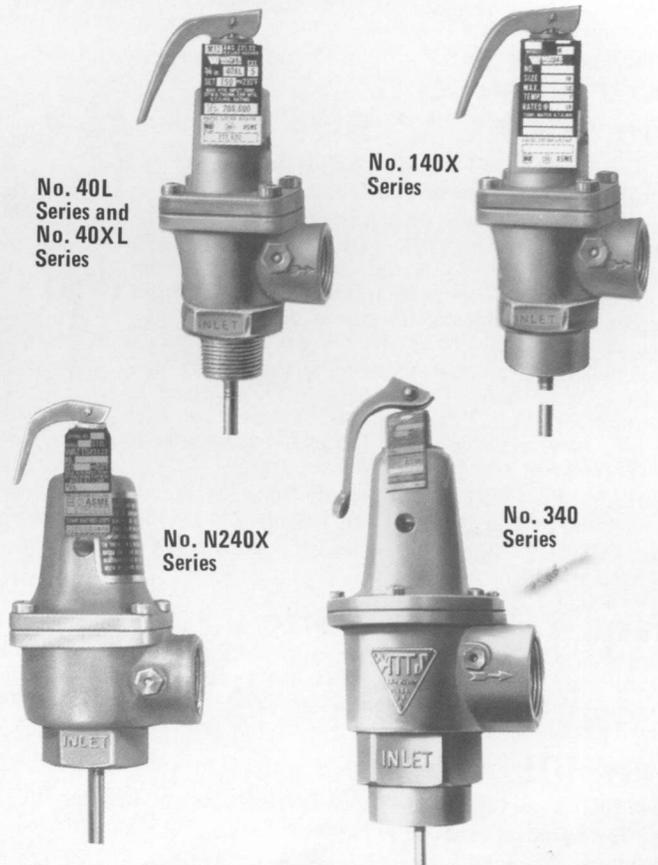
Use 1" 40, 140, N240 Series tested under ANSI Z21.22 with ratings as certified and listed by A.G.A. and C.G.A.

For installations of gas or oil-fired hot water supply boilers over 730,000 BTU/Hr. output heating domestic water and for installations of steam coil storage water heaters:

Use No. 340, 342 Series tested under ANSI Z21.22 with ratings as certified and listed by A.G.A. and C.G.A.

Temperature relief 210°F. Standard pressure settings 75, 100, 125 and 150 lbs.

- Bronze body construction
- Thermostat is accurate and proven, exclusively designed and manufactured by Watts
- 3/4" No. 40, 140 Model M12 Series feature a thermostat with thermo-bonded (non-metallic) protective coating. This feature forms a highly protective dielectric barrier which isolates the copper thermostat from the heated water to prevent accumulations of mineral deposits and galvanic corrosive action.
- 1" and above sizes are standardly furnished with stainless steel thermostat tube



For Additional Information, send for F-TP-ASME.

Type No.	Inlet	Outlet	Thermostat Length (Below inlet thread)	DIMENSIONS			Weight Lbs.	A.G.A. - C.G.A. Temp. Steam Rating BTU/HR	** A.S.M.E. Pressure Steam Rating BTU/HR	Model
				Height (Less Thermostat)	Width					
40L-3	3/4" M	3/4" F	3"	5 5/8"	2 5/8"	1 3/4	180,000	777,600	M12	
40XL-5	3/4" M	3/4" F	5"	5 5/8"	2 5/8"	1 3/4	200,000	777,600	M12	
40XL-8	3/4" M	3/4" F	8"	5 5/8"	2 5/8"	1 3/4	200,000	777,600	M12	
140S-3	3/4" F	3/4" F	3"	5 5/8"	2 5/8"	1 3/4	180,000	777,600	M12	
140X-5	3/4" F	3/4" F	5"	5 5/8"	2 5/8"	1 3/4	200,000	777,600	M12	
140X-8	3/4" F	3/4" F	8"	5 5/8"	2 5/8"	1 3/4	200,000	777,600	M12	
40L-2	1" M	1" F	2"	6 1/4"	2 3/4"	2 1/4	450,000	1,155,000	M12	
40XL-4	1" M	1" F	4"	6 1/4"	2 3/4"	2 1/4	500,000	1,155,000	M12	
40XL-7	1" M	1" F	7"	6 1/4"	2 3/4"	2 1/4	500,000	1,155,000	M12	
*140S-3	1" F	1" F	3"	5 1/2"	3"	2 1/4	570,000	1,670,000	M14	
*140X-6	1" F	1" F	6"	5 1/2"	3"	2 1/4	670,000	1,670,000	M14	
*140X-9	1" F	1" F	9"	5 1/2"	3"	2 1/4	670,000	1,670,000	M14	
*N240X-6	1" F	1" F	6"	6 5/8"	3 3/8"	2 3/4	730,000	2,195,000	M2	
*N240X-9	1" F	1" F	9"	6 5/8"	3 3/8"	2 3/4	730,000	2,195,000	M2	
*N241X-5	1 1/4" M	1" F	5"	6 5/8"	3 3/8"	2 3/4	730,000	2,195,000	M2	
*N241X-8	1 1/4" M	1" F	8"	6 5/8"	3 3/8"	2 3/4	730,000	2,195,000	M2	
*340-3	1 1/2" F	1 1/2" F	3"	9 3/4"	4 1/2"	7	1,150,000	3,450,000	M4	
*340X-8	1 1/2" F	1 1/2" F	8"	9 3/4"	4 1/2"	8	1,150,000	3,450,000	M4	
*342-3	2" M	1 1/2" F	3"	9 3/4"	4 1/2"	7	1,150,000	3,450,000	M4	
*342X-8	2" M	1 1/2" F	8"	9 3/4"	4 1/2"	8	1,150,000	3,450,000	M4	

The stated temperature water rating should only be used where approved and understood to be conditional that there must be no less than 30 lbs. supply pressure available to the water heater. Otherwise, the valves would not be responsible for adequate protection of heater BTU input installations in excess of the A.G.A. temperature steam ratings.

*Standardly furnished with stainless steel thermostat tube.

M = Male F = Female

**A.S.M.E. capacities are steam pressure ratings and do not reflect the A.G.A. temperature relieving capacity of the valves for selection purposes.

No. 210 Design Certified by A.G.A.

Immersion Type Temperature Gas Shut-off

Provides protection for gas water heaters against overheating by shutting off the gas supply. Shuts off gas supply at water temperature of 210°F. Entirely separate from regular heater operating controls. Thermostat immersed directly in tank water for accurate response to water temperature. Tank connection 3/4" male. Gas connection 1/2" female.



For Additional Information, send for F-TP-ASME.

No.	Height (Less Thermostat)	Length	Weight	BTU/Hr.	
				Natural Gas	Liquified Petroleum Gases
210-5	3 1/4"	2 1/2"	1 lb.	150,000	243,000

TEMPERATURE & PRESSURE RELIEF VALVES

Watts ANSI Z21.22 certified non-adjustable temperature and pressure relief valves are necessary to meet established water heater safety standards, such as A.G.A., UL, Military Spec. MIL-V-13612D and various regional, state and local codes.

BLUE RIBBON MODEL No. 100XL 3/4" Size

A.S.M.E. rated, Self-closing T & P Relief Valves for Water Heaters up to 100,000 BTU/Hr.

A THERMOSTAT WITH THERMO-BONDED (NON-METALLIC) PROTECTIVE COATING and a highly protective dielectric barrier to protect thermostat from accumulations of mineral deposits and galvanic corrosive action. Extends the effective life of the valve by overcoming problems created by adverse water conditions.

No. 100XL has test lever and extension thermostat. Male inlet and female outlet. Pressure range 75-150 lbs. Standard settings 75, 100, 125 and 150 lbs. Temperature relief 210°F. Also available with 8" extension thermostat at small extra cost, specify No. 100XL-8.

SOLAR - No. 100XL or 1XL; specify Model Z9 for stainless steel lever and pin for outside solar applications. Model Z11 for 180°F thermostat. No. L100XL-3 - extended inlet model for installations with extra thick insulation.

No. 1L, 1XL 1/2" Size

For both temperature and pressure relief protection. No. 1L has short thermostat and test lever. No. 1XL has extension thermostat with thermo-bonded protective coating. Also available with 8" extension thermostat.

No. 10L 3/4" Size

No. 10L - 3/4" size A.G.A. and A.S.M.E. rated with short thermostat.

- Thermostats with special protective coating
- All bronze body
- Stainless steel spring
- Thermostat is accurate and proven exclusively designed and manufactured by Watts

No.	Size	Height (Less Thermostat)	Width	Weight	A.G.A. Temp. Steam Rating BTU/HR	Model
1L-2	1/2"	3 1/2"	1 7/8"	5/8 lb.	15,000	M6
1XL-4	1/2"	3 1/2"	1 7/8"	3/4 lb.	15,000	M6
1XL-8	1/2"	3 1/2"	1 7/8"	1 lb.	15,000	M6
10L-2	3/4"	3 1/2"	1 7/8"	5/8 lb.	80,000	M4
100XL-4	3/4"	3 1/2"	1 7/8"	3/4 lb.	100,000	M4
100XL-8	3/4"	3 1/2"	1 7/8"	7/8 lb.	100,000	M4
L100XL-3	3/4"	4 1/4"	1 7/8"	1 lb.	100,000	M5

No. 36A Vacuum Relief Valves for Water Heater Service

Automatically vents a system if vacuum occurs. Opens at less than 1/2" vacuum. Design features a dry guide which is located out of the water and thus not exposed to corrosion. Construction is bronze body with silicone disc. Maximum water pressure 200 lbs. Maximum temperature 250°F. Sizes 1/2" and 3/4".

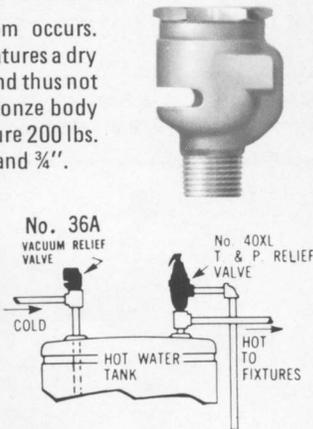
Also suitable for steam service.

NOTE: Vacuum Relief Valves are not designed or approved for use as back-siphonage backflow preventers. For protection against backflow on other applications, see backflow preventers.

VENTING 1/2" No. 36A - 13.5 CFM
CAPACITY 3/4" No. 36A - 20.0 CFM

No.	Size	Height	Width	Weight
36A	1/2"	2 3/8"	1 3/4"	3/8 lb.
36A	3/4"	2 3/4"	1 3/4"	3/4 lb.

ANSI Z21.22 "Relief Valves and Automatic Gas Shut-off Devices", DESIGN CERTIFIED by A.G.A. and C.G.A. Listed.



PRESSURE RELIEF VALVES

No. 3L

A.S.M.E. RATED, ANSI Z21.22 "Relief Valves and Automatic Gas Shut-off Devices", DESIGN CERTIFIED by A.G.A. and C.G.A. Listed. Meets Military Spec. MIL-V-136-12D, Type I.

Same construction as No. 10L, except it has no temperature relieving element. Therefore, it is only for protection against excessive pressure. Used on domestic storage tanks or tankless water heaters. Pressure range 75-150 lbs. Standard setting 75, 100, 125 and 150 lbs. Size 3/4" x 3/4".

Popularly used in conjunction with No. 210 (page 17) gas shut-off valve used for gas water heaters to shut-off gas to heater if water heater temperature exceeds 210°F.

SOLAR - For solar applications No. 3L, specify Model Z9 for stainless steel lever and pin for outside solar applications.

No. 53L

ANSI Z21.22 "Relief Valves and Automatic Gas Shut-off Devices", DESIGN CERTIFIED by A.G.A. and C.G.A. LISTED.

No. 53L is same basic design as No. 3L except it is furnished in 1/2" size and does not comply with A.S.M.E. requirements.

- No. 3L has ASME construction and is tested, listed and certified by the National Board of Boiler and Pressure Vessel Inspectors
- Bronze body and stainless steel spring

No.	Size	Height	Width	Weight	Model
3L	3/4"	3 1/2"	1 3/4"	5/8 lb.	M4
53L	1/2"	3 1/2"	1 7/8"	1/2 lb.	M6

No. 53

Pressure Relief Valve

For pressure relief only. Furnished without a lever. 1/2" female drain. Pressure range 75-175 lbs. Standard settings 75, 125 and 150 lbs.

Also specially available at 50 lbs. setting.

No. 530

Calibrated Pressure Relief Valve

Only relief valve with calibrated adjustment feature for setting valve to required relieving pressure. Adjustable range 50-175 lbs.

- All brass construction and stainless steel spring
- Ideally suited as a by-pass thermal expansion relief valve

No.	Size	Height	Width	Weight
53	1/2 or 3/4"	2 7/8"	1 3/4"	1/2 lb.
530	1/2 or 3/4"	3"	1 5/8"	5/8 lb.

No. 30L-Z1

Well System Relief Valve

30L-Z1 - 1/2" 75 PSIG - Well system relief valve. Capacity: 20 GPM at 10 PSIG over pressure (85 PSIG).

30L - Pressure Relief Valve - for pressure relief service only. Pressure range 75 to 150 lbs. These valves are not diaphragm actuated as needed for certain applications like by-pass control service. For adjustable non-lever diaphragm actuated relief or control service, see BP30 Series. Standard setting 100, 125 and 150 lbs.

N30 - Pressure range 5-25 and less lever.

N30L - Pressure range 30-50 lbs. Standard setting 30 or 45 lbs.

No.	Size	Height	Width	Weight
30L	1/2"	4 1/2"	2 1/4"	7/8 lb.

A.S.M.E. WATER SAFETY RELIEF VALVES

No. 174A Series

A.S.M.E. Water Pressure Safety Relief Valves

Bronze body safety relief valves for pressure protection only of all types of hot water heating boiler equipment. Pressure range 30 to 150 lbs. with corresponding high BTU/Hr. ratings from 650,000 to 14,370,000 BTU/Hr. Female inlet and outlet connections. Sizes 3/4" to 2".

Meets Military Spec. MIL-V-136-12D, Type III.



No. 740 Series

Iron body safety relief valves with expanded outlets for hot water space heating boilers. Pressure range 30-75 lbs. with corresponding high ratings from 925,000 to 10,700,000 BTU/Hr. This wide range of relieving capacities provides a much lower BTU per thousand cost because this series provides a much higher BTU rating, size for size, than other valves on the market. Female inlet and outlet connections. Sizes 3/4" to 2".



- Seat located above drain; water can't be trapped and sediment can't foul seat
- Non-mechanical seat-to-disc alignment will not stick or freeze
- Water seal of high temperature resisting material isolates spring working parts from water during relief.



A.S.M.E. Rated and Tested

No.	Size	Model	Height	Length	Weight
174A	3/4" x 3/4"	M3	5 1/8"	2 1/2"	1 1/2 lbs.
174A	1" x 1"	M1	5 3/4"	3"	3 1/8 lbs.
174A	1 1/4" x 1 1/4"	M1	8 3/8"	4 3/4"	6 1/4 lbs.
174A	1 1/2" x 1 1/2"	M	9"	4 7/8"	7 1/4 lbs.
174A	2" x 2"	M	11 5/8"	6 1/4"	13 3/4 lbs.
740	3/4" x 1"	M1	5 5/8"	3"	1 7/8 lbs.
740	1" x 1 1/4"	M	7 1/4"	3 1/2"	3 1/8 lbs.
740	1 1/4" x 1 1/2"	M	8 3/4"	4 5/8"	6 1/8 lbs.
740	1 1/2" x 2"	M	9 1/4"	5 1/4"	7 1/2 lbs.
740	2" x 2 1/2"	M	11 5/8"	6 3/4"	16 1/2 lbs.

SETTINGS and RELIEVING CAPACITIES (National Board Certified Ratings) BTU Steam Discharge Capacities

No.	Size	30 lbs.	100 lbs.	125 lbs.	150 lbs.
174A	3/4"	650,000	1,695,000	2,070,000	2,445,000
174A	1"	1,005,000	2,635,000	3,215,000	3,795,000
174A	1 1/4"	1,682,000	4,399,000	5,370,000	6,340,000
174A	1 1/2"	2,020,000	5,290,000	6,460,000	7,630,000
174A	2"	3,815,000	9,970,000	12,170,000	14,370,000

No.	Size	30 lbs.	45 lbs.	50 lbs.	75 lbs.
740	3/4" x 1"	925,000	1,245,000	1,352,000	1,886,000
740	1" x 1 1/4"	1,300,000	1,750,000	1,899,000	2,649,000
740	1 1/4" x 1 1/2"	2,105,000	2,830,000	3,075,000	4,285,000
740	1 1/2" x 2"	2,900,000	3,903,000	4,237,000	5,909,000
740	2" x 2 1/2"	5,250,000	7,067,000	7,672,000	10,700,000

NOTE: Valve settings, other than shown above, are available in 5 lb. increments within the pressure ranges shown.

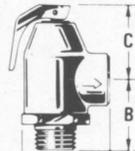
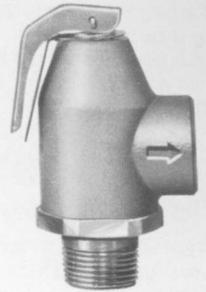
For Additional Information, send for F-TP-ASME.

RELIEF VALVES/ MISC. VALVES

Nos. 315, 415

Steam Safety Valves
For Steam Service Installations

A.S.M.E. rated steam safety relief valves up to 450 lbs./hr. For low pressure steam heating equipment up to 15 lbs.. Also available with lower settings, such as 8 lbs. for pressure cooker requirements, but are not A.S.M.E. rated. Consult factory for rating and quotation.



A.S.M.E. Rated and Tested



A.S.M.E. Steam
Discharge Capacity
Lbs./Hr. (Set 15 lbs.)

Dimensions

No.	Size	Discharge Capacity	A	B	C	Weight
315	3/4" x 3/4"	300	1 3/4"	1 13/16"	1 3/4"	5/8 lb.
415	3/4" x 3/4"	450	2 1/8"	1 13/16"	1 7/8"	1 lb.

For Additional Information, send for S-315.

No. BP30 Series

Diaphragm Operated Relief Valve
By-Pass Control Valves

Diaphragm actuated by-pass relief valves to regulate liquid pressure as supplied by a positive pressure pump. Protects equipment by opening at desired setting and allowing excess volume to be by-passed back to source. Construction is bronze body. Sensitive rubber diaphragm and special Teflon disc. T handle facilitates pressure change. Spring and adjustment handle free from contact with liquid elements being controlled. Max. temperature 180°F.

PRESSURE RANGES:

- BP30A - Pressure range 10-50 lbs.
- BP30B - Pressure range 45-100 lbs.
- BP30C - Pressure range 75-175 lbs.



No. BP30



No. 5300A

No.	Size	Height	Length	Weight
BP30	1/2"	5 3/4"	2 1/4"	1 1/8 lbs.

No. 5300A - Poppet type compact by-pass relief valve. Size 1/2". Pressure range 0-250 psi.

No. 2000S, 2000 Series

Two-Way Flow Check

Incorporates new soft seated design to provide positive gravity shut-off when circulator is not running. Easily opened for gravity circulation.

No. 2000S is furnished with a bronze body and sweat copper connections.



No. 2000S

No. 2000 combines angle and horizontal checks. Extra expansion tank connection when installed as angle check. Max. temperature 250°F. Max. pressure 50 psi.

No.	Size	Height	Length	Weight
2000S	3/4" x 3/8"	3"	1 lb.	
2000S	1" x 3/8"	3 3/4"	2 lbs.	
2000	3/4"	5"	4 1/8"	3 lbs.
2000	1"	5"	4 1/8"	3 lbs.
2000	1 1/4"	5 5/8"	4 3/4"	4 1/2 lbs.



No. 2000

HYDRONIC PRODUCTS

FEED WATER PRESSURE REGULATORS

Adjustment range 10-25 lbs. Set at 15 psi.

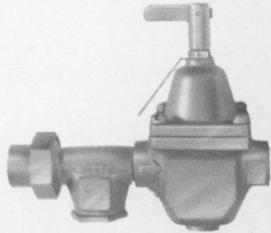
"All 1/2" models furnished with 'purge' lever."

Because of the exceptional high capacity features of these Watts designs, the lever is only necessary for purging of the system. When the lever is raised to a vertical position, it manually forces the valve wide open. Returning the lever to its normal position permits the valve to maintain normal pressure in the system.



No. T156B Bronze Body Feed Water Pressure Regulator

Bronze body feed water pressure regulator with separate accessible strainer and 1/2" union inlet connection. Max. Temp. 212°F. Max. Pressure 100 psi.

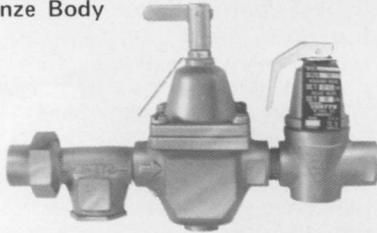


N256 - Bronze Body 3/4" N256 replaces Iron Body 3/4" 256C with highest filling capacity, tight seating check valve and unitized design for maintenance.

No.	Inlet Connection	Size	Height	Length	Weight
T156B	Union Threaded	1/2"	5 5/16"	6"	2 1/4 lbs.
N256	Threaded	3/4"	6 3/8"	4"	3 1/2 lbs.

No. T145B Bronze Body Hot Water Dual Control

No. T145B is a high quality, all bronze dual control unit incorporating the T156B feed water regulator plus a bronze body precision design diaphragm relief valve. Set 30 lbs. Max. Temp. 212°F. Max. Pressure 100 psi.

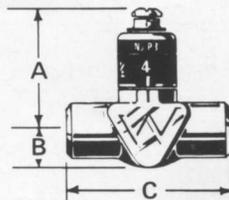
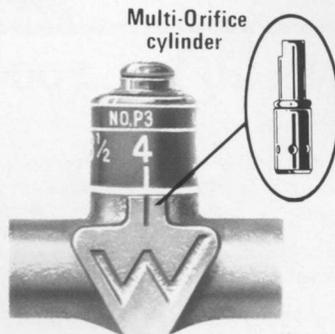


No.	Inlet Connection	Size	Height	Length	Weight
T145B	Union Threaded	1/2"	5 5/16"	8 1/2"	3 1/2 lbs.

No. P3

Multi-Orifice Flow Controls for Tankless Heaters
Adjusts to 2 1/2, 3, 3 1/2 or 4 GPM
Max. Temperature 250°F.
Max. Pressure 150 psi.

Watts Flow Control valves are designed to limit the flow of water to equipment and are ideally used for tankless heater installations. Features a multi-orifice design which lets you select desired flows at 50 psi (as shown above) simply and quickly by turning the cap to the required setting. Setting is obtained by locating multi-orifice cylinder adjusting cap to the marking over the matching line on the body. For other pressures and flow capacities see instruction sheet.



No.	Size	Dimensions			Wgt. (oz.)
		A	B	C	
P3	1/2"	1 5/8"	1/2"	2"	6

Series 1156F

Iron Body Feed Water Pressure Regulator

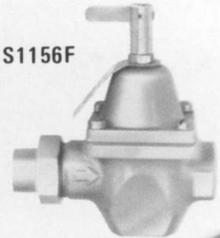
Watts 1156F features highest capacity performance (twice that of contemporary popular competitive makes) as well as unique simplified servicing accessibility for complete unitized maintenance. Max. Temp. 212°F. Max. Pressure 100 psi.

No. 1156F



No. S1156F - This model is identical to the above except it is furnished with union sweat inlet connection.

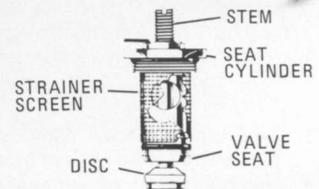
No. S1156F



No. T1156F - This model is identical to the above except furnished with union threaded inlet connection.

OUTSTANDING MAINTENANCE FEATURES

These new models feature a special unitized construction which consists of the seat, disc and stem assembly, and strainer screen altogether in one unit for complete replacement maintenance.

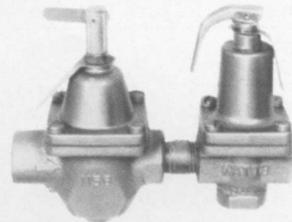


No.	Material	Inlet Connection	Size	Height	Length	Weight
1156F	Iron	Threaded	1/2"	5 5/16"	3 1/2"	2 1/8 lbs.
T1156F	Iron	Union Thread	1/2"	5 5/16"	4 1/4"	2 1/4 lbs.
S1156F	Iron	Union Sweat	1/2"	5 5/16"	4 1/8"	2 1/4 lbs.

No. 1450F

Iron Body Dual Control

No. 1450F - Combines construction features of No. 1156F and rugged Iron Body diaphragm relief valve. Set 30 lbs. Size 1/2". Max. Temp. 212°F. Max. Pressure 100 psi.



No. T1450F - Is identical to above except furnished with union threaded inlet connection.

No. S1450F - Is identical to above except furnished with union sweat inlet connection.

No.	Inlet Connection	Size	Height	Length	Weight
1450F	Threaded	1/2"	5 5/16"	6 1/2"	3 1/4 lbs.
T1450F	Union Threaded	1/2"	5 5/16"	7 1/4"	3 1/4 lbs.
S1450F	Union Sweat	1/2"	5 5/16"	7"	3 1/4 lbs.

No. PB56

Purge and Balancing Valve

No. PB56 is an efficient design for exceptionally high capacity purging. It is specially designed with a self-contained, tight seating ball type purge valve with 3/4" hose thread connection for blow-off. Also balancing adjustment is by the same means and can be secured tightly by a packing compression nut against accidental tampering to maintain the balanced adjustment. Standardly furnished in bronze construction with 3/4" sweat connections. Max. temperature 250°F. Max. pressure 50 psi.



No.	Size	Height	Length	Weight
PB56	3/4"	3 3/4"	2 5/8"	3/4 lb.

LOW WATER CUT-OFFS

Meets C.S.A. Standard B51

No. 890 Series

For gauge glass installation on low pressure boilers. Furnished complete with all necessary fittings. Max. steam pressure 15 lbs.

- 890D - "Dual" (two) switch assembly
- 890S - "Single" switch assembly

Switch suitable for both standard and millivolt service.

- Modern design float chamber bowl with large mud space - no ledges for mud accumulation.
- Heavy reinforced stainless steel float.
- External drain valve (3/4" ball valve) for flushing float chamber.

DIRECT INSTALLATION TYPE For Various Boiler Applications

N101 Series - Deluxe type with deep sediment chamber and 2 1/2" female side tapping for connection to steam boiler. Max. steam pres. 15 lbs.

- N101D - "Dual" (two) switch assembly
- N101S - "Single" switch assembly

No.	Length	Width	Height (Float Chamber Only)	Weight
890S, 890D	9"	4"	6 1/2"	10 lbs.
N101S, N101D	8 1/4"	3 3/4"	5 7/8"	7 3/4 lbs.

No. N50 Series

Designed with heavier stainless steel float construction suitable for pressure up to 50 lbs. Provides dependable protection for hot water heating boilers against emergency low water conditions. Also may be used on low pressure process boilers. Float chamber has 1" female top and bottom connections.

N50S - Single switch assembly for burner service with extra terminal for line voltage single pole, double throw service.

N50D - Dual (two) switch assembly for line voltage burner service and for independent low (or high) voltage alarm, feed valve or pump starter service.

N501S and N501D - Same as above except designed with a 2 1/2" side tapping connection.

N50SM - Furnished with manual reset feature.

N501SM - Same as 501S but furnished with manual reset feature.

No.	Length	Width	Height	Weight
N50S, N50D	8 1/2"	3 3/4"	6"	6 3/4 lbs.
N501S, N501D	8 1/2"	5"	6"	6 3/4 lbs.

FLOAT and SWITCH ASSEMBLIES USED IN WATTS LOW WATER CUT-OFFS

The complete one piece unit facilitates installation and assures the user of receiving latest, up to date construction.

SAN89D - Complete assembly facilitates maintenance and inventory, by being interchangeable in all Series N89D and N101D.

Standardly furnished with "Dual" switch assembly. Maximum steam pressure 15 lbs.

SAN89S - Same as above, but furnished with single switch assembly for N89S and N101S.

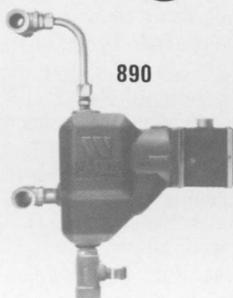
SAN50D - Complete assembly facilitates servicing by being interchangeable in all previous Series No. N50D and N501D. Maximum boiler pressure 50 lbs.

SAN50S - Same as above, but furnished with single switch assembly for N50S and N501S.

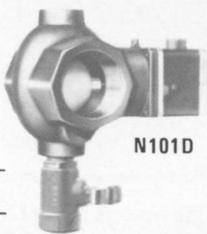
When required for manual reset models, specify SAN50SM for N50SM and N501SM.

For Process Boiler Water Feeders, specify Series 142, 144.

LISTED BY 



890



N101D



N50S
N50D



N501S
N501D



SAN89D
SAN89S



SAN50D
SAN50S

PLUMBING and HYDRONIC PRODUCTS

No. 70A, L70A Series

Tempering Valves for Residential Installations

For domestic hot water service. Mixes cold water and hot water. For automatic storage water heaters it increases draw capacity.

Convenient adjusting dial for "finger-tip" temperature control. Heavy stainless steel springs. Standard temperature range 120-160°F. Max. temperature 210°F. Max. pressure 150 psi.

No. L70A - Special model available for low temperature range 100-130°F.

- All bronze construction
- Solid wall thermostat interchangeable and replaceable in all valves



Adjustable Feature



Temperature Range		Connections	Size	Height	Length	Weight
120°-160°	100°-130°					
No. 70A	No. L70A	Sweat	1/2"	3 3/4"	2"	3/4 lb.
70AT	L70AT	Threaded	1/2"	3 7/8"	2 3/4"	1 lb.
70A	L70A	Sweat	3/4"	4 1/8"	2 3/4"	1 lb.
70AT	L70AT	Threaded	3/4"	4 1/8"	2 3/4"	1 1/4 lb.

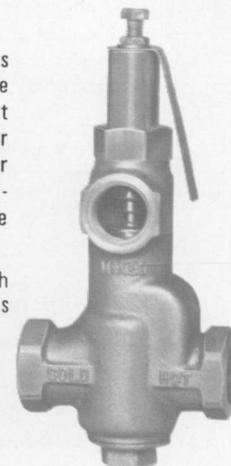
No. N170-M1, N170L-M1 Series

Tempering Valves for Large Commercial and Institutional Installations

For use on larger hot water supply systems requiring dependable control of water temperature at fixture outlets. Unique "double thermostat design" combines two thermostats in one for more sensitive control/rapid response to water temperature. Standard adjustable range 130 - 180°F. Max. temperature 210°F. Max. pressure 150 psi.

N170L-M1 - Special model available for car wash and other low temperature range applications between 100-130°F.

- All bronze body construction with stainless steel disc
- Solid wall hydraulic principle thermostat assures dependable control of water temperature
- Interchangeable thermostat assembly replaceable in all valves



Temperature Range		Size	Height	Length	Weight
130°-180°	100°-130°				
No. N170-M1	No. N170L-M1	3/4"	7 5/8"	4 1/8"	4 1/8 lbs.
N170-M1	N170L-M1	1"	7 5/8"	4 1/2"	4 3/8 lbs.
N170-M1	N170L-M1	1 1/4"	8"	6"	8 lbs.
N170-M1	N170L-M1	1 1/2"	8 1/8"	6"	8 lbs.
N170-M1	N170L-M1	2"	8 1/8"	6 3/8"	8 3/4 lbs.

The Watts Tempering Valves are designed to be installed at the boiler or water heater and will deliver a relatively uniform temperature throughout the entire system. However, they should not be used to provide "anti-scald" or "anti-chill" service because of system pressure and temperature variations beyond its control. Watts Tempering Valves are not designed to compensate for system pressure fluctuations and should not be used where more sophisticated pressure equalized temperature controls are required to provide anti-scald performance.

For Additional Information, send for F-N170.

MISC. PLUMBING PRODUCTS

TC Series

Multi-Purpose "Ball" Type Valve for Use as Test Cocks, Balancing, Shut-off or Drain

"Ball" type shut-off valve for liquids. Brass ball rotates smoothly against a "teflon" seat for positive open or closed position. The ball cleans and lubricates itself as it is rotated. Flow can be controlled by partial rotation of the ball. A female screwed outlet connection provides easy attachment of test hoses, etc.



No.	Size N.P.T.	DIMENSIONS			Wgt. (oz.)
		A	B	C	
TC-1	1/8"	1 3/4"	1/2"	7/8"	3 1/2
TC-2	1/4"	1 3/4"	1/2"	7/8"	3 1/2
TC-4	1/2"	1 7/8"	1/2"	7/8"	4
TC-6	3/4"	2"	5/8"	7/8"	5

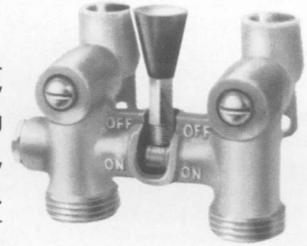
For Additional Information, send for S-TC.

No. 2 "DUO-CLOZ"

Washing Machine Shut-off Valve with Ball-Type Construction

Controls both hot and cold water simultaneously. One "finger-tip" lever ends inconvenience of turning two hand type valves.

Bronze body construction with 1/2" copper ell adapters, 2 3/8" on center. Max. temperature 180°F. Max. pressure 150 psi.



No. 2SC - Satin chrome finish

No. 2T, 2TSC - with 2-way male connectors. (1/2" threaded and sweat copper dual adapter

Size	Height	Length	Weight
1/2"	3 1/4"	3 3/4"	1 1/4 lbs.

For Additional Information, send for F-2.

No. 150A

*See page 27 for other water hammer arrestors.

Water Hammer Arrestor

Compact device to end annoying noises from banging pipes and water hammer noises. Dishwashers, clothes washers, quick closing fixtures all contribute to creating water shock which is not only annoying but damaging to pipes and appliances. It has a permanent precharged air chamber and sealed-in diaphragm which flexes to absorb shock. Size 1/2". Max. temperature 180°F.



- Sealed-in rugged diaphragm flexes to reduce shock
- Will not waterlog

No.	Max. Working Pressure (PSIG)	Max. Velocity (F.P.S.)	Max. Shock Pressure (PSIG)	Total Volume (Cu. In.)	Wgt. (oz.)
150A	150	10	200	10	12

Factory charged to 30 psig.

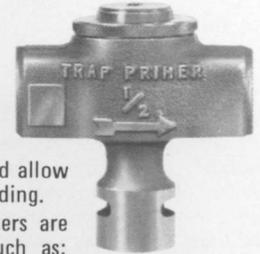
For Additional Information, send for F-150A.

No. A200 Series

Water Saving "Flow Through" Trap Primer

Designed to prevent floor drain traps (or similar traps) from losing their water seal. Loss of trap water seal would allow sewer gas and odor to enter room and building.

Because of their importance, trap primers are specified in various plumbing codes such as: I.A.P.M.O., Southern Standard Building Code, National Standard Plumbing Code and many local plumbing codes in U.S.A. and Canada.

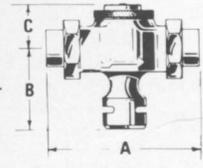


Automatically delivers a metered amount of water to the trap at the beginning and end of each line flow. Saves water by eliminating the unnecessary waste of water. Max. temperature 110°F. Max. pressure 125 psi.

No. A200T - Threaded ends

No. A200S - Union adapters with sweat ends

No.	Size	Dimensions			Weight
		A	B	C	
A200T	1/2"	2 3/4"	2"	1 1/4"	16 1/4 oz.
A200S	1/2"	4 1/8"	2"	1 1/4"	18 oz.

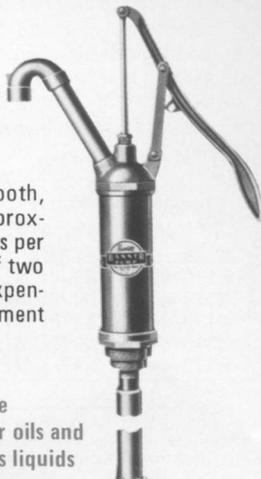


No. 5040A

Barrett Banner Barrel Pump

Our pump is by any comparison the greatest pump value on the market today . . . made for every filling need.

Compression is immediate and constant. Smooth, easy strokes deliver liquid fast and full . . . approximately one pint per stroke and up to 8 gallons per minute. Low initial cost allows purchasing of two or more pumps at the same price of a more expensive pump. Connections: Double bung attachment 1 1/2" or 2". Spout has 3/4" hose connection.



- Kerosene
- Gasoline
- Alcohol
- Naphtha
- Lubricating Oils
- Range Oils
- Anti-Freeze
- Many other oils and non-viscous liquids

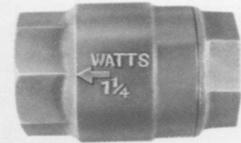
SPECIFICATIONS

CAPACITY	One pint per stroke . . . 8 gallons per minute
WEIGHT	9 lbs.

For Additional Information, send for Folder C-1.

No. 600 Series "Maxi-Flo" Check Valve

Designed to allow full fluid flow. Brass disc and "teflon" seat for tightest possible seating capacity. Stainless steel guide rod and spring. Can be installed horizontally or vertically. Rated at 125 lbs. steam and 400 lbs. WOG.



No. 601 - Especially designed for well pump service and other applications requiring extra tight seating. No. 601 also serves as positive "backstop" to eliminate reduced pressure backflow preventer supply pressure fluctuations. Rated 400 lbs. WOG. Temperature 180°F.

- Horizontal or vertical positions
- Pressure drop is equal to or less than swing checks
- For water, steam, gas or oil
- Replaceable seat and disc
- Bronze body construction

No. 601S - Sweat ends, sizes 1/2" thru 1".

No.	Size	Length	Height	Wgt. (lbs.)
600,601,601S	1/4", 3/8", 1/2"	2 1/8"	1 1/4"	1/2
600,601,601S	3/4"	2 1/2"	1 1/2"	3/4
600,601,601S	1"	3 1/8"	2"	1 3/8
600,601	1 1/4"	3 3/4"	2 1/2"	2 1/8
600,601	1 1/2"	4"	2 3/4"	3
600,601	2"	4 1/2"	3 1/2"	4 3/8

WARNING: Do not use for reciprocating air compressor service.

WATTS

GATE VALVES

GV, GVS Series

Bronze Gate Valves
For Water and Steam Service

Full rating for broad application. 125 WSP, 200 psi WOG.

GV Series have IPS threaded connections in sizes 1/4" thru 4".

GVS Series have C x C sweat connections in sizes 3/8" thru 3".

- Screw-in Bonnet
- 85-5-5 Bronze Body



Size	DIMENSIONS (Inches)						Weight (lbs.)	
	A		B		C		GV	GVS
	GV	GVS	GV	GVS	GV	GVS		
1/4"	15/8	—	3	—	115/16	—	0.62	—
3/8"	15/8	13/4	33/16	33/8	115/16	21/8	0.62	0.62
1/2"	13/4	13/4	33/8	33/8	23/16	21/8	0.71	0.62
3/4"	115/16	23/8	35/8	35/8	23/8	23/8	0.93	0.88
1"	21/8	213/16	47/16	47/16	29/16	29/16	1.2	1.15
1 1/4"	23/8	3	5	5	23/4	23/4	2.0	1.72
1 1/2"	21/2	33/8	53/8	57/16	31/8	31/8	2.7	1.85
2"	27/8	4	61/2	61/2	39/16	31/2	3.4	3.53
2 1/2"	31/2	41/2	8	85/16	45/16	43/8	6.4	5.95
3"	315/16	53/16	93/16	93/16	415/16	415/16	9.3	8.82
4"	43/4	—	103/4	—	53/4	—	18.0	—

For Additional Information, send for S-GV.

Series 406, 407, (408) (UL/FM Listed)

Iron Flanged Gate Valves
For Water and Steam Service

ASTM A-126 Class B Iron IBBM rated gate valves. 125 WSP, 200 psi WOG.

Sizes 2" thru 10"

406 Series are NRS
(non-rising stem)

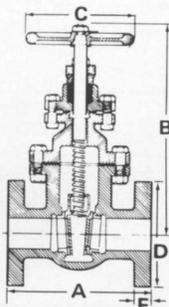
407 Series are OS&Y
(outside stem & yoke)

Sizes 2" thru 12"

408 Series are OS&Y

UL/FM Listed gate valves.

- Solid Wedge Disc
- Bolted Bonnet
- Gland Packed



Dimensions	VALVE SIZE							
	2"	2 1/2"	3"	4"	6"	8"	10"	12"
A	7	7 1/2	8	9	10 1/2	11 1/2	13	14
406 B	10 1/4	11 3/4	13	15	18 3/4	23	27 1/2	—
407 B	14	16 3/8	19 1/8	22 7/8	31 1/2	39 3/8	48 1/4	—
408 B	14	16 3/8	19 1/8	22 7/8	31 1/2	39 3/8	48 1/4	56 1/4
406 C	6 1/2	7	7	9	10	11	14	—
407 C	7 1/16	7 1/16	8 7/8	9 7/8	11 7/8	14	15 3/4	—
408 C	7 1/16	7 1/16	8 13/16	9 7/8	11 13/16	14	15 3/4	19 11/16
D	6	7	7 1/2	9	11	13 1/2	16	19
406, 407 E	5/8	11/16	3/4	15/16	1 1/64	1 1/16	1 1/4	—
408 E	5/8	11/16	3/4	15/16	1	1 1/8	1 3/16	1 1/4
Weight (lbs.)								
406	29	40	48	79	140 1/2	225	368 1/2	—
407	35	41 1/2	67	93	173	268	419	—
408	32	44	67	93	173	269	419	639

For Additional Information, send for S-406-407.

No. 805 Series

316 Stainless Steel Gate Valves
For Water and Steam Service
Sizes: 1/2" thru 2"

High performance and low cost. 125 WSP, 200 psi WOG. Threaded connections. ANSI B2.1.

- Corrosion resistant
- Lightweight



Also available a complete line of 150 lb. 304 and 316SS screwed fittings. Send for Catalog PL-SSF.

Size	DIMENSIONS (Inches)			Weight (lbs.)
	A	B	C	
1/2"	23/16	33/4	23/16	1
3/4"	23/8	43/16	29/16	13/4
1"	29/16	413/16	31/8	2
1 1/4"	3	61/2	31/8	3 1/4
1 1/2"	33/8	67/8	315/16	4
2"	33/4	81/16	415/16	7 1/2

For Additional Information, send for S-805.

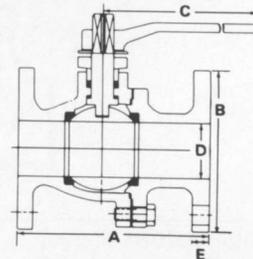
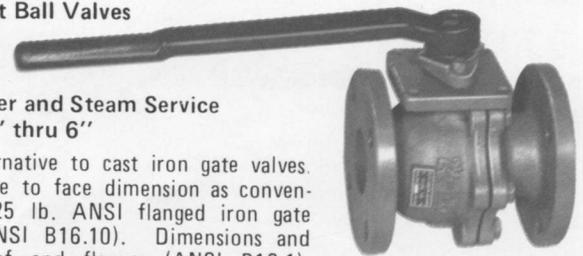
No. G-4000 Series (Gate Valve Alternative)

Cast Iron Flanged
Full Port Ball Valves

For Water and Steam Service
Sizes: 2" thru 6"

The alternative to cast iron gate valves. Same face to face dimension as conventional 125 lb. ANSI flanged iron gate valve (ANSI B16.10). Dimensions and drilling of end flanges (ANSI B16.1). 125 lb. WSP saturated, 200 lb. psi WOG non-shock.

- Fast 1/4-turn open or closed operation
- Positive shut-off
- Stainless steel ball and stem
- Available with actuator mounting pads



Size	2"	2 1/4"	3"	4"	6"
A	7	7 1/2	8	9	10 1/2
B	6	7	7 1/2	9	11
C	9	15 3/4	15 3/4	19 1/2	26
D	2	2 1/2	3	4	6
E	5/8	11/16	3/4	15/16	1
Weight (lbs.)	22	34	38	58	118

For Additional Information, send for S-G4000.

GLOBE VALVES/ SHUT-OFF VALVES

CAST BRASS SPECIALTY PRODUCTS

GLV Series

Bronze Globe Valves
For Water and Steam Service
Sizes: 1/4" thru 2"



A general service globe valve for water, steam, oil or gas applications. IPS threaded connections. 125 WSP/200 WOG.

- Screwed Bonnet
- Swivel Disc
- 85-5-5-5 Bronze Body

Size	DIMENSIONS (Inches)			Weight (lbs.)
	A	B	C	
1/4"	1 13/16	2 15/16	2	0.71
3/8"	1 13/16	2 15/16	2	0.71
1/2"	1 15/16	2 15/16	2 5/16	0.74
3/4"	2 1/4	3 1/8	2 1/2	1.25
1"	2 9/16	3 3/4	2 13/16	1.93
1 1/4"	2 15/16	4 1/8	3 1/2	2.33
1 1/2"	3 5/16	4 3/4	3 5/8	4.20
2"	3 7/8	5 1/2	4 1/8	5.50

For Additional Information, send for S-GLV.

807 Series

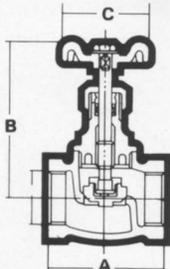
316 Stainless Steel Globe Valves
For Water and Steam Service
Sizes: 3/8" thru 2"

High performance at low cost. 125 WSP/200 psi WOG. Threaded connections. ANSI B2.1.

- Corrosion resistant
- Lightweight

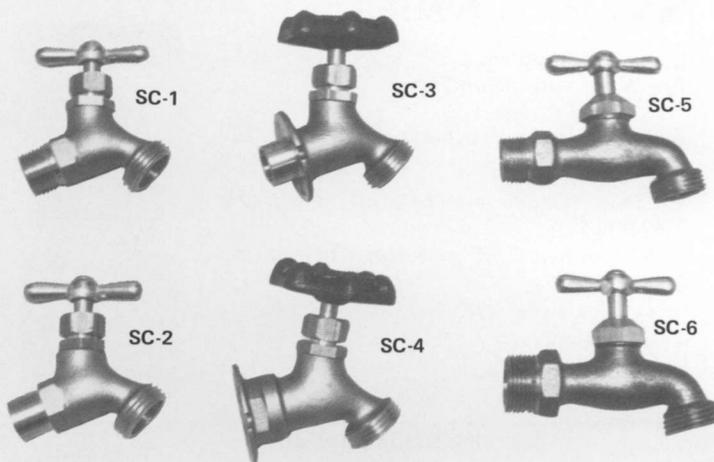


Also available a complete line of 150 lb. 304 and 316SS screwed fittings. Send for Catalog PL-SSF.

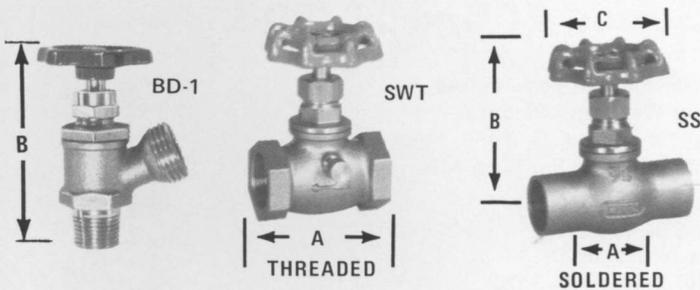


Size	DIMENSIONS (Inches)			Weight (lbs.)
	A	B	C	
3/8"	2 3/16	4	2 3/16	7/8
1/2"	2 9/16	4 1/8	2 3/16	1
3/4"	3 1/8	4 5/16	2 9/16	1 3/4
1"	3 3/16	5 1/8	3 1/8	2 3/4
1 1/4"	4 1/8	6 1/2	3 15/16	8
1 1/2"	4 3/4	7	3 15/16	5
2"	5 1/2	8	4 15/16	8 1/2

For Additional Information, send for S-805.



No.	Size	Description	Dimensions (Inches)			Weight (lbs.)
			A	B	C	
NO KINK HOSE FAUCET with tee handle						
SC-1	1/2"	Male I.P. or Copper Connection	2 3/4	2 1/2	2 1/4	3/8
SC-2	1/2" or 3/4"	Copper Connection	2 3/4	2 1/2	2 1/4	3/8
LAWN FAUCET (Sillcock) with cast iron handwheel						
SC-3	1/2" or 3/4"	Regular pattern, dual conn.	2 3/4	2 1/2	2 1/4	1/2
SC-4	3/4"	I.P. Regular pattern	2 3/4	2 1/2	2 1/4	1/2
HOSE BIBB HEX SHOULDER with tee handle						
SC-5	1/2"	I.P. Inlet Hose End	3 3/4	2	2 1/4	3/8
SC-6	3/4"	I.P. Inlet Hose End	3 3/4	2	2 1/4	3/8



No.	Size	Description	Dimensions (Inches)			Weight (lbs.)
			A	B	C	
BOILER DRAINS with wheel handle and stuffing box						
BD-1	1/2"	I.P. Male or Nom. Copper Conn. Rough Brass	1 1/2	3 1/16	1 1/2	1/2
BD-2	3/4"	I.P. Male or 1/2" I.P. Female, Rough Brass	1 1/2	3 1/16	1 1/2	1/2
STOP & WASTE VALVES - 150 lb. WOG non-shock disc, soft seat						
SWS	1/2"	Solder Ends - Cast Brass	1 3/8	2 15/16	2	1/2
	3/4"		1 1/4	2 15/16	2	1/2
SWT	1/2"	I.P. Threaded Ends - Cast Brass	2 1/8	2 1/2	2	3/8
	3/4"		2 1/4	2 5/8	2	3/4
STOP ONLY VALVES						
SS	1/2"	Solder Ends - Cast Brass	1 3/8	2 15/16	2	1/2
	3/4"		1 1/4	2 15/16	2	1/2
ST	1/2"	IPS Threaded Ends - Cast Brass	2 1/8	2 1/2	2	3/8
	3/4"		2 1/4	2 5/8	2	3/4

WATTS

CHECK VALVES

CV Series

**Bronze Check Valves
For Water and Steam Service**

Used to prevent reverse flow in commercial and industrial steam, water, gas or oil lines. Rating: 125 WSP/200 WOG.

- 85-5-5-5 bronze body
- Metal to metal seating
- 90° straight pattern

CV Series - Sizes: 3/8"-4", IPS threaded connections

CVS Series - Sizes: 1/2"-3", CxC sweat connections



Size	DIMENSIONS (Inches)				Weight (lbs.)	
	CV	CVS	CV	CVS	CV	CVS
3/8"	21/16	—	11/2	—	0.46	—
1/2"	21/4	21/2	11/2	11/2	0.53	0.53
3/4"	23/8	3	111/16	13/4	0.67	0.71
1"	23/4	31/2	115/16	17/8	1.01	0.95
11/4"	31/4	4	23/16	21/16	1.54	1.54
11/2"	35/8	43/4	25/16	23/8	1.94	1.87
2"	41/4	51/4	27/8	23/4	3.21	3.20
21/2"	51/2	63/8	31/2	31/2	6.00	5.80
3"	57/8	73/16	33/4	33/4	7.90	7.60
4"	71/4	—	41/2	—	13.00	—

For Additional Information, send for S-CV.

CVY Series

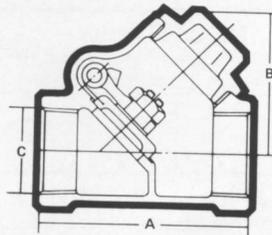
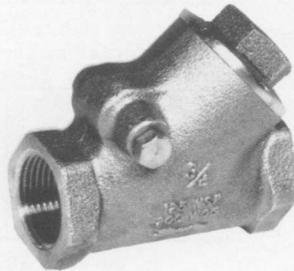
**Bronze Check Valves
For Water and Steam Service**

For industrial and commercial lines to prevent reverse flow. Rating: 125 WSP/200 WOG.

- 85-5-5-5 bronze body
- Metal to metal seating
- "Y" pattern type

CVY Series - Sizes: 3/8"-2", IPS threaded connections

CVYS Series - Sizes: 1/2"-2", CxC sweat connections



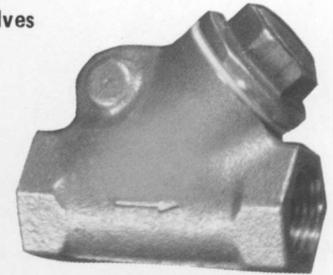
Size	DIMENSIONS (Inches)				Weight (lbs.)	
	CVY	CVYS	CVY	CVYS	CVY	CVYS
3/8"	23/16	—	15/8	—	0.62	—
1/2"	23/16	211/16	15/8	15/8	0.62	0.60
3/4"	23/4	33/8	2	115/16	0.88	0.82
1"	31/8	41/16	21/4	21/4	1.32	1.24
11/4"	33/4	43/4	211/16	25/8	2.00	1.87
11/2"	45/16	53/8	31/16	31/16	2.87	2.71
2"	51/16	611/16	33/4	33/4	4.76	4.76

For Additional Information, send for S-CV.

No. 806 Series

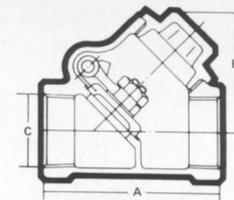
**316 Stainless Steel Check Valves
For Water and Steam Service**

Sizes: 1/2"-2" threaded connections. High performance "Y" type swing check valves. Rating: 125 WSP/200 WOG.



- Lightweight
- Corrosion resistant
- Low maintenance

Also available a complete line of 150 lb. 304 and 316SS screwed fittings. Send for Catalog PL-SSF.



Size	DIMENSIONS (Inches)			Weight (lbs.)
	A	B	C	
1/2"	29/16	17/8	1/2	3/4
3/4"	31/8	23/16	3/4	11/2
1"	33/16	29/16	1	2
11/4"	41/8	3	11/4	31/2
11/2"	43/4	33/8	11/2	4
2"	51/2	41/16	2	71/4

For Additional Information, send for S-805.

No. 410 Series

**Iron Flanged Check Valves
For Water and Steam Service**

Sizes: 1 1/2" thru 12"

ANSI 125 lb. swing checks. Straight pattern to prevent reverse flow. Full flow, minimum pressure drop. Rating: 125 WSP/200 WOG. ASTM A-126, Class B Iron; Body, cover.



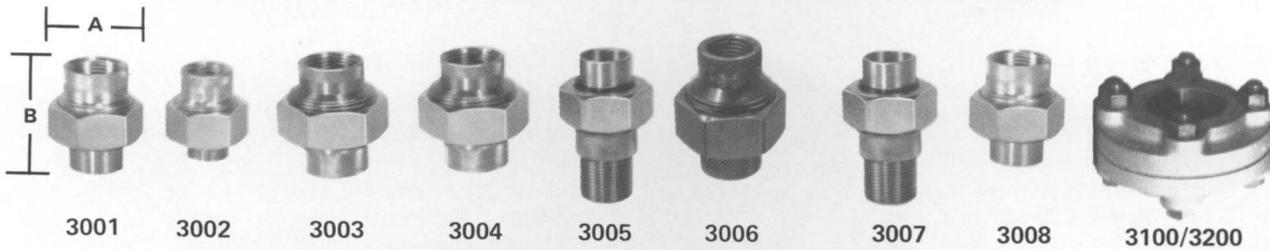
- Bronze trim
- Bolted cover

WARNING: Do not use for reciprocating air compressor service.

Size (Inches)	Dimensions (inches)		Weight (lbs.)
	A	B	
1 1/2	61/2	4	24
2	8	41/4	26
2 1/2	81/2	5	38
3	91/2	51/4	49
4	111/2	6	77
5	13	71/8	112
6	14	8	152
8	191/2	93/8	261
10	241/2	12	474
12	271/2	131/2	530

For Additional Information, send for S-410.

DIELECTRIC PIPE FITTINGS/UNIONS



No. 3000 Series

For Residential, Commercial and Industrial Use.

Used to provide protection against the destruction caused by galvanic and stray current corrosion. An effective means for preventing piping system deterioration from accelerated corrosion due to galvanic and stray current is the installation of Dielectric Fittings/Unions.

SPECIFICATIONS and MATERIALS

The unions are rated at 250 psi at 180°F and are designed to meet the requirements of ANSI B16.39, including hydrostatic strength, tensile strength and air pressure testing. All pipe threads are in accordance with ANSI B2.1 and solder joints meet national plumbing standards.

Gray Iron	ASTM A-48-25
Malleable Iron Parts	ASTM A-197
Steel Parts	ASTM A-107
Brass Parts	ASTM B-16
Bronze Parts	ASTM 844
Cadmium Parts	ASTM A-165
Insulators	Watts #I425

- Meets federal specifications for both tensile strength and thread end connections
- All Watts Dielectric Unions individually factory certified to withstand a minimum of 600 volts on a dry line with no flashover
- Watts Dielectric Unions are rated at 250 psi conforming to ANSI B16.39
- Watts Dielectric Flange Fittings are rated at 175 psi conforming to B16.42 (iron), B16.24 (bronze)
- Watts Dielectric Fittings/Unions are designed and manufactured to the highest quality standards

Standardly supplied with GA gaskets unless otherwise specified. GA gaskets are suitable for water, air, oil, natural gas, propane, gasoline, kerosene, mineral oil, vegetable oil and alkalines. Specify suffix GB for use with steam to 300°F at 50 psi. NOTE: for other applications of either gasket material, consult factory.

Size (Inches)	DIMENSIONS (Inches)		Weight (lbs.)
	A	B	
No. 3001 Series —			
Female Iron Pipe Thread to Solder Connection			
1/2	1 1/2	1 7/8	1/2
3/4	1 5/8	2 1/8	1/2
1	1 7/8	2 1/2	1/2
1 1/4	2 1/4	3	1 1/4
1 1/2	2 3/4	3	1/2
2	3 1/2	3	2 1/4
No. 3002 Series —			
Female Iron Pipe Thread to Reduced Solder Connection			
1/2 x 3/8	1 1/2	1 7/8	1/2
3/4 x 1/2	1 5/8	1 7/8	1/2
1 x 3/4	1 7/8	2 1/2	3/4
No. 3003 Series —			
Female Iron Pipe Thread to Female Brass Pipe			
1/2	1 5/8	2 1/4	1/2
3/4	1 7/8	2 1/4	3/4
1	2 1/4	2 1/2	1
1 1/4	2 3/4	2 3/4	1 3/4
1 1/2	3 1/2	2 3/4	3
2	4 1/8	3 1/8	4 1/2
No. 3004 Series —			
Female Iron Pipe Thread to Female Iron Pipe Thread, Galvanized			
1/2	1 5/8	2 1/4	1/2
3/4	1 7/8	2 1/4	3/4
1	2 1/4	2 1/2	1
1 1/4	2 3/4	2 3/4	1 3/4
1 1/2	3 1/2	2 3/4	3
2	4 1/8	3 1/8	4
No. 3005 Series —			
Male Iron Pipe Thread to Solder Connection			
1/2	1 1/2	2 5/8	1/2
3/4	1 5/8	3	1/2

Size (Inches)	DIMENSIONS (Inches)		Weight (lbs.)
	A	B	
No. 3006 Series —			
Female Iron Pipe Thread to Female Iron Pipe Thread, Black			
1/2	1 5/8	2 1/4	1/2
3/4	1 7/8	2 1/4	3/4
1	2 1/4	2 1/2	1
1 1/4	2 3/4	2 3/4	1 3/4
1 1/2	3 1/2	2 3/4	3
2	4 1/8	3 1/8	4
No. 3007 Series —			
Male Iron Pipe Thread to Reduced Solder Connection			
1/2 x 3/8	1 1/2	2 5/8	1/2
3/4 x 1/2	1 5/8	3	1/2
No. 3008 Series —			
Female Brass Pipe Thread to Female Solder Connection			
1/2	1 1/2	1 7/8	1/2
3/4	1 5/8	2 1/8	3/4
1	1 7/8	2 1/2	1
Flanged Fittings - No. 3100 Series —			
Iron Pipe Thread to Copper Solder Joint			
2	5 1/8	3 1/4	8
2 1/2	5 7/8	3 1/2	12
3	6 3/4	3 3/4	14
4	9 1/8	4 3/8	30
Flanged Fittings - No. 3200 Series —			
Iron Pipe Thread to Iron Pipe Thread			
2	5 1/8	2 1/8	8
2 1/2	5 7/8	2 3/4	12
3	6 3/4	2 3/4	15
4	9 1/8	3	31

Weights Approximate

WATER HAMMER ARRESTOR

No. 15 Series

Water hammer arrestors used to end annoying noises from banging pipes and water hammer. Pre-charged air chamber design for optimum performance.

Can be installed vertically, horizontally or at any angle. Temperature range 33°F to 300°F. ASSE 1010 standard, ANSI A112.26.1M and PDI approved.

SIZE: ½" through 2".

OPERATING PRESSURE - Designed to operate on all domestic and commercial lines @ 150 PSI working pressure.

INSTALLATION - May be installed in new or existing plumbing systems with a standard pipe tee vertically, horizontally or at any angle.

No. 15 Series is factory air charged and permanently capped and epoxy sealed. They may be installed in concealed locations without access panels and are not rechargeable in the field.



Size	Dimensions		Weight (lbs.)
	A	B	
1/2"	6"	17/16"	3/4
3/4"	77/8"	17/8"	1 1/4
1"	8 1/2"	23/16"	2 1/4
1 1/4"	10 13/16"	2 11/16"	3 1/2
1 1/2"	11 1/2"	3 5/16"	6
2"	14 7/8"	3 5/16"	7

Size	AIR Preload PSI	Fixture Units	Cross Ref. PDI Standard
1/2"	60	1-11	A
3/4"	60	12-32	B
1"	60	33-60	C
1 1/4"	60	61-113	D
1 1/2"	60	114-154	E
2"	60	155-330	F

- Hard drawn copper bodies
- Seals, "O" rings - EPDM
- Brass piston and cap



For Additional Information, send for F-15.

PLASTIC BALL VALVES

PVC and CPVC

A new line of compact and true union plastic ball valves in PVC and CPVC. Available in socket and threaded connections. Sizes ½" through 2".

PBV Series (PVC) models
CBV Series (CPVC) models
Compact Plastic Ball Valves



Compact - PVC - Socket

Valve No.	Size	EDP No.	Carton Qty.
PBV-S	½"	540020	96
PBV-S	¾"	540030	72
PBV-S	1"	540040	60
PBV-S	1 ¼"	540050	30
PBV-S	1 ½"	540060	30
PBV-S	2"	540070	24

Compact - CPVC - Socket

Valve No.	Size	EDP No.	Carton Qty.
CBV-S	½"	540220	96
CBV-S	¾"	540230	72
CBV-S	1"	540240	60
CBV-S	1 ¼"	540250	30
CBV-S	1 ½"	540260	30
CBV-S	2"	540270	24

Compact - PVC - Thread

Valve No.	Size	EDP No.	Carton Qty.
PBV-T	½"	540120	96
PBV-T	¾"	540130	72
PBV-T	1"	540140	60
PBV-T	1 ¼"	540150	30
PBV-T	1 ½"	540160	30
PBV-T	2"	540170	24

Compact - CPVC - Thread

Valve No.	Size	EDP No.	Carton Qty.
CBV-T	½"	540320	96
CBV-T	¾"	540330	72
CBV-T	1"	540340	60
CBV-T	1 ¼"	540350	30
CBV-T	1 ½"	540360	30
CBV-T	2"	540370	24

TPBV Series (PVC) models
TCBV Series (CPVC) models
True Union Plastic Ball Valves



TPBV-D Series (PVC) models are furnished with socket weld connectors and two threaded connectors to allow a choice of end connections.

True Union - PVC - Dual Adaptor

Valve No.	Size	EDP No.	Carton Qty.
TPBV-D	½"	542020	48
TPBV-D	¾"	542030	36
TPBV-D	1"	542040	30
TPBV-D	1 ¼"	542050	24
TPBV-D	1 ½"	542060	24
TPBV-D	2"	542070	24

True Union - CPVC - Socket

Valve No.	Size	EDP No.	Carton Qty.
TCBV-S	½"	541020	48
TCBV-S	¾"	541030	36
TCBV-S	1"	541040	30
TCBV-S	1 ¼"	541050	24
TCBV-S	1 ½"	541060	24
TCBV-S	2"	541070	24

True Union - CPVC - Thread

Valve No.	Size	EDP No.	Carton Qty.
TCBV-T	½"	541120	48
TCBV-T	¾"	541130	36
TCBV-T	1"	541140	30
TCBV-T	1 ¼"	541150	24
TCBV-T	1 ½"	541160	24
TCBV-T	2"	541170	24

For Additional Information, send for F-PBV.

INTERNATIONAL REPRESENTATION

NORTHEASTERN REGION

Trayco Sales, Inc.	P.O. Box 653, Lynnfield, Massachusetts 01940	617 334-6078
W. P. Haney Co., Inc.	11 Memorial Drive, Avon, Massachusetts 02322	617 588-6464
E. W. Leonard, Inc.	Ray Palmer Rd., P.O. Box 371, Moodus, CT 06469-0371	203 873-8691
WMS Sales, Inc.	4415 Cindy Lane, Syracuse, New York 13215	315 469-8083
WMS Sales, Inc.	160 Sugg Road, Buffalo, New York 14225	716 632-5790
Mack-Allied Sales Co., Inc.	1012 Goffle Road, Hawthorne, New Jersey 07506	{ 201 423-1101 212 594-1319
Mack-Allied Sales Co., Inc.	95 J. Hoffman Lane, Central Islip, New York 11722	516 348-2550
Vernon Bitzer Associates, Inc.	186 Easton Road, Horsham, Pennsylvania 19044	215 674-4660
R. F. Luley Co.	2781 Noblestown Road, Pittsburgh, Pennsylvania 15205	412 921-4291
R. F. Luley Co.	1291 West Fir Drive, Latrobe, Pennsylvania 15650	412 539-3893

SOUTHEASTERN REGION

Walter E. Harkleroad Sales Agency Inc.
Walter E. Harkleroad Sales Agency Inc.
Virginia Marketing Associates
Virginia Marketing Associates
Virginia Marketing Associates
Smith & Stevenson
Central Sales Co.
Central Sales Company
Spotswood Parker & Co.
Distributor Sales of Florida
Distributor Sales of Florida
Distributor Sales of Florida
Earl L. Griffin Co.
Billingsley & Associates, Inc.
Billingsley & Associates, Inc.
Plinex, Inc.

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

604 N.E. Fourth Ave., Ft. Lauderdale, Florida 33304 305 463-0572
13 Oakview Circle, Ormond Beach, Florida 32074 904 441-1072
2736B Loveless St., Birmingham, Alabama 35209 205 879-3469
2000 Clearview Pkwy., Suite 201, Metairie, Louisiana 70001 504 885-6771
478 Cheyenne Lane, Madison, Mississippi 39110 601 856-7565
38 Villamil Street, Santurce, Puerto Rico 00907 809 725-1356

MIDWEST REGION

Mid-Continent Marketing Services Ltd.	11424 Whistler Dr., Indianapolis, Indiana 46229	312 953-1211
Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, Illinois 60101	312 953-1211
Advance Industrial Marketing Ltd.	P.O. Box 87, 923 South Bird St., Sun Prairie, Wisconsin 53590	608 837-5005
Dave Watson Associates	1325 West Beecher, Adrian, Michigan 49221	517 263-8988
The Harris-Billings Co.	3062 Ranchview Lane, Plymouth, Minnesota 55441	612 559-9400
Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, Iowa 50314	515 288-0184
Mack McClain & Associates, Inc.	1438 South 76th Street, Omaha, Nebraska 68124	402 397-3688
Mack McClain & Associates, Inc.	11836 W. 85th St., Lenexa, Kansas 66214	913 888-9426
J. W. Sullivan Company	7901 Manchester Ave., St. Louis, Missouri 63143	314 644-5454
Disney-McLane, Inc.	2704 Colerain Ave., Cincinnati, Ohio 45225	513 541-1682
Madsen-Bayer & Associates, Inc.	2510 Englewood Drive, Columbus, Ohio 43219	614 476-1883
Madsen-Bayer & Associates, Inc.	20412 Center Ridge Rd., Rock River, Ohio 44116	216 331-3840
Gary S. Gilpin Sales Co.	4468 Emberson Ave., Louisville, Kentucky 40209	502 367-2178

WESTERN REGION

R. C. Hartnett & Associates	2088 Wayne Ave., San Leandro, California 94577	415 352-9450
Hollabaugh Brothers & Associates	610 South Alaska, Seattle, Washington 98108	206 467-0346
Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, Oregon 97202	503 238-0313
R. E. Fitzpatrick Sales, Inc.	16 East 8th Ave., Midvale, Utah 84047	801 566-7156
Hudson and Lening Sales Co.	2596 W. Barbary Place, Denver, Colorado 80204	303 623-1186
Benisek-Delaney and Associates	2267 Yates Avenue, Los Angeles, California 90040	213 685-9900
Frank Hockett Co.	618 East 20th Street, Tucson, Arizona 85719	602 622-5187
Frank Hockett Co.	2012 W. 4th St., Tempe, Arizona 85281	602 967-5222
Frank Hockett Co.	19 Serena Drive, Rio Rancho, New Mexico 87124	505 892-1460
Charlie Hall & Associates, Inc.	3030 Lincoln Ct., Garland, Texas 75041	214 840-1530
Texas Allied Marketing	33 Lyerly, Suite B-5, Houston, Texas 77022	713 699-5778
Crown Sales	360 Mokuaua St., Honolulu, Hawaii 96819	808 845-7881

EXPORT Rte. 114 and Chestnut St., No. Andover, MA 01845 USA 617 688-1811

International

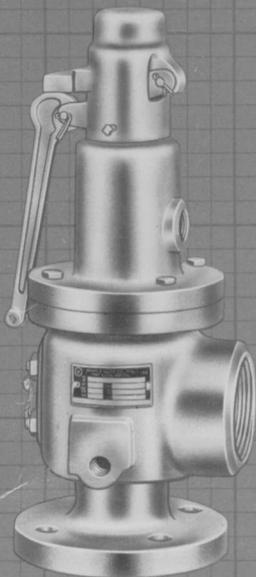
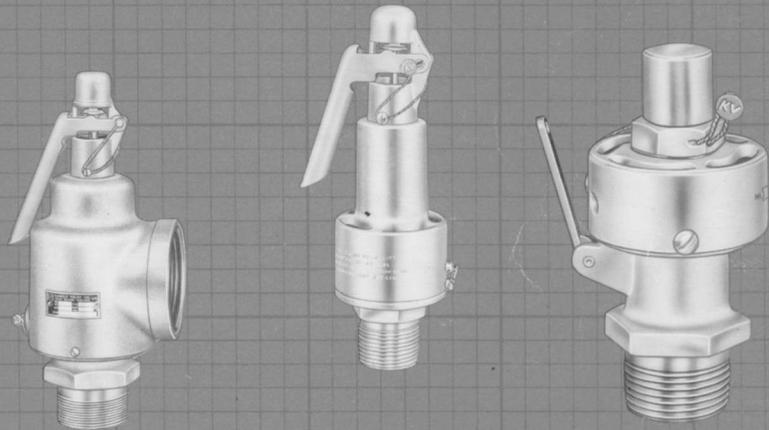
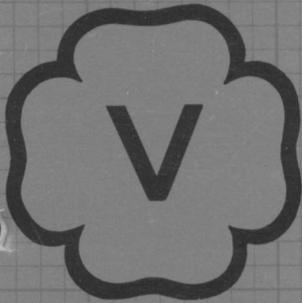
HEADQTRS: Watts Regulator Company	Rte. 114 and Chestnut St., No. Andover, MA 01845 USA	617 688-1811
Watts Regulator of Canada Ltd.	441 Hanlan Road, Woodbridge, Ontario L4L3T1, Canada	416 851-8591
Canadian Sales Agencies:		
Currie Agencies Ltd.	3468 Bridgeway Ave., Vancouver, BC V5K 1B6	604 294-5321
Currie Agencies Ltd.	3220 56th Ave., SE Calgary, Alta T2C 0B1	403 236-3747
Watts Regulator of Canada Ltd.	4030 Steinberg St., St. Laurent, PQ H4R 2G7	514 337-9010
Murray Krovats Sales Agency	18 Barnstaple Cove, Winnipeg, Man R3R 2W3	204 943-2684
KF-RB Agency	15 Caesar Ave., Nepean, Ontario K2G 0B1	613 225-9774
W. B. Gingerich Sales Ltd.	175 Waterloo St., New Hamburg, Ontario N0B 2G0	519 662-2460
S.T.E. Fetterly & Son Ltd.	6080 Young St., Ste 911, Halifax, NS B3K 5L8	902 454-9377
Watts Regulator (Nederland) b.v.	De Beaufortlaan 24A, 3768MJ, Soestduinen, Holland Telex 43786	2155-18276



Mail: Box 628, Lawrence, MA 01842 • (617) 688-1811 • Telex: 94-7460 Watts Reg Law
Hdqtrs: Rte. 114 and Chestnut St., No. Andover, MA 01845 • Fax: (617) 794-1848/794-1674

OUR SECOND HUNDRED

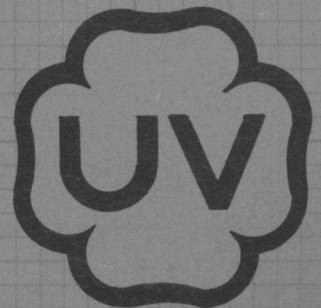
CATALOG 85



SAFETY and RELIEF VALVES



KUNKLE VALVE COMPANY, INC.



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

THE COMPANY

The KUNKLE VALVE COMPANY, a pioneer in the safety and relief valve industry, was established in 1875 for the manufacture of safety valves under United States patents granted to Mr. E. B. Kunkle. The original Kunkle valve (our present Figure 1), with its short stature and neatness of structure, gained wide acceptance in national and international markets. Continual improvement and expansion through the years have produced the present KUNKLE products for steam, air, gas and liquid services covering a wide range of pressures, temperatures and capacities—described on the following pages.

In 1947 the Valve Division of the Star Brass Manufacturing Company was acquired. KUNKLE-STAR Navy-approved relief valves are used extensively aboard all types of Naval vessels. A number of other well-proved STAR designs have been absorbed into the regular KUNKLE line of industrial valves.

KUNKLE VALVE COMPANY now has two of the most modern manufacturing facilities in the industry. The Fort Wayne, Indiana facility has been occupied since 1975 and includes corporate Sales, Engineering and Administrative offices. The Black Mountain (Asheville), North Carolina plant has been occupied since 1981. We operate our own greatly expanded foundry in a community near Fort Wayne. These facilities assure you of the highest quality at attractive prices.

POP SAFETY AND RELIEF VALVES

In ordinary diction the terms "safety valve" and "relief valve" are frequently used interchangeably. This is satisfactory to the extent that both safety valves and relief valves of the spring-loaded type are similar in external appearance and both serve the broad general purpose of limiting fluid (liquid or gaseous) pressures by discharging some of the pressurized liquid or gas. Some authorities restrict "safety valves" to those installed on boilers, superheaters and fired vessels—all others being classified as relief valves. We prefer, however, to define them briefly as follows:

Safety valves are for use with gases—which include air and steam. Their design always includes a huddling chamber which utilizes the expansion forces of these gases to effect quick opening (popping) and closing actions. The difference between the opening and closing pressures is termed "blowdown"; and for steam safety valves blowdown limitations are carefully stated in the A.S.M.E. Power Boiler Code.

Relief valves are normally used for liquid service, although safety valves may be so used. Ordinarily relief valves do not have an accentuated huddling chamber nor a regulator ring for varying or adjusting blowdown. They therefore operate with a relatively lazy motion, slowly opening as pressure increases and slowly closing as pressure decreases. Such relieving action affords suitable protection for vessels or systems where there is no need for instantaneous release of large volumes, and where sufficient leeway is provided between the design pressure and the operating pressure in the system.

GUARANTY

KUNKLE valves are guaranteed to be free from defects in material and workmanship for one year from date of shipment. Upon our written consent, any valve claimed defective may be returned to us, transportation charges prepaid, for examination. If, in our opinion, the valve is defective, it will be repaired or replaced, as we may designate, f.o.b. Ft. Wayne, Indiana. Under no circumstances do we assume responsibility for consequential or incidental damages, nor will we accept claims for labor, repairs or other expenses. In addition, we do not assume responsibility for repair or replacement of any valve, the necessity for which is occasioned by the improper application, installation, sale, maintenance, use or operation of such valve. KUNKLE MAKES NO WARRANTY AS TO MERCHANTABILITY OR AS TO FITNESS OF PRODUCTS FOR A PARTICULAR PURPOSE EXCEPT AS STATED ABOVE. (See page 2 for recommendations to obtain satisfactory service.)

All specifications in this catalog are subject to change without notice. We will furnish certified drawings for specific orders on request.

KUNKLE

**safety and relief
valves**

CATALOG 85



**Fort Wayne, Indiana — Sales, Engineering and
Administrative Offices — Manufacturing Plant.**



**Black Mountain (Asheville), North Carolina
Manufacturing Plant.**

RECOMMENDED SELECTIONS

FOR STEAM

- Fig. 6010**—Bronze, Top Guided, High Capacity—Page 9
- Fig. 252**—Iron Bodied, Top Guided, High Capacity—Page 23
- Fig. 300/600**—Steel Bodied, Top Guided, High Capacity—Page 22
- Fig. 910**—Steel, NPT Connections, Top Guided—Page 24
- Fig. 930-1**—For Low Pressure Steam Heating Boilers—Page 25
- Fig. 933**—For Low Pressure Steam Heating Boilers—Page 26

FOR AIR/GAS

- Fig. 83-4**—Bronze, Bottom Guided, Medium Capacity—Page 6
- Fig. 1-A**—Bronze, Compact, Top Outlet—Page 8
- Fig. 86**—Bronze, High Capacity, Top Outlet—Page 10
- Fig. 87**—Bronze, High Capacity, Side Outlet—Page 10
- Fig. 23-M**—Bronze, S/S Trim, High Pressure—Page 11
- Fig. 48-A**—Brass, 1/4", 3/8", 1/2", For Small Compressors—Page 19

FOR LIQUIDS

- Fig. 20-1**—Bronze, Screwed or Flanged—Page 31
- Fig. 71**—All Iron, Screwed—Page 36
- Fig. 71-S, 171, 171-S**—Same as 71, Except for Materials—Page 36
- Fig. 91-1, 91-1S, 191-1**—Large Sizes, Iron, Steel—Pages 34, 35

RECOMMENDED INSTALLATION

1. Before installing a new safety/relief valve we recommend that a pipe tap be used to assure clean-cut and uniform threads in the vessel opening and to allow for normal hand engagement followed by a half to one turn by wrench.
2. Avoid over-tightening as this can distort safety/relief valve seats. One need only remember that as the vessel and valve is heated the heat involved will grasp the valve more firmly.
3. Avoid excessive "popping" of the safety/relief valve as even one opening can provide a means for leakage. Safety/relief valves should be operated only often enough to assure that they are in good working order.
4. Avoid wire, cable or chain pulls for attachment to levers that do not allow a vertical pull. The weight of these devices should not be directed to the safety/relief valve.
5. Avoid having the operating pressure too near the safety/relief valve set pressure. A very minimum differential of 5# or 10% (whichever is greater) is recommended. An even greater differential is desirable, when possible, to assure better seat tightness and valve longevity.
6. Avoid discharge piping where its weight is carried by the safety/relief valve. Even though supported separately, changes in temperature alone can cause piping strain. We recommend that drip pan elbows or flexible connections be used wherever possible.
7. Apply only a moderate amount of pipe compound to male threads only, leaving the first thread clean. Compound applied to female threads or used to excess can find its way into the valve, causing leakage. Flange connections should be clean and straight, with new gaskets. Draw the mounting bolts down evenly.

SOME SAFETY/RELIEF VALVE POINTERS

1. ASME Codes require that steam and air safety valves have test levers, although levers may be omitted on valves used in hazardous or toxic gas service.
2. Steam safety valves may be used for air service but not vice versa. Liquid valves should be used for liquid only.
3. Safety valves should be installed vertically with the drain holes open or piped to a convenient location.
4. The inlet to and outlet from a safety valve must be at least as large as the safety valves connections.
5. Every safety/relief valve is individually tested and set by us. Steam valves are sealed to prevent tampering. Liquid valves are adjustable plus or minus 20%.
6. In the event you have safety/relief valve problems, first check the accuracy and cleanliness of pressure gauges and then refer to "Recommended Installation" above for help in determining the cause of your problem. Feel free to consult us in these matters—we would like to help.
7. When ordering, we need to know the size, type of connections, figure number, pressure setting, required relieving capacity and service media, or advise your complete requirements so that we can make a selection for you.

KUNKLE STEAM SAFETY VALVES

SELECTION INDEX

FOR LOW PRESSURE STEAM HEATING BOILERS

Material	FIGURE NUMBER	SIZES	Maximum Pressure PSIG	Features or Applications	Page
Bronze	183-T	3/4 thru 3"	15	Side outlet, 250# Standard.	26
Cast Iron	930-1	3/4 thru 3"	15	Side outlet, Full nozzle, Bronze trim.	25
Cast Iron	254	1 1/2 thru 4"	15	Semi-Nozzle. Bronze or S/S trim.	26
Bronze	933, 934, 935	1/2 thru 2"	15	Side Outlet, Full nozzle, 250# Standard.	26

FOR HOT WATER BOILERS & GENERATORS

Bronze	137	3/4 & 1"	160	Soft seated. 250° F. Max.	28
Cast Iron	137	1 1/2 & 2"	160	Soft seated. 250° F. Max.	28
Steel	5000	1 thru 6"	600	750 F. See Bulletin	5000
Steel	927	1/2" thru 2"	500/900	800 F. S/S trim, packed lever	24

FOR POWER BOILERS & UNFIRED STEAM EQUIPMENT

Bronze	1	1/2, 3/4 and 1"	250	Top outlet. Very compact.	8
"	2	1/2, 3/4 and 1"	250	Side outlet. Very compact.	8
"	23-M	1/2 - 2"	250	Extra Heavy. Side outlet.	11
"	82-4, 82-4S	1/2 - 3"	250	Top outlet. Flat seats.	6
"	83-4, 83-4S	1/2 - 3"	250	Side outlet. Flat seats.	6
"	6010, 6021	1/2 - 2 1/2"	250	Full nozzle. Side outlet.	9
"	6030	1/2 - 2"	300	S/S Trim. Full Nozzle. Side Outlet	9
Cast Iron	252 Series	1 1/2 - 6"	250	Semi-nozzle. Bronze or S/S trim.	23
Steel	300 & 600	1 1/4 - 6"	750	Full nozzle. S/S trim 800° F.	22
Steel	910 Series	1/2 - 2"	500/900	Full nozzle. S/S trim 800° F.	24

FOR SPECIAL OR OTHER APPLICATIONS

Bronze	21-M	1/2 - 2"	250	Extra Heavy. With handwheel.	11
"	22-M	1/2 - 2"	250	Extra Heavy. With pressure tight cap.	11
"	80-4, 80-4S	1/2 - 3"	250	Pressure tight cap.	7
"	84-4, 84-4S	1/2 - 3"	250	Packed lift lever.	7
Steel	264-1/267-1	1/2, 3/4, 1"	2000	Sentinel Relief. 750° F.	33
S/S	40-R, 40-RL	1/2, 3/4"	400	Sentinel Relief. 850° F.	21
Steel	Navy Specifications			MIL-V-20065. Comp. D	29
Alloy Steel	Navy Specifications			MIL-V-20065. Comp. A and B	29

FITTINGS & ACCESSORIES

Cast Iron	299	2 thru 8"		Drip Pan Elbows.	27
-----------	-----	-----------	--	------------------	----

FOR GENERAL INDUSTRIAL SERVICES

Material	FIGURE NUMBER	SIZES	Maximum Pressure PSIG	Features or Applications	Page
Brass	11, 11-C, H, G, S	1/4, 3/8, 1/2"	100	General Utility Services.	30
Bronze	19-1, 20-1, 20-1P	1/2 - 4"	300	Extra Heavy Pattern. Flg'd or NPT.	31
"	19M-1, 20M-1, 20M-1P	1/2 - 3"	1200	Extra Heavy. S/S trim. Flg'd or NPT.	31
"	189-M, 189-MP	1/2, 3/4"	6500	Extra Heavy. S/S seats.	32
"	200-A, 200-H	1/2 - 2"	200	U. L. Listed for fuel oils.	32
Iron	71	1/2 - 2"	400	All Iron. Caustic service.	36
"	71-S	1/2 - 2"	400	S/S trim.	36
"	91-1	1 1/2 - 6"	400	High capacity. Flg'd or NPT	35
"	91-1S	1 1/2 - 6"	400	S/S trim. Flg'd or NPT	35
"	218-1	3 - 6"	200	Fire Pump Relief—F. M./U. L.	35
"	219-1	1 1/2 - 6"	400	Handwheel pressure adjustment.	35
Steel	171	1/2 - 2"	400	S/S trim.	36
"	191-1	1 1/2 - 6"	400	S/S trim. Flg'd or NPT	34
"	264-1/265-1	1/2, 3/4, 1"	3300	Liquid/Vapor to 750° F.	33
"	291	1/2 - 1 1/4"	1500	S/S trim. NPT.	34
"	910 Series	1/2 - 2"	500/900	S/S trim.	24
Stainless Steel	140	3/8, 1/2"	300	All S/S.	36
"	171-S	1/2 - 2"	400	All 316 S/S.	36
"	266-1/267-1	1/2, 3/4, 1"	3300	Liquid/Vapor to 750° F.	33

FOR HOT WATER BOILERS & GENERATORS

Bronze	137	3/4, 1"	160	Soft seated. Max. temp. 250° F.	28
Iron	137	1 1/2, 2"	160	Soft seated. Max. temp. 250° F.	28
Steel	5000	1 - 6"	600	750° F. See Bulletin	5000-82
Steel	927	3/4 - 2"	500/900	800° F. S/S trim. Packed lever.	24

SPECIAL APPLICATIONS

Bronze	Navy Specification.	MIL-V-24332 GR-B	29
Steel	Navy Specification.	MIL-V-24332 GR-A	29

KUNKLE AIR/GAS SAFETY AND RELIEF VALVES

SELECTION INDEX

METAL SEATED

Material	FIGURE NUMBER	SIZES	Maximum Pressure PSIG	Features or Applications	Page
Brass	11, 11-C, 11-H	1/4, 3/8, 1/2"	100	Side outlet.	30
"	14-A	1/4, 3/8, 1/2"	300	Sidewall outlet. No lever.	19
"	29-A	1/4, 3/8, 1/2"	300	Sidewall Outlet	19
"	30-1, 30-2	1/4	4000	Sidewall Outlet	21
"	39-A	1/4, 3/8, 1/2"	300	Sidewall outlet. Mass Std.	19
"	48-A	1/4, 3/8, 1/2"	300	Sidewall outlet.	19
"	949	1/2"	300	Top Guided. High capacity. Sidewall outlet.	18
Bronze	1-A & 2-A	1/2, 3/4 and 1"	250	Very compact assembly.	8
"	21-M, 22-M, & 23-M	1/2 - 2"	1200	Extra heavy. S/S seats.	11
"	80-4, 82-4, 83-4, 84-4	1/2 - 3"	300	High capacity. Flat seats.	6, 7
"	86, 87, 87C, 87P	1/2 - 2"	150/300	High capacity. Bevel seats.	10
"	6010, 6030	1/2 - 2 1/2"	300	High capacity. Full nozzle.	9
Iron	252 Series	1 1/2 - 6"	250	Bronze or S/S trim. Semi-nozzle.	23
"	337	2, 2 1/2, 3"	60	Bronze trim. Full nozzle.	12
"	215-V	2, 2 1/2, 3"	22" Hg.	Bronze trim. Vacuum relief.	12
Steel	264-1/267-1	1/2, 3/4, 1"	3300	S/S trim. 750° F.	33
"	300/600	1 1/4 - 6"	750	S/S full nozzle. 800° F.	22
"	910 Series	1/2 - 2"	500/900	S/S trim. 800° F.	24

WITH SOFT SEAT SEALS

Brass	11-G, 11-S	1/4, 3/8, 1/2"	100	Synthetic disc. Pressure tight cap.	30
"	14-M	1/4, 3/8, 1/2"	200	Synthetic disc. Sidewall outlet. No lever.	19
"	28-A	1/4, 3/8, 1/2"	200	Synthetic disc. Sidewall outlet. Lever.	19
Bronze	86-T, 87-T, 87-TC, 87-TP	1/2 - 2"	150/300	Teflon seal. Cryogenic service.	13
"	189, 189-C, 189-P	1/2, 3/4"	6500	Teflon seal.	15
"	363, 363-C, 363-P	1/2, 3/4"	1000	Teflon seal.	14
"	6021	1/2 thru 2 1/2"	250	Teflon (PFA) Disc/Insert	9
Aluminum	230	1/4"	1500	Sidewall outlet. Relief type.	16
"	330, 333	1/4"	6500	High pressure. Relief type.	17
"	430, 433	1/4, 1/2"	15,000	High pressure. Relief type.	16
Iron	463, 463-C, 463-P	1/2, 3/4"	400	S/S trim. Teflon seal.	14
Stainless Steel	389-C, 389-P	1/2, 3/4"	6500	All S/S. Teflon seal.	15
Steel	663-C, 663-P	1/2, 3/4"	1000	Teflon seal. Cryogenic service.	14
Steel St./Steel	910 Series	1/2 thru 2"	900	"O" ring seat	24

FOR SPECIAL SERVICES

Various	Navy Specifications, MIL-V-22549				29
"	800 Series. Pressure Holding ("priority") Valves.				21
Bronze	Vacuum Relief, Figure 80-4.				7
Iron	Vacuum Relief, Figure 215-V, Bronze trim.				12
"	Vacuum Relief, Figure 259, Iron body, Bronze or S/S trim.				23
Steel	Figure 55—Safety flow cut-off. For O.S.H.A. requirements.				20

FIGURES

82-4 & 82-4S

83-4 & 83-4S

KUNKLE

BRONZE SAFETY VALVES

For Steam • Air • Gas

PRESSURE SETTINGS:
STEAM TO 250 PSI. 406° F.
AIR/GAS TO 300 PSI. 300° F.

These valves of bronze, or bronze with stainless steel seats and discs, have flat seats, wing-guided discs and high discharge coefficient. Either type is available with S/S springs and with all hardware of brass, bronze or S/S for low temperature—cryogenic—service.

APPLICATIONS

For air / gas compressors and unfired pressure vessels only. For steam (except on boiler) and protection of discharge side of pressure reducing valves.

PARTS AND MATERIALS

No.	DESCRIPTION	82-4, 83-4	82-4S, 83-4S
1	Body	Copper Alloy	Copper Alloy ①
2	Seat	Integral	Stainless Steel
3	Disc	Copper Alloy	Stainless Steel
4	Disc Ball	Stainless Steel	Stainless Steel
5	Regulator Ring	Copper Alloy	Copper Alloy
6	Regulator Set Screw	Steel, Brs. Plt.	Steel, Brs. Plt.
7	Cap ②	Copper Alloy	Copper Alloy
8	Spindle	Steel, Cad. Plated	Steel, Cad. Plated
9 & 10	Retainer & Locknut	Brass	Brass
11 & 12	Spring & Plates	Steel, Cad. Plated	Steel, Cad. Plated
13 & 14	Press. Sc. & Nut	Brass	Brass
15 & 16	Hood & Lever	Bronze/Steel	Bronze/Steel
17	Lever Nut Seals	Steel, Cad. Plt. Lead & Wire	Steel, Cad. Plt. Lead & Wire

① — 1/2", 3/4", 1" Bodies S/S — Others Copper Alloy.

② — 2", 2 1/2", 3" Caps may be furnished cast iron. Bronze available for cryogenic service.

DIMENSIONS

Inlet Male NPT	Outlet		A		B	C		Weight, Lbs.			
	83-4 NPT	82-4	Sc'd	Flg'd		Sc'd	Flg'd	82-4		83-4	
								Sc'd	Sc'd	150# Flg'd	300# Flg'd
1/2"	3/4"	Top	5 5/8		1 1/8	2 1/2		3/4	1		
3/4"	1 1/4"	Top	7 1/8		1 1/2	2 5/8		2	2 1/4		
1"	1 1/2"	Top	7 7/8		1 7/8	3 5/16		2 3/4	3		
1 1/4"	2"	Top	8 7/8		2 1/4	3 5/8		4 3/4	5		
1 1/2"	2 1/2"	Top	10 3/16	10 1/16	2 3/8	4 1/8	4	6 1/2	7 1/4	9	10 1/4
2"	3"	Top	11 3/4	11 5/16	2 7/8	4 7/8	4 7/16	10	10 3/4	14 1/4	16 3/4
2 1/2"	3"	Top	14 7/16	14 1/4	3 1/2	6 1/16	5 7/8	21	22	27 1/4	31
3"	4"	Top	15 7/16	14 11/16	4 1/8	7 1/8	6 3/8	24 3/4	29	34 1/2	39 3/4

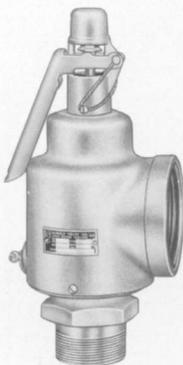
CAPACITIES

Tables B, C, pages 38, 39.

A.S.M.E. Standard—N.B. Certified



FIGURES
82-4, 82-4S



FIGURES
83-4, 83-4S

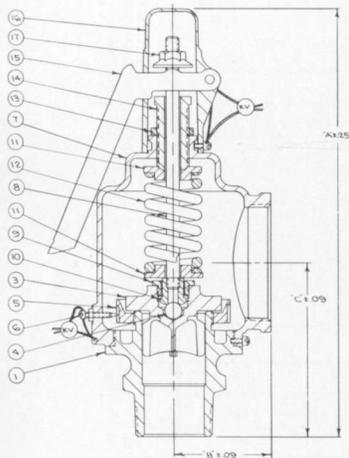


FIGURE 83-4

KUNKLE BRONZE SAFETY VALVES

For Steam • Air • Gas

PRESSURE SETTINGS:
STEAM TO 250 PSI. 406° F.
AIR/GAS TO 300 P.S.I. 300° F.

Standard assembly is bronze with flat seats and wing guided discs. Figures 80-4S and 84-4S have stainless steel seat inserts and discs. Either type is available with S/S springs and with all hardware of brass, bronze or S/S for low temperature—cryogenic—service.

APPLICATIONS

For protection of unfired pressure vessels only, gas compressors and systems handling hazardous or noxious gases requiring valves which are pressure tight on downstream side.

For vacuum relief—by installing "in reverse."

PARTS AND MATERIALS

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1	Body	Copper Alloy ①	16	Stem	Stl. Cad. Plt.
2	Ball	S/S	17	Top Spring Plate	Stl. Cad. Plt.
3	Seat	Integral ②	18	Hood Gasket	Teflon
4	Cap Gasket	Teflon	19	Locknut	Brass
5	Set Scr. Gasket	Teflon	20	Pressure Screw	Brass
6	Set Scr. Locknut	Stl. Brs. Plt.	21	Lever	Steel
7	Seal	Lead & Wire	22	Dog	S/S
8	Reg. Ring Set Screw	Stl. Brs. Plt.	23	Cotter Pin	Steel
9	Regulator Ring	Copper Alloy	24	Drivescrew	Stl. Brs. Plt.
10	Disc	Copper Alloy	25	Dog Retainer	Brass
10	Disc (-4S)	S/S	26	O-Ring (Dog Retainer)	Buna-N
11	Stem Retainer Locknut	Brass	27	O-Ring (Dog)	Buna-N
12	Stem Retainer	Brass	28	Lift Nut	Stl. Cad. Plt.
13	Bottom Spring Plate	Stl. Cad. Plt.	29	Hood	Copper Alloy
14	Cap	Copper Alloy ③			
15	Spring	Chr. Van. Cad. Plt.			

① On -4S Valves — 1/2", 3/4", 1" Bodies S/S

② S/S Insert on -4S Valves, 1 1/4" & Larger

③ 2", 2 1/2", 3" Caps may be furnished Cast Iron. Bronze available for Cryogenic Service.

DIMENSIONS

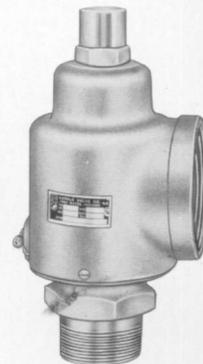
Inlet Male NPT	Outlet Female NPT	A		A		B	C		Weight, Lbs.	
		80-4 & 80-4S		84-4 & 84-4S			Sc'd	Flg'd	80-4	84-4
		Sc'd	Flg'd	Sc'd	Flg'd				Sc'd	Sc'd
1/2"	3/4"	4 3/4		6		1 1/8	2 1/2		1	1 1/4
3/4"	1 1/4"	6		7 1/2		1 1/2	2 5/8		2	2 1/8
1"	1 1/2"	6 5/8		8 1/4		1 7/8	3 1/16		2 3/4	3 1/4
1 1/4"	2"	7 1/16		9 1/8		2 1/4	3 3/8		4 3/4	5 1/4
1 1/2"	2 1/2"	8 3/8	8 1/4	9 3/4	9 5/8	2 3/8	4 1/8	4	7	7 1/2
2"	3"	10 1/2	10 1/16	12 1/2	12 1/16	2 7/8	4 7/8	4 1/16	10 1/2	11
2 1/2"	3"	12 1/4	12	14 1/4	14	3 1/2	6 1/8	5 5/8	21 3/4	22 1/4
3"	4"	13 1/8	12 3/8	15 1/2	14 1/2	4 1/8	7 1/8	6 3/8	28 3/4	29 1/2

CAPACITIES

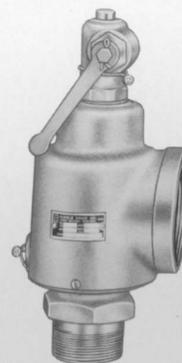
Tables B, C, pages 38, 39.
 Vacuum—Table V, page 41.

FIGURES 80-4 & 80-4S 84-4 & 84-4S

A.S.M.E. Standard—N.B. Certified
 (when used for steam or air, must
 have lever)



FIGURES
80-4, 80-4S



FIGURES
84-4, 84-4S

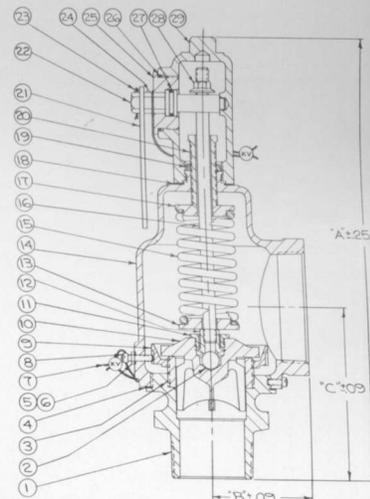


FIGURE 84-4S

KUNKLE VALVE COMPANY, INC., FT. WAYNE, INDIANA

FIGURES 1 & 2

A.S.M.E. Standard—N.B. Certified

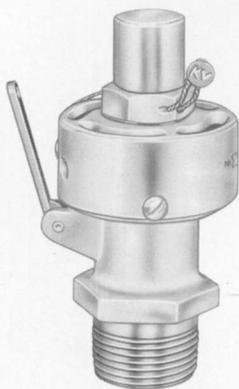


FIGURE 1 (steam)
FIGURE 1-A (air)

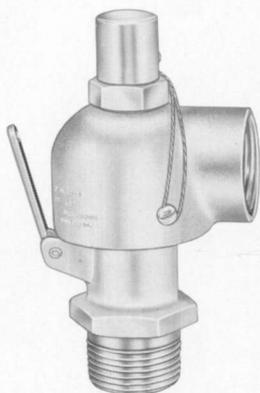


FIGURE 2 (steam)
FIGURE 2-A (air)

KUNKLE BRONZE SAFETY VALVES For Air • Steam • Nonhazardous Gas

PRESSURE SETTINGS:
STEAM TO 250 PSI. 406° F.
AIR/GAS TO 250 PSI. 300° F.

Very compact assembly. Cup-type disc. Extra-long disc guides. Fully enclosed spring. Precision-ground seats.

APPLICATIONS

These all-bronze pop safety valves are in world-wide use on portable and stationary compressors, boilers, turbines, steam generators, kettles and other types of pneumatic and steam-processing equipment. Especially recommended wherever exceptional seat tightness is required on equipment subject to vibration.

Any of these valves, can be furnished with polished, decorative nickel/chrome plating for use on institutional equipment.

CONNECTIONS

Furnished only with male NPT inlet. Figure 2 valves have female NPT outlet same size as inlet—except 1/2", which has 3/4" outlet.

DIMENSIONS

Size	MAX. SET PRESSURE		OVERALL HEIGHT INCHES		WEIGHT	
	Steam Service	Air, Gas Service	Fig. 1	Fig. 2	Fig. 1	Fig. 2
1/2"	250	250	3 3/8	4 1/16	11 Ozs.	12 1/2 Ozs.
3/4"	250	250	3 3/8	4 1/16	11 Ozs.	14 1/2 Ozs.
1"	250	250	4 1/2	5 1/4	1 3/4 Lbs.	2 1/4 Lbs.

CAPACITIES

Table E, page 41.

KUNKLE BRONZE SAFETY VALVES

For Steam • Air

Pressure Settings:

Steam—Fig. 6010 & 6021 to 250 PSI. 406°F.
Fig. 6030 to 300 PSI. 420°F. **Air/Gas to 300 PSI. 300°F.**
 Seats lapped to optical flatness. Valve housing is heavy cast bronze^①. Wide hex on body provides ample wrench clearance for easy installation. Factory tested and adjusted for precise opening without simmer, and for correct blowdown.

Figure 6010. Copper Alloy - Disc & Full Nozzle.

Figure 6021. Same As 6010 With Teflon (PFA) Disc Insert For Exceptional Leak Free Performance. **(Use On Steam Only)**

Figure 6030. Same As 6010 With S/S Body and Disc. - Recommended For Use On Severe Applications And/Or Set Pressures Above 150 PSI. Up to 300 PSI.
(Available In (- 1) Size Configuration Only)

PARTS AND MATERIALS

ITEM	DESCRIPTION	MATERIAL
1	Body	Copper Alloy (S/S Fig. 6030)
2	Regulator Ring	Copper Alloy
3	Reg. Ring Set Screw	Steel/Brs. Plt.
4	Disc	Copper Alloy (W/TEF/PFA Insert Fig. 6021) (S/S Fig. 6030)
5	Guide Set Screw	Steel/Brs. Plt.
6	Stem Retainer L'nut	Brass
7	Stem Retainer	Brass
8	Stem	Steel/Cad. Plt.
9	Spring	Steel/Cad. Plt.
10	Spring Plate	Steel/Cad. Plt.
11	Pressure Screw	Brass

ITEM	DESCRIPTION	MATERIAL
12	Press. Screw L'nut	Brass
13	Lever Pin	Steel
14	Lever	Steel/Brs. Plt.
15	Lift Nut	Steel/Cad. Plt.
16	Hood	Copper Alloy
17	Ball	S/S
18	Guide	Copper Alloy
19	Cap	Copper Alloy ^①
20	Hood Set Screw	Steel/Brs. Plt.
21	Seal	Lead & Wire
22	Vibration Damp. Sp. ^②	Ph. Br.

- ① Cast iron cap may be furnished at our option.
 ② Optional at extra cost.

DIMENSIONS

In-let	Ori- fice	Out-let	Figure Number	Discharge Area Sq. In.	Connections		A	B	C	Approx. Wt. Lbs.
					Inlet D	Outlet E				
1/2 x D	x 3/4		60**D-1	0.121	1/2" M.	3/4" FE.	6 3/8	1 5/8	2 1/8	1 1/2
3/4 x D	x 3/4		60**D-2	0.121	3/4" M.	3/4" FE.	6 3/8	1 5/8	2 1/8	1 3/4
3/4 x E	x 1		60**E-1	0.216	3/4" M.	1" FE.	7 1/2	1 3/4	2 3/8	2 1/2
1 x E	x 1		60**E-2	0.216	1" M.	1" FE.	7 5/8	1 3/4	2 1/2	2 3/4
1 x F	x 1 1/4		60**F-1	0.338	1" M.	1 1/4" FE.	8 1/2	2	2 5/8	3 1/2
1 1/4 x F	x 1 1/4		60**F-2	0.338	1 1/4" M.	1 1/4" FE.	8 5/8	2	2 7/8	3 3/4
1 1/4 x G	x 1 1/2		60**G-1	0.554	1 1/4" M.	1 1/2" FE.	9 5/8	2 3/8	3 1/8	5 1/4
1 1/2 x G	x 1 1/2		60**G-2	0.554	1 1/2" M.	1 1/2" FE.	9 7/8	2 3/8	3 3/8	5 1/2
1 1/2 x H	x 2		60**H-1	0.863	1 1/2" M.	2" FE.	10 5/8	2 3/4	3 5/8	7
2 x H	x 2		60**H-2	0.863	2" M.	2" FE.	11 1/8	2 3/4	4 1/8	7 1/2
2 x J	x 2 1/2		60**J-1	1.414	2" M.	2 1/2" FE.	13 3/8	3 3/8	4 1/4	14
2 1/2 x J	x 2 1/2		60**J-2	1.414	2 1/2" M.	2 1/2" FE.	13 3/8	3 3/8	4 1/2	14 1/2

** Applies to Figures 6010, 6021, 6030

CAPACITIES

Tables O & P, pages 46 & 47.

FIGURE 6010 SERIES

A.S.M.E Standard—N.B. Certified

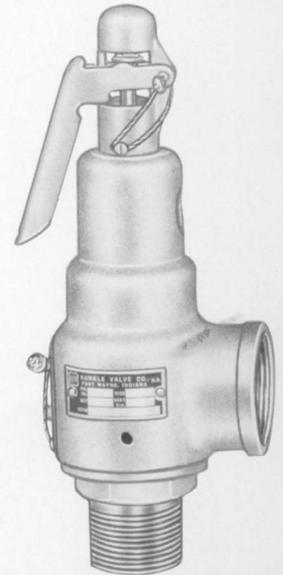
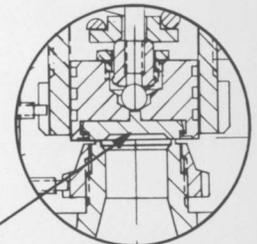


Figure 6010, 6021 & 6030



Teflon (PFA) Disc Insert
Figure 6021
Disc Assembly

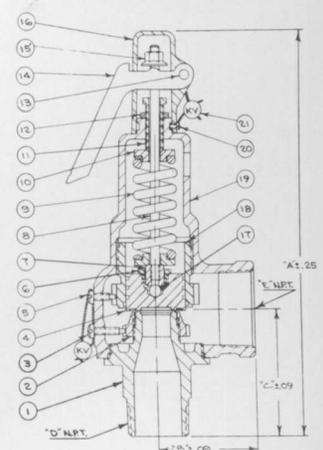


Figure 6010 & 6030

FIGURES 86 & 87 SERIES

A.S.M.E. Standard—N.B. Certified
(When used for air, must have lever)



FIGURE 86

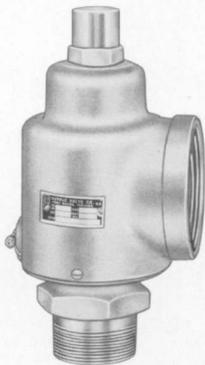


FIGURE 87-C

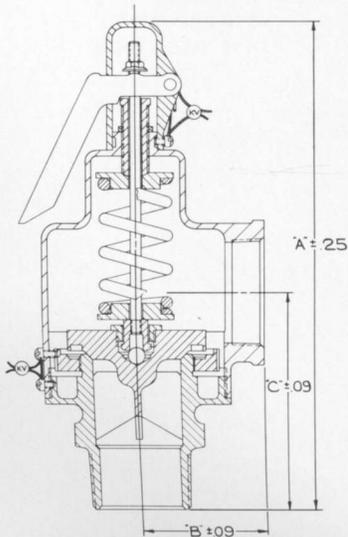


FIGURE 87

KUNKLE BRONZE SAFETY VALVES

For Air • Gas

PRESSURE SETTINGS TO 300 PSI. (87 SERIES) PRESSURE SETTINGS TO 150 PSI. (86 SERIES)

These valves have micro-finished, 45° bevel seats. Designed especially for high-capacity, air-gas service. New style regulator ring permits very close blowdown control.

All sizes and styles are available with stainless steel springs and with all hardware of brass, bronze or S/S for low temperature—cryogenic—service.

Figure 86* Top outlet. Plain lift lever.
(Maximum set pressure 150 psi., 300° F.)

Figure 87.* Side outlet. Plain lift lever.

Figure 87-C. Pressure tight cap. No lever.

Figure 87-P. Pressure tight. With packed lift gear.

*Can be equipped with lever snubber—vibration dampening—spring. Optional extra.

APPLICATIONS

Portable and stationary rotary or reciprocating compressors. Intercoolers, after-coolers, receivers. Oil-gas separators. Dry or liquid bulk-handling equipment.

DIMENSIONS

Inlet Male NPT	OUTLET		A					B	C	WEIGHT, LBS.			
	87 Fe NPT	86	86	87	87-C	86	87			87-C	87-P		
1/2"	3/4"	TOP	5 5/16	5 5/16	4 3/4	1 1/16	2 1/2	3/4	1	1	1 1/4		
3/4"	1"	TOP	6 7/16	6 3/8	5 1/2	1 7/16	2 3/4	1 1/2	2 1/4	2	2 3/8		
1"	1 1/4"	TOP	7	7	6 1/8	1 5/8	3	2 1/4	3	2 3/4	3		
1 1/4"	1 1/2"	TOP	8 5/16	8 1/4	7	1 7/8	3 3/4	3 3/8	5	4 5/8	5 1/8		
1 1/2"	2"	TOP	9 1/4	9	7 13/16	2 1/4	4 1/8	6 1/4	7 1/4	7	7 3/8		
2"	2 1/2"	TOP	10 1/2	11	9 3/8	2 7/8	4 7/8	10 1/4	11	10 3/4	11 1/2		

CAPACITIES

Table D, page 40.

KUNKLE BRONZE SAFETY VALVES

For Steam • Air • Gas

**PRESSURE SETTINGS: TO 1200 PSI. AIR/GAS, 300° F.
TO 250 PSI. STEAM, 406° F.**

Extra-heavy, rugged construction. Both inlet and outlet connections are cast integral with body to permit easy inspection and servicing without disconnecting inlet or discharge piping.

SPRINGS: Steel, cadmium plated, are standard. These valves are available with stainless steel springs and with all hardware of brass, bronze or stainless steel for low temperature—cryogenic—service.

All styles can be furnished with pressure tight manual test levers as optional extra.

Figure 21-M. S/S seat and disc is handwheel equipped for quick variation of setting.

Figure 22-M. S/S seat and disc pressure tight cap. ASME Std. for gas.

Figure 23-M. Has stainless steel seat and disc, for steam (except on boiler) and air.

APPLICATIONS

Unfired pressure vessels only. Gas lines, compressors and separators.

CONNECTIONS

- A. Unless otherwise specified, furnished standard with male NPT inlet x female NPT outlet.
- B. All sizes available with female NPT inlet—optional.
- C. All sizes: 150# or 300# flange inlet x 150# outlet. See page 30.

DIMENSIONS

Inlet	Outlet	Maximum Set Pressure PSIG				A	B ②	C ②	Weight Lbs. Std Conn's
		Air-Gas 300° F.		Steam 406° F.					
		Male Inlet	Female Inlet	Male Inlet	Female Inlet				
1/2"	3/4" ①	1000	1200	250	250	7	1 5/8	2	2 1/2
3/4"	3/4"	1000	1200	250	250	7	1 5/8	2	2 1/2
1"	1"	900	1200	250	250	8	1 7/8	2 1/4	4
1 1/4"	1 1/4"	800	1200	250	250	9	2 1/8	2 5/8	5 1/4
1 1/2"	1 1/2"	700	1200	250	250	9 1/2	2 1/8	2 3/4	7
2"	2"	600	900	250	250	11 1/4	2 3/4	3 1/2	12

① 1/2" outlet optional, on order.

② These dimensions for NPT valves.

CAPACITIES

Table G, page 43.

FIGURES 21-M, 23-M 22-M

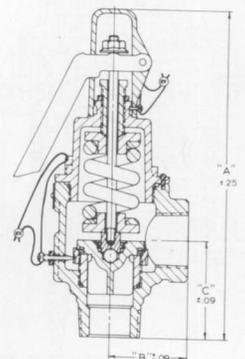
A.S.M.E. Standard—N.B. Certified
(When used for air or steam, must have lever)



**FIGURE
23-M**



**FIGURE
22-M**



**FIGURE
23-M**

KUNKLE VALVE COMPANY, INC., FT. WAYNE, INDIANA

FIGURES 337 & 215-V

A.S.M.E. Standard—N.B. Certified



FIGURE 337

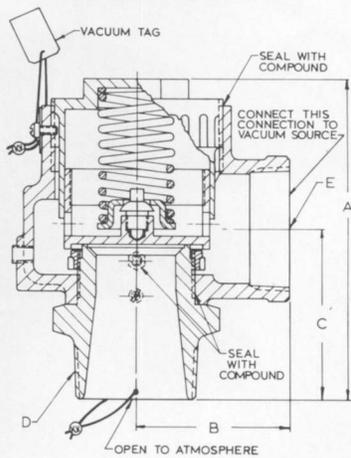


FIGURE 215-V

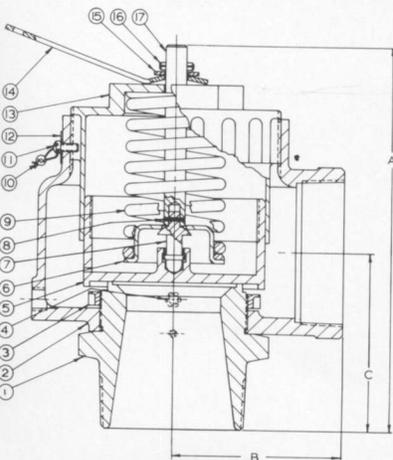


FIGURE 337

KUNKLE CAST IRON RELIEF VALVES

For Air • Gas

PRESSURE SETTINGS TO 60 PSI.; VACUUM TO 22" HG.

Figure 337. Cast iron housing with bronze full nozzle and disc. Reversible steel lever or optional lift ring for manual operation.

Figure 215-V. For vacuum. Same construction as Figure 337, except for pressure tight housing and no lever. Installed "in reverse". See drawing center left.

APPLICATIONS

For protection of low to medium pressure high volume blowers and compressors, light gauge tanks, bulk hauling trailers, and similar equipment.

PARTS AND MATERIALS

Item	Description	Material
1	Body (Nozzle)	Bronze
2	Cap	Cast Iron, Cad. Plated
3	Regulator Ring	Bronze
4	Reg. Ring Set Sc.	Brass
5	Disc	Bronze
6	Spring Plate	Steel
7	Spindle Retainer	Brass
8 & 17	Roll Pins	Stainless Steel
9	Spring	Steel, Cadmium Plated
13	Press. Sc. & Guide	Cast Bronze
14 & 15	Lever & Washer	Steel
16	Spindle	Steel, Cadmium Plated

DIMENSIONS

Valve Size	A		B	C	E	F	Weight — Lbs.	
	337	215-V					337	215-V
2"	7 $\frac{1}{4}$	6 $\frac{3}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	2	2	7 $\frac{1}{2}$	7
2 $\frac{1}{2}$ "	8	7 $\frac{1}{2}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	12 $\frac{1}{4}$	11 $\frac{3}{4}$
3"	9 $\frac{1}{2}$	9	4 $\frac{1}{4}$	4 $\frac{1}{4}$	3	3	18 $\frac{3}{4}$	18 $\frac{1}{2}$

CAPACITIES

SCFM Air, 60° F., 10% Accumulation.

Set Pressure PSIG	Figure 337			Set Inches Mercury	Figure 215-V		
	2"	2 $\frac{1}{2}$ "	3"		2"	2 $\frac{1}{2}$ "	3"
5	527	799	1157	1	140	213	308
10	743	1127	1632	2	217	329	477
15	903	1368	1982	3	264	400	579
20	1062	1609	2331	4	299	453	657
25	1221	1850	2680	5	331	501	726
30	1380	2091	3029	6	352	533	772
35	1539	2332	3379	7	372	564	817
40	1698	2573	3728	8	391	592	858
45	1857	2814	4076	9	403	610	884
50	2017	3055	4428	10	413	625	906
60	2335	3537	5125	12	424	642	930
				12.8+	426	646	935

KUNKLE BRONZE SAFETY VALVES

For Air • Gas

PRESSURE SETTINGS TO 300 PSI. (87-T SERIES)
PRESSURE SETTINGS TO 150 PSI. (86-T SERIES)

The valve discs in this series of bronze safety valves contain a seat-sealing teflon washer to produce superior seat tightness over entire operational temperature range -300° F. to +400° F. Springs are stainless steel. All hardware is brass, bronze and/or stainless.

- Figure 86-T.** Top outlet. Plain lift lever.
(Maximum set pressure 150 psi.)
- Figure 87-T.** Side outlet. Plain lift lever.
- Figure 87-TC.** Pressure tight cap. No lever.
- Figure 87-TP.** Pressure tight. With packed lift gear.

APPLICATIONS

For "cold" to liquefied air, gas, oxygen service. For unfired pressure vessels, transfer lines and gas systems.

DIMENSIONS

Inlet Male NPT	OUTLET		A			B	C	WEIGHT, LBS.			
	87-T Fe NPT	86-T	86-T	87-T	87-TC			86-T	87-T	87-TC	87-TP
1/2"	3/4"	TOP	5 5/16	5 5/16	4 3/4	1 1/16	2 1/2	3/4	1	1	1 1/4
3/4"	1"	TOP	6 7/16	6 3/8	5 1/2	1 1/16	2 3/4	1 1/2	2 1/4	2	2 3/8
1"	1 1/4"	TOP	7	7	6 1/8	1 5/8	3	2 1/4	3	2 3/4	3
1 1/4"	1 1/2"	TOP	8 5/16	8 1/4	7	1 7/8	3 3/4	3 7/8	5	4 5/8	5 1/8
1 1/2"	2"	TOP	9 1/4	9	7 13/16	2 1/4	4 1/8	6 1/4	7 1/4	7	7 3/8
2"	2 1/2"	TOP	10 1/2	11	9 3/8	2 7/8	4 7/8	10 1/4	11	10 3/4	11 1/2

CAPACITIES

Table T, page 52.

FIGURES 86-T & 87-T SERIES

A.S.M.E. Standard—N.B. Certified

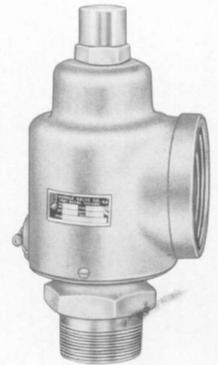


FIGURE 87-TC

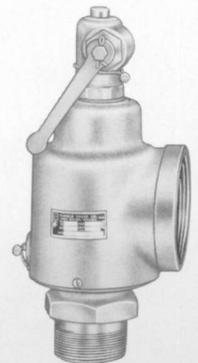


FIGURE 87-TP

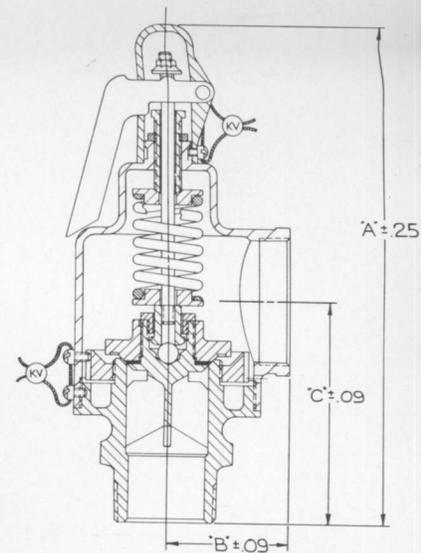


FIGURE 87-T

FIGURES 363, 463, 663 SERIES

A.S.M.E. Standard—N.B. Certified



FIGURE 363

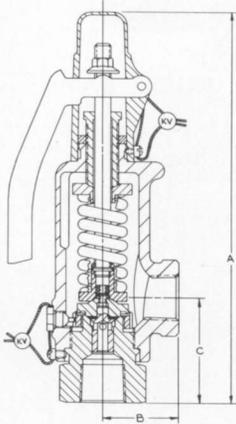


FIGURE 363

KUNKLE SAFETY VALVES For Air • Gas

PRESSURE SETTINGS TO 400 PSI. 300° F. (Iron) AND TO 1000 PSI. 300° F. (Bronze and S/S)

All of the valves in these series feature the Kunkle patented* three piece disc (with Teflon insert) which has proved outstandingly successful in Figure 189 for many years. Exceptional seat tightness. Close blowdown control, easily adjustable. All series with "-C" and "-P" construction rated for back-pressures to 50 psi.

- Figure 363.** Bronze, S/S trim, plain lift lever.
- Figure 363-C.** Same as 363, with pressure tight hood.
- Figure 363-P.** Same as 363, with pressure tight packed lever.
- Figure 463-C.** Same as above, except Iron, S/S base & disc, press. tight hood.
- Figure 463-P.** Same as 463C, except with press. tight packed lever.
- Figure 663-C.** Same as above, except all stainless steel, press. tight hood.
- Figure 663-P.** Same as 663C, except with press. tight packed lever.

APPLICATIONS

Especially recommended for thermal expansion relief and/or full rated capacity discharge. Bronze valves, when equipped with S/S springs, and the all stainless steel assemblies for low temperature—cryogenic—installations.

DIMENSIONS

Inlet Female NPT	Seat Diameter, Inches	Outlet Female NPT	A			B	C	Approx. Weight Lbs.
			363	363-C 463-C 663-C	363-P 463-P 663-P			
1/2"	1/2"	3/4"	9	7 3/16	8 5/8	1 3/4	2 7/16	5
3/4"	1/2"	3/4"	9	7 3/16	8 5/8	1 3/4	2 7/16	5

CAPACITIES

S.C.F.M. Air at 60° F., 10% Accumulation.

Set Pressure PSIG	Capacity	Set Pressure PSIG	Capacity
50	40	550	330
100	70	600	360
150	100	650	390
200	120	700	420
250	150	750	450
300	180	800	480
350	210	850	510
400	240	900	540
450	270	950	570
500	300	1000	600

* U. S. Patent 2,689,581

* Canadian 522,203

KUNKLE
BRONZE • STAINLESS STEEL • SAFETY VALVES
 For Air • Gas

189 & 389
SERIES

PRESSURE SETTINGS: 1000-6500 PSI. 300° F.

These high pressure safety valves combine extra sturdy construction, a patented* three-piece disc including seat seal of Teflon, and finely adjustable blowdown control—resulting in long service life with superior seat tightness at operating pressures and following relieving/reseating cycles.

Figure 189. With plain lever. Stainless steel base and 3 piece disc; bronze bonnet, hood and lift gear. Furnished standard with carbon steel spring, cadmium plated. Stainless steel spring optional extra.

Figure 189-C. Same as 189, with pressure tight hood.

Figure 189-P. Same as 189, with pressure tight packed lever.

Figure 389 Series: Same as above, except all stainless steel construction.

APPLICATIONS

Multi-stage compressor intercoolers and aftercoolers, Receivers.

Especially recommended for thermal expansion relief and/or full rated capacity discharge. When equipped with S/S springs, or all stainless steel assemblies, for low temperature—cryogenic—installations.

DIMENSIONS

Figure Numbers	Size			Cap Construction	Maximum Setting PSIG	Overall Height Inches	Weight Approx. — Lbs.
	Inlet ① Fe NPT	Bore Dia.	Outlet Fe NPT				
189	1/2" or 3/4"	1/2"	3/4"	Plain lift lever	6500	9	5 1/4
189-C & 389-C	1/2" or 3/4"	1/2"	3/4"	Capped—no lever	6500	7 3/8	5
189-P & 389-P	1/2" or 3/4"	1/2"	3/4"	Packed lift gear	6500	8 5/8	5 1/2

① Can be furnished with AMINCO or AND 10050 connections.

CAPACITIES

SCFM air at 60° F. — 10% accumulation.

Set PSIG	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
CAP.	600	890	1180	1480	1770	2070	2360	2660	2950	3240	3540	3830

* U.S. Patent 2,689,581

A.S.M.E. Standard—N.B. Certified



FIGURES 189-C & 389-C



FIGURES 189-P & 389-P

FIGURES 230 430 & 433

KUNKLE RELIEF VALVES For Air and Inert Gases

PRESSURE SETTINGS 300/1500 PSI. 185° F.

Figure 230 valves are light weight, direct spring-loaded, with sidewall discharge ports. In operation, opening is gradual—in direct proportion to overpressure applied—closing with minimum pressure drop.

Primary aluminum parts are chromic acid anodized. "O" rings, back-up rings and/or quad rings comply with current Military specifications.

APPLICATIONS

Compressor intercoolers. Thermal expansion relief.

PARTS AND MATERIALS

Item	Description	Materials
1	Body	S/S
2	Cap	Al.
3	Hood	Al.
4	Pressure Screw	Al.
5	Gasket	Buna-N
6	Spring	Steel, Cad. Plt.
7 & 13	Spring Plates	Al.
8	Top Disc Ass'y.	S/S
9	Bottom Disc	S/S
14	Seal	Lead & Wire

Standard size: 1/4" Male NPT. Height 5". Weight 6 1/2 oz.

CAPACITIES

SCFM Air, 60° F., 10% Accumulation

Set PSIG	300	500	750	1000	1250	1500
Capacity	18	30	45	60	75	85

PRESSURE SETTINGS 5,000/15,000 PSI. 185° F.

Figures 430 and 433 relief valves incorporate the same differential mechanism* found in KUNKLE 330 series. It maintains a pre-determined seat-contact effort during pressure build up and prevents deformation of the synthetic seat insert at maximum operating conditions. Cracking pressure is consistently repetitive. Reseating accurate and positive. Pressure parts are stainless steel. Spring is chrome-vanadium steel, cadmium plated. Spring housing and cap are aluminum, chromic acid anodized. "O" rings, and/or quad rings comply with current Military specifications.

DIMENSIONS

	Standard Connections ①	Height	Weight
Fig. 430	3/8" or 1/2" Fe. NPT x Sidewall ports	7 1/2	2 1/2#
Fig. 433	3/8" or 1/2" Fe. NPT x 1" Fe. NPT	8	3#

① Can be furnished for use with AND 10050 or AMINCO connections.

CAPACITIES

SCFM Air, 60° F., 10% Accumulation.

Set PSIG	5000	5500	6000	6500	7500	10/15,000
Capacity	207	238	270	300	350	500

* U.S. Patent 2,906,289. Canadian #610,231.

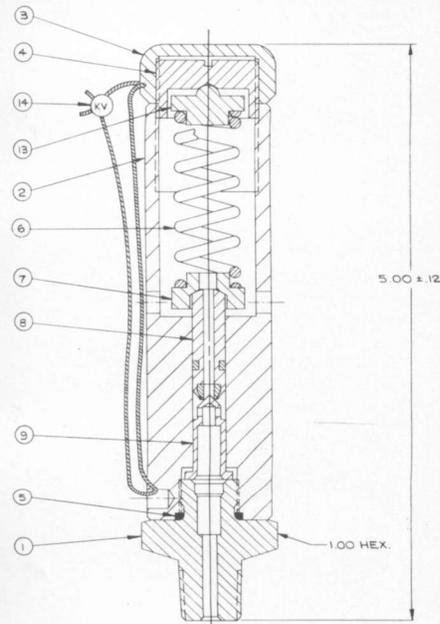


FIGURE 230



FIGURE 430



FIGURE 433

KUNKLE RELIEF VALVES

For Air and Inert Gases

PRESSURE SETTINGS TO 6500 PSI. ADJUSTABLE

Figure 330 series valves are light weight, and resistant to environmental and internal corrosion. Relief action is smooth; cracking pressure repetitively consistent; reseating accurate and positive.

A differential mechanism* maintains a predetermined, seat-contact effort. The full load of the pressure spring is never imparted to the synthetic seat insert. Seat tightness **increases** to a maximum as valve inlet pressure approaches the opening, or cracking point.

Primary aluminum parts are chromic acid anodized. "O" rings, and/or quad rings comply with current Military specifications.

Figure 330. Adjustable pressure range 1000/5500 psi., 185° F. 1/4" MNPT inlet.

Figure 330-S. Adjustable pressure range 2000/6500 psi., 185° F. 1/4" MNPT inlet.

Figure 333-S. Same, with 1/2" Fe. NPT outlet. Pressure tight cap.

APPLICATIONS

Multi-stage compressor intercoolers and aftercoolers. Receivers. Thermal expansion relief. A.S.M.E. std. N.B. certified.

PARTS AND MATERIALS

Item	Description	Materials
1	Body Bushing	S/S
2	Body (330)	Al.
2	Body (330-S)	S/S
3	Cap	Al.
4	Top Disc Ass'y.	S/S
5	Bottom Disc	S/S
6	Spring	Steel, Cad. Plt.
7	Bottom Spring	S/S
8 & 9	Spring Plates	Al.
13	Gasket	Buna N
14 & 15	Press. Sc. & Nut	S/S
16	Seal	Lead & Wire

Standard size: 1/4" Male NPT. Height 5 1/4". Weight 12 ozs.
1/2" MNPT available.

Optional extras: AND 10050 or AMINCO inlet.

CAPACITIES

S.C.F.M. AIR AT 60° F. — 10% ACCUMULATION

Set PSIG	Capacity	Set PSIG	Capacity
1000	29	3000	86
1100	32	3500	100
1200	35	4000	114
1350	39	4500	129
1500	43	5000	143
1750	50	5500	156
2000	57	5750	164
2250	64	6000	171
2500	72	6250	178
2750	79	6500	186

*U.S. Patent 2,906,289. Canadian #610,231.

FIGURES 330 & 333 SERIES

A.S.M.E. Standard—N.B. Certified



FIGURE 333

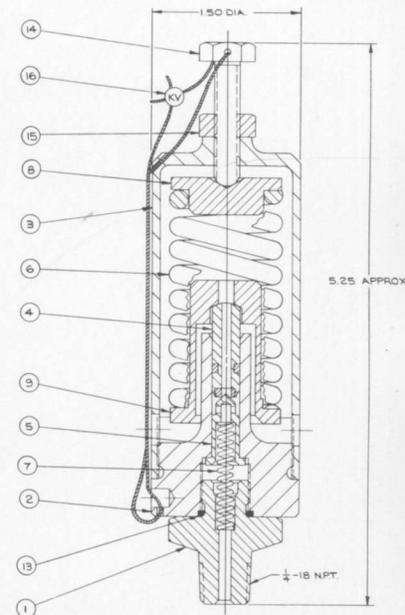


FIGURE 330 SERIES

KUNKLE VALVE COMPANY, INC., FT. WAYNE, INDIANA

FIGURE 949

KUNKLE BRASS SAFETY VALVES For Air • Gas

A.S.M.E. Standard N.B.—Certified

PRESSURE SETTINGS TO 300 PSI

Superior top guided disc which allows considerably higher capacity than other designs. 1/2" Size.

Figure 949 — A.S.M.E. Standard — N.B. Certified, Micro-finished Flat Seats.

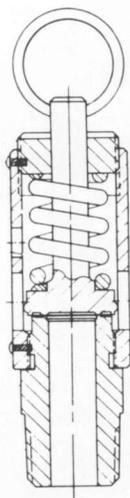


FIGURE 949

APPLICATIONS

Small to medium portable and stationary air compressors, intercoolers after coolers, receivers and instrument lines.

DIMENSIONS

FIGURE	SIZE	HEIGHT	WEIGHT
949	1/2"	3/4"	5 oz.

CAPACITIES

SCFM AIR @ 60° F. — 10% ACCUMULATION

SET PRESSURE PSIG	CAPACITY SCFM
	1/2"
10	48
30	90
50	132
75	184
100	237
125	289
150	342
175	394
200	446
250	551
300	652
--	--

KUNKLE BRASS SAFETY VALVES

For Air • Gas

PRESSURE SETTINGS: TO 300 PSI.

Made entirely of brass bar. Micro finished bevel seats—or, with synthetic disc insert. Standard with cadmium plated steel springs. Stainless steel springs, optional extra. Sizes 1/4", 3/8" and 1/2" male NPT.

- Figure 14-A.** Metal seats. No lever. Is non-code for air service. 300° F. max.
- Figure 14-M.** Has silicone or oil-resistant neoprene disc. Recommended for set pressures below 200 psi. at ambient temperatures. 200° F. max.
- Figure 28-A.** A.S.M.E. Std. Same construction as 14-M plus spindle and ring.
- Figure 29-A.** A.S.M.E. Std. Metal seats and test ring. Registered in all Canadian Provinces. 300° F. max.
- Figure 39-A.** A.S.M.E. Std., MASS. Std. and approved in District of Columbia. Metal seats. Protective hood over spindle. 300° F. max.
- Figure 48-A.** A.S.M.E. Std. and Canadian registered. Very compact. Manual lift ring. Metal seats only. 300° F. max.

APPLICATIONS

Small to medium size air compressors, receivers and instrument lines.

DIMENSIONS

	Figs. 14-A, 14-M All Sizes	Figs. 28-A, 29-A All Sizes	Fig. 39-A All Sizes	Fig. 48-A	
				1/4", 3/8"	1/2"
Height	3 1/2	3 1/2	4 1/4	2 3/4	2 7/8
Weight	7oz.	9 ozs.	10 ozs.	3 + ozs.	5 ozs.

CAPACITIES

S.C.F.M. AIR AT 60° F. — 10% ACCUMULATION

Set Pressure PSIG	Figs. 14-A, 14-M, 28-A, 29-A, 39-A		Fig. 48-A	
	1/4"	3/8", 1/2"	1/4", 3/8"	1/2"
20	28	46	17	23
40	45	74	27	36
60	62	101	37	49
80	79	128	47	63
100	96	156	57	76
125	117	190	70	93
150	138	224	82	110
175	159	258	95	127
200	181	292	108	144
225	203	326	120	161
250	223	362	133	177
300	264	431	158	210

FIGURES 14-A, 14-M, 28-A 29-A, 39-A, 48-A

A.S.M.E. Standard—N.B. Certified



**FIGURES
14-A, 14-M**



**FIGURES
28-A, 29-A**



**FIGURE
39-A**

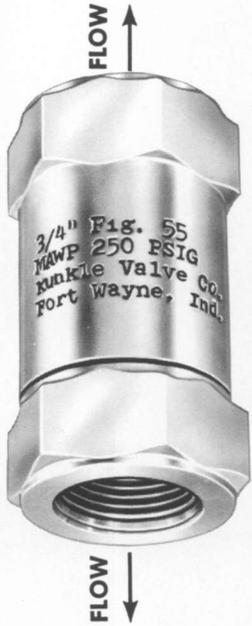


**FIGURE
48-A**

KUNKLE VALVE COMPANY, INC., FT. WAYNE, INDIANA

**FIGURE
NO.
55**

Valve CANNOT be installed incorrectly. Operates in either direction.



MATERIALS

- BODY Steel, Zinc Plated
- DISC S/S
- SPRINGS S/S

**KUNKLE
SAFETY FLOW-CUT-OFF VALVE**

(TO MEET FEDERAL REGULATIONS)

MAX. ALLOWABLE WORKING PRESSURE 250 PSIG, MAX. TEMP. 400°F

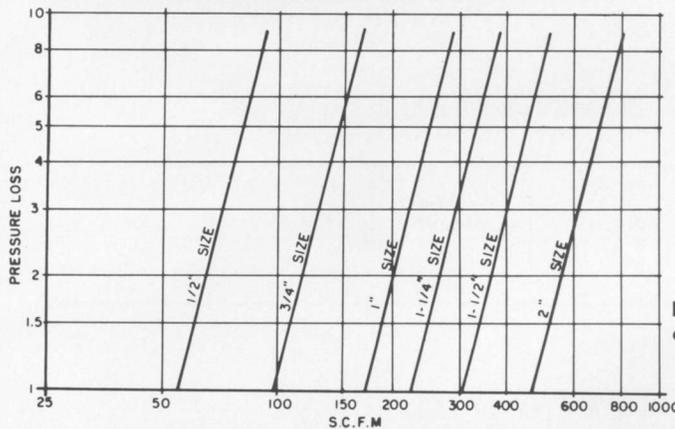
VALVE TO MEET NEW FEDERAL SAFETY and HEALTH REGULATIONS—Section 1518, Paragraph 7 of Federal Register Volume 36, Number 75 dated April 17, 1971 which reads, "All hoses exceeding 1/2" inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure". Such valve to protect persons from whipping hoses caused by a severed hose line or a sudden disconnect of hose fittings or air tools.

DESIGN FEATURES: Due to a constant bleed hole in the valve disc the Flow-Cut-Off valve automatically re-opens upon repair of hose and re-connection of tool. The Kunkle Safety Flow-Cut-Off valve has the additional safety feature that it cannot be installed incorrectly as it will operate efficiently regardless of which end of the valve is connected to the hose. Valve designed with female end connections to assure sturdy construction.

SIZING: It is desirable that valve be selected in the same size as the hose on which it will be used. One valve to be used on each hose line. To assure that valve does not close prematurely the valve capacity (SCFM) at closing must be greater than the maximum flow of air expected through the air line hose on which it is installed.

This valve, or modifications thereof, may be used on other lines for steam, gas, water, etc., where breakage will cause hazardous conditions. Apply to Factory for further assistance.

**APPROXIMATE PRESSURE LOSS WITH
90 PSIG AT INLET**



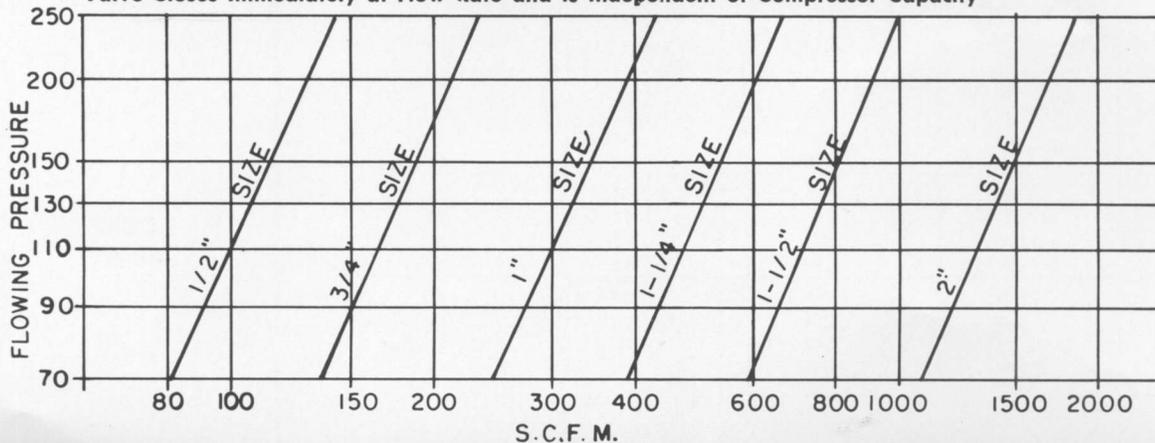
DIMENSIONS

SIZE FNPT	HEX. SIZE	LENGTH
1/2"	1 "	2 1/2"
3/4"	1 3/8"	3 "
1 "	1 3/4"	3 3/8"
1 1/4"	2 1/4"	4 1/8"
1 1/2"	2 3/4"	4 5/8"
2 "	3 3/4"	5 1/2"

NOTE: Write factory for sizes other than indicated

APPROXIMATE CAPACITY AT CLOSURE

Valve Closes Immediately at Flow Rate and Is Independent of Compressor Capacity



KUNKLE
SAFETY VALVES (Air/Gas)
SENTINEL RELIEF VALVES (Steam)
PRESSURE HOLDING VALVES (Air/Gas)

PRESSURE SETTINGS TO 4000 PSI.

FIGURE 30-1. A.S.M.E. Standard—N.B. Certified. This high pressure air/gas safety valve has a stainless steel, top guided disc with micro-finished, 45° bevel seats (to insure optimum seat tightness and alignment). Pressure settings to 2000 PSI.

FIGURE 30-2. Same as 30-1 except stainless steel body. Pressure settings 2000/4000 PSI.

CAPACITIES • DIMENSIONS

Set Pressure	300	400	500	750	1000	1250
Capacity SCFM	64	85	105	156	208	259
Set Pressure	1500	1750	2000	2500	3000	4000
Capacity SCFM	310	361	413	515	618	823
Size, Inlet	Seat Diameter		Height		Weight	
1/4" NPT	.157		3 1/2		1 #	

PRESSURE SETTINGS TO 400 PSI. 850° F.

FIGURE 40-R. All parts cast or wrought stainless steel with Hi-Temp. Steel spring to insure stability at elevated temperatures. Precision-finished seats to eliminate leakage. Equipped with regulator ring to adjust blowdown.

FIGURE 40-RL. Same as 40-R with manual lift lever.

DIMENSIONS

Size—Male NPT Inlet	Figure No.	Seat Dia.	Height	Weight - Lbs.
1/2" or 3/4"	40-R	.500	5 1/4	1
1/2" or 3/4"	40-RL	.500	5 3/8	1 1/4

PRESSURE SETTINGS TO 10,000 PSI.

SERIES 800. PRESSURE HOLDING, or 'Priority' valves are a type of direct acting, spring-loaded pressure control. Whereas safety-relief valves control overpressure by exhausting vapor or fluid from a vessel, priority valves **prohibit** exhaust from, or flow thru a process vessel or system when the pressure therein is below a predetermined minimum—for efficient operation.

Conversely, when the primary source of fluid to the process equipment is available in required volume above the predetermined minimum pressure, the Pressure Holding valve permits flow-thru at its rated capacity. Set—or opening point—pressure is unaffected by constant or variable downstream conditions within design limits.

Because of the wide range of capacity/pressure requirements in this service these pressure holding valves vary accordingly in sizes, materials of construction and configuration. One of several styles incorporating the basic design of Figure 330 is shown at right.

Inquiries—which should include complete information concerning flowing media, flow capacity required, operating limits of the preferential process equipment, and up-stream and downstream conditions—are solicited.

FIGURES
30-1, 30-2, 40-R
& 800 SERIES



FIGURES 30-1, 30-2

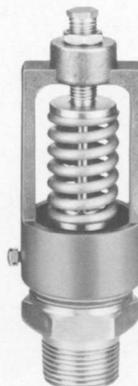


FIGURE 40-R

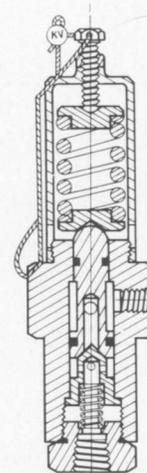


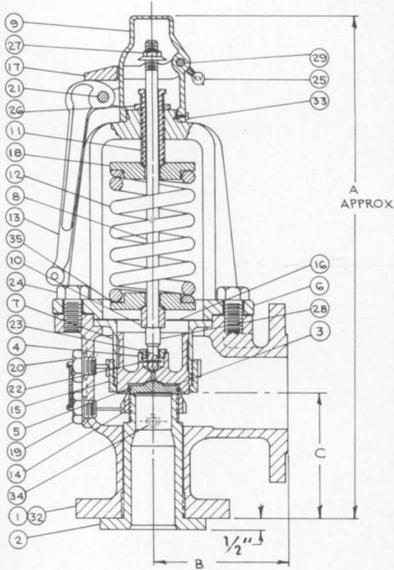
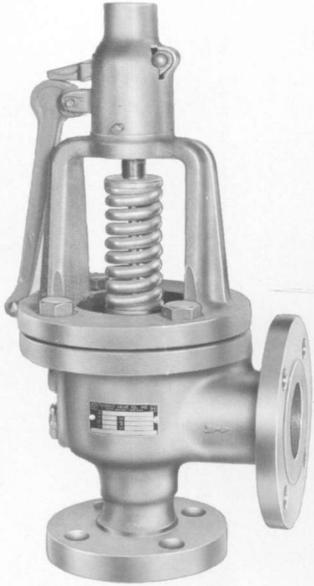
FIGURE 805

FIGURES

300

600

A.S.M.E. Standard—N.B. Certified



KUNKLE CAST STEEL SAFETY VALVES

High Capacity, Full-Nozzle

For Steam • Air • Nonhazardous Gas

PRESSURE SETTINGS TO 750 PSI. 800° F.

These series of valves are constructed of high quality carbon steel bodies with stainless steel full nozzle seats and discs. Steel yokes incorporate a cover-shield for disc and guides, and provide for fully exposed springs. Flat seats. Dual blowdown adjusting rings.

FIGURE 300. Standard with 300# A.N.S.I. flange inlet and 150# A.N.S.I. flange outlet. Maximum temperature 750° F.

FIGURE 300-A. For 800° F. service. (with hi-temp. spring).

FIGURE 600. Standard with 600# A.N.S.I. flange inlet and 150# A.N.S.I. flange outlet. Maximum temperature 750° F.

FIGURE 600-A. For 800° F. service. (with hi-temp. spring).

APPLICATIONS

Steam generators, boilers, lines, unfired vessels. Intercoolers, receivers.

PARTS AND MATERIALS

Item No.	Description	No. Reqd.	Material	Item No.	Description	No. Reqd.	Material
1	Body (300)	1	Steel	19	Ring Pin Sub Ass'y	1	Stainless Steel
2	Nozzle	1	Stainless Steel	20	Ring Pin Sub Ass'y	1	Stainless Steel
3	Disc	1	Stainless Steel	21	Lever Pin	1	Carbon Steel
4	Disc Holder	1	Stainless Steel	22	Spring Pin	1	Stainless Steel
5	Disc Retainer	1	Stainless Steel	23	Stem Ret. Locknut	1	Stainless Steel
6	Yoke	1	Steel	24	Body Bolts	4	Steel
7	Guide	1	Stainless Steel	25	Seal	2	Lead & Wire
8	Stem	1	Stainless Steel	26	Press. Scr. Locknut	1	Stainless Steel
9	Cap	1	Malleable Iron	27	Lift Nut	1	Cold Rolled Steel
10	Collar	1	Stainless Steel				Cad. Plated
11	Pressure Screw	1	Stainless Steel	28	Stem Retainer	1	Stainless Steel
12	Spring (300/600)	1	Carbon Steel Cad. Plated	29	Lifter Pin	1	Cold Rolled Steel
13	Lever	1	Malleable Iron	30	Name Plate	1	Aluminum
14	Regulator Ring	1	Stainless Steel	31	Name Plate	2	Carbon Steel
15	Control Ring	1	Stainless Steel				Dr. Screw
16	Shield	1	Stainless Steel	32	Body (600)	1	Steel
17	Lifter	1	Malleable Iron	33	Set Screw (Cap)	2	Steel
18	Spring Plate (Top)	1	Cold Rolled Steel Cad. Plated	34	Drain Plug	1	Carbon Steel
				35	Spring Plate (Bot)	1	Cold Rolled Steel Cad. Plated

DIMENSIONS • CAPACITIES^①: pages 46-51

In-let	Ori- fice	Out- let	Figure Numbers	Dis- charge Area Sq. In.	Connections A.N.S.I. Std. R.F. Flanges		A	B	C	Approx. Weight Lbs.
					Inlet	Outlet				
1 1/4 x	F x 2	x 2	300F / 300FA 600F / 600FA	.307	1 1/2" 300#	2" 150#	16 1/4	4 7/8	4 3/8	35
					1 1/2" 600#					
1 1/4 x	G x 2	x 2	300G / 300GA 600G / 600GA	.503	1 1/2" 300#	2" 150#	16 1/4	4 7/8	4 3/8	35
					1 1/2" 600#					
1 1/2 x	H x 2 1/2	x 2 1/2	300H / 300HA 600H / 600HA	.785	1 1/2" 300#	2 1/2" 150#	17 3/4	5 1/2	4 7/8	40
					1 1/2" 600#					
1 1/2 x (#1)	x 2 1/2	x 2 1/2	300#1 / 300#1A 600#1 / 600#1A	1.000	1 1/2" 300#	2 1/2" 150#	17 3/4	5 1/2	4 7/8	40
					1 1/2" 600#					
2 x	J x 3	x 3	300J / 300JA 600J / 600JA	1.287	2" 300#	3" 150#	21	5 1/8	5 1/4	45
					2" 600#					
2 x	K x 3	x 3	300K / 300KA 600K / 600KA	1.840	2" 300#	3" 150#	21	5 1/8	5 1/4	60
					2" 600#					
2 1/2 x	L x 4	x 4	300L / 300LA 600L / 600LA	2.853	2 1/2" 300#	4" 150#	25 1/2	6 3/8	6 1/8	85
					2 1/2" 600#					
3 x	M x 4	x 4	300M / 300MA 600M / 600MA	3.600	3" 300#	4" 150#	25 3/4	6 3/8	6 1/4	100
					3" 600#					
4 x	N x 6	x 6	300N / 300NA 600N / 600NA	4.340	4" 300#	6" 150#	29 1/4	7 1/4	7 1/2	160
					4" 600#					
4 x	P x 6	x 6	300P / 300PA 600P / 600PA	6.380	4" 300#	6" 150#	29 1/4	7 1/4	7 1/2	190
					4" 600#					
6 x	Q x 8	x 8	300Q / 300QA 600Q / 600QA	11.045	6" 300#	8" 150#	39 1/4	9 1/4	9 1/4	365
					6" 600#					

① For capacities, F, G & H orifices to 250 psi. UV basis use Tables O & P x .910, pages 46 & 47.

KUNKLE CAST IRON SAFETY VALVES

High Capacity, Semi-Nozzle

For Steam • Air • Nonhazardous Gas

PRESSURE SETTINGS TO 250 PSI. 406° F.

Heavy, high quality cast iron valves arranged as follows:

Figure 252. Fully enclosed spring. All bronze/brass trim.

Figure 253. Same as 252, except S/S disc and semi-nozzle.

Figure 257. Enclosed spring. Complete S/S trim (except spring and spring plates).

NOTE: Figure 257 recommended for air/gas only (where no brass/bronze permitted).

Figure 259. Pressure tight cap—for vacuum service.

NOTE: These large safety valves must be installed upright, with the stem vertical for Code compliance and satisfactory operation.

APPLICATIONS

Steam boilers, generators, lines, unfired vessels. Intercoolers, receivers.

PARTS AND MATERIALS

Item	Description	Fig. 252	Fig. 257
1, 2, 3	Cap, lifter and lever	Malleable Iron	Malleable Iron
4, 5, 6	Pins and locknut	Cold Rolled Steel	Cold Rolled Steel
7	Lever Nut	Cold Rolled Steel	Stainless Steel
8	Pressure Screw	Brass	Stainless Steel
9	Lock Nut	Cold Rolled Steel	Stainless Steel
10	Cap Screw	Brass	Carbon Steel
11	Spring Plates	*Cold Rolled Steel	*Cold Rolled Steel
12	Spring	*Carbon Steel	*Carbon Steel
13	Bonnet	Cast Iron	Cast Iron
14	Spindle	*Cold Rolled Steel	Stainless Steel
15	Disc Nut	Brass	Stainless Steel
16	Guide	Cast Bronze	Stainless Steel
17-1	Disc	Forged Copper Alloy	Stainless Steel
17-2	Disc Holder	Cast Bronze	Stainless Steel
17-3	Retainer	Monel	Monel
18	Semi-Nozzle	Bronze	Stainless Steel
19	Regulator Ring	Cast Bronze	Stainless Steel
20	Reg. Ring Set Screw	Brass	Stainless Steel
21	Guide Pin	Brass	Stainless Steel
22A	Body	Cast Iron	Cast Iron
25	Body Bolts	Carbon Steel	Carbon Steel

* These parts cadmium plated

DIMENSIONS • CAPACITIES: pages 48 & 49

In-let	Ori-fice	Out-let	Figure Number ①	Dis-charge Area Sq. In.	Connections		A	B ₁	B ₂	C	Wt. Lbs.
					Inlet ②	Outlet ③					
1½ x J	x 2½	2½	252-Jf	1.287	1½" F.P.T.	2½" F.P.T.	15.50	3.50		4.25	30
1½ x J	x 2½	2½	252-J15	1.287	1½" 250#	2½" F.P.T.	15.50	3.50		4.25	32
2 x J	x 2½	2½	252-J20	1.287	2" 250#	2½" F.P.T.	15.50	3.50		4.25	34
2½ x J	x 2½	2½	252-J25	1.287	2½" 250#	2½" F.P.T.	15.50	3.50		4.25	43
3 x J	x 2½	2½	252-J30	1.287	3" 250#	2½" F.P.T.	15.50	3.50		4.25	43
2 x K	x 3	3	252-Kf	1.840	2" F.P.T.	3" F.P.T.	16.12	3.94		4.56	38
2 x K	x 3	3	252-K20	1.840	2" 250#	3" F.P.T.	16.12	3.94		4.56	40
2½ x K	x 3	3	252-K25	1.840	2½" 250#	3" F.P.T.	16.12	3.94		4.56	48
3 x K	x 3	3	252-K30	1.840	3" 250#	3" F.P.T.	16.12	3.94		4.56	48
4 x K	x 3	3	252-K40	1.840	4" 250#	3" F.P.T.	16.12	3.94		4.56	64
2½ x L	x 4	4	252-Lf	2.853	2½" F.P.T.	4" F.P.T.	20.25	4.81		5.50	54
2½ x L	x 4	4	252-L25	2.853	2½" 250#	4" F.P.T.	20.25	4.81		5.50	67
3 x L	x 4	4	252-L30	2.853	3" 250#	4" F.P.T.	20.25	4.81		5.50	72
4 x L	x 4	4	252-L40	2.853	4" 250#	4" F.P.T.	20.25	4.81		5.50	83
3 x M	x 4	4	252-Mf	3.600	3" F.P.T.	4" F.P.T.	20.38	5.06		5.62	76
3 x M	x 4	4	252-M30	3.600	3" 250#	4" F.P.T.	20.38	5.06		5.62	80
4 x M	x 4	4	252-M40	3.600	4" 250#	4" F.P.T.	20.38	5.06		5.62	92
4 x N	x 6	6	252-N40	4.340	4" 250#	6" 125#	21.50		7.25	6.75	143
4 x P	x 6	6	252-P40	6.380	4" 250#	6" 125#	24.88		7.25	6.75	168
6 x Q	x 8	8	252-Q60	11.045	6" 250#	8" 125#	36.00		9.25	9.25	310
6 x R	x 8	8	252-R60	15.904	6" 250#	8" 125#	44.25		10.00	10.44	415

① Data also applies to 253, 257 and 259, with corresponding suffix.

② Inlet flanges are 250# A.N.S.I., raised face.

③ Outlet flanges are 125# A.N.S.I., flat face.

FIGURE 252 SERIES

A.S.M.E. Standard—N.B. Certified

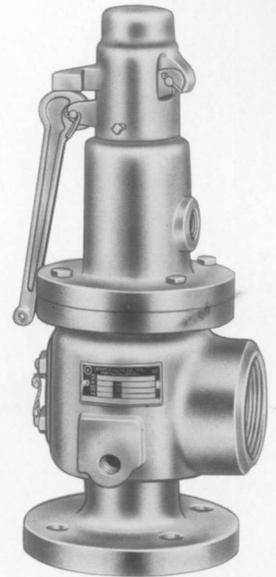


FIGURE 252

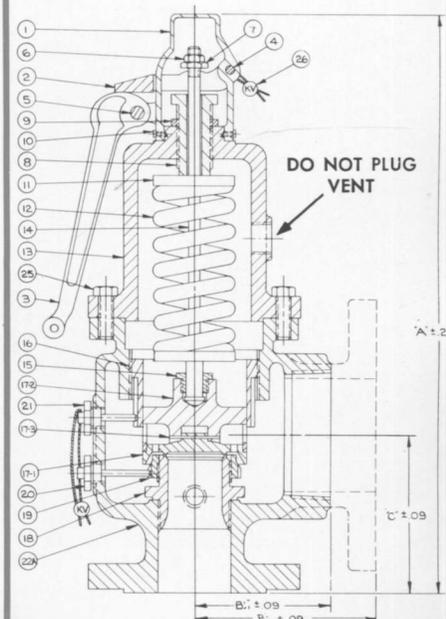


FIGURE 252

FIGURE 910 SERIES

A.S.M.E. Standard—N.B. Certified
(When used for air or steam, must have lever)



FIGURE 910 (Std.)

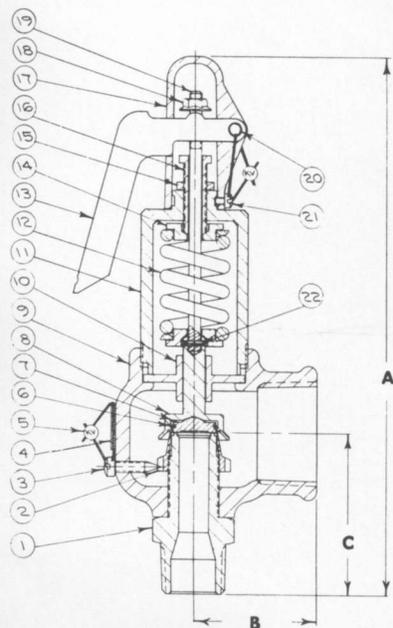


FIGURE 910
(Plain Lever)

KUNKLE

SAFETY-RELIEF VALVES

For Steam • Air • Gas • Liquid

PRESSURE SETTINGS TO 900 PSI^② 800° F.^①

Figure 910. Carbon steel body and bonnet. 316 S/S trim.

Figure 911. 316 S/S body, bonnet and trim.

Figure 927. Carbon steel body and bonnet. S/S trim and spring with packed lift gear. For use on high pressure and temperature hot water boilers (above 160 PSI 250° F.) A.S.M.E. Code Section I.

This series of valves, standard with closed hood and screwed connections. Available with plain lifting lever, packed lifting lever, gag and flanged connections seal welded to valve's base and/or body. 50 P.S.I.G. back pressure limit.

APPLICATIONS

A steel valve for process and general applications involving steam, air, gas or liquid on equipment or systems where compliance with Sections I or VIII of the A.S.M.E. Boiler and Pressure Vessel Code may, or may not, be required.

NUMBERING CODE

Body and Bonnet	Orifice	Trim	Spring	Hood
910 Carbon Steel	D	1 316 St. St.	1 Steel Cad. Plt.	1 Plain Lever
911 Stainless Steel	E	4 Special	2 Alloy-Hi. Temp.	2 Capped
914 Special	F	6 Soft Seat	3 Stainless Steel	3 Packed Lever
927 Hi-Temp Hot Water	G H J		4 Special	4 Special 5 Capped W/Gag 6 Packed W/Gag

EXAMPLE: 910F112

- 910 Body & Bonnet—Carbon Steel
- F Orifice Size
- 1 Trim—316 Stainless Steel
- 1 Spring—Steel Cad. Plt.
- 2 Hood—Capped

PARTS AND MATERIALS

(FIGURE 910 PLAIN LEVER)

Item	Description	No. Reqd.	Material	Item	Description	No. Reqd.	Material
1	Base	1	Stainless Steel	13	Lever	1	Steel Cadmium Plt.
2	Regulator	1	Stainless Steel	14	Spring Plate	2	Steel Cadmium Plt.
3	Regulator Ring			15	Pressure Screw		
	Set Screw	1	Stainless Steel		Locknut	1	Stainless Steel
4	Nameplate	1	Aluminum	16	Pressure Screw	1	Stainless Steel
5	Seal Wire	2	Lead and Wire	17	Hood	1	Bronze
6	Disc Retainer	1	Stainless Steel	18	Flange Nut	1	Steel Cadmium Plt.
7	Disc	1	Stainless Steel	19	Stem	1	Stainless Steel
8	Disc Holder	1	Stainless Steel	20	Lever Pin	1	Steel
9	Body	1	Steel	21	Set Screw	1	Steel Brs. Plate
10	Guide	1	Stainless Steel	22	Spring Pin	1	Stainless Steel
11	Bonnet	1	Steel	23	Drive Screw	2	Stainless Steel
12	Spring (450° F. Max.)	1	Steel Cadmium Plt.				
	(800° F. Max.)	1	Hi-Temp. Steel				

DIMENSIONS

Inlet NPT Male	Orifice	Outlet NPT Fe.	Discharge Area Sq. In.	Max. ② Set Press. PSI	Max. Temp. ° F. ①		A Std. Hood	A Plain Lever	A Packed Lever	B	C	Weight Lbs. Std. Hood
					Carbon Steel Spring	Hi-Temp. Spring						
1/2"	D	1"	.1213	900	450	800	7 3/16	8 3/8	8 5/8	1 5/8	2 3/8	2 3/4
3/4"	E	1 1/4"	.2157	900	450	800	7 3/16	8 3/4	9 1/16	2	2 5/8	3 3/4
1"	F	1 1/2"	.3369	600	450	800	8 3/8	9 1/8	10 1/8	2 3/8	2 7/8	5 1/4
1 1/4"	G	2"	.553	600	450	800	10	11 3/16	11 1/2	2 5/8	3 1/4	7 3/4
1 1/2"	H	2 1/2"	.864	500	450	800	11 1/8	12 15/16	12 1/2	2 3/4	3 3/16	10 1/2
2"	J	3"	1.415	500	450	800	12 1/2	14 3/16	15	3 1/4	3 15/16	14

Suitable For 600°F When Furnished With S/S Spring

CAPACITIES

Table F, page 42.

KUNKLE CAST IRON SAFETY VALVES

For Steam Heating Boilers conforming to
Section IV of A.S.M.E. Code — Only

PRESSURE SETTING 15 PSI ONLY

High capacity for all sizes of residential, commercial and industrial low pressure steam heating boilers. Cast iron body with bronze nozzle, disc and guide. Large seat area/guide area ratio, along with disc pivot design insures top valve performance. Flat bronze valve seats are ground and polished to increase seat tightness. Reversible steel lever for "pull-up" or "pull-down" manual testing.

PARTS LIST

Item	Description	Material
1	Nozzle	Bronze
2	Body	Cast Iron
3	Disc	Bronze
4	Snap Ring	Steel
5	Lift Washer	Steel—Cad. Plate
6	Name Plate	Aluminum
7	Spring Plate	Steel—Cad. Plate
8	Spring	Steel—Cad. Plate
9	Pressure Screw	Bronze
10	Lever	Steel
11	Seal Wire	Lead & Wire
12	Snap Ring	Steel
13	Stem	St/Steel
14	Machine Screw	Steel—Brs. Plate

DIMENSIONS • CAPACITIES

Valve Size Inlet and Outlet	A	B	C	Capacity Lbs./Hr.	Weight Lbs.
3/4"	3 5/8	1 3/4	2	501	1
1"	4 3/8	2 1/4	2 1/2	811	2
1 1/4"	4 7/8	2 1/4	3	1413	2 1/2
1 1/2"	5 1/2	2 3/8	3 5/8	1909	3
2"	7 1/4	3	3	3161	7 1/2
2 1/2"	8 1/4	3 1/2	3 3/4	4497	12
3"	8 3/4	4	4 1/4	6942	18 1/2

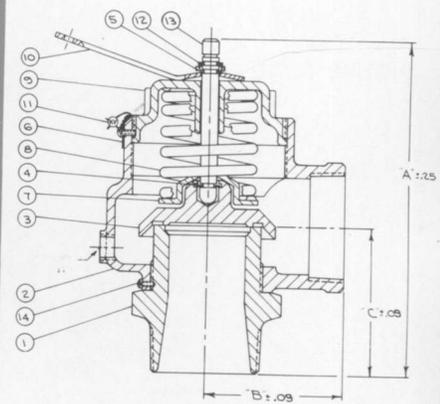
Official relieving capacities are in accordance with A.S.M.E. Code, Section IV, Low Pressure Heating Boilers.

FIGURE 930-1

A.S.M.E. Standard — N.B. Certified



**FIG.
930-1**



FIGURES 933 183-T, 254

A.S.M.E. Standard—N.B. Certified

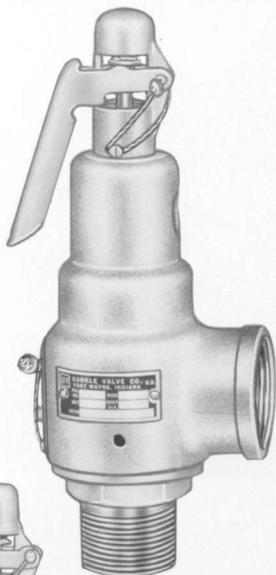


FIGURE 933

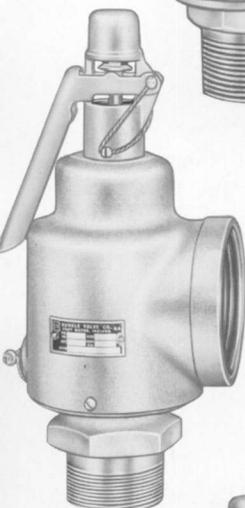


FIGURE 183-T

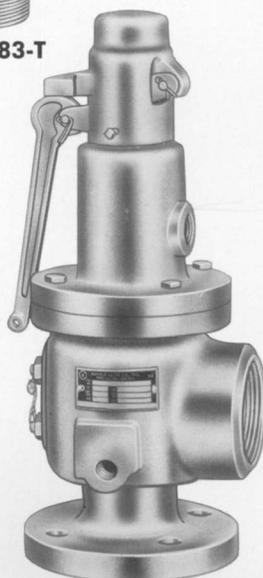


FIGURE 254

KUNKLE SAFETY VALVES

For Steam Heating Boilers conforming to
Section IV of A.S.M.E. Code — Only

FIG. 933
PRESSURE SETTING 15 PSI ONLY

Copper Alloy - disc and full nozzle. Valve housing is heavy cast bronze conforming to 250# Standards. Fig. 934 with Teflon (PFA) disc insert (See Page 9 - Fig. 6021). Fig. 935 with stainless steel nozzle and disc. (See Fig. 6030 - Page 9).

Inlet Male NPT	Orifice Designations ^①	Capacity Pounds Per Hour
1/2" or 3/4"	D	190
3/4" or 1"	E	338
1" or 1 1/4"	F	530
1 1/4" or 1 1/2"	G	868
1 1/2" or 2"	H	1352
2"	J	2215

① For complete dimensional information refer Figure 6010, Page 9

FIG. 183-T
PRESSURE SETTING 15 PSI ONLY

Figure 183-T valves are cast bronze construction conforming to 250# Standards. Design includes flat seats and an adjustable blowdown regulator ring. Steel springs are cadmium plated. Official relieving capacities are in accordance with A.S.M.E. Code, Section IV, Low Pressure Heating Boilers.

DIMENSIONS • CAPACITIES

Inlet ^① Male NPT	Outlet Female NPT	Overall ^② Height, Inches	Weight, Pounds	Capacity Lbs. Steam/Hr.
1 1/2"	2 1/2"	10 3/16	7 1/4	1433
2"	3"	11 3/4	10 3/4	2544
2 1/2"	3"	11 7/16	22	3972
3"	4"	15 7/16	29	5732

① Sizes 1 1/2" thru 3" can be furnished with 150# or 300# flange inlet.

② For complete dimensional information refer Figure 83-4, page 6.

FIG. 254
PRESSURE SETTING 15 PSI ONLY

In accordance with A.S.M.E Code, Section IV, Low Pressure Heating Boilers—N.B. Certified. See Figure 252, Page 23 for Parts, Materials and Dimensions. Available J thru P orifice designations. Stainless Steel trim available on special order.

CAPACITIES

15 PSI. SET PRESSURE—33 1/3% ACCUMULATION

Orifice Designations	Capacity Pounds Per Hour
J	2016
K	2880
L	4470
M	5640
N	6800
P	9990

KUNKLE CAST IRON Accessories

DRIP PAN ELBOWS

The illustration below shows Kunkle discharge elbow and drip pan unit attached to Figure 252 safety valve with female NPT outlet. For safety valves with flanged outlets—2" to 4"—use companion flange, short nipple and drip pan elbow, Figure 299, all same size as valve outlet.

6" & 8" Elbows have integral 125# ANSI Flange.

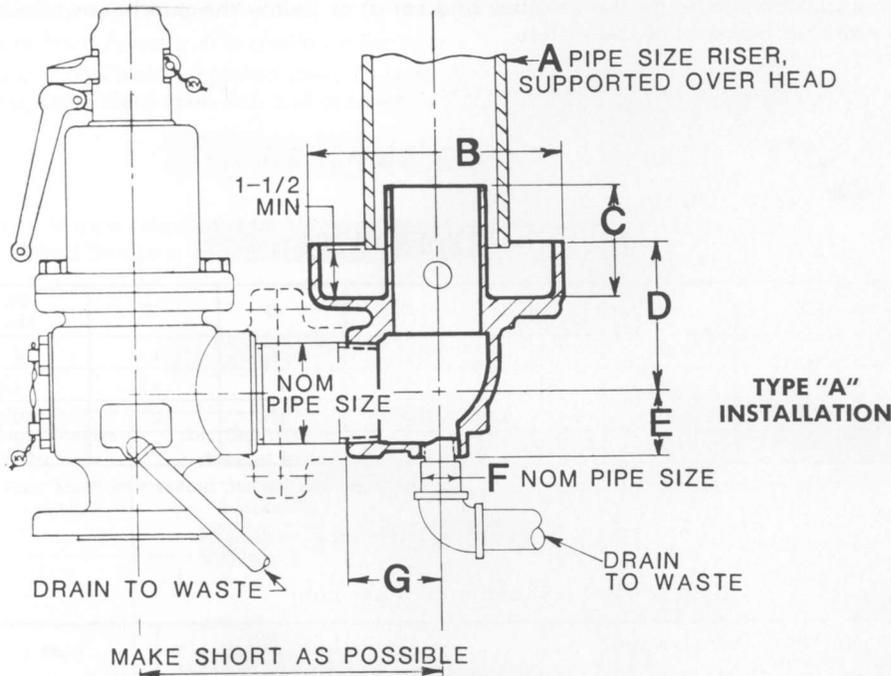
RECOMMENDED INSTALLATION

IMPORTANT—Length of discharge piping must be kept to a minimum. For design considerations see articles, "Steam Flow Through Safety Valve Vent Pipes" by H. E. Brandmaier and M. E. Knebel (Dec. 1975) and "Analysis of Power Plant Safety and Relief Valve Vent Stacks" by G. S. Liao (Nov. 1974) available through ASME Publications.

Type "A" installation—for power boilers and unfired pressure vessel service.

Type "B" installation—for hot water boiler and generator service (160 PSIG/250° F. max.).

Type "C" installation—for low pressure steam boiler service (15 PSIG max.).



TYPE "A" INSTALLATION

DIMENSIONS

Size*	A	B	C	D	E	F	G	Wt. Lbs.
2"	3	6 1/4	2 3/8	3 3/8	1 5/8	1/2	2 1/4	6 1/2
2 1/2"	3 1/2/4	7 3/8	3	4 5/16	1 15/16	3/4	2 11/16	11
3"	4	8	3 1/2	4 7/8	2 5/16	3/4	3 1/8	14 1/2
4"	6	9 5/8	4 1/2	5 3/4	2 7/8	3/4	3 3/4	27
6"	8	12 3/4	6 5/8	7 9/16	4 3/16	3/4	8	60
8"	10	16 1/2	7 1/2	9 9/16	5 3/8	1	10 3/4	102

* Safety Valve Outlet and Fig. 299 Size.

FIGURE 299

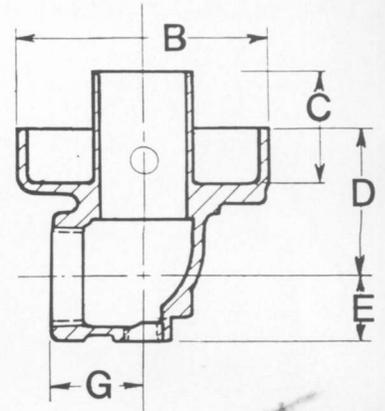
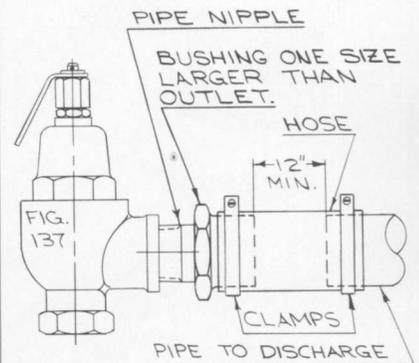
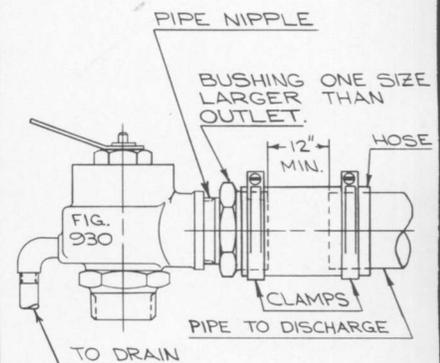


FIGURE 299



TYPE "B" INSTALLATION



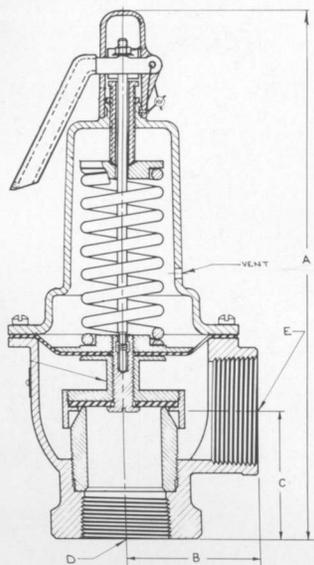
TYPE "C" INSTALLATION

FIGURE 137

A.S.M.E. Standard—N.B. Certified



3/4" AND 1"



1 1/2" AND 2"

KUNKLE SAFETY-RELIEF VALVES

For Hot Water Boilers and Generators conforming to
Section IV of A.S.M.E. Code — Only

PRESSURE SETTINGS: TO 160 PSI. 250° F. ①

Kunkle Figure 137 valves are of extra-heavy construction for durability. Top-guided valve discs are of E.P.R. Springs are protected against corrosion from discharged liquid by an isolating diaphragm.

APPLICATIONS

These valves serve the dual purpose of relieving (1) overpressure created by thermal expansion under normal "on and off" firing conditions, and (2) overpressure in the form of WATER or STEAM created in over-firing due to failure of electrical or other controls. In most cases only one Figure 137 dual-purpose valve of proper size will be needed.

In a few cases involving very large hot water heating boilers, two or more valves may be required. The first, or "working valve," to relieve normal thermal expansion should be the smallest and set at or below the maximum allowable working pressure of the system.

DIMENSIONS

SIZE	A	B	C	D	E	Wt. Lbs.
* 3/4	5 1/2	1 3/4	1 5/8	3/4	1	2
1	7 1/2	2 5/8	1 7/8	1	1 1/4	4 3/8
** 1 1/2	11 1/8	3 1/4	2 9/16	1 1/2	2	10 1/2
** 2	14 1/2	3 3/8	3 3/8	2	2 1/2	18

* This size only designed "137-B".

** Iron body and bonnet, bronze trim, these sizes only.

CAPACITIES

Stated in BTU per hour

Set Pressure	3/4"	1"	1 1/2"	2"
20	520,000	760,000	2,474,000	3,450,000
30	700,000	986,000	2,925,000	4,450,000
32.5	740,000	1,044,000	3,025,000	4,692,000
35	780,000	1,103,000	3,125,000	4,935,000
40	860,000	1,212,000	3,375,000	5,450,000
45	950,000	1,328,000	3,625,000	5,980,000
50	1,025,000	1,445,000	3,875,000	6,450,000
60	1,190,000	1,670,000	4,360,000	7,450,000
70	1,365,000	1,899,000	4,870,000	8,430,000
80	1,525,000	2,127,000	5,375,000	9,450,000
90	1,680,000	2,358,000	5,850,000	10,500,000
100	1,850,000	2,579,000	6,360,000	11,470,000
125	2,230,000	3,154,000	7,630,000	14,000,000
150	2,660,000	3,154,000	8,850,000	16,500,000
160	2,810,000	3,154,000	9,375,000	17,500,000

① For operating conditions exceeding 160 psi and/or 250° F. cast steel, enclosed spring Power Boiler valves with packed lift gear are required:

(a) Figure 927 (page 24) 3/4" thru 2" NPT.

(b) 5000 Series, all sizes with flange connections (See CATALOG 5000-82).

KUNKLE
SERIES 1200, 1500, 1700, 2200, 2500, 2700
For Steam • Air • Gas • Liquid

PRESSURE SETTINGS TO 6500 PSI.

KUNKLE bolted bonnet Navy relief valves are constructed in full conformity with U. S. Navy specifications:

- MIL-V-20065—Valves for steam service
 - Composition A—to 1050° F.—Hi-Temperature alloy steel
 - Composition B—to 1000° F. Alloy steel
 - Composition D—to 775° F.—Carbon steel
- MIL-V-22549—Valves for air or gas service
 - Nominal ratings: 400, 1500, 3000 and 6000 PSI—165° F.
- MIL-V-24332—Valves for liquid service
 - Grade A—(Ferrous) Cast steel or stainless steel
 - Grade B—(Nonferrous) Bronze or Monel

Available in a complete range of sizes 1/4" thru 8".

Standard materials of construction include bronze, steel, alloy steel and monel or stainless steel in certain sizes and types.

Trim materials are monel or stainless steel with soft seat seals available in most sizes and for many applications.

Stellite or hard faced trim is available for severe applications.

Springs are available of plated steel, Hi-temp steel, phosphor bronze, stainless steel or monel, dependent upon size and pressure.

CONNECTIONS

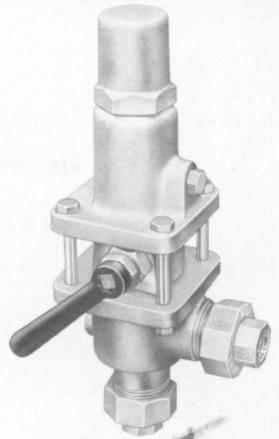
Flange x flange—designated "FF"—or union x union "UU" are standard. Can be furnished flange x union "FU", or union x NPT, or with special end connections.

NUMBERING CODE

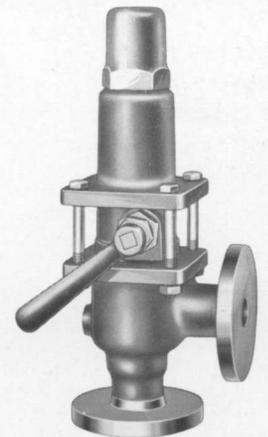
1st Digit Signifies Body Material	2nd Digit Signifies Type of Head	3rd Digit Signifies Seat & Disc Construction	4th Digit Signifies Kind of Top
1 - - - Bronze	- 2 - Exposed Spring		- - - 0 Adjusting screw, without cap
	- 5 - - Enclosed Spring		- - - 1 Adjusting screw, with screwed cap
2 - - - Steel	- 7 - - Enclosed Spring with packed lifting lever	- - 4 - Top-guided disc without adj. ring	
		- - 5 - Top-guided disc with adj. ring	

KUNKLE screwed bonnet Navy Relief valves with non-metallic disc inserts are constructed of corrosion-resisting steel, bronze, monel, copper-nickel alloy or naval brass for air, gas and oxygen service. Pressure tight discharge. Totally enclosed springs.

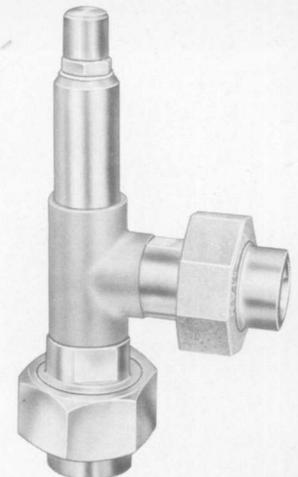
Sizes to 3/4". Nominal pressure ratings 400, 1500, 3000 and 6000 psig.



**TYPICAL 1/2-2" VALVE
PER MIL-V-22549**



**TYPICAL—ENCLOSED SPRING—
PACKED LIFT LEVER VALVE**

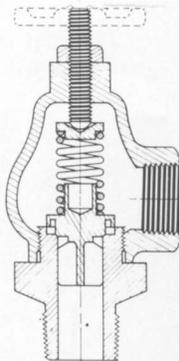


**TYPICAL 1/4 - 1/2" VALVE
PER MIL-V-22549**

FIGURE 11 SERIES

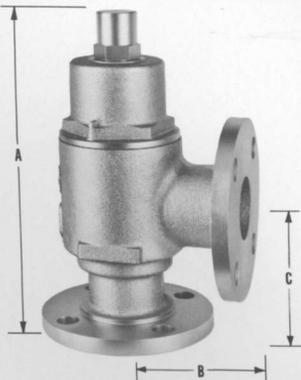


FIGURES
11-C
11-G
11-S



FIGURES
11
11-H

FIGURES 19-1 thru 23-M & 200-H



KUNKLE BRASS/BRONZE RELIEF VALVES For Liquids • Gases

PRESSURE SETTINGS TO 100 PSI.

These general utility relief valves have micro-finished 45° brass seats—or synthetic disc inserts, as indicated below. They provide dependable medium capacity pressure relief of non-corrosive liquids and gases.

Figure 11. Metal seats. Exposed pressure adjusting screw and locknut.

Figure 11-C. Metal seats. Pressure tight cap.

Figure 11-H. Metal seats. Handwheel equipped for ready change of pressure settings.

Figure 11-G. Neoprene to metal seating. Pressure tight cap.

Figure 11-S. Silicone to metal seating. Pressure tight cap.

APPLICATIONS

These are general utility valves designed to provide dependable medium-capacity liquid relief service for pumps, tanks, lines, etc., handling materials not injurious to brass and/or bronze.

DIMENSIONS

Inlet, Male NPT	Seat Dia.	Outlet	Overall Height	Weight
1/4", 3/8" or 1/2"	1/2"	1/2" Fe. NPT	3 3/4"	3/4 #

FACE TO FACE DIMENSIONS

**FLANGED ENDS VALVES

*A = Overall Height.

B = \varnothing Valve spindle to face of outlet flange.

C = \varnothing of outlet to face of inlet flange.

Size Inlet & Outlet		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
150 # Inlet	A	7 7/8	7 7/8	7 3/4	8 1/2	9 1/16	10	10 7/8	12 5/8	15 7/8
	X	3 5/16	3 5/16	3 7/16	3 11/16	4 1/8	4 1/4	4 3/4	5	6 7/16
150 # Outlet	C	3 5/16	3 5/16	3 7/16	3 11/16	4 1/8	4 1/4	4 3/4	5	6 7/16
300 # Inlet	A	7 3/8	7 3/8	8	8 3/4	9 3/16	10 1/4	11 1/8	13	16 5/16
	X	3 5/16	3 5/16	3 7/16	3 11/16	4 1/8	4 1/4	4 3/4	5 1/4	6 13/16
150 # Outlet	C	3 1/2	3 1/2	3 5/8	3 7/8	4 3/8	4 1/2	5	5 3/8	6 7/16

*The "A" dimensions in this table are for valves with pressure tight caps: Figures 20-1, 20M-1 and 22-M. For overall heights of valves with other top constructions see individual descriptive pages.

**All flanges ANSI.

KUNKLE BRONZE RELIEF VALVES For Liquids

FIGURES 19-1 & 19M-1 20-1 & 20M-1

PRESSURE SETTINGS TO 1200 PSI. 300° F.

Extra-heavy, rugged construction. Both inlet and outlet connections are cast integral with body to permit easy inspection and servicing without disconnecting inlet or discharge piping.

SPRINGS: Steel, cadmium plated are standard. Stainless steel or phosphor bronze for most sizes and pressure settings are optional extras.

TEST LEVERS: Figures 20-1 and 20M-1 in sizes to 3" can be furnished with pressure tight manual test levers as optional extra. Designated as Figures 20-1P and 20M-1P, respectively.

Figure 19-1. All bronze, is handwheel equipped for easy adjustment of relief pressure.

Figure 19M-1. Same as Figure 19-1 with S/S seat and disc.

Figure 20-1. All bronze, with pressure tight cap.

Figure 20M-1. Same as Figure 20-1 with S/S seat and disc for higher settings or more severe operating conditions.

APPLICATIONS

For intermittent relief of overpressures—tanks, lines and hydraulic systems; or (Figures 20-1 and 20M-1 only) for continuous pressure regulation as by-pass relief.

CONNECTIONS

- A. Unless otherwise specified, furnished standard with male NPT inlet x female NPT outlet.
- B. All sizes available with female NPT inlet—optional.
- C. All sizes available. 150# or 300# flange inlet x 150# outlet.

DIMENSIONS

Inlet NPT	Outlet NPT	Max. Set Pressure PSIG			A ②	B ②	C ②	Weight Lbs. Std. Conn's.
		Figs. 19-1, 20-1	Figs. 19M-1, 20M-1					
			Male Inlet	Female Inlet				
1/2"	3/4" ①	300	1000	1200	5 3/4	1 5/8	2	2 1/4
3/4"	3/4"	300	1000	1200	5 3/4	1 5/8	2	2 1/4
1"	1"	300	900	1200	6 1/2	1 7/8	2 1/4	3 1/2
1 1/4"	1 1/4"	300	800	1200	7 3/8	2 1/8	2 5/8	5
1 1/2"	1 1/2"	300	700	1200	7 5/8	2 1/8	2 3/4	6 1/4
2"	2"	300	600	900	9 3/8	2 3/4	3 1/2	11
2 1/2"	2 1/2"	300	500	500	10	3	3 7/8	16
3"	3"	300	500	500	12 3/8	3 7/8	4 5/8	25
4"	4"	250			15 3/8	5 1/4	6	60

① 1/2" outlet optional, on order.

② These dimensions for NPT connections.

CAPACITIES

Table K, page 44



FIGURES
20-1 & 20M-1

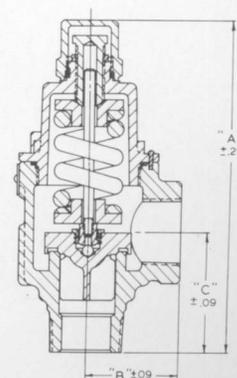
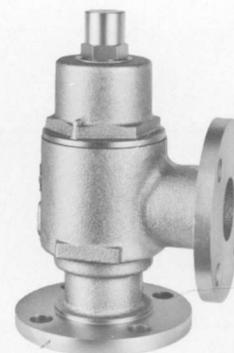


FIGURE 20-1

**FIGURES
200-A
200-H**



**FIGURE
200-H**

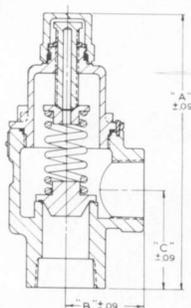


FIGURE 200-A

**KUNKLE
BRONZE RELIEF VALVES
For Liquids**

PRESSURE SETTINGS TO 200 PSI., MAXIMUM.

Underwriters' Laboratories Listed. Approved for use with fuel oils not heavier than #6. Heavy cast bronze construction throughout. Suitable for backpressures to 50 psi.

Figure 200A. Has a specially designed non-chattering disc. Particularly recommended for light oils. Sizes 3/4" through 1 1/2". Female NPT connections only.

Figure 200H. Has conventional wing-guided disc. Furnished standard with male threaded inlet and female threaded outlet.

Female inlet optional.

Available with 150# or 300# flanged inlet x 150# flanged outlet.

(For dimensions and weights see fig. 20-1 data, page 31)

APPLICATIONS

Fuel oil pump pressure regulation—continuous by-pass relief.

DIMENSIONS

SIZE	3/4"	1"	1 1/4"	1 1/2"	2"
A	6	6 1/2	7 3/8	7 3/4	9 1/2
B	1 5/8	1 7/8	2 1/8	2 1/8	2 3/4
C	2	2 1/4	2 5/8	2 3/4	3 1/2
Wt./Lbs.	2 1/2	4	5 1/4	7 1/4	14

CAPACITIES

Figure 200-H only, Table K, page 44

**FIGURES
189-M
189-MP**



FIGURE 189-MP

PRESSURE SETTINGS TO 6500 PSI.

Extra sturdy construction, Stainless steel seat and disc. Cadmium plated steel spring. S/S spring—optional extra. Figure 189-M has pressure tight cap—no lift lever. Figure 189-MP has pressure tight, packed lift lever.

APPLICATIONS

Intermittent overpressure relief, or continuous by-pass for pressure regulation.

DIMENSIONS

Standard Connections		Height		Inlet Face Outlet	Outlet Face Inlet	Weight Lbs.	
Inlet Female - NPT	Outlet Female - NPT	Fig. 189-M	Fig. 189-MP			Fig. 189-M	Fig. 189-MP
1/2" or 3/4"	3/4"	7 3/16	8 5/8	1 3/4	2 1/16	5	5 1/2

CAPACITIES

GPM — 25% Overpressure

Set Pressure PSIG	800	900	1000	1500	2000	2500	3000	3500	4000	5000	6000	6500
Capacity GPM	16	17	18	22	26	28	30	33	35	40	43	45

KUNKLE STEEL RELIEF VALVES

For Liquid • Gas • Vapor

PRESSURE SETTINGS TO 3300 PSI.

Standard with type 316 S/S trim.

This series of valves is available in a variety of materials combinations for operation over wide range of temperature and for resistance to corrosion.

Figure Number	Spring Housing	Trim	Spring	Maximum Pressure	Maximum Temperature
264-1	Carbon Steel	S/S	S/S	3300	600° F.
265-1	Carbon Steel	S/S	Hi-Temp.	2000	750° F.
266-1	Stainless Steel	S/S	S/S	3300	600° F.
267-1	Stainless Steel	S/S	Hi-Temp.	2000	750° F.

264-1P, 265-1P, 266-1P, 267-1P—as above with packed lift gear.

APPLICATIONS

For protection of pumps, pressure vessels or systems handling moderately corrosive fluids or vapors; and for sentinel service. Backpressure limit 400 psi.

DIMENSIONS

Standard with 1/2" 3/4", or 1" male NPT inlet x 1" female NPT outlet. Available on special order with 1/2" or 3/4" female inlet; and/or 3/4" outlet and seal welded flanges. Discharge (orifice) area .1104 sq. in. Weight 3 3/4 lbs.

PARTS AND MATERIALS

Figures 264-1/265-1

ITEM	DESCRIPTION	MATERIALS
1	Body	S/S
2	Cap Gasket	Teflon
3	Disc Guide	S/S
4	Cap	Steel
5	Disc	S/S
6	Ball	S/S
7	Stem Retainer L'nut	S/S
8	Stem Retainer	S/S
9	Stem	S/S
10	Spring (264-1, 266-1)	S/S
10	Spring (265-1, 267-1)	Hi-Temp.
11	Spring Plate	S/S
12	Hood Gasket	Teflon
13	Press. Scr. L'nut	S/S
14	Press. Screw	S/S
15	Hood	S/S

CAPACITIES

Based on Set Pressure plus 10% Accumulation

Set Pressure	Water GPM	Air SCFM at 60° F.	Steam Lbs. Per Hr. at 10% Accum.	Set Pressure	Water GPM	Air SCFM at 60° F.	Steam Lbs. Per Hr. at 10% Accum.
10	5.7	39	111	600	44.	1039	2927
20	8.	56	159	700	47.5	1209	3405
30	9.8	73	206	800	50.8	1378	3882
40	11.3	90	254	900	53.9	1547	4359
50	12.7	107	302	1000	56.8	1717	4837
75	15.5	149	421	1200	62.4	2056	5791
100	17.9	192	541	1400	67.2	2395	6746
125	20.	234	660	1600	71.8	2734	7701
150	21.9	276	779	1800	76.1	3073	8656
200	25.4	361	1018	2000	80.4	3412	9610
250	28.3	446	1257	2250	85.2	3835	
300	31.	531	1495	2500	90.	4259	
350	33.5	616	1734	2750	94.2	4683	
400	35.9	700	1973	3000	98.4	5106	
500	40.	870	2450	3300	102.5	5615	

FIGURES 264-1, 265-1 266-1, 267-1

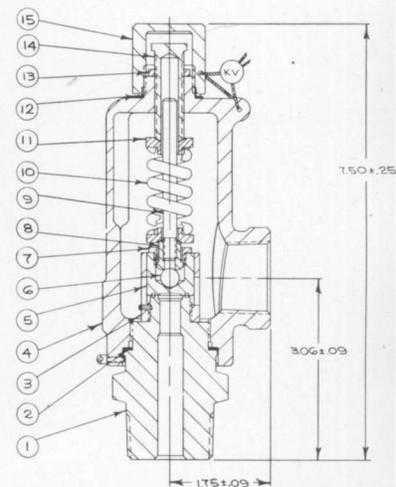
A.S.M.E. Standard—N.B. Certified



FIGURES
264-1
265-1
266-1
267-1



FIGURES
264-1P
265-1P
266-1P
267-1P



**FIGURES
191-1
291**

**KUNKLE
STEEL RELIEF VALVES
For Liquids**

PRESSURE SETTINGS TO 1500 PSI. 400° F.

Cast steel body and bonnet with stainless seat insert, high lift—high capacity disc, and hardware. Springs are steel, cadmium plated. Figure 291 available with stainless or alloy steel springs for temperatures to 750°F or for additional corrosion resistance.

FIGURE 191-1. Bolted bonnet, pressure tight cap. Sizes 1 1/2" thru 6".

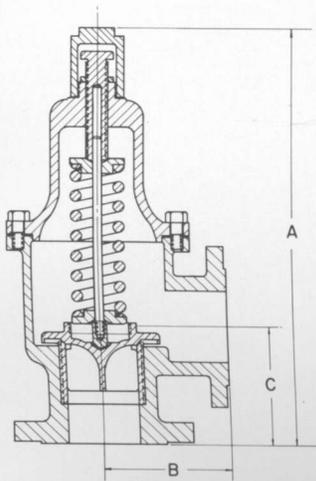
FIGURE 291. Screwed bonnet, pressure tight cap. Sizes 1/2" thru 1 1/4" with female NPT connections.



**FIGURE
191-1**



**FIGURE
291**



APPLICATIONS

General industrial and marine services.

DIMENSIONS

FIGURE 291.

Size	Inlet ①	Outlet	A	B	C	Maximum Pressure PSIG	Weight Lbs.	
							Flg'd	Sc'd
1/2	1/2" Fe. NPT	1/2" Fe. NPT	5 3/4	1 5/8	2	1250	—	4
3/4	3/4" Fe. NPT	3/4" Fe. NPT	8	1 7/8	2 1/4	1500	—	5 1/2
1	1" Fe. NPT	1" Fe. NPT	10 3/4	1 7/8	2 3/4	1250	—	8 1/2
1 1/4	1 1/4" Fe. NPT	1 1/4" Fe. NPT	11 3/8	2 3/8	3 3/8	1400	—	12 1/2

FIGURE 191-1.

1 1/2	1 1/2"-300#	1 1/2"-150#	12 1/8	4 5/8	5	400	36	—
2	2"-300#	2"-150#	13 5/8	4 5/8	5	400	50	—
2 1/2	2 1/2"-300#	2 1/2"-150#	14 7/8	4 7/8	5 1/8	400	75	—
3	3"-300#	3"-150#	17	5 7/8	6 1/8	300	92	—
4	4"-300#	4"-150#	21 3/4	6 1/2	7	300	160	—
6	6"-300#	6"-150#	26	8 1/2	9 3/8	250	280	—

① All sizes Figure 191-1 valves can be furnished with both inlet and outlet 150# flange connections.

CAPACITIES

Table L, page 45

KUNKLE IRON BODIED RELIEF VALVES

For Liquids • For Fire pump service

**FIGURES
91-1, 91-1S
218-1, 219-1**

PRESSURE SETTING — ADJUSTABLE 70/200#

FIGURE 218-1. U.L. and F.M. approved for fire pump installations. Cast iron with bronze trim (St/Steel trim optional extra). Relieving capacity stated for 100 PSIG setting in GPM at 25% overpressure. U.L. version limited to 170 PSIG maximum setting.

FIGURE 218-1 CS-164.

Same as 218-1 except equipped with pressure tight hood. For installations where backpressures are present.

DIMENSIONS

Size	STANDARD CONNECTIONS ①		Available With FE. NPT In. & Out.	A	B	C	Officially Rated Capacity GPM	Weight Flange X Flange
	ANSI FLANGES							
	Inlet	Outlet						
3"	3" -250#	3" -125#	3"	17	5 ⁷ / ₈	6 ¹ / ₈	500	93
4"	4" -250#	4" -125#	4"	22	6 ¹ / ₂	6 ⁵ / ₈	1000	160
6"	6" -250#	6" -125#	—	29	8 ¹ / ₂	9 ³ / ₈	2000	270

① 125# flanged inlet optional.

PRESSURE SETTINGS TO 400 PSI. 300° F.

Extra heavy pattern, high quality cast iron relief valves with bolted bonnets and high lift, wing guided discs. Springs are steel, cadmium plated.

FIGURE 91-1. Bronze trim. Pressure tight cap.

FIGURE 91-1S. Stainless steel trim. Pressure tight cap.

FIGURE 219-1. Equipped with handwheel for easy adjustment of relief pressure to 10% above or below original setting.

DIMENSIONS

Size	STANDARD CONNECTIONS				A	B	C	Max. Set Pressure PSIG.	Weight - Lbs.	
	ANSI FLANGES ①		FE. THREADED						Flg'd.	Sc'd.
	Inlet	Outlet	Inlet NPT	Outlet NPT						
1 ¹ / ₂ "	1 ¹ / ₂ " -250#	1 ¹ / ₂ " -125#	1 ¹ / ₂ "	1 ¹ / ₂ "	12 ¹ / ₈	4 ⁵ / ₈	5	400	33	26
2"	2" -250#	2" -125#	2"	2"	13 ⁵ / ₈	4 ⁵ / ₈	5	400	46	38
2 ¹ / ₂ "	2 ¹ / ₂ " -250#	2 ¹ / ₂ " -125#	2 ¹ / ₂ "	2 ¹ / ₂ "	15	4 ⁷ / ₈	5 ¹ / ₈	400	69	56
3"	3" -250#	3" -125#	3"	3"	17	5 ⁷ / ₈	6 ¹ / ₈	300	85	70
4"	4" -250#	4" -125#	4"	4"	22	6 ¹ / ₂	6 ⁵ / ₈	300	130	111
6"	6" -250#	6" -125#			26	8 ¹ / ₂	9 ³ / ₈	250	260	

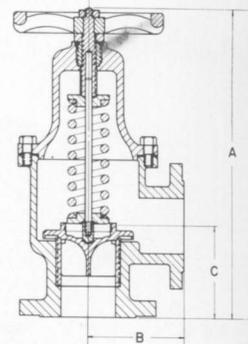
① 125# flanged inlet optional.

CAPACITIES

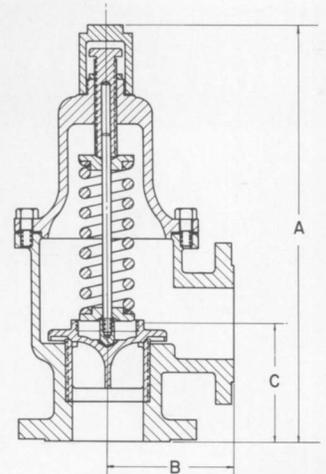
Table L, page 45



FIGURE 218-1



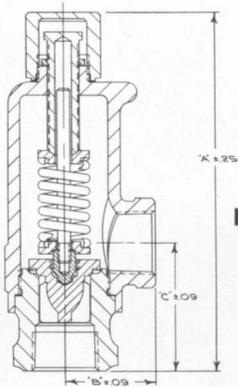
**FIGURES
91-1
91-1S**



FIGURES 71, 71-S 171, 171-S



FIGURE 71



FIGURES
71
71-S
171
171-S

KUNKLE

IRON AND STEEL RELIEF VALVES

For Liquids

PRESSURE SETTINGS TO 400 PSI. 400° F.

Conventional, heavy pattern relief valves with wing-guided discs. Back-pressure tight. No parts of brass, bronze, copper or aluminum. General materials specifications as follows:

Figure 71. All iron, including body/seat and disc. Steel spring.

Figure 71-S. Same as 71 except S/S body/seat and disc.

Figure 171. Cast carbon steel. S/S body/seat and disc. Steel spring.

Figure 171-S. All type 316 stainless steel, including spring.

All styles available with packed lift gear.

APPLICATIONS

For pressure relief of caustics, ammonia and other corrosive liquids. Also for vapors, on installations which can tolerate relief valve closing action.

DIMENSIONS

Inlet & Outlet Fe. NPT ①	A		B	C	Max. Pressure PSIG.				Approx. Weight* Lbs.
	With Plain Cap	With Packed Lever			71 & 71-S		171	171-S	
					150° F.	400° F.	400° F.	400° F.	
1/2"	6 7/8	8 5/8	1 3/4	2 7/16	400	250	400	400	2 1/2
3/4"	6 7/8	8 5/8	1 3/4	2 7/16	400	250	400	400	2 5/8
1"	7 7/8	8 7/8	1 3/4	2 11/16	400	250	400	400	3 1/4
1 1/4"	7 1/2	8 7/8	2 1/8	3	400	250	400	400	5 1/2
1 1/2"	8 1/4	9 3/4	2 7/16	3 3/8	400	250	400	400	7 1/4
2"	9 3/4	11 1/8	2 3/4	4 1/8	400	250	400	400	12

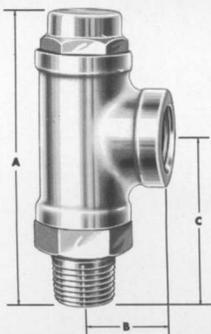
* For all iron, plain capped.

① 1/2" size has 3/4" outlet.

CAPACITIES

Table K, page 44.

FIGURE 140



PRESSURE SETTINGS TO 300 PSI. 400° F.

A general utility valve of all stainless steel construction, including spring, for air, gas or liquid.

DIMENSIONS

Size	Inlet.	Outlet	A	B	C	Weight - Lbs.
3/8" or 1/2"	3/8" or 1/2" Male	1/2" Female	3 13/16	1 1/16	2 1/4	7/8

NOTES

TABLE

B

KUNKLE

FIGURES 80-4, 80-4S, 82-4, 82-4S, 83-4, 83-4S, 84-4, 84-4S

A.S.M.E. (UV) Basis—90% of tested capacity at 10% accumulation

CAPACITY IN POUNDS OF SATURATED STEAM PER HOUR

To correct capacities for superheat see page 53.

Set Pressure PSIG.	VALVE SIZE		1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
	1/2"	3/4"						
SEAT DIAMETER	VALVE SIZE		1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
	1/2"	3/4"						
5	58	156	277	434	623	1111	1739	2500
10	74	198	353	553	793	1414	2212	3181
15	90	240	429	671	963	1716	2686	3862
20	106	283	504	790	1133	2019	3160	4543
25	122	325	580	908	1302	2321	3633	5224
30	137	368	656	1026	1472	2624	4107	5904
35	153	410	731	1145	1642	2927	4580	6585
40	169	452	807	1263	1811	3229	5053	7266
45	185	495	883	1382	1981	3532	5527	7947
50	201	538	958	1500	2151	3834	6001	8628
55	217	580	1034	1619	2321	4137	6474	9308
60	233	622	1110	1737	2490	4440	6948	9989
65	249	665	1185	1855	2660	4742	7421	10670
70	264	707	1261	1973	2830	5045	7895	11350
75	280	750	1336	2092	3000	5347	8368	12030
80	296	792	1412	2210	3169	5650	8842	12710
85	312	835	1488	2329	3339	5952	9315	13390
90	328	877	1563	2447	3509	6255	9789	14070
95	344	920	1639	2565	3679	6557	10263	14760
100	360	962	1715	2684	3848	6860	10736	15440
105	375	1004	1790	2802	4018	7163	11210	16120
110	391	1047	1866	2920	4188	7465	11683	16790
115	407	1090	1941	3039	4358	7768	12157	17480
120	423	1132	2017	3157	4527	8070	12630	18160
125	439	1174	2093	3276	4697	8373	13104	18840
130	455	1217	2169	3394	4867	8675	13577	19520
135	470	1259	2244	3513	5037	8978	14051	20200
140	486	1302	2320	3631	5207	9280	14524	20880
145	502	1344	2395	3749	5376	9583	14997	21560
150	518	1387	2471	3867	5546	9886	15471	22240
160	550	1471	2622	4104	5885	10490	16418	23610
170	582	1556	2774	4341	6225	11100	17365	24970
180	613	1641	2925	4578	6565	11700	18312	26330
190	645	1726	3076	4814	6904	12300	19259	27690
200	677	1811	3227	5051	7244	12910	20207	29050
210	709	1895	3379	5288	7583	13510	21154	30410
220	740	1980	3530	5525	7922	14120	22101	31780
230	772	2065	3681	5762	8262	14730	23048	33140
240	804	2150	3833	5999	8602	15330	23995	34490
250	835	2235	3984	6235	8941	15940	24942	35860

KUNKLE

FIGURES 80-4, 80-4S, 82-4, 82-4S, 83-4, 83-4S, 84-4, 84-4S

A.S.M.E. (UV) Basis—90% of tested capacity at 10% accumulation

TABLE

C

CAPACITY IN CU. FT. AIR PER MINUTE AT 60° F.

To determine capacities at temperatures other than 60° F. see page 54.

Set Pressure PSIG.	VALVE SIZE							
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
	SEAT DIAMETER							
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
5	21	55	99	154	222	395	619	890
10	26	70	125	196	282	503	788	1130
15	32	86	152	239	342	611	956	1370
20	37	100	180	281	403	719	1124	1620
25	43	116	206	323	463	826	1293	1860
30	48	131	233	365	524	934	1462	2100
35	54	146	260	407	584	1042	1630	2340
40	60	161	287	450	644	1150	1799	2580
45	65	176	314	492	705	1257	1968	2820
50	71	191	341	535	765	1365	2136	3070
55	77	206	368	576	826	1473	2305	3310
60	82	221	395	618	886	1580	2473	3550
65	88	236	422	660	947	1688	2642	3800
70	93	252	449	703	1007	1796	2810	4040
75	99	267	475	745	1069	1904	2980	4280
80	105	282	503	786	1128	2011	3147	4520
85	110	297	530	829	1188	2120	3316	4760
90	116	312	557	871	1249	2226	3485	5010
95	122	327	584	913	1310	2335	3653	5250
100	127	342	610	955	1370	2442	3822	5495
105	133	357	637	997	1430	2550	3990	5737
110	139	372	664	1040	1491	2657	4159	5980
115	144	388	691	1082	1551	2765	4328	6222
120	150	403	718	1124	1611	2873	4496	6464
125	156	418	745	1166	1672	2980	4665	6706
130	161	433	772	1208	1732	3089	4833	6949
135	167	448	799	1250	1793	3196	5002	7191
140	173	463	825	1292	1853	3304	5170	7433
145	178	478	853	1335	1914	3412	5339	7675
150	184	493	880	1377	1974	3520	5507	7918
160	195	524	933	1461	2095	3735	5845	8400
170	206	554	987	1545	2216	3950	6182	8888
180	218	584	1041	1679	2337	4165	6519	9372
190	229	614	1095	1714	2458	4381	6856	9857
200	240	644	1148	1798	2579	4596	7193	10340
210	251	675	1207	1882	2700	4812	7530	10820
220	263	705	1256	1966	2820	5027	7868	11310
230	274	735	1310	2051	2941	5243	8205	11790
240	285	765	1364	2135	3062	5458	8542	12280
250	297	795	1418	2219	3183	5673	8879	12760
260	308	826	1472	2304	3304	5889	9216	13250
270	319	856	1525	2388	3424	6105	9553	13730
280	330	886	1580	2472	3545	6320	9890	14220
290	342	917	1633	2556	3666	6536	10228	14700
300	352	947	1687	2641	3787	6750	10560	15190

TABLE

D

KUNKLE

FIGURES 86, 87, 87C AND 87-P

A.S.M.E. (UV) Basis—90% of Tested Capacity at 10% Accumulation

CAPACITY IN CU. FT. AIR PER MINUTE AT 60° F.

To determine capacities at temperatures other than 60° F. see page 54.

Set Pressure PSIG.	VALVE SIZE					
	½"	¾"	1"	1¼"	1½"	2"
5	21	48	81	131	188	334
10	26	61	104	167	239	425
15	32	74	126	203	290	516
20	37	87	148	238	342	607
25	43	100	170	274	392	698
30	48	113	192	310	444	789
35	54	126	214	345	495	880
40	60	139	236	381	546	971
45	65	152	259	417	597	1062
50	71	165	281	453	649	1153
55	77	178	303	488	697	1244
60	82	192	325	524	751	1335
65	88	205	348	560	803	1426
70	93	218	370	595	854	1517
75	99	231	392	631	905	1608
80	105	244	414	667	956	1699
85	110	257	436	703	1008	1790
90	116	270	458	740	1059	1881
95	122	283	480	774	1110	1972
100	127	296	502	810	1161	2063
105	133	309	525	845	1212	2154
110	139	322	547	881	1263	2245
115	144	335	569	917	1314	2336
120	150	348	591	953	1365	2426
125	156	361	613	988	1417	2518
130	161	374	636	1024	1468	2609
135	167	387	658	1060	1519	2700
140	173	400	680	1095	1570	2791
145	178	414	702	1131	1622	2882
150	184	427	724	1167	1673	2973
160	195	453	770	1238	1775	3155
170	206	479	813	1310	1878	3337
180	218	505	858	1381	1981	3518
190	229	531	902	1453	2083	3700
200	240	557	946	1525	2185	3882
210	251	583	991	1596	2288	4064
220	263	610	1035	1667	2390	4246
230	274	636	1079	1738	2492	4428
240	285	662	1123	1810	2595	4610
250	297	688	1168	1882	2697	4792
260	308	714	1212	1953	2800	4974
270	319	740	1257	2024	2902	5156
280	330	766	1301	2096	3004	5338
290	342	792	1345	2167	3107	5520
300	352	818	1389	2238	3209	5702

KUNKLE
FIGURES 1 AND 2
FIGURES 1-A AND 2-A

TABLE
E

STEAM/AIR RELIEVING CAPACITIES

Set Pressure PSIG	1/2" & 3/4"			1"		
	Lbs./Hour Steam 90% Basis 3% Acc.	Lbs./Hour Steam 90% Basis 10% Acc.	SCFM Air 10% Acc.	Lbs./Hour Steam 90% Basis 3% Acc.	Lbs./Hour Steam 90% Basis 10% Acc.	SCFM Air 10% Acc.
5	81	82	29	139	142	50
10	101	104	37	173	179	63
15	120	125	44	207	215	76
20	139	145	52	240	250	89
25	158	165	59	272	284	101
30	176	185	66	304	318	113
40	211	223	79	365	383	136
50	245	258	92	422	445	158
60	277	293	104	477	504	179
70	307	325	115	530	560	199
80	335	355	126	579	613	217
90	362	384	136	625	662	235
100	387	411	146	669	709	252
125	442	469	167	764	811	288
150	486	517	183	842	895	318
175	520	553	196	902	959	340
200	542	577	205	943	1003	356
225	554	590	210	966	1028	365
250	556	592	210	971	1034	367

FIGURES 80-4 AND 84-4

CAPACITY IN SCFM AIR – VACUUM SET PRESSURE

TABLE V

Set for Inches Hg.	SIZE	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
1		5.2	11.5	19.7	32.3	49	81	128	186
2		8.3	17.8	30.7	50.2	80	115	205	285
3		10.0	21.6	37.6	61.5	95	155	246	355
4		11.2	24.5	42.3	70.0	108	175	280	400
5		12.2	27.1	46.4	76.3	117	191	301	438
6		13.0	28.8	49.5	82.0	125	205	322	470
7		13.7	30.5	52.1	86.2	131	215	341	498
8		14.3	32.0	54.6	90.0	138	225	358	512
9		14.8	33.0	56.2	92.5	142	230	369	530
10		15.2	33.8	57.7	94.7	145	236	377	545
11		15.5	34.3	58.8	96.2	147	240	383	553
12		15.6	34.7	59.2	97.7	148	242	388	560
12.8/30		15.7	34.9	59.6	98.0	149	244	390	563

STEAM / AIR / LIQUID RELIEVING CAPACITIES

Capacity in Pounds of Saturated Steam Per Hour at 3% Accumulation

Set Press. PSIG	D	E	F	G	H	J
5	109	193	302	496	774	1268
10	137	243	380	624	975	1597
20	193	344	537	881	1377	2255
30	250	444	694	1138	1779	2913
40	306	544	850	1396	2180	3571
50	362	645	1007	1653	2582	4229
60	419	745	1164	1910	2984	4887
70	475	845	1320	2167	3386	5545
80	532	946	1477	2424	3788	6203
90	588	1046	1634	2681	4189	6861
100	644	1146	1790	2938	4591	7519
120	757	1347	2103	3453	5395	8835
140	870	1547	2417	3967	6198	10150
160	983	1748	2730	4481	7002	11470
180	1096	1949	3043	4996	7805	12780
200	1209	2149	3357	5510	8609	14100
220	1321	2350	3670	6024	9412	15410
240	1434	2550	3983	6539	10216	16730
260	1547	2751	4297	7053	11020	18050
280	1660	2952	4610	7567	11820	19360
300	1773	3152	4923	8082	12630	20680
325	1914	3403	5315	8724	13630	22320
350	2055	3654	5707	9367	14640	23970
375	2196	3904	6098	10010	15640	25610
400	2337	4155	6490	10650	16640	27260
425	2478	4406	6882	11300	17650	28900
450	2619	4657	7273	11940	18650	30550
475	2760	4908	7665	12580	19660	32190
500	2901	5158	8057	13220	20660	33840
525	3042	5409	8448	13870		
550	3183	5660	8840	14510		
575	3324	5911	9232	15150		
600	3465	6161	9623	15800		
625	3606	6412				
650	3747	6663				
675	3888	6914				
700	4029	7164				
725	4170	7415				
750	4311	7666				
775	4452	7917				
800	4593	8167				
825	4734	8418				
850	4875	8669				
875	5016	8920				
900	5157	9170				

Capacity in Pounds of Saturated Steam Per Hour at 10% Accumulation

Set Press. PSIG	D	E	F	G	H	J
5	110	196	308	504	786	1289
10	140	250	391	641	1001	1640
20	200	357	559	916	1429	2343
30	260	464	726	1190	1857	3045
40	320	571	894	1464	2285	3747
50	380	678	1061	1739	2714	4449
60	440	784	1229	2013	3142	5151
70	500	891	1396	2288	3570	5853
80	560	998	1564	2562	3998	6556
90	620	1105	1731	2836	4427	7258
100	680	1212	1899	3111	4855	7960
120	800	1426	2234	3660	5712	9364
140	920	1640	2569	4209	6568	10770
160	1040	1854	2904	4757	7425	12170
180	1160	2068	3239	5306	8281	13580
200	1280	2282	3574	5855	9138	14980
220	1400	2495	3909	6404	9994	16390
240	1520	2709	4244	6953	10850	17790
260	1640	2923	4579	7502	11710	19190
280	1761	3137	4914	8051	12560	20600
300	1881	3351	5249	8599	13420	22000
325	2031	3618	5667	9285	14490	23760
350	2181	3885	6086	9972	15560	25510
375	2331	4153	6505	10658	16630	27270
400	2481	4420	6923	11340	17700	29020
425	2631	4687	7342	12030	18770	30780
450	2781	4955	7761	12720	19840	32530
475	2931	5222	8180	13400	20910	34290
500	3092	5489	8598	14090	21990	36050
525	3231	5757	9017	14770		
550	3381	6024	9436	15460		
575	3531	6291	9855	16150		
600	3681	6559	10270	16830		
625	3831	6826				
650	3981	7093				
675	4131	7361				
700	4281	7628				
725	4431	7895				
750	4581	8163				
775	4731	8430				
800	4881	8697				
825	5031	8965				
850	5181	9232				
875	5331	9499				
900	5481	9767				

To correct capacities for superheat see page 53.

Capacity in Cu. Ft. of Air Per Minute 60° F. at 10% Accumulation

Set Press. PSIG	D	E	F	G	H	J
5	39	70	110	180	280	459
10	50	89	140	289	357	584
20	71	127	199	327	510	835
30	93	165	259	424	662	1085
40	114	203	319	522	815	1336
50	136	242	378	620	968	1586
60	157	280	438	718	1121	1836
70	178	318	498	816	1273	2087
80	200	356	558	914	1426	2337
90	221	394	617	1012	1579	2588
100	243	432	677	1110	1732	2838
120	285	509	797	1305	2037	3339
140	328	585	916	1501	2343	3840
160	371	661	1036	1697	2648	4341
180	414	737	1155	1893	2954	4842
200	457	814	1275	2088	3259	5342
220	500	890	1394	2284	3565	5843
240	542	966	1513	2480	3870	6344
260	585	1043	1633	2676	4176	6845
280	628	1119	1752	2871	4481	7346
300	671	1195	1872	3067	4787	7845
325	724	1290	2021	3312	5168	8473
350	778	1386	2170	3556	5550	9099
375	831	1481	2320	3801	5932	9725
400	885	1576	2469	4046	6314	10350
425	938	1672	2619	4290	6696	10980
450	992	1767	2768	4535	7078	11600
475	1045	1862	2917	4780	7460	12230
500	1099	1958	3067	5025	7842	12850
525	1152	2053	3216	5270		
550	1206	2149	3366	5514		
575	1259	2244	3515	5759		
600	1313	2339	3664	6004		
625	1366	2435				
650	1420	2530				
675	1473	2625				
700	1527	2721				
725	1580	2816				
750	1634	2911				
775	1687	3007				
800	1741	3102				
825	1794	3197				
850	1848	3293				
875	1901	3388				
900	1955	3483				

To determine capacities at temperatures other than 60° F. see page 54.

Capacity—GPM Water at 25% Overpressure

Set Press. PSIG	D	E	F	G	H	J
10	9	16	26	43	67	111
20	13	23	37	61	95	157
30	16	29	45	74	117	192
40	19	33	52	86	135	221
50	21	37	59	96	151	248
60	23	41	64	106	165	271
70	25	44	69	114	179	293
80	27	47	74	122	191	313
90	28	50	79	130	203	332
100	30	53	83	137	214	350
120	33	58	91	150	234	383
140	35	63	98	162	253	414
160	38	67	106	173	270	443
180	40	71	112	184	287	470
200	42	75	118	193	302	495
220	44	79	124	203	317	519
240	46	82	129	212	331	542
260	48	85	135	221	344	564
280	50	89	140	229	357	586
300	52	92	145	237	370	606
320	54	95	149	245	382	626
340	55	98	154	252	394	646
360	57	101	158	260	405	664
380	58	104	163	267	416	682
400	60	107	167	274	427	700
420	61	109	171	280	438	717
440	63	112	175	287	448	734
460	64	114	179	293	458	751
480	66	117	183	300	468	767
500	67	119	187	306	477	783
600	73	131	205	335		
700	79	141				
800	85	151				
900	90	160				

To determine capacities at overpressures less than 25% see page 53.

KUNKLE FIGURES 21-M, 22-M, 23-M

TABLE G

A.S.M.E. (UV) BASIS—90% OF TESTED CAPACITY AT 10% ACCUMULATION

To correct capacities for superheat see page 53.

CAPACITY IN CU. FT. OF AIR PER MINUTE 60° F.

To determine capacities at temperatures other than 60° F. see page 54.

Set Pressure PSIG	1/2" & 3/4"		1"		1 1/4"		1 1/2"		2"	
	Lbs./Hour Steam	SCFM Air	Lbs./Hour Steam	SCFM Air	Lbs./Hour Steam	SCFM Air	Lbs./Hour Steam	SCFM Air	Lbs./Hour Steam	SCFM Air
5	49		87		135		195		347	
10	62	22	110	39	172	61	248	88	441	157
15	75	27	134	48	209	74	301	107	535	191
20	89	32	157	56	246	88	354	126	630	224
25	102	36	181	64	283	101	407	145	724	258
30	115	41	205	73	320	114	461	164	819	291
40	142	50	252	90	394	140	567	202	1007	359
50	168	60	299	106	467	166	673	240	1196	426
60	195	69	346	123	541	192	779	278	1385	493
70	221	78	393	140	615	218	885	316	1574	560
80	248	87	441	157	689	245	991	354	1763	627
90	274	96	488	173	762	271	1098	391	1951	694
100	301	107	535	190	836	298	1204	429	2140	762
125	367	131	653	232	1020	363	1469	523	2612	930
150	434	154	771	274	1205	429	1735	618	3084	1098
200	566	202	1007	359	1573	560	2266	807	4028	1434
250	699	249	1243	443	1942	691	2797	996	4972	1770
300		296		527		823		1185		2106
400		391		695		1085		1563		2778
500		485		863		1348		1941		3450
600		580		1031		1610		2319		4122
700		674		1199		1873		2697		4795
800		769		1367		2135		3075		5467
900		863		1535		2398		3453		6139
1000		958		1703		2660		3831		
1100		1025		1871		2923		4209		
1200		1147		2039		3186		4587		

**TABLE
K**

**KUNKLE
FIGURES 19-1, 19M-1, 20-1, 20M-1, 71, 71-S, 171, 171-S**

CAPACITY—GPM WATER AT 25% OVERPRESSURE

To determine capacities at overpressures less than 25% see page 53.

Set Pressure PSIG	VALVE SIZE								
	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"
10	3	6	11	19	31	58	96	141	251
20	4	9	16	28	43	83	137	195	347
30	5	11	19	34	52	102	167	242	413
40	6	13	21	40	61	119	194	278	493
50	6	15	25	44	69	132	217	315	558
60	7	16	27	48	74	144	237	343	610
70	8	18	30	53	81	156	256	371	660
80	8	19	32	56	86	168	274	399	707
90	9	20	34	59	92	178	290	423	752
100	9	21	35	62	97	187	306	446	793
110	9	22	37	66	102	196	320	468	832
120	10	23	39	68	106	205	333	490	871
130	10	24	41	71	110	213	350	510	907
140	11	25	42	74	115	221	363	529	940
150	11	26	44	77	119	228	376	547	971
160	12	27	45	79	122	236	386	564	1000
170	12	28	47	81	126	244	400	581	1031
180	12	29	48	84	130	250	410	598	1062
190	13	29	49	86	133	256	422	614	1090
200	13	30	50	88	137	264	430	630	1119
210	14	31	52	91	140	272	442	645	1142
220	14	32	53	92	144	277	454	660	1172
230	14	32	54	95	147	284	465	676	1200
240	14	33	55	96	151	290	474	691	1225
250	15	34	56	98	153	296	484	706	1252
260	15	34	58	100	156	302	493	722	
270	15	35	59	102	159	308	503	739	
280	15	35	60	103	162	314	510	755	
290	16	36	61	103	165	319	520	771	
300	16	36	62	104	168	324	530	785	
325	16	37	64	109	175	337	550	815	
350	17	39	67	112	182	350	571	840	
375	18	40	69	115	187	362	593	865	
400	18	41	71	121	195	374	612	890	
450	19	44	75	128	206	394	643	939	
500	20	46	79	135	216	414	672	980	
600	22	52	86	145	235	444			
700	23	56	93	161	252				
800	25	60	100	171	267				
900	27	63	105	181	282				
1000	28	66	112	191	298				
1100	29	68	118	199	311				
1200	30	70	123	205	320				

KUNKLE

FIGURES 91-1, 91-1S, 191-1, 219-1, & 291

TABLE L

CAPACITY—GPM WATER AT 25% OVERPRESSURE

To determine capacities at overpressures less than 25% see page 53.

Set Pressure PSIG.	VALVE SIZE									
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"
10	5	11	20	31	44	79	123	177	315	632
20	7	16	28	43	63	111	174	250	445	894
30	8	19	34	53	77	136	213	307	545	1095
40	10	22	39	61	88	157	246	354	629	1265
50	11	25	44	69	99	176	275	396	704	1414
60	12	27	48	75	108	193	301	434	771	1549
70	13	29	52	81	117	208	325	468	832	1673
80	14	31	55	87	125	223	348	501	890	1789
90	15	33	59	92	133	236	369	531	944	1897
100	16	35	62	97	140	249	389	560	995	2000
120	17	38	68	106	153	273	426	613	1090	2191
140	18	41	73	115	166	295	460	663	1177	2366
160	20	44	78	123	177	315	492	708	1259	2530
180	21	47	83	130	188	334	522	751	1335	2683
200	22	49	88	137	198	352	550	792	1407	2828
220	23	52	92	144	208	369	577	831	1476	2966
240	24	54	96	150	217	386	603	867	1541	3098
260	25	56	100	156	226	401	627	903	1604	3225
280	26	58	104	162	234	417	651	937	1665	
300	27	60	107	168	242	431	674	970	1723	
325	28	63	112	175	252	449	701			
350	29	65	116	181	262	466	728			
375	30	68	120	188	271	482	753			
400	31	70	124	194	280	498	778			
450	33	74	131	206						
500	35	78	139	217						
550	36	82	145	227						
600	38	85	152	238						
700	41	92	164	257						
800	44	99	175	274						
900	46	105	186	291						
1000	49	110	196	307						
1100	51	116	206	322						
1200	54	121	215	336						
1300	56	126	223	350						
1400		131		363						
1500		135		376						

**KUNKLE
FIGURE 6010, 6021,
6030 SERIES**

CAPACITY IN POUNDS OF SATURATED STEAM PER HOUR

To correct capacities for superheat see page 53.

ORIFICE	D		E		F		G		H		J	
	.121 sq. in.		.216 sq. in.		.338 sq. in.		.554 sq. in.		.863 sq. in.		1.414 sq. in.	
Set Pressure PSIG	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.
5	99	110	176	196	275	308	450	504	703	786	1153	1289
10	124	140	221	250	347	391	568	641	886	1001	1453	1640
15	150	170	267	303	418	475	685	778	1069	1215	1752	1991
20	175	200	312	357	489	558	802	916	1251	1429	2051	2342
25	201	230	358	410	561	642	919	1053	1434	1644	2350	2693
30	226	260	404	464	632	725	1036	1191	1616	1858	2650	3045
35	252	290	449	517	703	809	1152	1328	1799	2072	2949	3396
40	278	320	495	571	775	893	1269	1465	1981	2286	3248	3747
45	303	350	540	625	846	977	1386	1602	2164	2500	3547	4098
50	329	380	586	678	918	1061	1503	1739	2347	2714	3846	4449
55	354	410	631	732	989	1145	1620	1876	2529	2928	4146	4800
60	386	440	677	785	1060	1229	1737	2014	2711	3142	4445	5151
65	405	470	723	839	1132	1312	1854	2151	2894	3356	4744	5503
70	431	500	768	892	1203	1396	1971	2289	3076	3570	5043	5854
75	457	530	814	946	1274	1479	2088	2426	3259	3784	5343	6205
80	482	560	860	1000	1346	1563	2205	2563	3441	3999	5642	6556
85	508	590	905	1053	1417	1647	2322	2700	3624	4213	5941	6907
90	533	620	950	1106	1489	1731	2439	2837	3806	4427	6240	7258
95	559	650	996	1159	1560	1815	2556	2974	3989	4641	6540	7609
100	586	680	1042	1212	1631	1899	2673	3111	4171	4855	6839	7960
105	610	710	1087	1265	1703	1983	2790	3248	4354	5069	7138	8311
110	636	740	1133	1319	1774	2067	2907	3385	4536	5283	7437	8662
115	661	770	1178	1372	1845	2151	3024	3522	4719	5497	7736	9013
120	687	800	1224	1425	1917	2235	3141	3660	4901	5711	8036	9365
125	712	830	1269	1479	1988	2318	3258	3797	5084	5925	8335	9716
130	738	860	1315	1532	2060	2402	3375	3935	5266	6140	8634	10067
135	764	890	1361	1586	2131	2486	3492	4072	5449	6354	8933	10418
140	789	920	1406	1640	2202	2569	3608	4209	5632	6568	9233	10769
145	815	950	1452	1694	2273	2653	3725	4346	5814	6782	9532	11120
150	840	980	1497	1747	2345	2736	3842	4483	5997	6996	9831	11471
160	891	1040	1588	1853	2488	2904	4076	4757	6362	7424	10430	12173
170	943	1100	1680	1961	2631	3071	4310	5032	6727	7832	11028	12875
180	994	1160	1771	2068	2773	3239	4544	5306	7092	8281	11627	13578
190	1045	1220	1862	2174	2916	3406	4778	5581	7457	8709	12225	14280
200	1096	1280	1953	2282	3059	3574	5012	5855	7822	9138	12824	14982
210	1147	1340	2044	2389	3202	3642	5246	6130	8187	9566	13422	15684
220	1198	1400	2135	2496	3344	3809	5480	6404	8552	9994	14021	16386
230	1249	1460	2226	2603	3487	4077	5714	6678	8917	10423	14619	17088
240	1301	1520	2318	2710	3630	4244	5948	6953	9282	10851	15218	17790
250	1352	1580	2409	2816	3773	4411	6181	7227	9647	11279	15816	18492
260	1403	1640	2500	2924	3916	4579	6415	7501	10012	11707	16418	19194
270	1454	1700	2591	3032	4059	4747	6649	7775	10377	12135	17016	19896
280	1505	1760	2682	3140	4201	4915	6883	8049	10742	12563	17614	20598
290	1556	1820	2773	3248	4344	5083	7117	8323	11107	12991	18212	21300
300	1607	1880	2865	3356	4487	5251	7351	8597	11472	13419	18810	22002

FIG. 6030 ONLY

KUNKLE FIGURE 6010, 6030, SERIES

TABLE P

CAPACITY IN CU. FT. OF AIR PER MINUTE 60° F.

To determine capacities at temperatures other than 60° F. see page 54.

ORIFICE AREA	D	E	F	G	H	J
	.121 sq. in.	.216 sq. in.	.338 sq. in.	.554 sq. in.	.863 sq. in.	1.414 sq. in.
	SCFM Air 10% Acc.	SCFM Air 10% Acc.	SCFM Air 10% Acc.	SCFM Air 10% Acc.	SCFM Air 10% Acc.	SCFM Air 10% Acc.
5	39	70	110	179	280	459
10	50	89	139	228	356	584
15	61	108	169	277	433	709
20	71	127	199	326	509	834
25	82	146	229	375	585	959
30	93	165	258	424	661	1084
35	103	184	288	473	738	1209
40	114	203	318	522	814	1334
45	124	222	348	570	890	1459
50	135	241	378	619	966	1584
55	146	260	407	668	1042	1709
60	157	279	437	717	1119	1834
65	167	298	467	766	1195	1959
70	178	317	497	815	1271	2084
75	189	336	526	864	1347	2209
80	199	355	556	913	1424	2334
85	210	374	586	962	1500	2459
90	221	393	616	1010	1576	2584
95	232	412	646	1059	1652	2709
100	242	431	675	1108	1728	2834
110	264	469	735	1206	1881	3084
120	285	507	794	1304	2033	3334
130	306	545	854	1402	2186	3584
140	328	583	914	1499	2338	3834
150	349	621	973	1597	2491	4084
160	370	659	1033	1695	2643	4334
170	391	697	1092	1793	2796	4584
180	413	735	1152	1890	2948	4834
190	434	774	1211	1988	3100	5084
200	455	812	1271	2086	3253	5334
210	477	850	1332	2184	3405	5584
220	498	889	1392	2281	3558	5834
230	520	927	1451	2379	3710	6084
240	542	965	1511	2477	3862	6334
250	563	1002	1570	2575	4015	6584
260	585	1040	1630	2673	4167	6834
270	606	1077	1689	2770	4320	7084
280	628	1115	1749	2868	4472	7334
290	649	1152	1808	2966	4625	7584
300	671	1190	1868	3065	4777	7834

KUNKLE
FIGURES 252, 300, 600 SERIES

STEAM/AIR RELIEVING CAPACITIES

To correct capacities for superheat see page 53.

ORIFICE	1#			J			K			L			M		
AREA	1.000 sq. in.			1.287 sq. in.			1.840 sq. in.			2.853 sq. in.			3.600 sq. in.		
Set Pressure PSIG	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.
10	1129	1159	411	1453	1492	529	2077	2133	757	3220	3308	1174	4064	4174	1482
15	1361	1407	499	1752	1811	643	2505	2590	919	3884	4016	1425	4901	5068	1799
20	1594	1655	587	2050	2131	756	2933	3046	1081	4547	4724	1677	5738	5961	2116
25	1826	1904	675	2350	2450	869	3360	3503	1243	5211	5432	1928	6575	6854	2433
30	2059	2152	764	2650	2770	983	3788	3960	1405	5874	6140	2179	7412	7748	2750
35	2291	2400	852	2950	3089	1096	4216	4416	1567	6538	6848	2431	8249	8641	3067
40	2524	2648	940	3249	3408	1210	4644	4873	1730	7201	7556	2682	9086	9535	3384
50	2989	3144	1116	3846	4047	1436	5499	5786	2054	8527	8972	3185	10760	11321	4019
60	3454	3641	1292	4446	4686	1663	6356	6700	2378	9854	10388	3687	12430	13108	4653
70	3919	4137	1468	5045	5325	1890	7211	7613	2702	11180	11804	4190	14110	14895	5287
80	4384	4633	1645	5644	5963	2117	8069	8526	3026	12510	13220	4693	15780	16682	5922
90	4849	5130	1821	6242	6602	2343	8923	9439	3351	13830	14636	5196	17460	18469	6556
100	5314	5626	1997	6839	7241	2570	9778	10353	3675	15160	16052	5698	19130	20256	7190
120	6244	6619	2349	8032	8519	3024	11480	12179	4323	17800	18885	6704	22460	23829	8459
140	7174	7612	2702	9235	9796	3477	13200	14006	4972	20470	21717	7709	25830	27403	9728
150	7639	8108	2878	9831	10435	3704	14060	14919	5296	21790	23133	8212	27500	29190	10362
160	8104	8604	3054	10430	11074	3931	14910	15832	5620	23120	24549	8714	29170	30976	10996
180	9034	9597	3407	11630	12351	4384	16620	17659	6269	25770	27381	9720	32520	34550	12265
200	9964	10590	3759	12820	13629	4838	18330	19485	6917	28430	30213	10725	35870	38124	13534
220	10890	11582	4111	14020	14906	5291	20050	21312	7565	31080	33045	11731	39220	41697	14802
240	11820	12575	4464	15220	16184	5745	21760	23138	8214	33740	35877	12736	42570	45271	16071
250	12290	13071	4640	15820	16823	5972	22610	24052	8538	35060	37293	13239	44240	47058	16705

CAPACITY INCREMENTS PER TABULATED SET PRESSURE INCREMENTS

1	46.5	49.7	18	59.8	63.9	23	85.6	91.4	32	133	142	50	167	179	63
3	139.5	149	53	180	192	68	257	274	97	398	425	151	502	536	190
5	232.5	248	88	299	320	113	428	457	162	663	708	251	837	894	317
10	465.0	497	176	598	639	227	856	914	324	1328	1417	503	1674	1788	635
15	697.5	745	264	897	959	340	1284	1370	487	1991	2125	754	2511	2682	952

KUNKLE FIGURES 252, 300, 600 SERIES

TABLE S₂

STEAM/AIR RELIEVING CAPACITIES

To determine air capacities at temperatures other than 60° F. see page 54.

N			P			Q			R			ORIFICE
4.340 sq. in.			6.380 sq. in.			11.045 sq. in.			15.904 sq. in.			AREA
Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	SCFM Air @ 60° F. 10% Acc.	Set Pressure PSIG
4899	5032	1786	7202	7398	2626	12470	12808	4546	17950	18442	6547	10
5908	6109	2168	8685	8981	3188	15040	15549	5519	21650	22389	7948	15
6917	7186	2551	10170	10565	3750	17600	18290	6493	25350	26336	9349	20
7926	8263	2933	11650	12148	4312	20170	21031	7466	29050	30283	10750	25
8935	9341	3316	13140	13731	4874	22740	23772	8439	32740	34230	12151	30
9945	10418	3698	14620	15315	5436	25300	26513	9412	36440	38177	13552	35
10950	11495	4080	16100	16898	5998	27880	29254	10385	40140	42124	14954	40
12970	13649	4845	19070	20064	7123	33010	34736	12331	47540	50017	17756	50
14990	15803	5610	22040	23231	8247	38150	40218	14277	54930	57911	20558	60
17010	17957	6374	25000	26398	9371	43280	45700	16223	62330	65805	23360	70
19030	20111	7139	27970	29564	10495	48420	51182	18169	69720	73699	26163	80
21040	22265	7904	30070	32731	11619	53560	56664	20115	77120	81592	28965	90
23060	24419	8669	33900	35898	12743	58690	62146	22062	84520	89486	31767	100
27080	28727	10198	39810	42231	14992	68920	73110	25954	99310	105274	37372	120
31140	33036	11727	45770	48564	17240	79240	84074	29846	114100	121061	42976	140
33150	35190	12492	48740	51731	18364	84370	89556	31792	121500	128955	45779	150
35170	37344	13257	51700	54898	19488	89510	95039	33738	128900	136849	48581	160
39120	41652	14786	57640	61231	21737	99780	106003	37631	143700	152636	54186	180
43240	45960	16316	63570	67564	23985	110100	116967	41523	158500	168424	59790	200
47280	50269	17845	69510	73897	26233	120300	127931	45415	173300	184211	65395	220
51320	54577	19374	75440	80231	28482	130600	138895	49307	188100	199999	70999	240
53340	56731	20139	78410	83397	29606	135700	144377	51254	195500	207893	73802	250

CAPACITY INCREMENTS PER TABULATED SET PRESSURE INCREMENTS

202	216	77	297	317	112	514	549	195	740	790	280	1
605	647	230	890	951	337	1541	1646	584	2219	2369	841	3
1009	1078	383	1483	1584	562	2568	2743	974	3698	3949	1402	5
2018	2155	765	2967	3168	1125	5136	5485	1947	7396	7898	2803	10
3027	3233	1148	4450	4753	1687	7704	8228	2921	11090	11847	4206	15

KUNKLE VALVE COMPANY, INC., FT. WAYNE, INDIANA

**KUNKLE
FIGURES 300 AND 600**

STEAM/AIR^① RELIEVING CAPACITIES

**3% COLUMN FOR POWER BOILER
A.S.M.E. CODE SECTION I**

**10% COLUMN FOR UNFIRED VESSEL
A.S.M.E. CODE SECTION VIII**

To correct capacities for superheat see page 53.

ORIFICE AREA	F .307 sq. in.		G .503 sq. in.		H .785 sq. in.		#1 1.000 sq. in.		J 1.287 sq. in.		K 1.840 sq. in.	
	Set Pressure PSIG	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.	Lbs./Hour Steam 10% Acc.	Lbs./Hour Steam 3% Acc.
260	3916	4165	6416	6824	10010	10650	12750	13568	16420	17462	23470	24965
280	4201	4470	6883	7324	10740	11430	13680	14560	17610	18739	25180	26791
300	4487	4774	7351	7823	11470	12209	14610	15553	18810	20017	26890	28618
320	4772	5079	7819	8322	12200	12988	15540	16546	20010	21294	28600	30444
340	5058	5384	8287	8822	12930	13767	16470	17538	21200	22572	30320	32271
360	5343	5689	8755	9321	13660	14547	17400	18531	22400	23850	32030	34097
380	5629	5993	9222	9820	14390	15326	18330	19524	23600	25127	33740	35924
400	5914	6298	9690	10319	15120	16105	19260	20516	24800	26405	35450	37750
420	6200	6603	10160	10819	15850	16884	20190	21509	25990	27682	37160	39577
440	6485	6908	10630	11318	16580	17664	21120	22502	27190	28960	38870	41404
460	6771	7212	11090	11817	17310	18443	22050	23494	28390	30237	40580	43230
480	7056	7517	11560	12317	18040	19222	22980	24487	29580	31515	42300	45057
500	7342	7822	12030	12816	18770	20001	23910	25480	30780	32793	44010	46883
520	7627	8127	12500	13315	19500	20781	24840	26472	31980	34070	45720	48710
540	7913	8431	12970	13815	20230	21560	25770	27465	33180	35348	47430	50536
560	8198	8736	13430	14314	20960	22339	26700	28458	34370	36625	49140	52363
580	8484	9041	13900	14813	21690	23119	27630	29450	35570	37903	50850	54189
600	8769	9346	14370	15313	22420	23898	28560	30443	36770	39180	52560	56018

CAPACITY INCREMENTS PER TABULATED SET PRESSURE INCREMENTS

1	14.3	15.2	23.4	25	36.5	39	46.5	49.7	59.8	63.9	85.6	91.4
3	42.8	45.7	70.2	74.9	109.6	117	139.5	149	180	192	257	274
5	71.4	76.2	117	125	182.5	195	232.5	248	249	320	428	457
10	142.8	152	234	250	365	390	465	497	598	639	856	914
15	214.1	229	350.9	375	547.6	585	697.5	745	847	959	1284	1370

① Multiply Lbs./Hour Steam by .356 to obtain SCFM Air, 10% Accumulation, 60° F.

KUNKLE FIGURES 300 AND 600

TABLE

S₄

STEAM/AIR^① RELIEVING CAPACITIES

3% COLUMN FOR POWER BOILER 10% COLUMN FOR UNFIRED VESSEL
A.S.M.E. CODE SECTION I A.S.M.E. CODE SECTION VIII

To correct capacities for superheat see page 53

L		M		N		P		Q		ORIFICE
2.853 sq. in.		3.600 sq. in.		4.340 sq. in.		6.380 sq. in.		11.045 sq. in.		AREA
Lbs./Hr. Steam 3% Acc.	Lbs./Hr. Steam 10%	Lbs./Hr. Steam 3% Acc.	Lbs./Hr. Steam 10%	Lbs./Hr. Steam 3% Acc.	Lbs./Hr. Steam 10%	Lbs./Hr. Steam 3% Acc.	Lbs./Hr. Steam 10%	Lbs./Hr. Steam 3% Acc.	Lbs./Hr. Steam 10%	Set Pressure PSIG
36390	38709	45920	48845	55360	58885	81380	86564	140900	149859	260
39040	41541	49270	52418	59390	63193	87310	92897	151200	160823	280
41700	44373	52610	55992	63430	67501	93240	99230	161400	171787	300
44350	47206	55960	59566	67470	71810	99180	105564	171700	182751	320
47000	50038	59310	63139	71500	76118	105100	111897	182000	193716	340
49600	52870	62660	66713	75540	80426	111000	118230	192200	204680	360
52310	55702	66010	70286	79580	84734	117000	124564	202500	215644	380
54960	58534	69360	73860	83610	89043	122900	130897	212800	226608	400
57620	61366	72700	77434	87650	93351	128800	137230	223100	237572	420
60270	64198	76050	81007	91680	97659	134800	143563	233300	248536	440
62920	67030	79400	84581	95720	101967	140700	149897	243600	259500	460
65580	69862	82750	88155	99760	106275	146700	156230	253900	270464	480
68230	72695	86100	91728	103800	110584	152600	162563	264200	281429	500
70880	75527	89450	95302	107800	114892	158500	168897	274400	292393	520
73540	78359	92790	98876	111900	119200	164500	175230	284700	303357	540
76190	81191	96140	102449	115900	123508	170400	181563	295000	314321	560
78840	84023	99490	106023	119900	127817	176300	187896	305200	325285	580
81500	86855	102800	109596	124000	132125	182300	194230	315500	336249	600

CAPACITY INCREMENTS PER TABULATED SET PRESSURE INCREMENTS

133	142	167	179	202	216	297	317	514	549	1
398	425	502	536	605	647	890	951	1541	1646	3
663	708	837	894	1009	1078	1483	1584	2568	2743	5
1328	1417	1674	1788	2018	2155	2967	3168	5136	5485	10
1991	2125	2511	2682	3027	3233	4450	4753	7704	8228	15

① Multiply Lbs./Hour Steam by .356 to obtain SCFM Air, 10% Accumulation, 60° F.

TABLE

T

KUNKLE

FIGURES 86-T, 87-T, 87-TC AND 87-TP

A.S.M.E. (UV) Basis—90% Capacity at 10% Accumulation

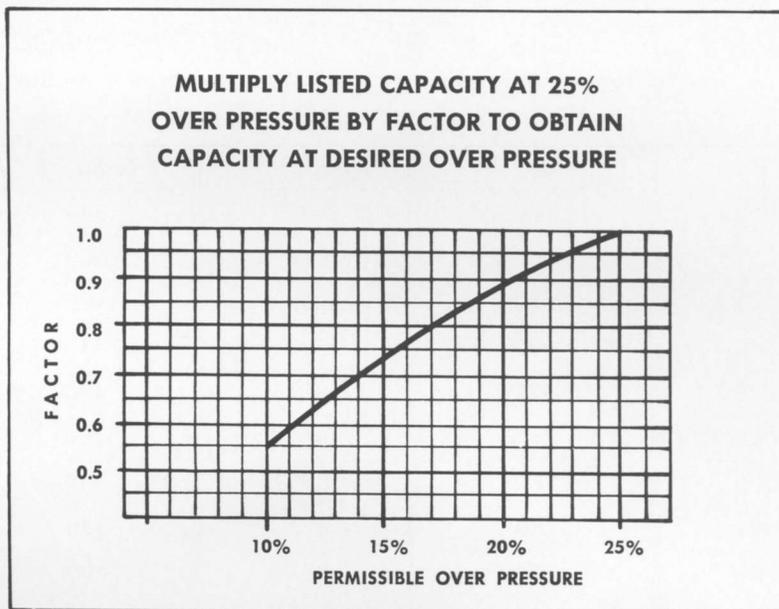
CAPACITY IN CU. FT. AIR PER MINUTE AT 60° F.

To determine capacities at temperatures other than 60° F. see page 54.

Set Pressure PSIG	VALVE SIZE					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
5	15	34	56	97	134	252
10	19	44	72	124	171	321
15	24	53	87	150	208	390
20	28	63	102	177	244	459
25	32	72	118	203	281	528
30	36	82	133	230	318	596
35	40	92	149	256	354	665
40	45	101	164	283	391	734
45	49	111	180	309	428	803
50	53	120	195	336	464	872
55	57	130	210	362	501	941
60	62	139	226	389	538	1009
65	66	149	241	415	575	1078
70	70	158	257	442	611	1147
75	74	168	272	469	648	1216
80	79	177	288	495	685	1285
85	83	187	303	522	721	1354
90	87	196	318	548	758	1422
95	91	206	334	575	795	1491
100	96	215	349	601	831	1560
105	100	225	365	628	868	1629
110	104	234	380	654	905	1698
115	108	244	396	681	941	1767
120	113	253	411	707	978	1835
125	117	263	426	734	1015	1904
130	121	272	442	760	1052	1973
135	125	282	457	787	1088	2042
140	129	291	473	814	1125	2111
145	134	301	488	840	1162	2179
150	138	310	504	867	1198	2248
160	146	329	534	920	1272	2386
170	155	348	565	973	1345	2524
180	163	367	596	1026	1419	2661
200	180	405	658	1132	1565	2937
220	197	443	720	1238	1712	3212
240	214	482	781	1344	1859	3487
250	223	501	812	1397	1932	3625
260	231	520	843	1451	2006	3763
280	248	558	905	1557	2152	4038
300	265	596	966	1663	2299	4313

CAPACITY CORRECTION FACTORS

LIQUID OVERPRESSURE FACTORS



SUPERHEATED STEAM CORRECTION FACTORS

For capacities of superheated steam, multiply saturated steam capacity by correction factor below.

Gauge Pressure PSI.	Saturated Temp. ° F.	TOTAL STEAM TEMPERATURE IN DEGREES FAHRENHEIT																					
		340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760
15	250	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82
20	259	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82
40	287	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82
60	308	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82
80	324	1.00	1.00	.99	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	
100	338	—	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82
120	350	—	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82
140	361	—	—	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82
160	371	—	—	—	1.00	.99	.98	.97	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	
180	380	—	—	—	1.00	.99	.98	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	
200	388	—	—	—	1.00	.99	.99	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83
220	395	—	—	—	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83
240	403	—	—	—	—	1.00	.99	.98	.97	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83
260	409	—	—	—	—	1.00	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83
280	416	—	—	—	—	1.00	1.00	.99	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83
300	422	—	—	—	—	—	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83
350	436	—	—	—	—	—	1.00	1.00	.99	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83
400	448	—	—	—	—	—	—	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84
450	460	—	—	—	—	—	—	—	1.00	.99	.97	.96	.94	.93	.92	.91	.89	.88	.87	.86	.86	.85	.84
500	470	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84
550	480	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.88	.87	.86	.85	.84
600	489	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92	.90	.89	.88	.87	.86	.85	.84
650	497	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.87	.86	.86	.85
700	506	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.96	.94	.93	.91	.90	.89	.88	.87	.86
750	513	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.95	.93	.92	.90	.89	.88	.87	.86
800	520	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.90	.88	.87	.86
850	527	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.92	.90	.89	.88
900	533	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.93	.92	.90	.89	.88
950	540	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.97	.95	.94	.92	.91	.89
1000	546	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.00	.99	.98	.96	.94	.93	.91

CAPACITY CORRECTION FACTORS

TABLE M

AIR • GAS TEMPERATURE CORRECTION

For temperatures other than 60° F. at valve inlet, multiply standard CFM by Tc.

Temp. °F.	Tc	Temp. °F.	Tc	Temp. °F.	Tc
0	1.062	140	.931	380	.787
10	1.051	160	.916	400	.778
20	1.041	180	.902	420	.769
30	1.030	200	.888	440	.760
40	1.020	220	.874	460	.752
50	1.009	240	.862	480	.744
60	1.000	260	.849	500	.737
70	.991	280	.838	550	.718
80	.981	300	.828	600	.701
90	.972	320	.817	650	.685
100	.964	340	.806	700	.669
120	.947	360	.796	750	.656

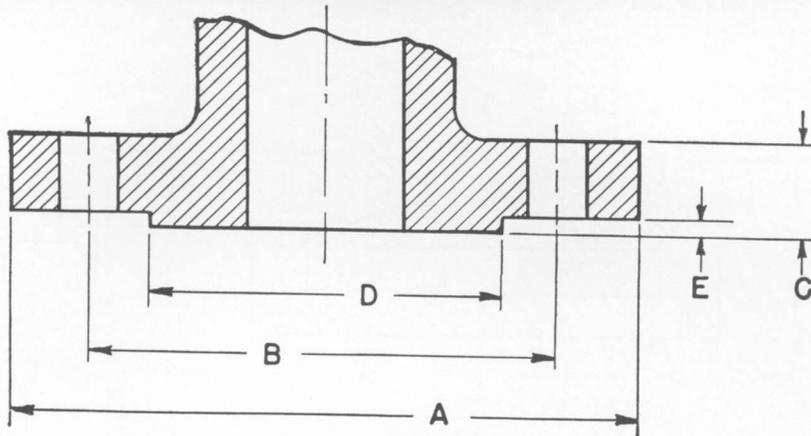
TABLE N

AIR • GAS RELATIVE DENSITY CORRECTION

For specific gravities other than air (=1.0), multiply standard CFM by Dc.

Specific Gravity	Dc	Specific Gravity	Dc	Specific Gravity	Dc
.07	3.770	.75	1.155	1.40	.845
.08	3.530	.80	1.117	1.50	.817
.09	3.333	.85	1.085	1.60	.791
.10	3.160	.90	1.055	1.70	.768
.20	2.240	.95	1.025	1.80	.745
.30	1.825	1.00	1.000	1.90	.725
.40	1.580	1.05	.975	2.00	.707
.50	1.414	1.10	.955	2.50	.633
.55	1.350	1.15	.933	3.00	.577
.60	1.290	1.20	.913	3.50	.535
.65	1.240	1.25	.895	4.00	.500
.70	1.195	1.30	.877	4.50	.471

A.N.S.I. STANDARDS



BRONZE FLANGES

150-Lb.

PIPE SIZE, INCHES

		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	8
Flange Dia.	A	3 1/2	3 7/8	4 1/4	4 5/8	5	6	7	7 1/2	8 1/2	9	.....	10	11	13 1/2
Bolt Circle Dia.	B	2 3/8	2 3/4	3 1/8	3 1/2	3 3/8	4 3/4	5 1/2	6	7	7 1/2	.....	8 1/2	9 1/2	11 3/4
Flange Thk.	C	5/16	11/32	3/8	13/32	7/16	1/2	9/16	5/8	11/16	11/16	.....	3/4	13/16	15/16
No. Bolts		4	4	4	4	4	4	4	4	8	8	.....	8	8	8
Bolt Dia.		1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	.....	3/4	3/4	3/4

300-Lb.

		3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	.....	11	12 1/2	15
Flange Dia.	A	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	.....	11	12 1/2	15
Bolt Circle Dia.	B	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5	5 7/8	6 5/8	7 1/4	7 7/8	.....	9 1/4	10 5/8	13
Flange Thk.	C	1/2	17/32	19/32	5/8	11/16	3/4	13/16	29/32	31/32	1 1/16	.....	1 1/8	1 3/16	1 3/8
No. Bolts		4	4	4	4	4	8	8	8	8	8	.....	8	12	12
Bolt Dia.		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	.....	3/4	3/4	7/8

CAST IRON FLANGES

125-Lb.

PIPE SIZE, INCHES

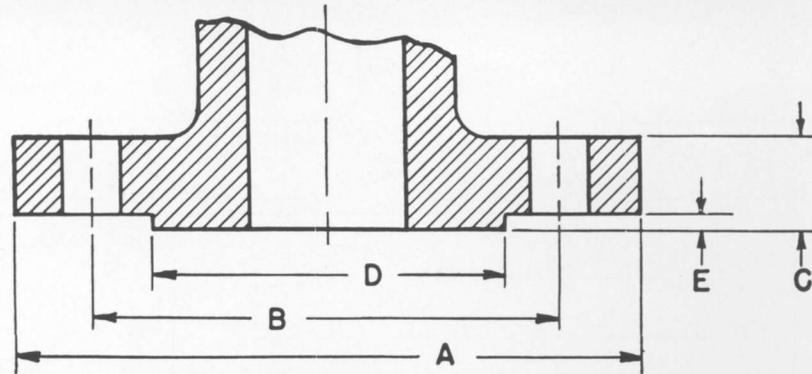
		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	8
Flange Dia.	A	.....	.....	4 1/4	4 5/8	5	6	7	7 1/2	8 1/2	9	9 1/4	10	11	13 1/2
Bolt Circle Dia.	B	.....	.....	3 1/8	3 1/2	3 3/8	4 3/4	5 1/2	6	7	7 1/2	7 3/4	8 1/2	9 1/2	11 3/4
Flange Thk.	C	.....	.....	7/16	1/2	9/16	5/8	11/16	3/4	13/16	15/16	15/16	15/16	1	1 1/8
No. Bolts		.....	.....	4	4	4	4	4	4	8	8	8	8	8	8
Bolt Dia.		.....	.....	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4

250-Lb.

		.....	.....	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Flange Dia.	A	.....	.....	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Bolt Circle Dia.	B	.....	.....	3 1/2	3 7/8	4 1/2	5	5 5/8	6 5/8	7 1/4	7 7/8	8 1/2	9 1/4	10 5/8	13
Flange Thk.	C	.....	.....	11/16	3/4	13/16	7/8	1	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 1/2	1 5/8
Raised Face Dia.	D	.....	.....	2 11/16	3 1/16	3 3/16	4 3/16	4 15/16	5 11/16	6 5/16	6 15/16	7 1/16	8 5/16	9 11/16	11 15/16
Raised Face Thk.	E	.....	.....	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
No. Bolts		.....	.....	4	4	4	8	8	8	8	8	8	8	12	12
Bolt Dia.		.....	.....	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4	3/4	3/4	7/8

STANDARD FLANGE DATA

A.N.S.I. STANDARDS



STEEL FLANGES

150-Lb.

PIPE SIZE, INCHES

		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	8
Flange Dia.	A	3 1/2	3 7/8	4 1/4	4 5/8	5	6	7	7 1/2	8 1/2	9	9 1/4	10	11	13 1/2
Bolt Circle Dia.	B	2 3/8	2 3/4	3 1/8	3 1/2	3 7/8	4 3/4	5 1/2	6	7	7 1/2	7 3/4	8 1/2	9 1/2	11 1/4
Flange Thk.	C	3/16	1/2	3/16	1/2	3/16	5/8	1 1/16	3/4	1 1/16	1 1/16	1 1/16	1 1/16	1	1 1/8
Raised Face Dia.	D	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8	4 1/8	5	5 1/2	6 3/16	6 3/4	7 5/16	8 1/2	10 5/8
Raised Face Thk.	E	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
No. Bolts		4	4	4	4	4	4	4	4	8	8	8	8	8	8
Bolt Dia.		1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4

300-Lb.

		3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Flange Dia.	A	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Bolt Circle Dia.	B	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5	5 7/8	6 5/8	7 1/4	7 7/8	8 1/2	9 1/4	10 5/8	13
Flange Thk.	C	3/16	5/8	1 1/16	3/4	1 1/16	7/8	1	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 1/16	1 5/8
Raised Face Dia.	D	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8	4 1/8	5	5 1/2	6 3/16	6 3/4	7 5/16	8 1/2	10 5/8
Raised Face Thk.	E	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
No. Bolts		4	4	4	4	4	8	8	8	8	8	8	8	12	12
Bolt Dia.		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4	3/4	3/4	7/8

400-Lb.

		3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Flange Dia.	A	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	10 1/2	11	12 1/2	15
Bolt Circle Dia.	B	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5	5 7/8	6 5/8	7 1/4	7 7/8	8 1/2	9 1/4	10 5/8	13
Flange Thk.	C	3/16	5/8	1 1/16	1 1/16	7/8	1	1 1/8	1 1/4	1 3/8	1 3/8	1 7/16	1 1/2	1 5/8	1 7/8
Raised Face Dia.	D	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8	4 1/8	5	5 1/2	6 3/16	6 3/4	7 5/16	8 1/2	10 5/8
Raised Face Thk. *	E	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
No. Bolts		4	4	4	4	4	8	8	8	8	8	8	8	12	12
Bolt Dia.		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	7/8	7/8	7/8	7/8	7/8	1

600-Lb.

		3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10 3/4	11 1/2	13	14	16 1/2
Flange Dia.	A	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10 3/4	11 1/2	13	14	16 1/2
Bolt Circle Dia.	B	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5	5 7/8	6 5/8	7 1/4	8 1/2	9 1/4	10 1/2	11 1/2	13 3/4
Flange Thk.	C	3/16	5/8	1 1/16	1 1/16	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2 3/16
Raised Face Dia.	D	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8	4 1/8	5	5 1/2	6 3/16	6 3/4	7 5/16	8 1/2	10 5/8
Raised Face Thk. *	E	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
No. Bolts		4	4	4	4	4	8	8	8	8	8	8	8	12	12
Bolt Dia.		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	7/8	7/8	1	1	1	1 1/8

* Not included in flange thickness.

NUMERICAL INDEX

By Kunkle Figure Numbers

Figure	Page	Figure	Page	Figure	Page
1	8	84-4	7	264-1	33
1-A	8	84-4S	7	265-1	33
2	8	86	10	266-1	33
2-A	8	86-T	13	267-1	33
11	30	87	10	291	34
11-C	30	87-C	10	299	27
11-H	30	87-P	10	300	22
11-G	30	87-T	13	300-A	22
11-S	30	87-TC	13	330	17
14-A	19	87-TP	13	330-S	17
14-M	19	91-1	35	333	17
19-1	31	91-1S	35	333-S	17
19M-1	31	137	28	337	12
20-1	31	140	36	363	14
20M-1	31	171	36	363-C	14
20-1P	31	171-S	36	363-P	14
20M-1P	31	183-T	26	389-C	15
21-M	11	189	15	389-P	15
22-M	11	189-C	15	430	16
23-M	11	189-P	15	433	16
28-A	19	189-M	32	463	14
29-A	19	189-MP	32	463-C	14
30-1	21	191-1	34	463-P	14
30-2	21	200-A	32	600	22
39-A	19	200-H	32	600-A	22
40-R	21	215-V	12	663-C	14
40-RL	21	218-1	35	663-P	14
48-A	19	219-1	35	910	24
55	20	230	16	911	24
71	36	252	23	927	24
71-S	36	253	23	930-1	25
80-4	7	254	26	933	26
80-4S	7	257	23	934	26
82-4	6	259	23	935	26
82-4S	6			949	18
83-4	6			6010	9
83-4S	6			6021	9
				6030	9

800 Series—Pressure Holding (Priority) Valves page 21
 Navy type Safety and Relief Valves page 29
 5000 Series—Steel (Full Nozzle) Catalog 5000-82



SINCE 1875



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner - Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

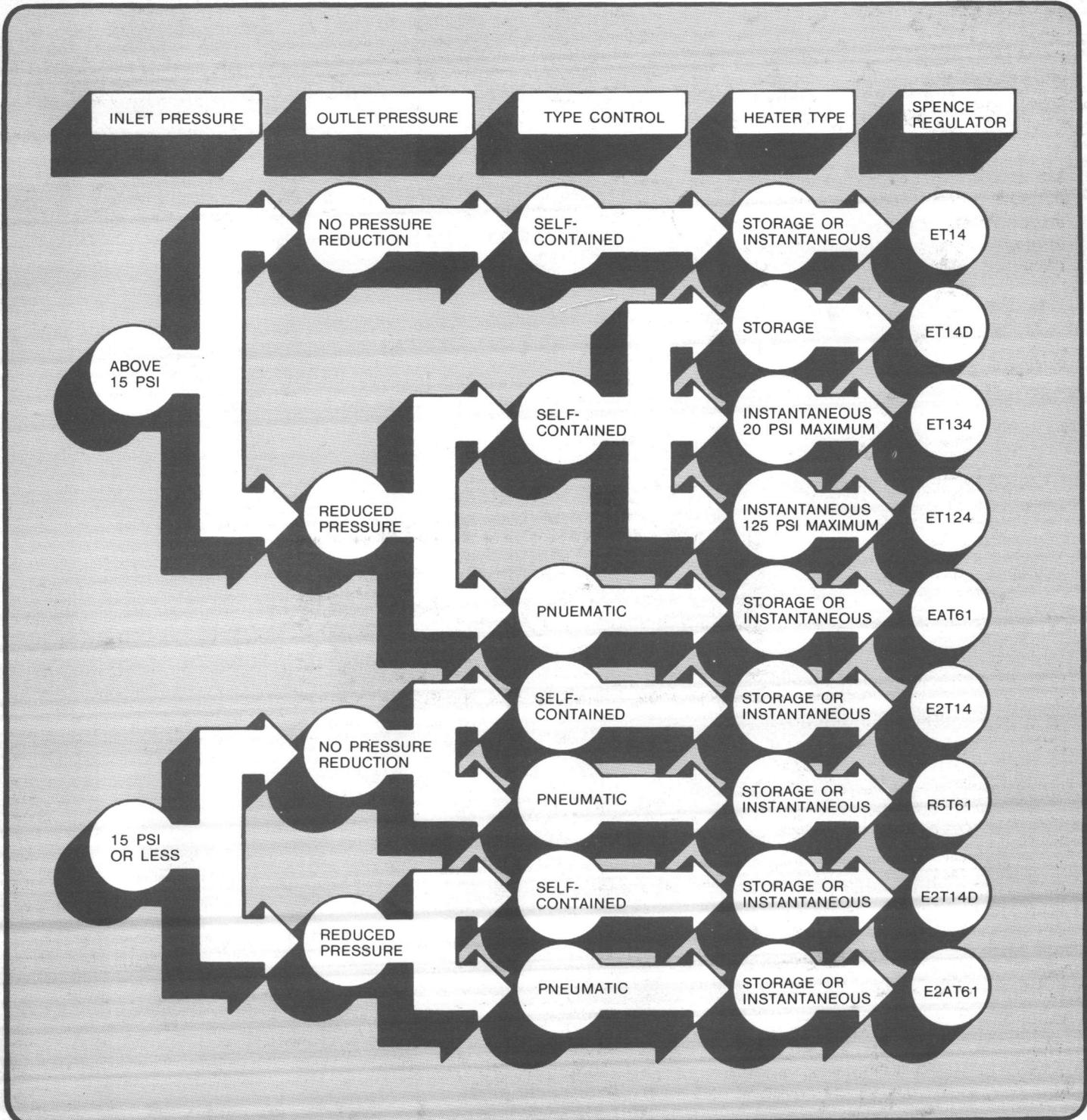


Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
 Industrial Equipment & Supplies
 Boiler & Burner—Sales & Service
 MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
 I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
 Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
 OUTSIDE - NC TOLL FREE 1-800-845-6073

TEMPERATURE REGULATORS

BULLETIN 3000A/830

PRINTED IN U.S.A.



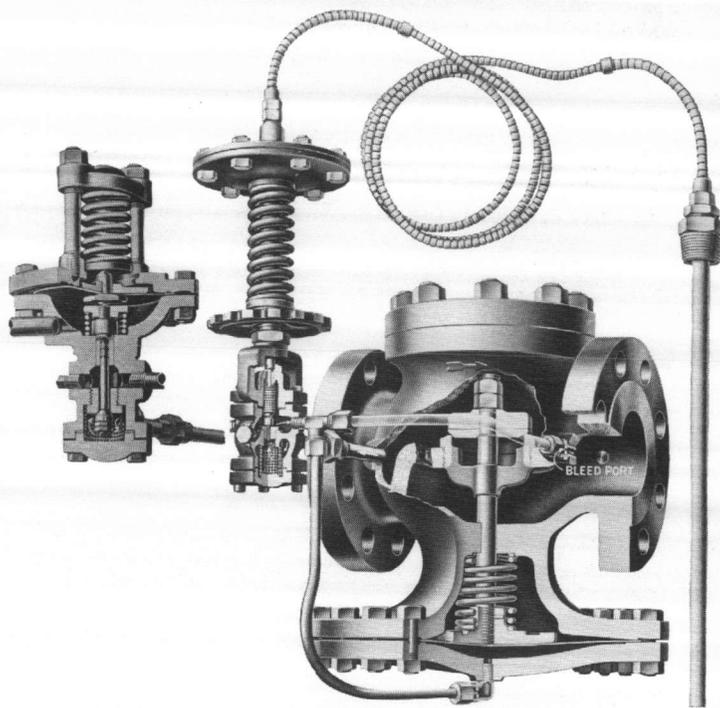
For Storage Water Heaters, Oil Tanks, Vats, Kettles and other slow responding heat exchangers.

TYPES ET14 & ET14D

Storage type heaters are characterized by the relatively large volume of heated fluid in the exchanger in proportion to the heat input capacity. Temperature change of the stored liquid is relatively slow, permitting use of sensitive single function controls.

The Type T14 Pilot provides the desirable close control of storage heaters. Combined with the Type E Main Valve, the ET14 Temperature Regulator controls temperature very accurately, opening and closing on only a degree or two change at the thermostat bulb — even accurate enough for most process applications. Being self-operated, the ET14 is not affected by power outage.

The ET14 applies line pressure to the heating equipment. If reduced output pressure is necessary or desirable, adding a Type D Pressure Pilot results in a ET14D which controls temperature and also limits steam pressure to an adjustable maximum. No separate reducing valve is required.



SELECT THE PILOT FOR THE APPLICATION, COMBINE IT WITH THE PROPER TYPE AND SIZE MAIN VALVE AND THE RESULT IS A SPENCE TEMPERATURE REGULATOR — YOUR ASSURANCE OF DEPENDABLE ACCURATE CONTROL.

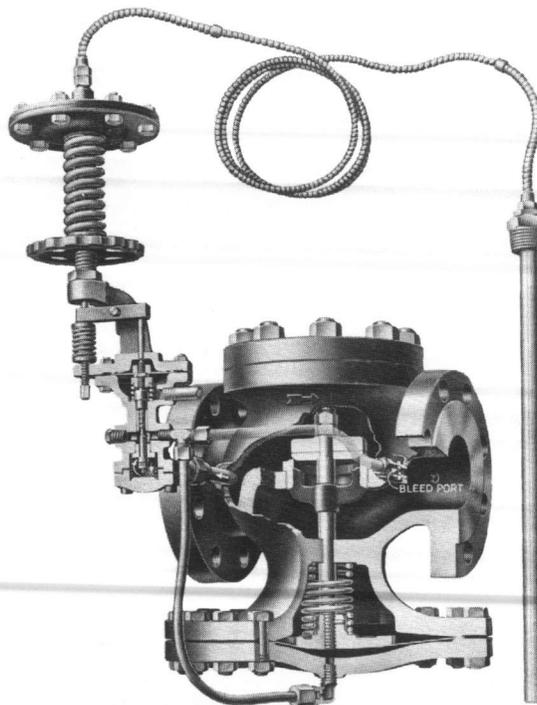
For Instantaneous Water Heaters, Convertors, Oil Preheaters, Make-Up Air Heaters and other once-through exchangers that respond quickly to load changes.

TYPES ET124 & ET134

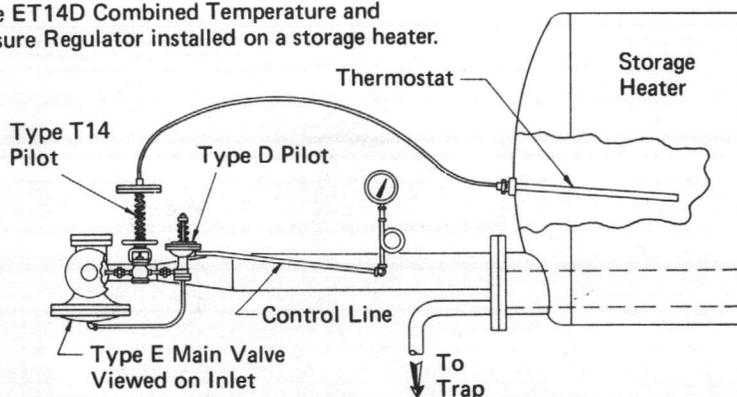
Once-through or instantaneous heat exchangers are extremely sensitive to load changes because of the short time the heated fluid spends in the heater and the relatively large heat input capability. Accurate and stable control of such heaters requires the dual control feature; temperature control with pressure modulation of the Type T134 and T124 Pilots.

In effect, the ET 134 Temperature Regulator is a pressure reducing valve with automatic delivery pressure adjustment produced by small changes in temperature at the thermostat. Pressure modulation keeps steam flow in balance with load. Pressure regulation affords instant response to fast load changes. The Pilot senses and reacts to pressure change in the heater in advance of temperature change at the thermostat. Stable control results from this anticipation.

The ET124 is like the ET134, except it is used where higher heater pressures are required. The ET134 is adjustable in the range of 18" Hg Vac. - 20 psi, the ET124 is adjustable in the range of 20 - 125 psi.



Type ET14D Combined Temperature and Pressure Regulator installed on a storage heater.



THERMOSTAT SELECTION PILOT TYPES T14, T124, T134

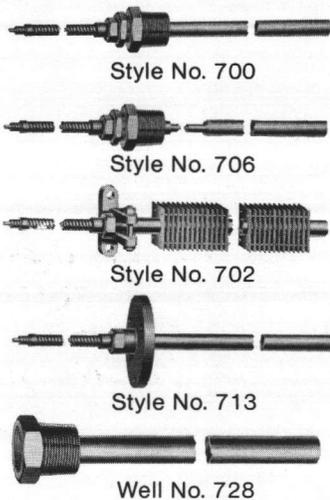
Thermostats are available in the following ranges. Choose that range which will place the desired average temperature approximately at its midpoint or above.

20 to 120°F	120 to 220°F
50 to 150°F	150 to 300°F
70 to 170°F	170 to 270°F
250 to 350°F	

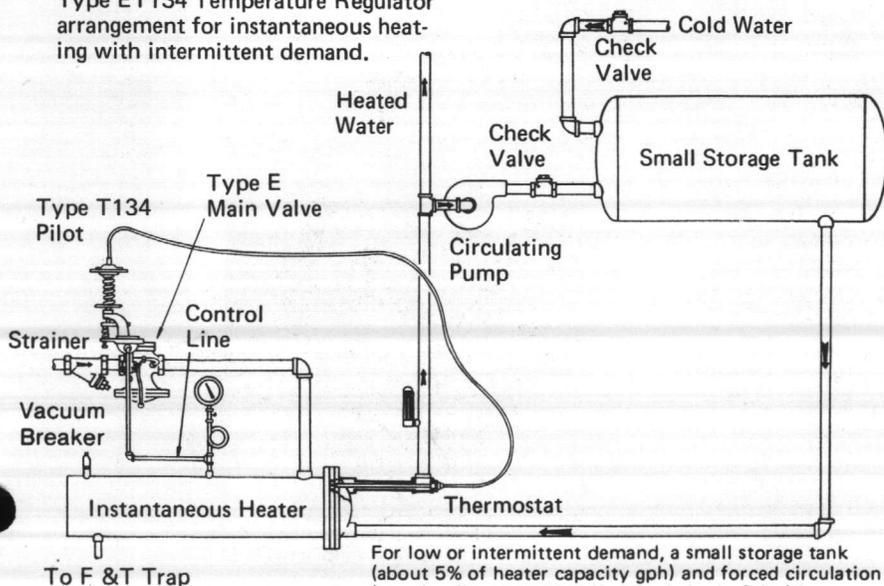
Popular ranges for specific applications:

- 50 to 150°F - Space or Room Control
- 70 to 170°F - Hot Water Tanks
- 170 to 270°F - Oil Preheaters

Typical Thermostat Bulb Styles (For complete selection see SD 9501)

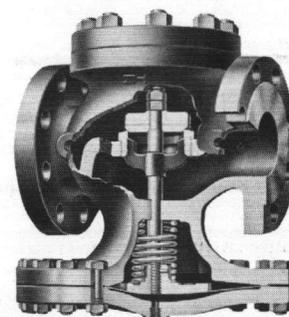


Type ET134 Temperature Regulator arrangement for instantaneous heating with intermittent demand.

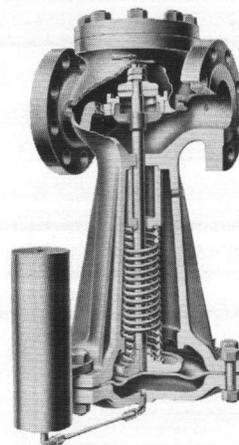


For low or intermittent demand, a small storage tank (about 5% of heater capacity gph) and forced circulation (creating flow velocity of approximately 3 fps) is recommended.

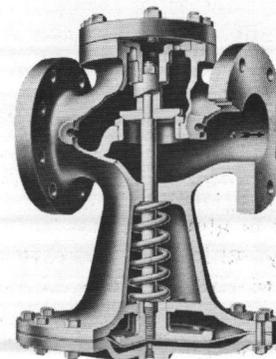
RULES FOR SELECTION OF MAIN VALVES



Use Type E Main Valve for initial pressures over 15 psi where a pressure drop* of 15 psi or more is permissible. When used with the T134 pilot, the regulator formed is a Type ET134.



Use Type E5 Main Valve for initial pressures over 15 psi when allowable pressure drop* is less than 15 psi. When used with the T124 pilot, the regulator formed is a Type E5T124.



Use Type E2 Main Valve for initial pressures up to 15 psi where a pressure drop* of 3 psi or more is permissible. When used with the T14 pilot, the regulator formed is a Type E2T14.

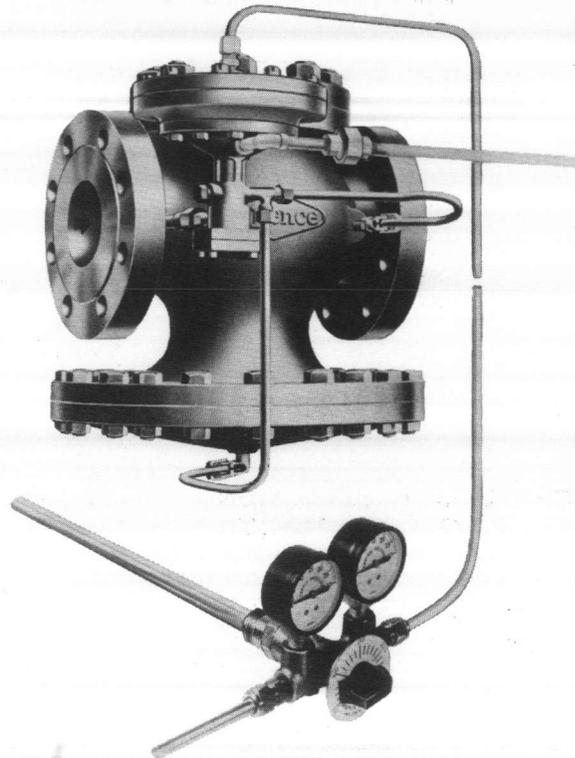
*This pressure drop represents the difference between initial pressure and maximum heater pressure.

**Pneumatic Control For Instantaneous Heaters,
Convertors and Process Heaters requiring
especially responsive controls.**

TYPE EAT61

The EAT Series of Temperature Regulators was developed for wide ranging, fast changing loads on instantaneous heaters and difficult process applications. The cascade principle, normally used only on instrument type regulators, is the basis for this inexpensive design. The AT Series Temperature Control continuously adjusts a pressure regulator to the required heater pressure. This action, coupled with the fast response of the bimetal thermostat, gives exceptional results. Added convenience and economy result from the wide (200°F) adjustable range, the low air consumption (about .25 cfm) of the T61 Pilot and the fact that no separate reducing valve is needed. These controls have adjustable proportional band as well as over and under temperature protection. Air failure closes the valve.

An existing instrument installation will perform better when the EA portion of this temperature regulator is substituted for the usual pneumatic valve. The packless design of the EA is an added bonus in this case.



**COMBINE THE SPEED, VERSATILITY AND DEPENDABILITY OF REGULATORS
WITH THE ACCURACY AND SENSITIVITY OF PNEUMATIC CONTROLS AND
THE RESULT IS A SPENCE EAT60 SERIES TEMPERATURE REGULATOR,
A MATCH FOR THE MOST DEMANDING APPLICATIONS.**

**Pneumatic Operation For Any Heater when
steam supply pressure is very low and self
operation is impossible.**

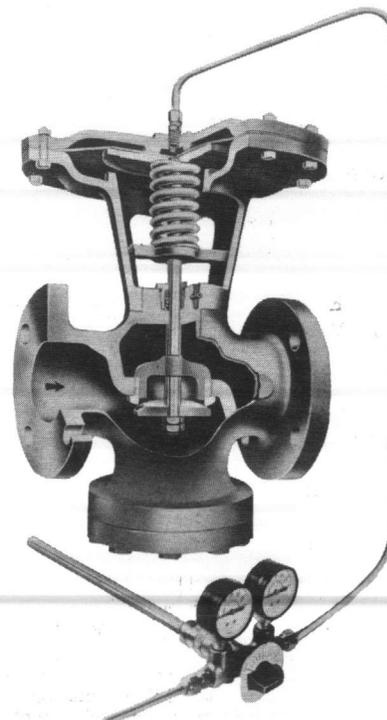
TYPE R5T61

The Type R5 Regulator is specifically intended for those applications in which the steam pressure required in the heat exchanger is almost equal to the available pressure; more specifically within 3 psi. They are intended for service on initial pressures of 15 psi or less.

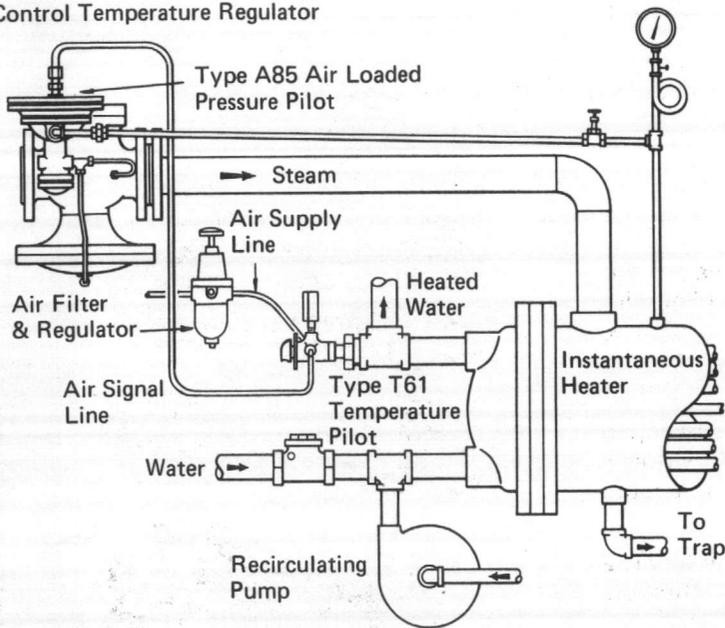
Available for heating or cooling control in both R5 air-to-open and G5 air-to-close types.

Single seated, with flow to close operation, closes tight to prevent overheating and, like all Spence Regulators, is guaranteed not to wiredraw.

The Control air signal is provided from the Type T61 Pilot. Mechanically simple, inherently accurate, the T61 has the speed to match any process application.



Type EA85T61
Air Control Temperature Regulator



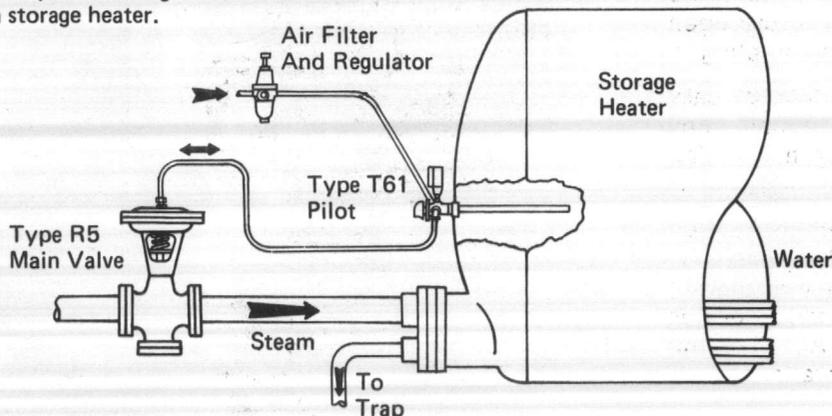
T60 SERIES PILOT

Type	Thermal System	Action	Range	Control Modes	Bulb Material
T60	Liquid SAMA Class IA	Reverse ¹	(4)	(2)	St. Stl. (316)
	Hg. SAMA Class IA	or Direct ¹	(5)		
T61	Bimetallic	Reverse	50 - 250°F	(3)	Copper or St. Stl. (316)
T62	Bimetallic	Direct	50 - 250°F	(3)	Copper or St. Stl. (316)
T63	Bimetallic	Reverse	150 - 350°F	(3)	St. Stl. (316)

Notes:

- 1 - Field convertible reverse or direct acting
Reverse Acting - Air Control Signal decreases as process temperature increases
Direct Acting - Air Control Signal increases as process temperature increases
- 2 - Control Modes: Proportional (gain); Proportional + Reset (integral);
- 3 - Control Mode: Proportional Control
- 4 - Typical Ranges: -40 to 110°F, 0 to 200°F, 0 to 300°F, 0 to 400°F
- 5 - Typical Ranges: 0 to 300°C, 200 to 600°F

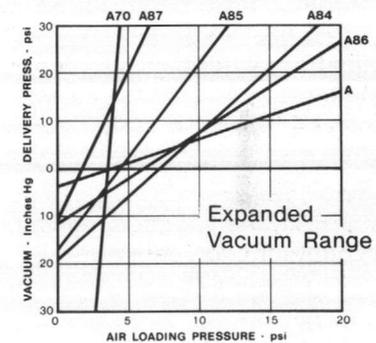
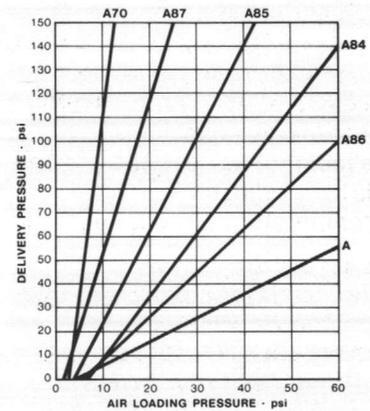
Type R5T61 pneumatically operated Temperature Regulator installed on a storage heater.



AIR ADJUSTED PILOTS FOR USE WITH AIR CONTROL TEMPERATURE PILOTS

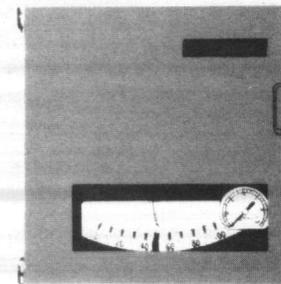
One of these air adjusted pressure pilots will be used with a pneumatic temperature pilot to provide pressure as well as temperature control in an EAT Temperature Regulator.

Response Curves - Type A Series Pilots



These curves represent delivery pressure obtainable with the A Series Pilots at varying air loading pressures. Air loading pressure is automatically controlled as a function of temperature by the T60 Series Pilot.

Select the A Pilot which, with an air loading pressure variation of approximately 3-15 psi, will deliver the heater pressures required.



Use the Type T60 Pilot when the control must also indicate temperature, the set point must be adjusted at a location remote from the thermostat bulb, or when reset or rate action is required. This pilot has a filled thermostat system.

COOLING CONTROLS – WATER SERVICE
– SELF OPERATED
– PNEUMATIC OPERATION.

For Refrigeration Condensers, Lube Oil Coolers, Process Coolers and other Water Cooled Heat Exchangers.

TYPE C34T52

When a self-operated type cooling control is required, select the Type T52 Pilot which opens on a rise in temperature. This pilot, with its close control range, combined with the Type C34 Main Valve, creates the Type C34T52 which is ideal for the control of cooling water flow in maintaining temperature.

The Type C34 Main Valve with balanced construction was developed specifically for water service. It will not chatter or slam and is virtually unaffected by changes in initial pressure. The single soft-seated plug permits tight shut-off when no flow is required.

Packless construction and frictionless operation make the C34T52 a very responsive valve requiring an absolute minimum of attention.

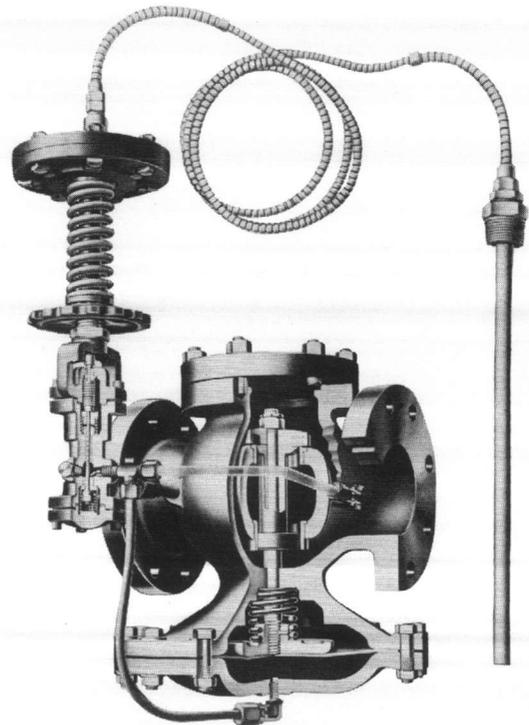
PNEUMATIC CONTROL FOR ESPECIALLY DEMANDING APPLICATIONS

The AT62 Air Control Pilots can be furnished for use in cooling control to operate the C34 Main Valve.

For applications where fast variations in load occur, the C34AT62 is recommended.

The adjustable throttling range and very fast response of the T62 provides stable control.

An important feature that adds to accuracy is the greater speed obtainable from self-operated regulators. The only air required is the small amount for pilot loading.



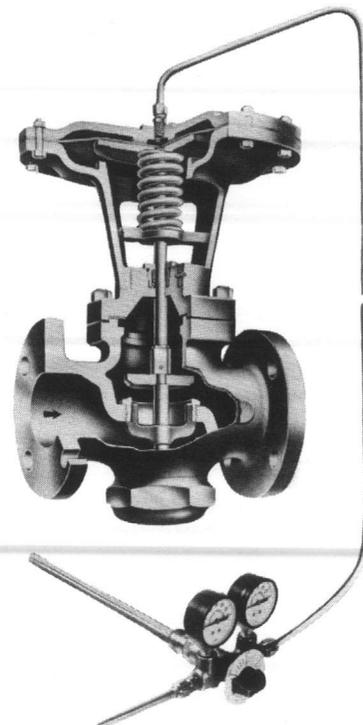
Pneumatic Operation for cooling applications when supply pressure is very low and self-operation is impossible.

TYPE G5T61

With low initial pressure, 15 psi or less, and closed circulated systems, it is often not possible to provide sufficient pressure drop for self-operation. For such cooling applications the Type G5 Main Valve is recommended. It has a single seat of stainless steel which can be depended upon to shut tight when the required heat exchanger temperature is reached. Flow pattern in the direction tending to open the valve eliminates the possibility of slamming and provides excellent throttling action. The G5 will go to the open position on loss of air, preventing the possibility of overheating.

The control air signal is provided from the Type T61 Pilot. Mechanically simple, inherently accurate, the T61 has the speed to match any process application. The adjustable throttling range permits tuning the control to system requirements.

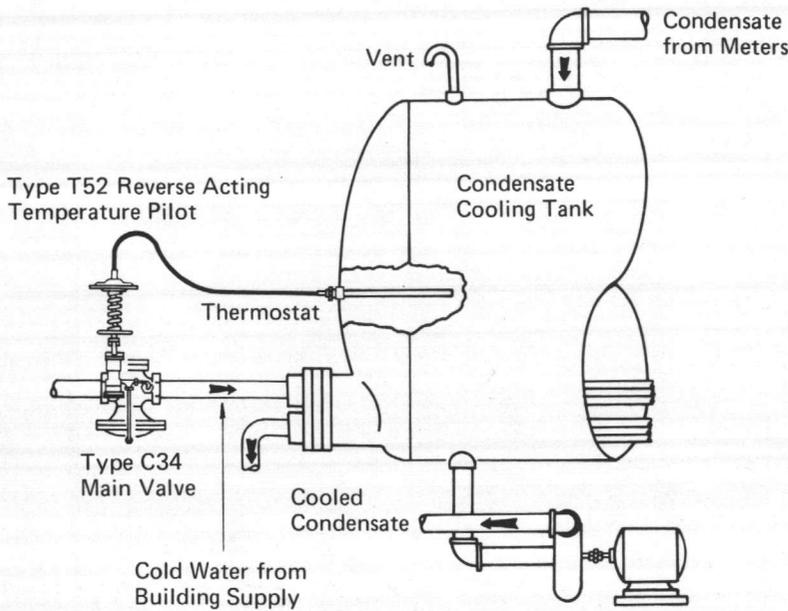
For line pressures above 15 psi and when minimum pressure drop (less than 10 psi) is necessary, the Type R6 Main Valve, which has a balancing piston, is recommended. Balanced piston design, with the flow pattern in the direction tending to open the valve, provides exceptional throttling action. Operated by the type T62 Pilot, the R6T62 will satisfy the most demanding cooling application.



THESE FEATURES MAKE



**YOUR BEST CHOICE
IN STEAM REGULATORS
FOR TEMPERATURE
CONTROL**



Positive Dead-End Shutoff — In the Spence design, all E Series Main Valves are single seated and normally closed. Initial pressure exerted on the main valve plug, assisted by a main spring, forces tight closing. Equipped with SECO Metal seats and plugs — guaranteed not to be cut by steam — and protected by approved strainers, Spence Regulators are guaranteed to shut tight, and stay tight.

Low Maintenance — Packless construction, simple stem guiding and large metal diaphragm operation reduce sticking and binding to a minimum. Springs are protected against heat and erosion because they are located out of the path of flowing steam. Vapor tension thermostat is rugged and of rupture-proof construction.

Any Spence pilot will fit any Spence main valve. A pilot can be removed and replaced by a spare in a matter of minutes. Pilot strainer, seat and plug are all accessible without opening the main valve. Main valve orifices can be inspected without disturbing the pilot.

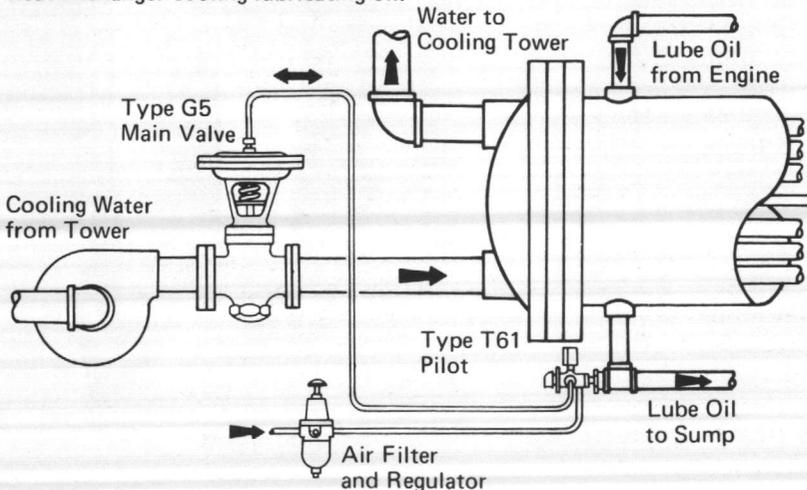
WATER CAPACITY — GPM

ΔP psi	Valve Type	Valve Size									
		1	1¼	1½	2	2½	3	4	5	6	8
2	G5				60	95	134	225	365	495	940
4					86	134	190	318	516	700	1330
6					105	164	232	390	632	857	1629
8					122	190	269	450	730	990	1880
10					136	212	300	503	816	1107	2103
10	C34	17	40	55	76	114	168	272	440	620	
15		21	48	67	93	139	205	333	538	759	
20		25	56	77	107	161	237	385	622	877	
25		28	63	87	120	180	265	430	695	980	
30		30	68	95	131	197	290	471	761	1074	

Lower First Cost — Since a pressure reducing valve mechanism is an inherent part of all Spence pilot operated regulators (single exception - ET14), a separate reducing valve is **not** needed. Smaller sizes usually can be specified because all the pressure drop is taken in the regulator.

Versatility — Valves in iron, bronze or steel; in sizes 3/8" to 12"; for pressures to 600 psi; more than a dozen bulb styles for special requirements; thermostats in 100°F adjustable ranges, overlapping from 20°F to 350°F; pilots to interlock electrically or by pressure to other systems — these features prove Spence can satisfy the widest range of application requirements.

Type G5 T61 Pneumatically Operated Temperature Regulator installed on a heat exchanger cooling lubricating oil.



CAPACITY CHART FOR SIZING MAIN VALVES

RATED CAPACITY IN POUNDS OF SATURATED STEAM PER HOUR

Pressure-psi		Valve Type	Valve Sizes*												
Inlet	Reduced		3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
150	145	E5			645	990	1600	2320	3635	5665	8035	13450	21820	29600	56245
	140				900	1390	2245	3250	5105	7950	11275	18870	30620	41540	78925
	125	E	275	515	990	1610	2585	3625	5680	8060	13555	19970	30960	45430	81340
	100		370	695	1340	2185	3500	4915	7695	10920	18370	27055	41945	61555	110205
	80-0		425	790	1520	2480	3970	5575	8730	12390	20840	30700	47595	69845	125045
125	120	E5			590	910	1470	2130	3345	5210	7390	12370	20070	27225	51725
	115				830	1275	2060	2985	4685	7305	10355	17330	28120	38150	72485
	100	E	250	470	905	1475	2360	3315	5190	7370	12395	18255	28305	41535	74360
	80		325	605	1165	1900	3040	4270	6685	9490	15960	23510	36450	53490	95760
	65-0		360	670	1290	2100	3370	4730	7405	10510	17680	26040	40370	59245	106065
100	95	E5			535	825	1330	1925	3025	4715	6685	11185	18150	24620	46780
	90				750	1150	1860	2695	4230	6590	9345	15640	25380	34430	65410
	75	E	225	420	810	1320	2115	2970	4655	6605	11110	16365	25370	37230	66650
	50-0		295	550	1060	1725	2765	3885	6080	8630	14515	21380	33145	48640	87085
75	70	E5			470	725	1170	1700	2665	4155	5890	9860	16000	21705	41240
	65				655	1010	1635	2370	3715	5790	8210	13745	22300	30250	57480
	50	E	195	365	705	1150	1840	2585	4045	5740	9655	14220	22050	32355	57930
	40-0		225	420	805	1315	2105	2955	4630	6570	11050	16275	25230	37025	66285
60	55	E5			430	660	1065	1545	2425	3780	5360	8970	14560	19750	37525
	50				595	920	1480	2150	3370	5255	7450	12465	20230	27440	52140
	40	E	160	300	575	940	1505	2115	3310	4700	7905	11645	18055	26495	47435
	30-0		190	350	680	1105	1770	2490	3895	5530	9300	13700	21240	31170	55805
50	45	E5			400	615	990	1435	2250	3510	4975	8325	13515	18330	34830
	40				550	850	1370	1990	3120	4860	6895	11540	18720	25400	48255
	30	E	150	275	530	865	1385	1945	3045	4320	7270	10705	16600	24360	43615
	20-0		165	310	600	975	1560	2190	3430	4870	8185	12060	18700	27440	49125
40	35	E5			365	560	905	1315	2065	3215	4560	7630	12380	16795	31905
	30				505	775	1250	1815	2845	4435	6290	10525	17080	23175	44030
	20	E	135	250	480	780	1250	1760	2755	3905	6570	9680	15005	22020	39425
	15-0		140	260	505	825	1320	1850	2900	4115	6920	10195	15805	23195	41530
30	25	E5			330	505	815	1180	1855	2890	4100	6860	11130	15100	28690
	20				450	690	1120	1620	2545	3965	5620	9410	15265	20710	39350
	15	E	105	195	380	615	990	1390	2175	3085	5190	7645	11855	17400	31150
	10-0		115	215	415	675	1080	1515	2370	3365	5655	8330	12920	18955	33940
20	15	E5			285	440	710	1035	1620	2525	3580	5990	9720	13190	25060
	10				390	600	965	1400	2200	3430	4860	8140	13205	17915	34035
	5-0	E	90	165	320	520	835	1175	1840	2610	4390	6470	10030	14715	26345
15	14	R5							690	1075	1525	2550	4140	5615	10670
	13								970	1505	2140	3580	5805	7875	14965
	12	E2			150	230	375	545	875	1350	1905	2840	4010	5060	9230
	10				245	375	605	880	1415	2185	3085	4595	6490	8195	14945
	6				330	510	825	1195	1920	2970	4190	6240	8815	11130	20295
	2.5-0				375	575	930	1345	2160	3340	4715	7025	9925	12530	22850
12	11	R5							655	1020	1445	2415	3920	5320	10110
	10								915	1425	2025	3385	5495	7450	14160
	9	E2			145	220	355	515	825	1275	1800	2680	3785	4780	8715
	7				230	355	570	830	1330	2060	2910	4330	6115	7720	14080
2-0				325	495	805	1165	1870	2890	4080	6075	8585	10835	19760	
10	9	R5							630	980	1390	2325	3770	5115	9715
	8								880	1370	1940	3250	5275	7155	13595
	7	E2			135	210	340	490	790	1220	1725	2570	3630	4580	8355
	5				220	340	550	795	1275	1970	2780	4145	5855	7390	13475
1-0				295	455	735	1070	1715	2650	3740	5575	7875	9940	18125	
8	7	R5							600	940	1330	2225	3610	4900	9305
	6								840	1310	1860	3110	5050	6850	13010
	5	E2			130	200	325	470	755	1165	1645	2455	3465	4375	7980
	3				210	325	520	755	1215	1875	2650	3950	5575	7040	12835
1-0				255	390	630	910	1460	2260	3190	4755	6715	8475	15455	
6	5	R5							575	895	1270	2120	3445	4670	8875
	4								800	1250	1770	2965	4810	6525	12395
	3	E2			125	190	310	445	720	1110	1565	2330	3295	4160	7585
	1-0				200	305	495	715	1150	1780	2510	3740	5285	6675	12170
5	4	R5							560	870	1235	2070	3355	4555	8655
	3								780	1215	1725	2890	4685	6355	12080
	2	E2			120	185	300	435	700	1080	1525	2270	3205	4045	7380
	1-0				165	255	410	590	950	1470	2075	3090	4365	5515	10055

*For information on sizing 10" and 12" valves, consult your Spence Representative.

STEAM LOAD FORMULAS

Water Heating: $W = \frac{GPM}{2} \times \Delta T$

Air Heating
(Steam Coil):

$W = \frac{CFM}{900} \times \Delta T$

Where: W = Steam flow [lb./hr.]

ΔT = Temp. rise [F.]

GPM = Flow [gal./minute]

CFM = Air Flow [cubic ft./min.]

EDR = Equivalent Direct Radiation [sq. ft.]

Fuel Oil Heating: $W = \frac{GPM}{4} \times \Delta T$

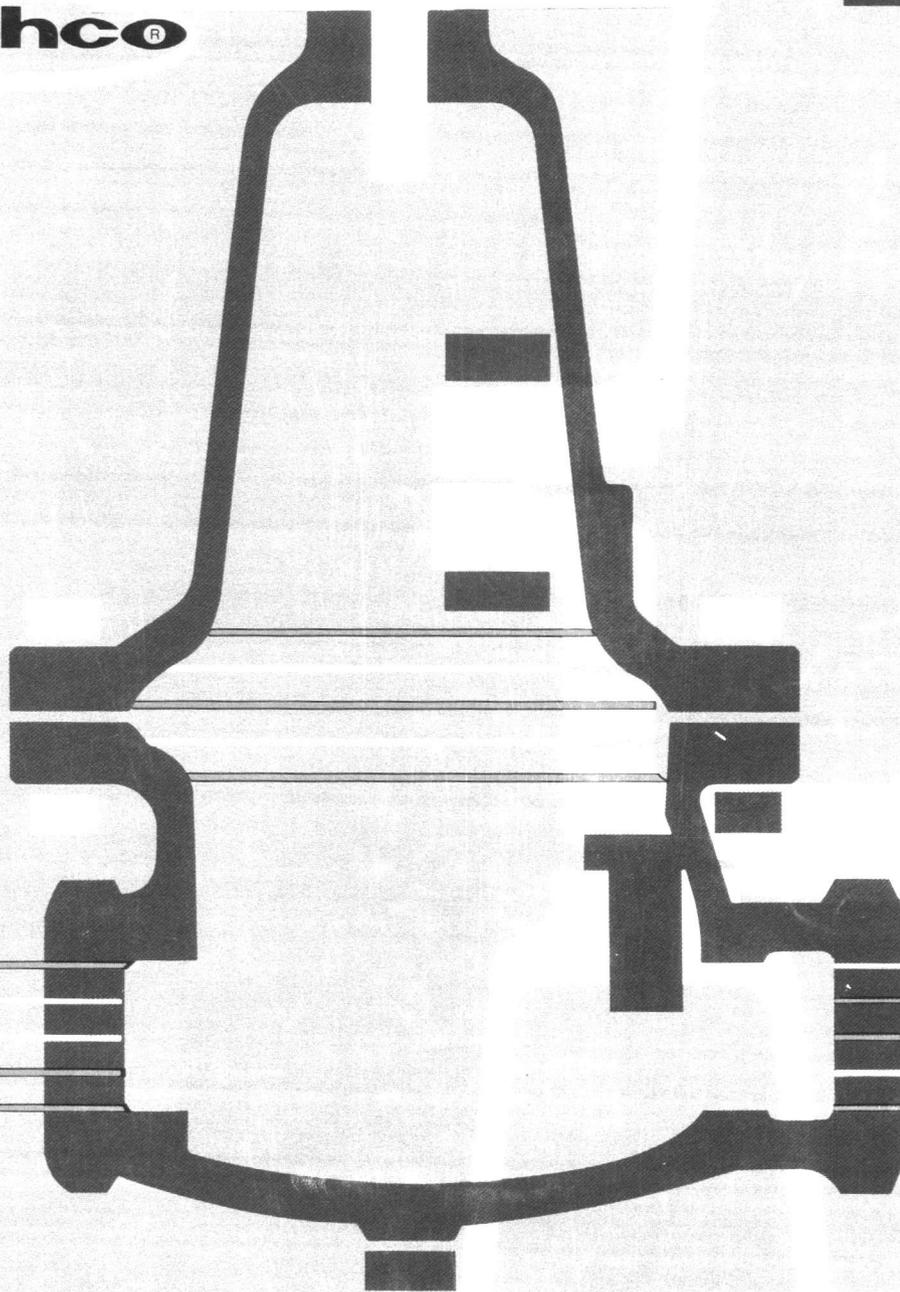
Radiation:

$W = \frac{EDR}{4} \times \Delta T$

M MATT MARSHALL & COMPANY

Interstate Hwy. 85-S. ~~Mail Route 7, Box 170~~
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
GREENSBORO, NORTH CAROLINA 27407-9799

cashco®



Control Valves and Regulators



Pressure Reducing Regulators

Type 1000HP Pressure Reducing Regulator

High capacity, self-contained pressure reducing regulator with sensitivity normally found in pilot operated control valves. An excellent general-purpose regulator.

Applications: Steam, air, oil, gas, water, chemicals
Sizes: 1/2", 3/4", 1", 1-1/2", 2" NPT

Maximum Cv: 13

Pressures:

Inlet: 400 psig maximum
Controlled: Springs for 10-300 psig (1/2" to 1" size)
 10-225 psig (1-1/2" size)
 10-150 psig (2" size)

Materials:

Body:	Trim:	Valve Seat:	Diaphragm:
Iron,	Brass,	Metal	302 St. St.
Brass,	or	or	or Neoprene
Steel, or	Stainless	Composition	
Stainless	Steel		
Steel			

Available Variations:

Type 1000LP, similar to 1000HP with a larger diaphragm for low pressure applications. Maximum inlet pressure 400 psig. Controlled pressure ranges from 1 to 30 psig.

Type 1000HP - 1 + 6, maintains a pressure differential between two lines. Widely used for steam atomizing service.

Type 1000HP - 1 + 8, for differential pressure reducing or steam atomizing service. Same as 1 + 6 with double diaphragm construction.

Type 1000HP-3 and **Type 1000LP-3**, handwheel with locking lever.

Type D Pressure Reducing Regulator

Inexpensive, very rugged pressure reducing regulator designed for medium capacity applications. Piston type valve plug for excellent stability in high pressure drop conditions. Built-in strainer.

Applications: Steam, air, oil and water, plus many chemicals and gases.
Sizes: 1/2", 3/4", 1", 1-1/2", 2" NPT

Maximum Cv: 10

Pressures:

Inlet: 250 psig maximum
Controlled: Springs for 2-150 psig

Materials:

Body:	Trim:	Valve Seat:	Diaphragm:
Iron,	Brass,	Metal	302 St. St.
Brass,	or	or	or Neoprene
or steel	Stainless	Composition	
	Steel		

Available Variation:

Type D-3 with handwheel and locking lever.

Type DC Cryogenic Pressure Reducing Regulator

Type D regulator modified for use in cryogenic service to -350°F.

Application: Cryogenic Service
Sizes: 1/2", 3/4", 1" NPT

Maximum Cv: 4

Pressures:

Inlet: 250 psig maximum
Controlled: Springs for 2-150 psig

Materials:

Body:	Trim:	Valve Seat:	Diaphragm:
Brass	Brass	TFE	302 St. St.
Flange bolts, nuts, springs: Stainless Steel			

Other Features:

Copper Integral strainer
 Spring chamber purge connection
 Cleaned for oxygen service

Type 3381 Pressure Reducing Regulator

For low flow applications, with excellent stability provided by a dashpot action plug.

Applications: Air, water, oil and steam
Sizes: 1/4", 3/8" NPT

Maximum Cv: 0.5

Pressures:

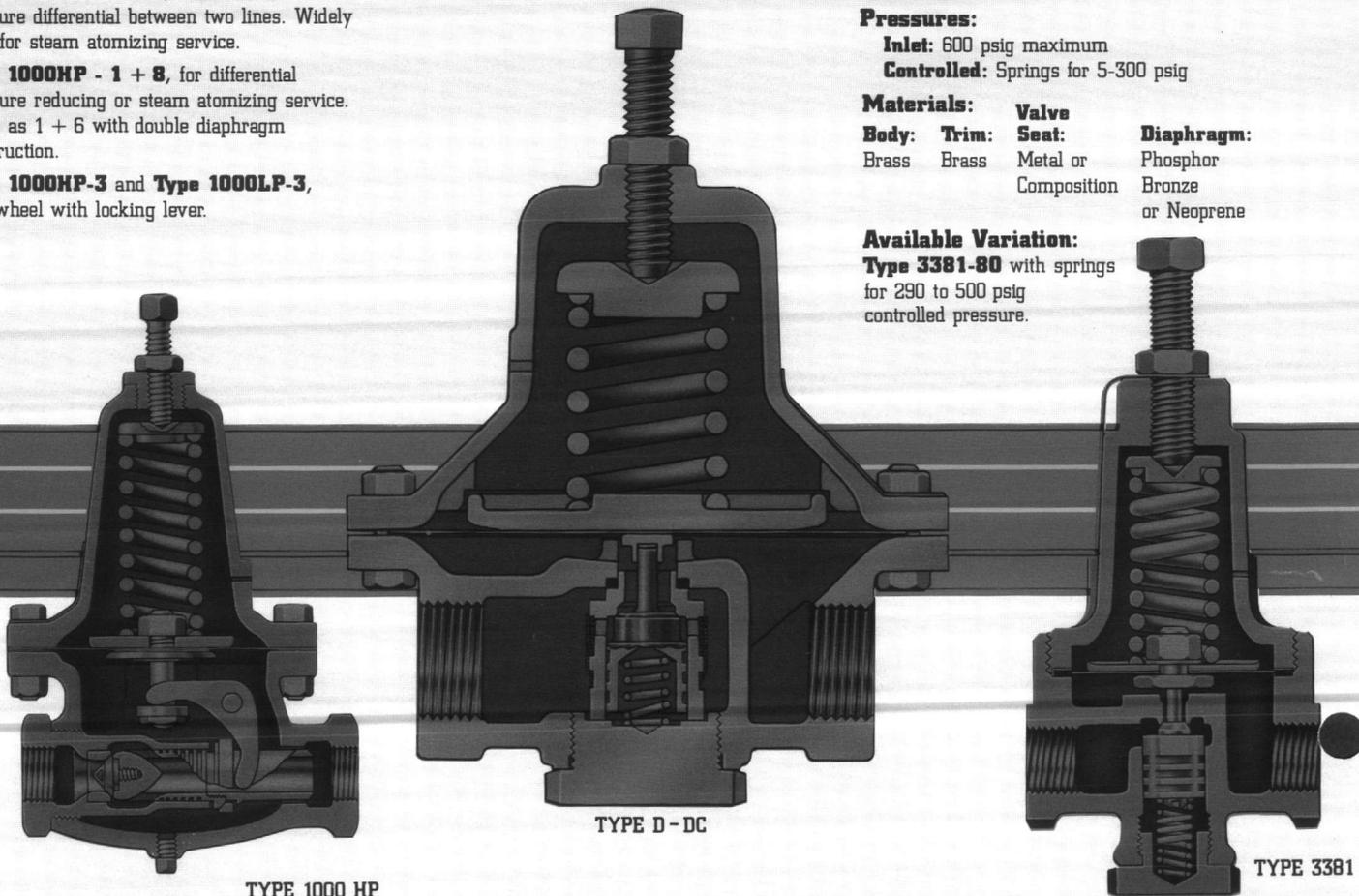
Inlet: 600 psig maximum
Controlled: Springs for 5-300 psig

Materials:

Body:	Trim:	Valve Seat:	Diaphragm:
Brass	Brass	Metal or Composition	Phosphor Bronze or Neoprene

Available Variation:

Type 3381-80 with springs for 290 to 500 psig controlled pressure.



TYPE 1000 HP

TYPE D - DC

TYPE 3381

Type 1465 Pressure Reducing Regulator

For application when a small quantity of process fluid must be extracted from a high pressure system. Equipped with an Elgiloy¹ seat and a chrome plated 17-4PH plug.

Applications: Most liquids, gases, and corrosive fluids.
Sizes: 1/4" NPT

Cv: 0.05 (0.109" orifice)
 0.19 (0.156" orifice)

Pressures:
Inlet: 5,000 psig maximum
Controlled: Springs for 5-300 psig

Materials:
Body: 316 St. St.
Trim: Stainless Steel and Elgiloy
Diaphragm: 302 St. St.

Available Variation:
Type 1465-80 with springs for 290 to 500 psig controlled pressures.

¹Trademark of Elgiloy Co.

Type HP Pressure Reducing Regulator

Extremely rugged pressure reducing regulator, with balanced TFE seat for tight shut-off.

Applications: Air, water, oil, gases
Sizes: 1/2", 3/4", 1" NPT

Maximum Cv: 1.8

Pressures:
Inlet: Up to 3,000 psig maximum
Controlled: Springs for 20-750 psig

Materials:
Body: Manganese Bronze or Steel
Trim: Stainless Steel
Seat: Composition or Neoprene
Diaphragm: 302 St. St.

Type 8310HP Pressure Reducing Regulator

A large capacity regulator for heavy-duty applications. Packless design for high sensitivity and double ported construction.

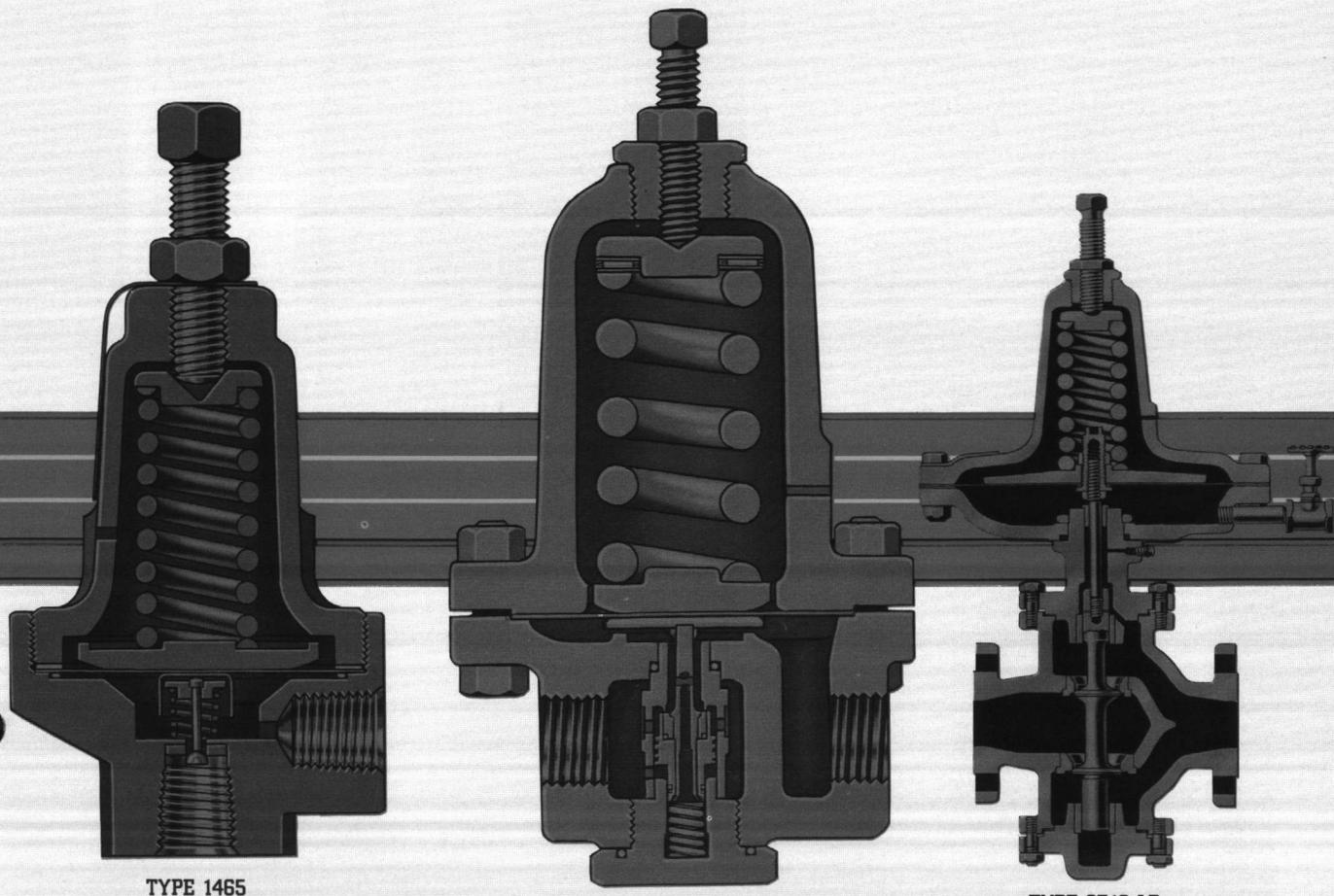
Applications: Steam, air, water, oil, gas, other fluids
Sizes: 1-1/2", 2", 3", 4"

End Connections:
 1-1/2", 2", NPT Iron or Steel
 2", 3", 4", -125#, 250# flange
 1-1/2", 2", 3", 4", -150#, 300# flange

Pressures:
Inlet: Maximum is limited by ANSI ratings of body material and ends selected.
Controlled: Springs for 10-200 psig

Materials:
Body: Iron or steel
Trim: Stainless Steel
Valve Seat: Metal
Diaphragm: 302 St. St. or Neoprene

Available Variation:
Type 8310LP with springs for 1 to 30 psig controlled pressure.



TYPE 1465

TYPE HP

TYPE 8310 LP



Back Pressure Regulators

Type 1171 Back Pressure Regulator

A small back pressure regulator for low flow requirements. Suitable for most liquids and gases.

Applications: Ideal for pump by-pass on package boiler fuel oil systems.

Sizes: 1/4", 3/8" NPT

Controlled Pressure Range: Springs for 5-300 psig

Materials:	Valve	Diaphragm:
Body: Brass	Trim: Brass	Seat: Metal or Composition
		Diaphragm: Phosphor Bronze or Neoprene

Available Variation:
Type 1171-80 with springs for 290 to 500 psig controlled pressure.

Type BQ Back Pressure Regulator

For low to medium flow installations requiring high accuracy. Cylinder guided plug for long life.

Applications: Water, air, oil, gas

Sizes: 1/2" NPT

Controlled Pressure Range: Springs for 5-300 psig

Materials:	Valve
Body: Iron, Brass or Steel	Trim: Brass or Steel
	Seat: Metal or Composition
	Diaphragm: 302 St. St. or Neoprene

Type 1164 Back Pressure Regulator

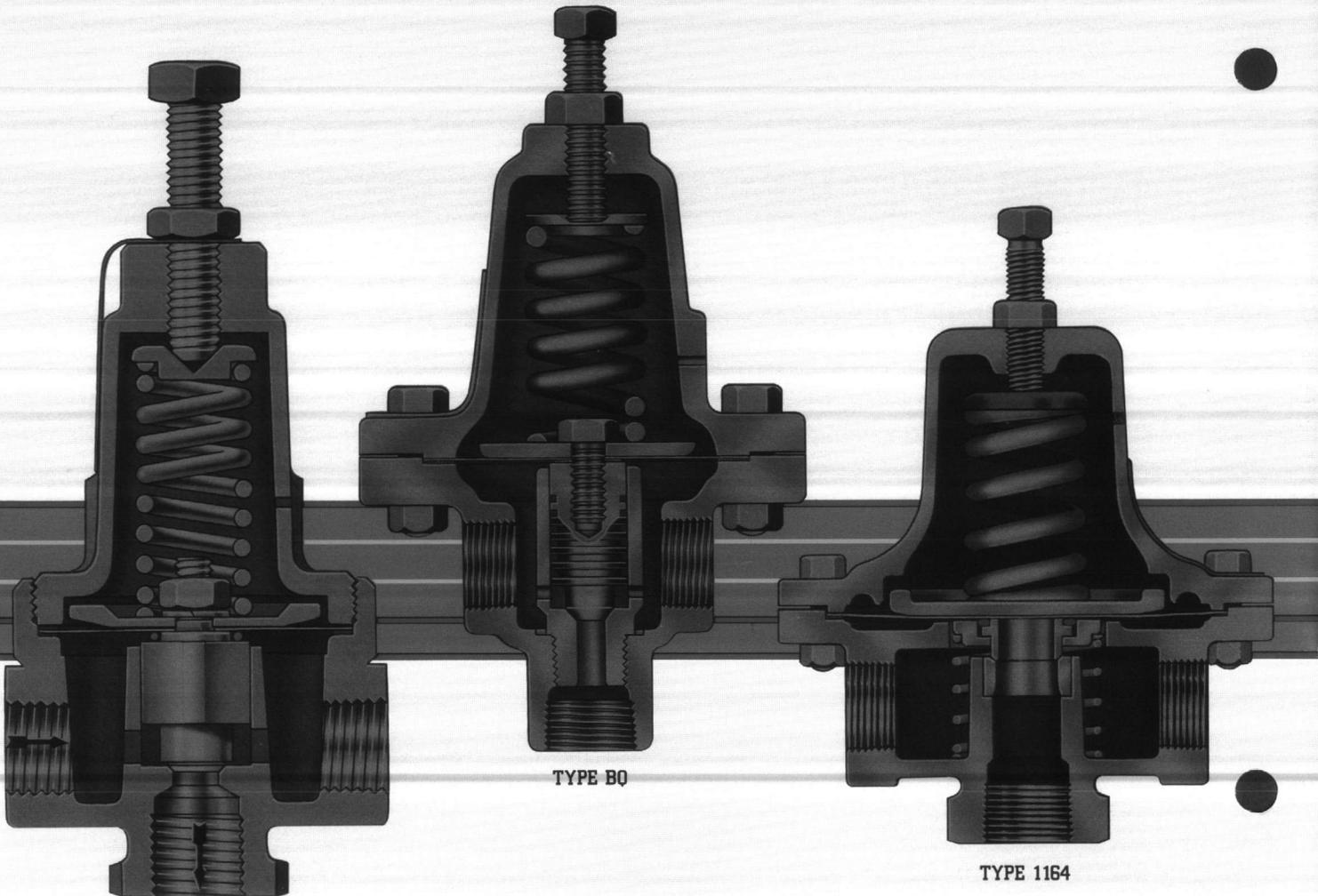
The high capacity trim provides stability and precise control.

Applications: Steam, air, oil, water, gas, many chemicals

Sizes: 3/4", 1", 1-1/2", 2" NPT

Controlled Pressure Range: Springs for 2-200 psig

Materials:	Valve
Body: Iron or Steel	Trim: Stainless Steel
	Seat: Metal or Composition
	Diaphragm: 302 St. St.



TYPE 1171

TYPE BQ

TYPE 1164

Type 123 Back Pressure Regulator

A heavy-duty regulator for a wide range of flows and pressure settings.

Applications: Steam, air, oil, water, gas, other fluids
Sizes: 1/2", 3/4", 1", 1-1/2", 2" NPT

Controlled Pressure Range: Springs for 0-350 psig

Materials:
Body: Iron or Steel
Trim: Brass or Stainless Steel
Valve Seat: Metal or Composition
Diaphragm: 302 St. St. or Neoprene

Type 6987 Back Pressure Regulator

For high pressure systems

Applications: Air, water, oil, gas, chemicals
Sizes: 1/2", 3/4" NPT

Controlled Pressure Range: Springs for 5-1050 psig

Materials:
Body: Steel
Trim: Stainless Steel
Valve Seat: Metal
Diaphragm: 302 St. St.

Type 8311HP Back Pressure Regulator

A high capacity back pressure regulator for heavy duty applications, similar in design to the 8310HP. Packless design for high sensitivity and double ported construction.

Applications: Steam, air, water, oil, gas and other fluids
Sizes: 1-1/2", 2", 2-1/2", 3", 4"

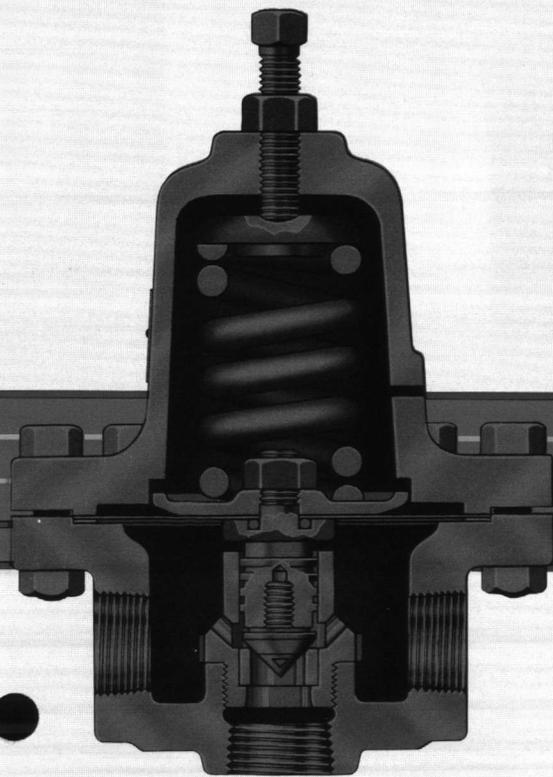
End Connections: 1-1/2", 2" NPT Iron or Steel
 2", 3", 4", 125#, 250# flanges
 1-1/2", 2", 3", 4", 150#, 300# flanges

Pressures:
Inlet: Maximum is limited by ANSI ratings of body material and ends selected

Controlled Pressure Range: Springs for 10-145 psig

Materials:
Body: Iron or Steel
Trim: Stainless Steel
Valve Seat: Metal
Diaphragm: 302 St. St. or Neoprene

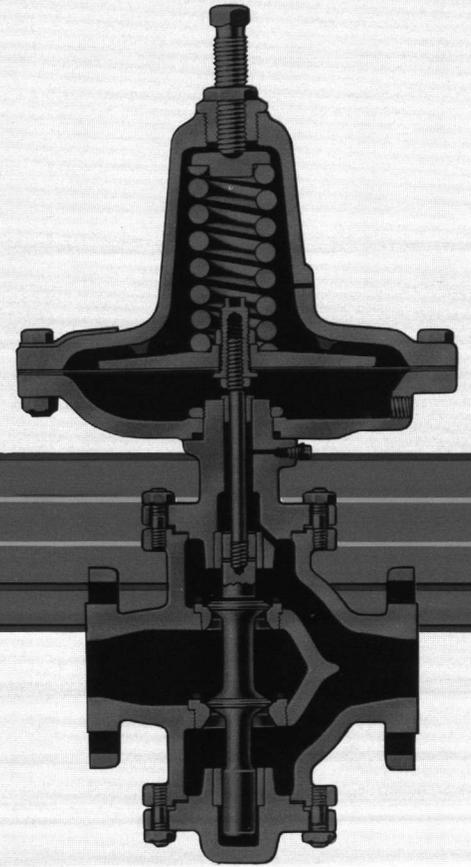
Available Variation:
Type 8311LP with springs for 1 to 30 psig controlled pressure.



TYPE 123



TYPE 6987



TYPE 8311 HP



Control Valves

Ranger OCT®

A rotary control valve so universal it will handle the majority of applications without any modifications. The standard unit has Quick Change Trim, both hardened metal and TFE soft seats, ANSI B16.104 Class VI shutoff, a spring diaphragm actuator that handles most throttling applications without a positioner, an auxiliary handwheel and fits 150#, 300#, and 600# ANSI raised face flanges.

Applications: Most fluids
Sizes: 1", 1-1/2", 2", 3", 4", 6"

Rating: ANSI Class 600

End Connections: Flangeless for installation between ANSI Class 150, 300 or 600 raised face flanges.

Body:	Seats:	Plug:
Steel or 316 St. St.	Inconel X-750 and TFE	17-4PH Chrome Plated

Cv: 5.5 to 755

Temperature Range: -320°F to +750°F

Shutoff: ANSI B16.104 Class VI.
Above 450°F Class IV

Available Variations: Low Noise Insert, 0.4 Cv Trim, Anti-Cavitation Trim, Positioner, Position Indication Switches, Line Bolting

Type 563 Small Flow Control Valve

Pneumatic control valve for small flows in laboratory, pilot plant and process applications. The actuator incorporates a novel positioning mechanism that automatically compensates for changing pressure drop and stuffing box friction. Air-to-open action.

Application: Most fluids
Sizes: 1/4" NPT

Cv: Adjustable to 0.07

Pressures:
Inlet: 5,000 psig maximum
Pressure drop: 3,000 psi maximum

Materials:
Body: 316 Stainless Steel
Trim: 316 Stainless Steel and Sapphire ball inner valve

Actuator: 4", 3-15 psig range

Type 563-A High Pressure Control Valve

for inlet pressures up to 30,000 psig. Similar construction as the Type 563, except has an angle body, larger actuator and uses all St. St. trim parts.

Size: 1/2" NPT

Cv: (1/16" Port = 0.1), (7/32" port = 1.0)

Type 2266 Control Valve

Brass body, for medium pressure applications. Field reversible fail-safe action and quick change trim.

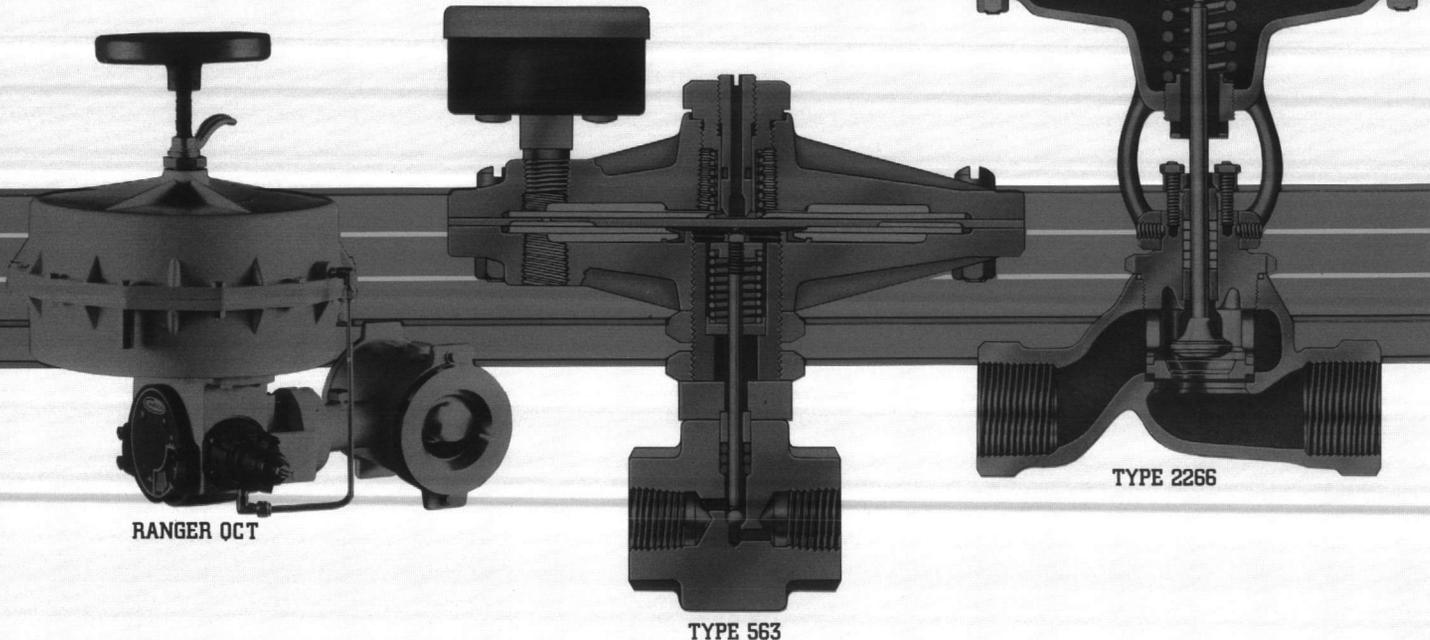
Applications: Steam, hot water
Sizes: 3/4", 1", 1-1/2", 2" NPT

Cv: 3.5 to 50

Materials:
Body: Brass
Trim: Stainless Steel
Seat: Metal or Composition

Actuator: 3-15 or 6-30 psig signals

Available Variations: TFE soft seat, Reduced port, Pneumatic positioner



RANGER OCT

TYPE 563

TYPE 2266

Controllers

Type 964 Control Valve

Designed with quick change, cage-type trim and field reversible fail-safe action.

Applications: Air, oil, gas, water, steam, many chemicals
Sizes: 1", 1-1/2", 2", 3"

End Connections: 1-1/2", 2" and 3" -125#, 250#, 150# or 300# flanges

Cv: 40 to 100

Materials:

Body:	Trim:	Valve Seat:
Iron or Steel	Stainless Steel	Metal

Actuator: 3-15 or 6-30 psig signals

Available Variation: TFE soft seat

Type 764P Pressure Controller

This reliable pressure controller produces a modulated output signal by a unique laminar flow restriction. It has both set point and proportional band adjustments.

Pressure Ranges: 30" HG Vac to 2,500 psig

Materials (wetted):
Diaphragm: Beryllium Copper
Diaphragm Cases: Aluminum: 30" HG to 100 psig
 Steel: 5-2500 psig
 316 St. St.: 30 HG to 100 psig
 303 St. St.: 5-2500 psig

"O" Ring: TFE

Output signal: 3-15 psig or 6-30 psig

Action: Direct or Reverse

Proportional Band: 2-20% adjustable

Available Variations: Adjusting knob, Panel mounting

Also available:

764PD is a differential pressure controller for differential ranges of 1-30 or 2-100 psi. The construction materials and operation is similar to the 764P. Maximum operating pressure is 350 psig.

Type 764T Temperature Controller

This sensitive pneumatic temperature controller produces a modulated signal for operating diaphragm control valves. Its pneumatic circuit is the same as the 764P.

Temperature Range: -70°F to +350°F (adjustable)

Sensing Element: Bi-Metallic

Thermal Bulb Connection: 1/2" NPT

Materials (wetted): Brass or 316 Stainless Steel

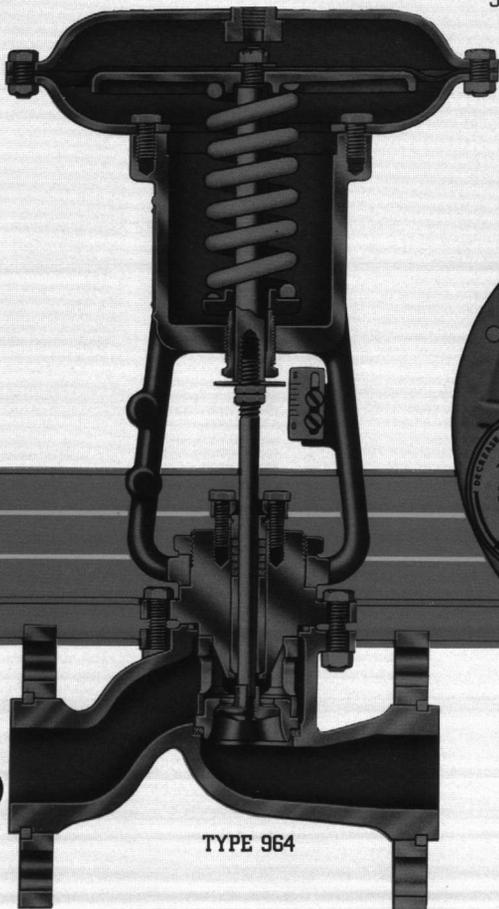
Maximum Static Pressure: 3,000 psig

Output Signal: 3-15 psig or 6-30 psig

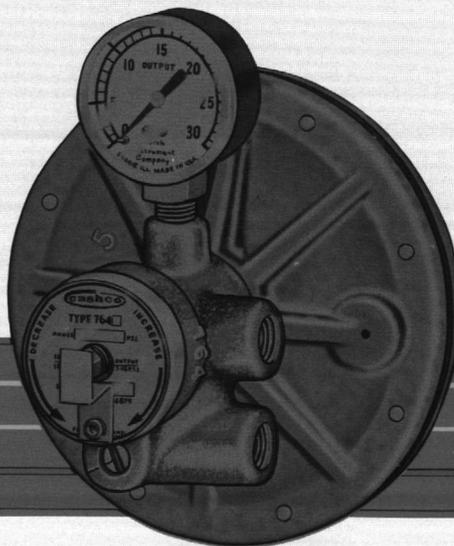
Action: Direct or Reverse

Proportional Band: 2-20% (adjustable)

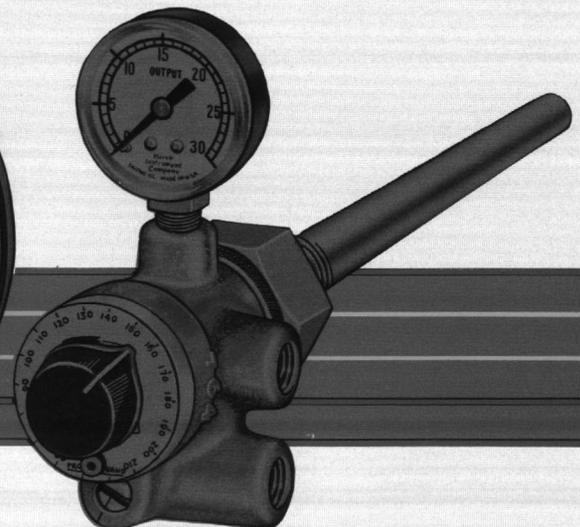
Available Variations: High temperature extension for 350°F to 580°F. 304 St. St. separable socket.



TYPE 964



TYPE 764P



TYPE 764T

M MATT MARSHALL & COMPANY

Interstate Hwy. 85 S. ~~Mail Route 7, Box 170~~
Phone (919) 292-6477 - NC TOLL FREE 1-800-632-1274
GREENSBORO, NORTH CAROLINA 27407-9799

cashco®

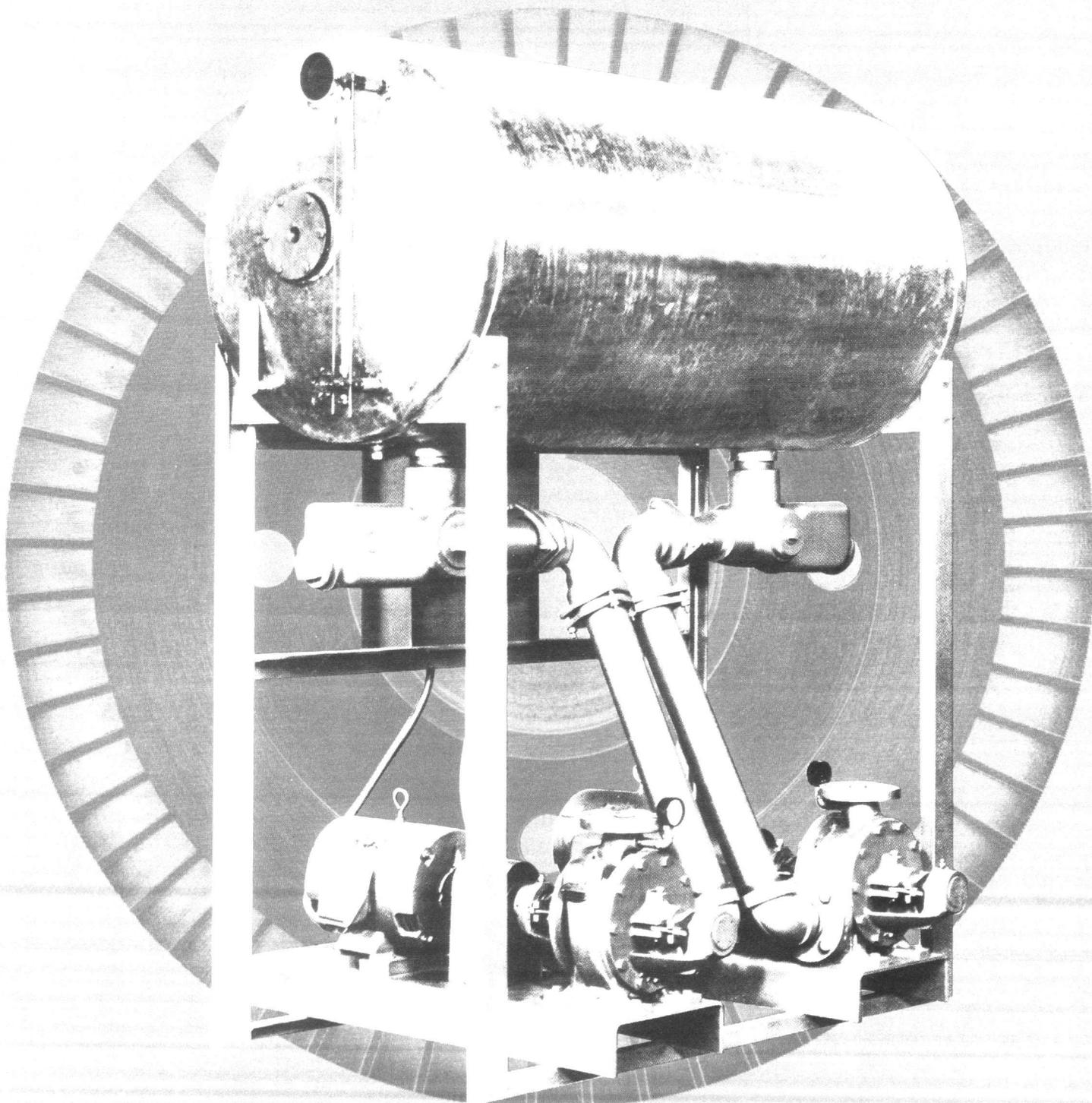
WARRANTY

LIMITATION OF LIABILITY

M MATT MARSHALL & COMPANY

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

AURORA PUMP



INTRODUCTION

AURORA BOILER FEED UNITS

Boiler feed requirements call for a system that will provide uninterrupted service for single or multiple boiler installations. Aurora Packaged Systems deliver those values which you need and expect. Quality features include a galvanized receiver, 3-way valves, and pumps, all completely

assembled. Duplex, dual and triplex units do not require any additional floor space than a simplex unit requires. In Aurora's design, the pumps, bases and piping are mounted beneath the receiver within the support stand. As your heating system grows, the receiver design will allow you

to convert from simplex to duplex, dual or triplex construction. Just add pumps and pipe them up! The following pages explain the reasons why AURORA PUMP is able to offer you a modern, packaged, customer proven, feed system.

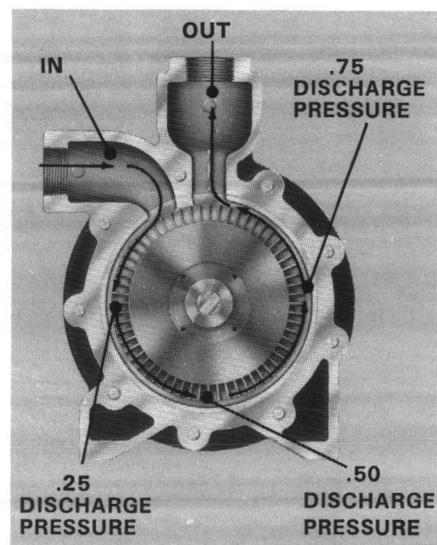
The turbine pump derives its name from the many buckets machined into the periphery of the rotating impeller which permits development of a relatively high pressure in an efficient and economic manner. More pressure is developed within the turbine pump than with a comparable size centrifugal pump. The pumped liquid is directed by the water passage so that it circulates in and out of the buckets many times on its way from the pump inlet to the pump outlet. Additional energy is added to the liquid each time it passes through the buckets so the numerous passes generate a high discharge pressure. The pressure is developed without pulsations. While close clearances are used within the turbine pumps, there is no metal to metal contact. Volatile liquids are handled easily because a turbine pump readily handles vapor and air along with

the liquid, thus eliminating the possibility of a vapor lock within the pump. Free-flowing and non-lubricating liquids are handled with a minimum of wear to pump parts because there is no metal to metal contact within the pump channel. The illustrations indicate the principle used in the handling of the liquid and developing of pressure in a turbine pump.

PUMP FEATURES

- Double suction minimizes axial thrust
- Replaceable channel or wearing rings and impellers
- Opposed discharges to balance radial loads (two stage)
- Interchangeable packing or mechanical seals. Seals are standard on the centrifugal pump
- Large shaft for minimum deflections
- Slings protect bearings
- O-rings prevent leakage

Single and two stage turbine pumps are furnished as standard for low-high head, low capacity selections. Two stage centrifugal pumps are furnished as standard for high head, medium capacity selections. Refer to tables on page 5 for selection.



QUICK REFERENCE 280 SERIES FEATURE SELECTOR

STANDARD

Quality Aurora Pumps
V.I.P. pump test
3/16" gauge galvanized steel receiver with inlet, vent and drain connections
3-Way strainer valves with on-off-by-pass adjustments
Piping from receiver to pumps
Expansion type suction elbows
Gauge glass assembly
Mechanical make-up valve
Factory assembled

OPTIONAL

Pressure gauges
A.S.M.E. receivers
Electrolytic corrosion inhibitors
Inlet "Y" strainers
Preheater tube
Thermometer
Temperature regulator valve
Make-up feeder valve
Control panel prewired
Electric alternator (Duplex)

SELECTION

TABLE — 1150 R.P.M. — 1750 R.P.M. — 3500 R.P.M.

	Boiler Size Horsepower	Evap. Rate in GPM	Pump Capacity in GPM	Tank Capacity in Gallons	Tank Size in Inches	Make-up Valve Size	MAXIMUM PUMP DISCHARGE PRESSURE, PSI						
							15 #	100 #	125 #	150 #	200 #	250 #	
							Model	Model	Model	Model	Model	Model	
SIMPLEX (Single Boiler — One Pump) 60 Cycle	15	1.0	3.9	30	16 x 42	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	20	1.4	4.1	30	16 x 42	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	25	1.7	4.4	30	16 x 42	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	30	2.1	5.0	30	16 x 42	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	40	2.8	6.6	30	16 x 42	3/4"	E4-1/3	F4T-2	G4T-3	G4T-3	G5T-5	G5T-7.5	
	50	3.5	7.6	60	22 x 43	3/4"	E4-1/3	F4T-2	G4T-3	H5-5	G5T-5	G5T-7.5	
	60	4.2	8.5	60	22 x 43	3/4"	E4-1/3	G4T-2	I4T-3	H5-5	G5T-5	H5T-7.5	
	70	4.8	10.0	60	22 x 43	3/4"	G4-1/2	G4T-2	H5-3	H5-5	G5T-5	H5T-7.5	
	80	5.5	11.0	100	24 x 56	3/4"	G4-1/2	G5-2	H5-3	G5T-5	G5T-5	H5T-7.5	
	100	6.9	14.0	100	24 x 56	3/4"	I4-3/4	H5-3	H5-3	H5T-5	H5T-5	I5T-10	
	125	8.6	17.5	100	24 x 56	3/4"	I4-3/4	H5-5	J5-5	K5-7.5	I5T-7.5	I5T-10	
	150	10.7	21.0	200	30 x 69	1"	I4-3/4	J5-5	K5-7.5	L5-10	D6T-7.5	E6T-20	
	200	13.8	28.0	200	30 x 69	1"	M4-1.5	K5-5	L5-10	D6T-7.5	E6T-15	G6T-20	
	250	17.3	33.0	250	36 x 71	1"	M4-1.5	L5-7.5	E6T-10	E6T-10	G6T-20	1 1/2 x 3 x 10-25	
	300	20.7	38.0	350	42 x 73	1"	M4-1.5	L5-7.5	E6T-15	G6T-15	G6T-20	1 1/2 x 3 x 10-25	
	350	24.2	43.0	350	42 x 73	1"	I14-1.5	G6-10	G6T-10	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	400	27.6	48.0	350	42 x 73	1"	J14-1.5	J6-15	G6T-15	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	500	34.5	57.0	500	42 x 97	1 1/2"	J14-1.5	G6T-10	J6T-20	J6T-20	1 1/2 x 3 x 10-25	1 1/2 x 3 x 10-30	
	600	41.5	71.0	500	42 x 97	1 1/2"	J6-2 *	J6T-20	J6T-20	J6T-20	1 1/2 x 3 x 10-25	1 1/2 x 3 x 10-30	
	700	48.3	77.0	750	48 x 98	1 1/2"	K6-2 *	K6T-20	K6T-20	K6T-25	1 1/2 x 3 x 10-30	1 1/2 x 3 x 10-30	
DUPLEX (Single Boiler — One Pump Standby) 60 Cycle	15	1.0	3.9	30	16 x 42	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	20	1.4	4.1	30	16 x 42	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	25	1.7	4.4	30	16 x 42	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	30	2.1	5.0	30	16 x 42	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	40	2.8	6.6	30	16 x 42	3/4"	E4-1/3	F4T-2	G4T-3	G4T-3	G5T-5	G5T-7.5	
	50	3.5	7.6	60	22 x 43	3/4"	E4-1/3	F4T-2	G4T-3	H5-5	G5T-5	G5T-7.5	
	60	4.2	8.5	60	22 x 43	3/4"	E4-1/3	G4T-2	I4T-3	H5-5	G5T-5	H5T-7.5	
	70	4.8	10.0	60	22 x 43	3/4"	G4-1/2	G4T-2	H5-3	H5-5	G5T-5	H5T-7.5	
	80	5.5	11.0	100	24 x 56	3/4"	G4-1/2	G5-2	H5-3	G5T-5	G5T-5	H5T-7.5	
	100	6.9	14.0	100	24 x 56	3/4"	I4-3/4	H5-3	H5-3	H5T-5	H5T-5	I5T-10	
	125	8.6	17.5	100	24 x 56	3/4"	I4-3/4	H5-5	J5-5	K5-7.5	I5T-7.5	I5T-10	
	150	10.7	21.0	200	30 x 69	1"	I4-3/4	J5-5	K5-7.5	L5-10	D6T-7.5	E6T-20	
	200	13.8	28.0	200	30 x 69	1"	M4-1.5	K5-5	L5-10	D6T-7.5	E6T-15	G6T-20	
	250	17.3	33.0	250	36 x 71	1"	M4-1.5	L5-7.5	E6T-10	E6T-10	G6T-20	1 1/2 x 3 x 10-25	
	300	20.7	38.0	350	42 x 73	1"	M4-1.5	L5-7.5	E6T-15	G6T-15	G6T-20	1 1/2 x 3 x 10-25	
	350	24.2	43.0	350	42 x 73	1"	I14-1.5	G6-10	G6T-10	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	400	27.6	48.0	350	42 x 73	1"	J14-1.5	J6-15	G6T-15	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	500	34.5	57.0	500	42 x 97	1 1/2"	J14-1.5	G6T-10	J6T-20	J6T-20	1 1/2 x 3 x 10-25	1 1/2 x 3 x 10-30	
	600	41.5	71.0	500	42 x 97	1 1/2"	J6-2 *	J6T-20	J6T-20	J6T-20	1 1/2 x 3 x 10-25	1 1/2 x 3 x 10-30	
	700	48.3	77.0	750	48 x 98	1 1/2"	K6-2 *	K6T-20	K6T-20	K6T-25	1 1/2 x 3 x 10-30	1 1/2 x 3 x 10-30	
DUAL (Two Boilers — Two Pumps — Large Receiver) 60 Cycle	15	1.0	3.9	30	16 x 42	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	20	1.4	4.1	60	22 x 43	3/4"	C4-1/3	E4T-1.5	E4T-1.5	F4T-3	D5T-2	E5T-3	
	25	1.7	4.4	60	22 x 43	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	30	2.1	5.0	60	22 x 43	3/4"	C4-1/3	E4T-1.5	F4T-2	G4T-3	E5T-3	G5T-7.5	
	40	2.8	6.6	100	24 x 56	3/4"	E4-1/3	F4T-2	G4T-3	G4T-3	G5T-5	G5T-7.5	
	50	3.5	7.6	100	24 x 56	3/4"	E4-1/3	F4T-2	G4T-3	H5-5	G5T-5	G5T-7.5	
	60	4.2	8.5	100	24 x 56	3/4"	E4-1/3	G4T-2	I4T-3	H5-5	G5T-5	H5T-7.5	
	70	4.8	10.0	200	30 x 69	1"	G4-1/2	G4T-2	H5-3	H5-5	G5T-5	H5T-7.5	
	80	5.5	11.0	200	30 x 69	1"	G4-1/2	G5-2	H5-3	G5T-5	G5T-5	H5T-7.5	
	100	6.9	14.0	250	36 x 71	1"	I4-3/4	H5-3	H5-3	H5T-5	H5T-5	I5T-10	
	125	8.6	17.5	250	36 x 71	1"	I4-3/4	H5-5	J5-5	K5-7.5	I5T-7.5	I5T-10	
	150	10.7	21.0	350	42 x 73	1"	I4-3/4	J5-5	K5-7.5	L5-10	D6T-7.5	E6T-20	
	200	13.8	28.0	500	42 x 97	1 1/2"	M4-1.5	K5-5	L5-10	D6T-7.5	E6T-15	G6T-20	
	250	17.3	33.0	500	42 x 97	1 1/2"	M4-1.5	L5-7.5	E6T-10	E6T-10	G6T-20	1 1/2 x 3 x 10-25	
	300	20.7	38.0	750	48 x 98	1 1/2"	M4-1.5	L5-7.5	E6T-15	G6T-15	G6T-20	1 1/2 x 3 x 10-25	
	350	24.2	43.0	750	48 x 98	1 1/2"	I14-1.5	G6-10	G6T-10	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	400	27.6	48.0	1000	48 x 125	1 1/2"	J14-1.5	J6-15	G6T-15	G6T-15	K6T-25	1 1/2 x 3 x 10-25	
	500	34.5	57.0	1000	48 x 125	1 1/2"	J14-1.5	G6T-10	J6T-20	J6T-20	1 1/2 x 3 x 10-25	1 1/2 x 3 x 10-30	
	TRIPLEX (Two Boilers — Three Pumps — One Pump Standby) 60 Cycle	50	3.5	7.6	350	42 x 73	1"	E4-1/3	G4T-2	I4T-3	H5-5	G5T-5	H5T-7.5
		60	4.2	8.5	350	42 x 73	1"	E4-1/3	G4T-2	I4T-3	H5-5	G5T-5	H5T-7.5
70		4.8	10.0	350	42 x 73	1"	G4-1/2	G5-2	H5-3	G5T-5	G5T-5	H5T-7.5	
80		5.5	11.0	350	42 x 73	1"	G4-1/2	G5-2	H5-3	G5T-5	G5T-5	H5T-7.5	
100		6.9	14.0	350	42 x 73	1"	I4-3/4	G5-2	J5-5	K5-7.5	I5T-7.5	I5T-10	
125		8.6	17.5	350	42 x 73	1"	I4-3/4	G5-2	J5-5	K5-7.5	I5T-7.5	I5T-10	
150		10.7	21.0	350	42 x 73	1"	I4-3/4	J5-5	K5-7.5	L5-10	D6T-7.5	E6T-20	
200		13.8	28.0	500	42 x 97	1 1/2"	M4-1.5	K5-5	L5-10	D6T-7.5	E6T-15	G6T-20	
250		17.3	33.0	500	42 x 97	1 1/2"	M4-1.5	L5-7.5	E6T-10	E6T-10	G6T-20	1 1/2 x 3 x 10-25	
300		20.7	38.0	750	48 x 98	1 1/2"	I14-1.5	G6-10	G6T-10	G6T-15	K6T-25	1 1/2 x 3 x 10-25	

TABLE SELECTIONS ARE FOR INTERMITTENT OPERATION — If system requires continuous operating pumps consult factory for pump selection. 2 stage centrifugal pump. 3500 R.P.M.

Apply firing factor to evaporation rate to obtain actual pump capacity required.

MODEL NUMBER EXAMPLE:

C4-1/3 designates C4 size pump with 1/3 H.P. motor. For selections not shown, please refer to factory.

*Available at 1150 R.P.M. only.

UNIT FEATURES

1 GALVANIZED RECEIVER inside and out prevents corrosion, eliminates the need for special coatings and is 3/16" to insure long life. Receivers include 2 vents, 2 inlets, drain and connections for additional optional equipment.

2 BRASS FLOAT VALVE with simple lever action replaces water lost due to processing, etc.

3 TEMPERATURES TO 210° F. water and selected for minimum capacity of twice the rate of evaporation.

4 BRASS WATER LEVEL GAUGE glass assembly is furnished complete with shut-off valve and protector rods.

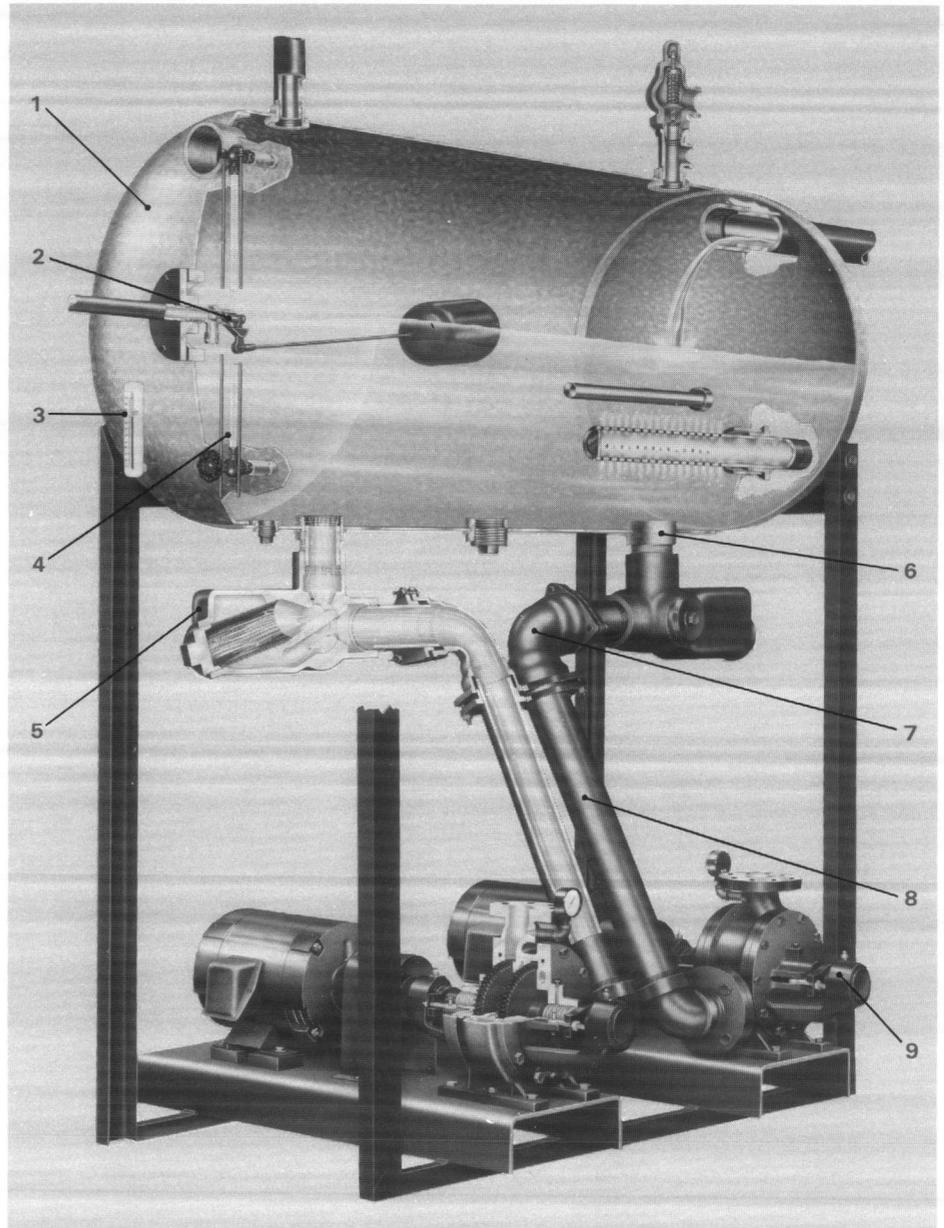
5 3-WAY VALVE provides dependable operation. With a turn of the plug the water flow can be channeled through the strainer or by-passed around the strainer (to allow the strainer to be cleaned), or completely shut off.

6 INTERCHANGEABLE DESIGN provides future system expansion with receiver connections for up to 3 pumps. Just add pumps and pipe them up.

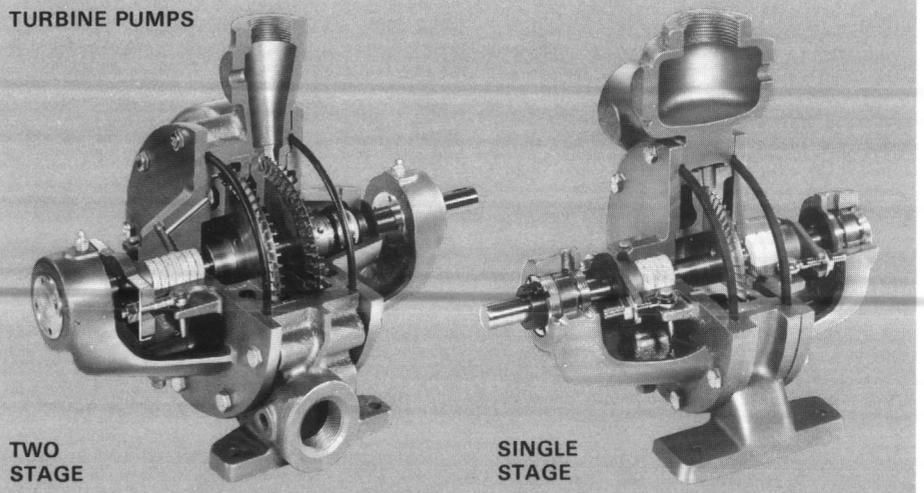
7 COMPLETELY ASSEMBLED PIPING from receiver to pump. Included are expansion type elbows.

8 ACCESSIBILITY to pump, strainer valve and other components for easier maintenance. All pumps and piping are mounted beneath the receiver within the support stand.

9 PUMPS designed for boiler feed applications will handle entrained vapor and air with liquid to eliminate vapor lock.



TURBINE PUMPS



TWO STAGE

SINGLE STAGE

STANDARD EQUIPMENT AND ENGINEERING

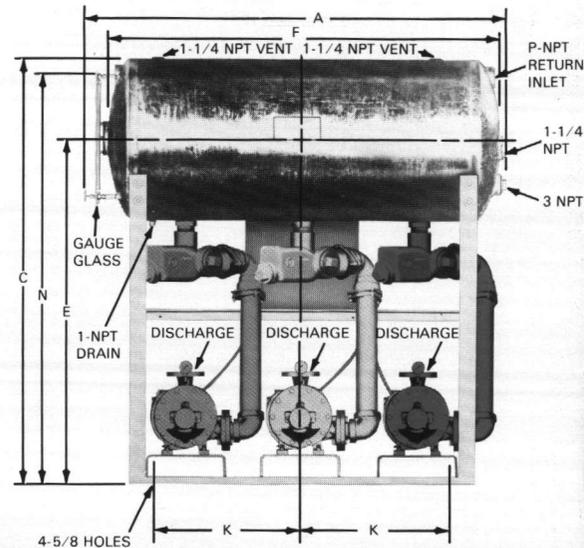
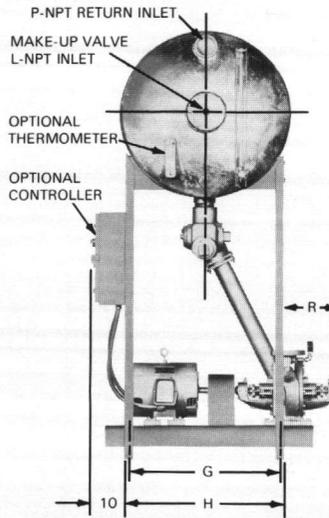
SIMPLEX — Model 281
Receiver with make-up valve, sight gauge glass with gauge cock, support legs, 3-way valve, piping, pump, motor, base and coupling. **RECOMMENDED OPTIONS:** pressure gauge, thermometer, magnetic starter and one hand-off-automatic switch mounted and wired.

DUPLEX — Model 282
Receiver with make-up valve, sight gauge glass with gauge cock, support legs, 3-way valves, piping, two pumps (one operational and one standby), motors, bases and couplings. **RECOMMENDED OPTIONS:** pressure gauges, thermometer, NEMA 1 control panel with two starters, hand-off-automatic switch and selector switch, or alternator, mounted and wired.

DUAL — Model 282A
Receiver with make-up valve, sight gauge glass with gauge cock, support legs, 3-way valves, piping, two pumps (that are operational simultaneously), motors, bases and couplings. **RECOMMENDED OPTIONS:** pressure gauges, thermometer, NEMA 1 control panel with two starters, hand-off-automatic switch mounted and wired. Two-hand-off-automatic switches for two independently operational pumps are provided.

TRIPLEX — Model 283A
Receiver with make-up valve, sight gauge glass with gauge cock, support legs, 3-way valves, piping, three pumps (two operational and one standby), motors, bases and couplings. **RECOMMENDED OPTIONS:** pressure gauges, thermometer, NEMA 1 control panel with three starters, two hand-off-automatic switches and two selector switches which allow the following combinations of pumps to operate: 1 & 2, 1 & 3 or 2 & 3, all mounted and wired.

DIMENSIONS



REC. CAP. (GAL.)	3-WAY VAL. SIZE	A	B	C	E	F	G	H	K	L	N	P	R
30	1 1/4	42	16	42 3/16	34	46	14 1/4	15 3/4	16	3/4	40	2	7 13/16
60	1 1/4	43	22	49 11/16	38 1/2	46	20 3/8	21 7/8	16	3/4	47	2	4 3/4
100	1 1/4	56	24	59 11/16	47 1/2	59	21 1/4	22 3/4	21	3/4	57	2	4 5/16
200	2*	69	30	77 3/16	62	73	26 1/4	27 3/4	25 1/2	1	74	3	10 13/16
250	2*	71	36	80 3/16	62	74	28 3/8	29 7/8	25 1/2	1	77	3	9 13/16
350	3**	73	42	80 3/16	59	76	36 3/4	38 1/4	25 1/2	1 1/2	76	3	5 5/8
500	3	97	42	80 3/16	59	100	37 3/8	38 7/8	28 1/2	1 1/2	76	3	10 1/2
750	3	98	48	88 3/16	64	101	45 1/2	47	28 1/2	1 1/2	85	3	1 1/4
1000	3	124 1/2	48	88 3/16	64	128	45 1/2	47	42	1 1/2	85	3	1 1/4

* 3" WITH D6T AND E6T PUMPS

** 2" WITH J5, K5 AND L5 PUMPS

MATERIAL OF CONSTRUCTION

TURBINE PUMPS

PUMP PART	MATERIAL
Casing	Cast Iron ASTM A48
Covers	Cast Iron ASTM A48
Channel Rings	Cast Iron ASTM A48
Impeller	Bronze ASTM B62
Shaft	Stainless Steel AISI-416
Packing Glands	Cast Iron ASTM A48
Center Spacer	Cast Iron ASTM A48
Packing	Interwoven, graphited asbestos, die molded, diagonally cut

CENTRIFUGAL PUMPS

PUMP PART	MATERIAL
Casing	Cast Iron ASTM A48
Impeller	Cast Iron ASTM A48
Case Wearing Rings	Bronze ASTM B62
Imp. Wearing Rings	Bronze ASTM B62
Shaft	Steel AISI C1018
Shaft Sleeves	Bronze ASTM B62
Mechanical Seals	303 Stainless steel metal parts, "Buna-N" elastomer parts, Ni-Resist seat and carbon washer

RECEIVER ASSEMBLY

PUMP PART	MATERIAL
Receiver	3/16" Galvanized Steel
3-Way Valve Body	Cast Iron ASTM A48
3-Way Valve Strainer	Brass
Float Valve	Brass ASTM B-36
Gauge Glass Fitting	Brass ASTM B-36
Base and Supports	Steel Commercial

NOTES:

- Dimensions and weights are approximate.
- All dimensions are in inches and may vary $\pm 1/2$ ".
- Add pump(s), base(s), receiver, and motor weight(s) for unit weight.
- Not for construction purposes unless certified.
- Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information, without notice.

LIMITATIONS

MAXIMUM INTERNAL	MAXIMUM DISCHARGE PRESSURE	MAXIMUM TEMP. LIMIT ON PUMP SUCTION	MAKE-UP VALVE*
5 P.S.I.G. Short Surges Only†	250 P.S.I.G.	210° F.	3/4 NPT 22.5 G.P.M. 1 NPT 45 G.P.M. 1 1/2 NPT 87 G.P.M.

* Make-up valve limitation based on 40 P.S.I. utility water pressure.
† This is a vented system and pressure rating for short surges only.

ENGINEERING SPECIFICATIONS

Furnish and install as shown on the plans, one Aurora Pump Model Number (Simplex) (Duplex) (Dual) (Triplex) packaged Boiler Feed System consisting of gallon receiver of galvanized steel with dished heads, (turbine pump(s), centrifugal pump(s), horsepower, R.P.M. motor(s), 3-way strainer valves(s), steel base and supports, and all necessary suction piping factory installed. The system shall be suitable for returning G.P.M. at a pressure of P.S.I. for 210° F. water to supply a H.P. boiler.

TURBINE PUMPS:

Each pump shall be the APCO bronze fitted turbine type. The pump casing(s) shall be vertically split. The pump covers shall be of the removable channel ring design to permit replacement of the channels only and shall incorporate the bearing arms and stuffing boxes for packing or mechanical seals. The shaft(s) shall be stainless steel supported by two grease lubricated ball bearings. The bronze impeller(s) shall be hydraulically balanced and shall be designed to pass vapor with the water. Stuffing boxes shall have cast iron glands and packing (or mechanical seals). The pump (s) shall be flexibly coupled to the motor(s).

CENTRIFUGAL PUMPS:

Each pump shall be a two stage single suction bronze fitted type. The pump casing(s), shall be vertically split with a removable

crossover cover(s) and will allow front and back pull out. The unit must be equipped with (bronze) (stainless steel) keylocked shaft sleeve that extends the length of the seal box. The pump shaft extension shall be "O" ring sealed from the pumped liquid. The shaft(s) shall be carbon steel supported by two grease lubricated ball bearings. Pump shall have case wearing rings (impeller wearing rings). Impellers are to be dynamically balanced, keylocked to the shaft and shall be designed to pass vapor with the water. Stuffing boxes shall have mechanical seals. The pump(s) shall be flexibly coupled to the motor(s).

TURBINE OR CENTRIFUGAL PUMPS:

The pump(s) shall be mounted within the support stand on a common steel base. Standard coupling guard(s) will be provided. An optional discharge pressure gauge reading in P.S.I. shall be located on each pump. Suction piping between the receiver and pumps shall be factory assembled with expansion type elbows to relieve pipe strain and vibration and 3-way strainer valve(s) with removable brass strainer. The strainer valve plug must be so designed that by turning the plug the liquid flow may be channeled in two directions — through the strainer housing or by-passed around the strainer directly into the pump — or be completely shut off. The receiver shall contain all necessary openings, float operated auto-

matic make-up water feeder, water level sight glass with shut-off valves, optional back angled thermometer, and in simplex units, a plugged suction opening for a future pump shall be provided, to easily convert a simplex unit to a duplex, dual or triplex unit. The receiver shall be 3/16" galvanized steel and shall be mounted on structural steel legs attached to the pump base. Threaded inlets shall be provided at the top of both tank heads. Two 1-1/4" vents shall be provided and also a 1" drain. Motors shall be open drip-proof for (230/460 volt, 3 Phase) (115/230 volt, 1 Phase) 60 Hertz current, built in a standard NEMA frame.

OPTIONAL:

Magnetic starters with overload and under voltage protection shall be mounted and wired to the pump motors, 3 Phase, 1/3 H.P. and larger, and 1 H.P. and larger single Phase. (Starters not required on single Phase, 3/4 H.P. motors or less). On Simplex units, the starter shall be in a general purpose enclosure. On Duplex, Dual and Triplex units, magnetic starters shall be panel mounted in a NEMA 1 enclosure. Reset buttons shall be provided outside the box. On Duplex and Triplex units, transfer switches to provide standby pump operations shall be mounted and wired in the panel. The transfer switch is not required on Dual units. An alternator (will) (will not) be provided on Duplex models in lieu of a selector switch.

A UNIT OF GENERAL SIGNAL



AURORA PUMP



Manufacturer's Representatives and Distributors

MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073





Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

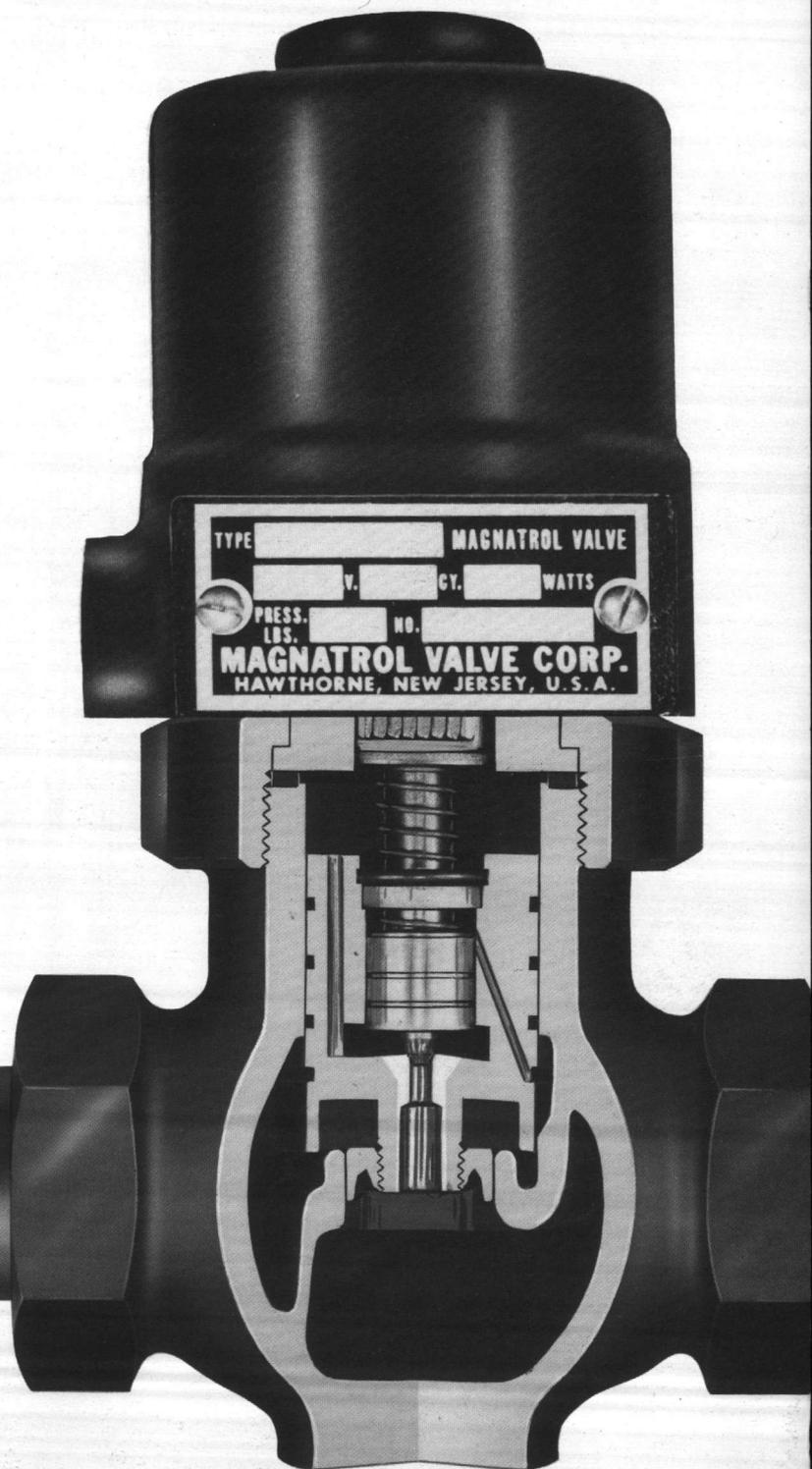
MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

Magnatrol SOLENOID VALVES

**DEPENDABLE PACKLESS
MAGNATROL SOLENOID VALVES**

for CONTROL of

- **WATER**
- **OIL**
- **AIR**
- **SOLVENTS**
- **GAS**
- **STEAM**



MAGNATROL VALVE CORPORATION
67 Fifth Avenue • Hawthorne • N. J. 07506 • U. S. A.
Phone 201 - 427-4341



Magnatrol
VALVE CORP.

DEPENDABLE • PACKLESS **SOLENOID**

67 Fifth Avenue • Hawthorne • New Jersey • U. S. A.

**VALVE
CONSTRUCTION
FEATURES:**

1. 2-WAY STRAIGHT THRU DESIGN
2. BRONZE BODY WITH FEMALE THREADS
3. FULL PORT-INTERNAL PILOT OPERATED OR DIRECT ACTING
4. PACKLESS CONSTRUCTION
5. CONTINUOUS DUTY COILS FOR ALL VOLTAGES
6. NO DIFFERENTIAL PRESSURE REQUIRED
7. ALL VALVES ARE AVAILABLE IN NORMALLY CLOSED OR NORMALLY OPEN DESIGN.

**AUTOMATIC ELECTRIC CONTROL
OF THE FOLLOWING FLUIDS**

FLUID TEMP.	AIR	BRINE	GAS	OIL	SOLVENTS	WATER	VACUUM	STEAM	HYDR. OIL	SIZES AVAILABLE	PORT SIZE	MAXIMUM		BUCKET IN
												DIFF. PRESS.	TEMP.	
UNDER 212°F.	•		•				•			3/8"-2"	FULL	30#	212°F.	200-D
	•		•		•	•	•			1"-3"	FULL	35#	212°F.	200-G
	•	•		•	•	•	•			1/4"-3/4"		300#	212°F.	200-N
	•	•	•	•	•	•	•			1/2"-3"	FULL	500#	212°F.	200-A
OVER 212°F.	•	•		•	•	•		•		3/8"-3/4"		150#	400°F.	200-M
								•		1/2"-3"	FULL	180#	400°F.	200-S
	•	•	•	•	•	•				1/2"-3"	FULL	500#	400°F.	200-L

FOR FLUIDS NOT LISTED ABOVE AND FOR SPECIAL APPLICATIONS CONSULT OUR ENGINEERING STAFF

APPLICATION NOTES

1. Solenoid Valves will control the flow in one direction only, as indicated by arrow cast on valve body.
2. Valves must be installed with solenoid vertical and on top.

EASILY ACCESSIBLE . . .

Unsurpassed ease of access is provided on all Magnatrol Valves as the entire solenoid and piston assembly can be removed without breaking flexible electrical connection and while valve body remains in pipe line.

Periodic inspection, cleaning or servicing can be readily accomplished.



GAS-VACUUM

1. A standard size soft resilient disc insures a bubble tight valve.
2. The full port opening allows maximum flow at minimum pressure drop.



TYPE 18D13

WATER OIL

SOLVENTS BRINE

AIR

1. Valve opens instantly on application of current featuring a tight shut-off when de-energized.
2. Windings are encapsulated with a tough epoxy resin to produce a moisture proof coil.



TYPE 18A44

STEAM

1. All moving parts have sufficient clearance to allow for thermal expansion caused by inrush of steam.
2. A standard size resilient disc has been compounded for steam service.



TYPE 35S26

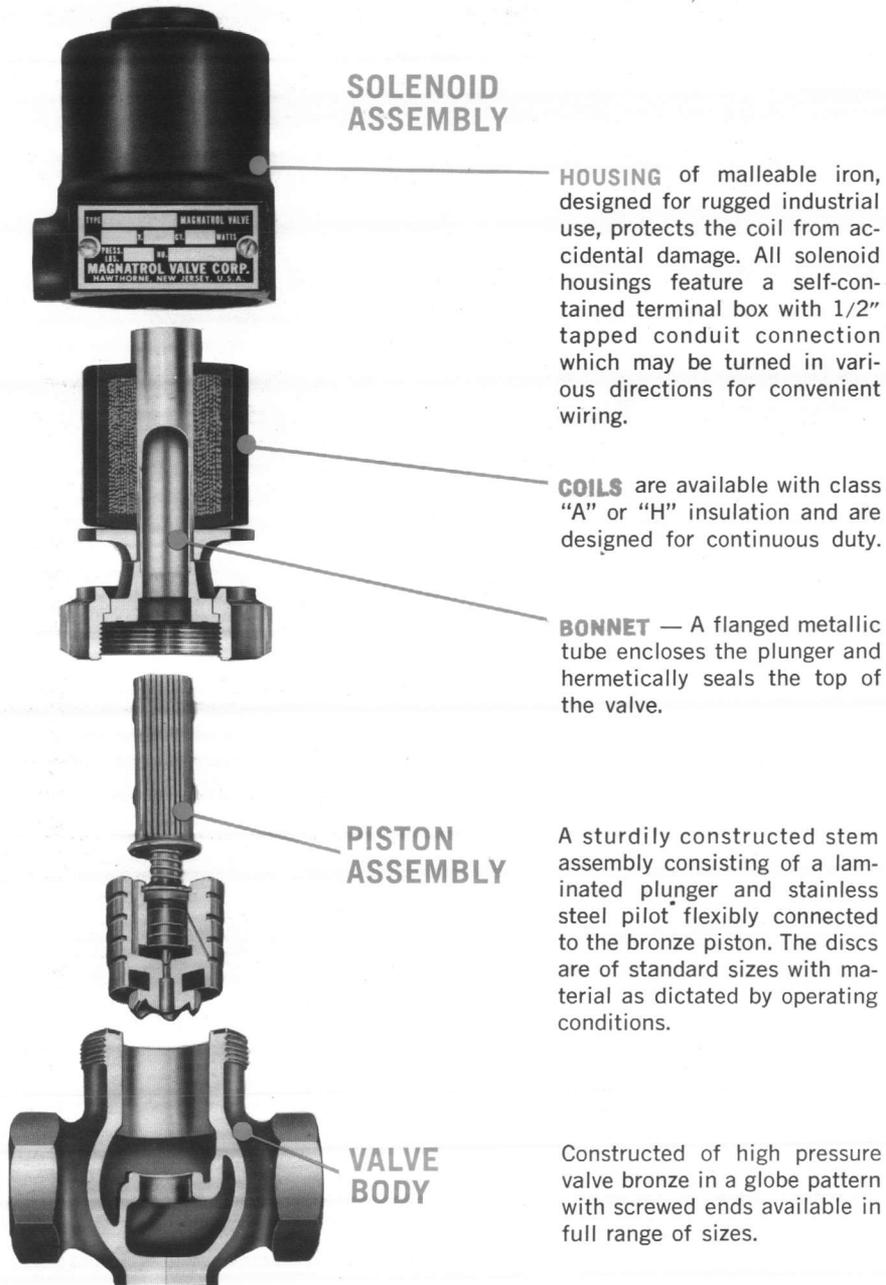
400°F LIQUIDS & GASES

1. A sturdily constructed valve body designed to withstand elevated temperatures.
2. The solenoid coil is of class "H" construction and designed for continuous operation at maximum temperature rating.



TYPE 42L37

MAGNATROL SOLENOID OPERATED VALVES are used to control the flow of liquids or gases, generally in conjunction with automatic control apparatus such as thermostat, float switch, time switch, flow meter, etc.



SOLENOID ASSEMBLY

HOUSING of malleable iron, designed for rugged industrial use, protects the coil from accidental damage. All solenoid housings feature a self-contained terminal box with 1/2" tapped conduit connection which may be turned in various directions for convenient wiring.

COILS are available with class "A" or "H" insulation and are designed for continuous duty.

BONNET — A flanged metallic tube encloses the plunger and hermetically seals the top of the valve.

PISTON ASSEMBLY

A sturdily constructed stem assembly consisting of a laminated plunger and stainless steel pilot flexibly connected to the bronze piston. The discs are of standard sizes with material as dictated by operating conditions.

VALVE BODY

Constructed of high pressure valve bronze in a globe pattern with screwed ends available in full range of sizes.

VALVE SHOWN IN ABOVE PHOTO IS TYPE A.

SOLENOID VALVE PROBLEMS...

solved quickly and accurately over the phone.

Valves shipped same day.

PHONE ...

Area Code 201—427-4341



67 FIFTH AVENUE • HAWTHORNE • N. J. 07506 • U. S. A.
Manufacturers of Solenoid Valves Since 1936



Manufacturer Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

This catalog covers liquid measurement meters for industrial, commercial and municipal applications. When you buy from KENT you enjoy the benefits of product excellence unduplicated in the marketplace.

KENT is one of the world's largest meter manufacturers, founded by George Kent in 1838. KENT introduced the first domestic water meters in 1883, and ever since then has pioneered in the design and production of flow measuring equipment of the highest quality.

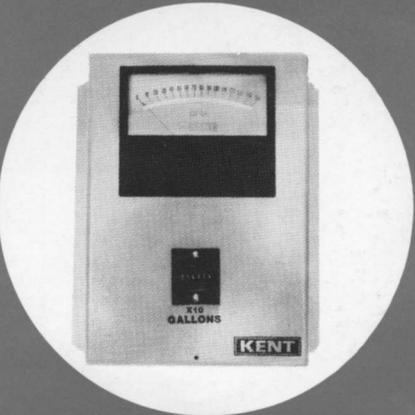
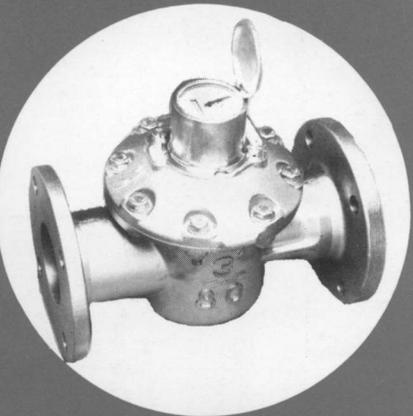
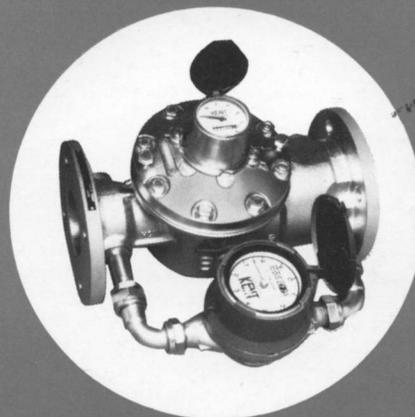
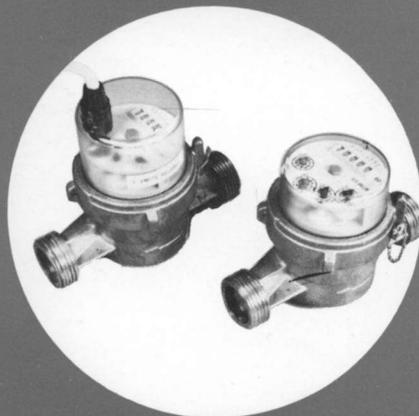
The KENT organization spans the globe and employs over 5,000 people. The product line encompasses literally hundreds of applications for measurement and control of liquids.

Kent Meters, Inc.

liquid measurement

METERS

Catalog AP-6



WATER

C-700 — POLYMER AND BRONZE —

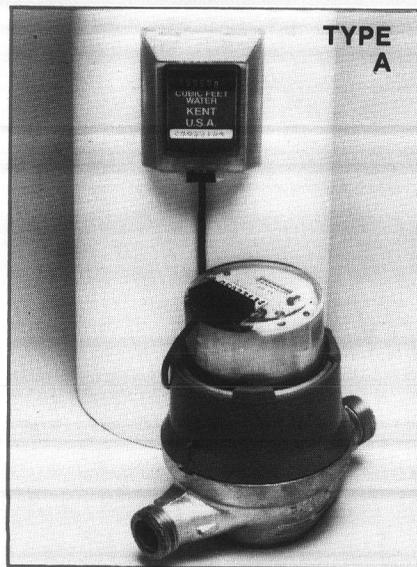
1/4 to 50 gpm 5/8" x 1/2", 5/8" x 3/4",
3/4" x 3/4", 1", 1 1/2" and 2"

The magnetically-driven register which eliminates packing glands, can be removed for service or maintenance without removing the meter from the line. The register case is factory sealed to the meter case. The giant-sized 3", direct-reading register makes reading easier. The large digits on the magnetically-driven register assure greater reading accuracy. Register indicates to 10 million gallons or 1 million cu. ft., and returns to zero. The entire register case can be placed in any one of four cardinal positions.

The positive displacement working chamber a top-in, bottom-out design, is self-flushing and self-lubricating. It is graphite-impregnated, non-corrosive thermoplastic in combination with a thermoplastic piston which assures longer life, more trouble-free service. Because of KENT's special oscillating piston design and lower oscillation rate, wear is reduced to a minimum. Precision-machined internal parts assure greater accuracy over the entire flow range. Our over-sized strainer design, minimizes stoppages due to sand or foreign matter, prevents meter damage, and assures reduced head loss at all working pressures.



PULSE TRANSMITTERS (Remote Heads)

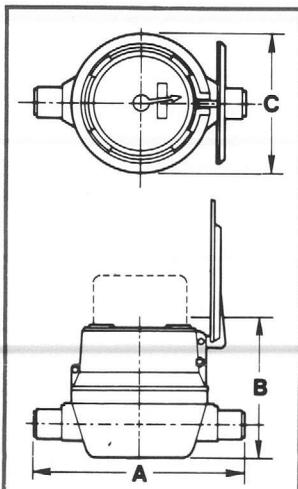


Type A—A self-powered generator. Contact Ocala for applications.

Type B—identical to Type A, but provided without a remote counter. This pulser provides a 3 amp, 125 VAC contact closure rating of 1 contact per 10 gallons on 1 1/2" and 2". It is suitable for use with Rate of Flow Transmitters and Remote Totalizers.

Type D—adds a high-frequency output capability to a standard C-700 register. Output pulse rate is:

Size	Standard	Optional
5/8"	100	200
3/4"	66.2	133.2
1"	24.6	49.2
1 1/2"	11.25	22.5
2"	5.62	11.25



Specifications — polymer and bronze

Dimensions

Size	Normal Operating Range	Head Loss For Given Flow Rates	Accuracy Within ± 1 1/2% Down To	Polymer			Bronze		
				A Length	B Height	C Width	A Length	B Height	C Width
5/8" x 1/2"	1/4-20 gpm	13 psi at 21 gpm	1/4 gpm	7 1/2"	5"	4 13/16"	7 1/2"	5"	4 3/4"
5/8" x 3/4"	1/4-25 gpm	13 psi at 25 gpm	1/4 gpm	7 1/2"	5"	4 13/16"	7 1/2"	5"	4 3/4"
3/4" x 3/4"	1/2-30 gpm	13 psi at 30 gpm	1/2 gpm	9"	5 1/2"	5 1/32"	9"	5 1/2"	4 3/4"
1"	3/4-50 gpm	13 psi at 53 gpm	3/4 gpm	—	—	—	10 3/4"	6 15/16"	7 1/16"
1 1/2"	5-100 gpm	—	5 gpm	—	—	—	12 5/8"	8 1/2"	7 1/2"
2"	8-160 gpm	—	8 gpm	—	—	—	15 1/4"	10 1/2"	8 3/4"

Available with gallons or cubic feet registers.
Pressure—150 psi working pressure.
Operating temperature—0-50°C (120°F)

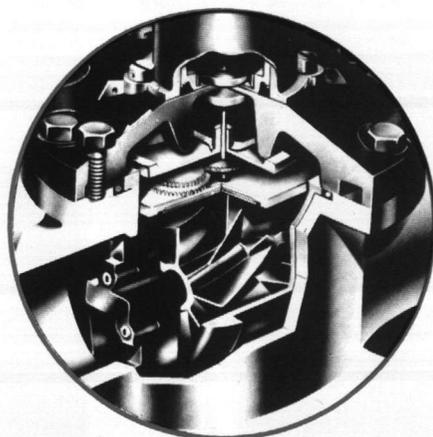
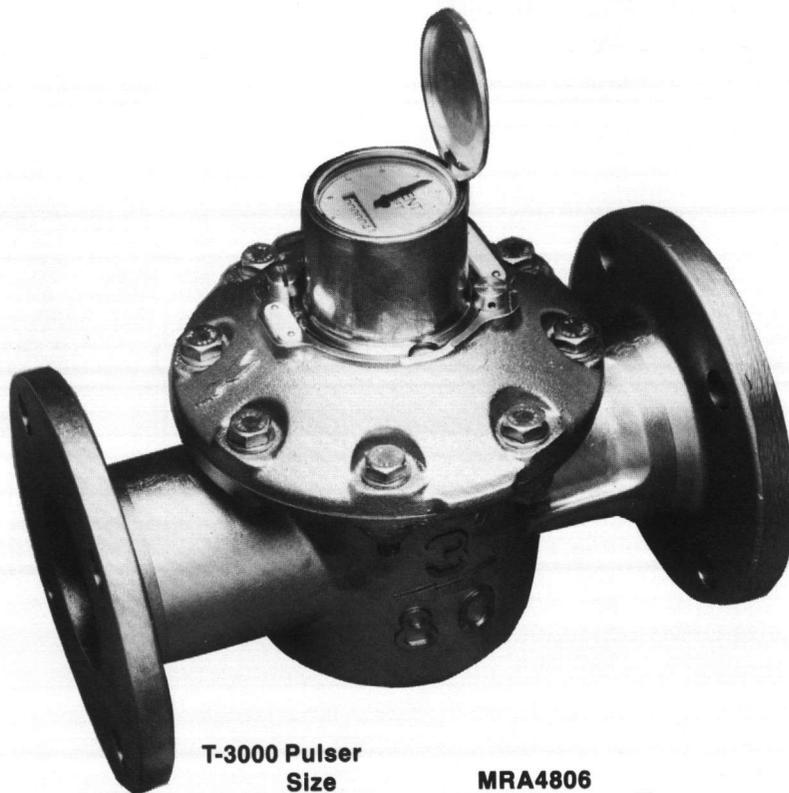
Connection—NPT male (1 1/2" and 2"—female)
*Available in bronze only.

WATER

MAGNETIC TURBINE — Cast Iron and Bronze — Series 3000 1½", 2", 3", 4", 6", 8", 10", 12" — 3 to 6500 gpm.

Accurate ± 2% all sizes. New concept for lower metering costs and trouble-free service. Cast iron or bronze body. Tungsten Carbide shafts. Working chamber removable for ease of maintenance. Flow straightening vanes reduce turbulence. Nonslip ceramic magnetic gland.

Sealed register can be mounted in any one of four positions. The working chamber is set in a tapered circular area to facilitate removal. Available with pulse head to interface with Rate of Flow Transmitter and Batch Controller.



T-3000 Pulsar Size	MRA4806
1½"-2"	1 contact/gal
3", 4", 6", 8"	1 contact/10 gal
10", 12"	1 contact/100 gal

SPECIFICATIONS

Performance

Meter sizes	1½"	2"	3"	4"	6"	8"	10"	12"
Minimum flow (± 2%) in gpm	3	3	4	7	15	30	79	158
Maximum recommended continuous flow in gpm	160	160	600	1000	2000	1600	2200	3398
Peak flow in gpm	200	200	750	1250	2500	3000	4800	6500

Pressure — 200 psi working pressure cast iron, 150 lbs. bronze.

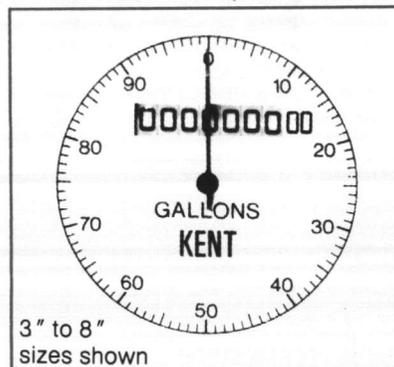
Operating temperature — 0-50°C (120°F)

Connections — Cast iron or bronze flanged ends, flat face drilled to ASA 150 lb. pattern. Bronze meters also available with oval flange in 1½" and 2" sizes.

* Iron-bodied meter only.

Optional Kynar lining is available.

Clean, easy-to-read register face with center-sweep test hand.

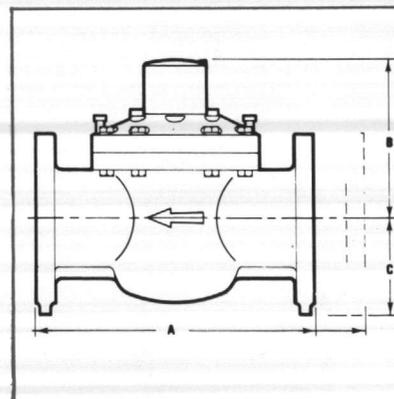


Dimensions — Iron

Meter size	1½"	2"	3"	4"	6"	8"	10"	12"
A Overall length	12¼	12¼	16¼	19	19¾	20½	17 ²³ / ₃₂	19 ¹ / ₁₆
B Center line to top	5	6 ¹ / ₁₆	6 ³ / ₁₆	7 ¹ / ₈	9 ¹ / ₁₆	9 ⁷ / ₁₆	10 ²⁹ / ₃₂	10 ²⁹ / ₃₂
C Center line to bottom	2 ¹ / ₈	3 ¹ / ₈	4 ¹ / ₈	4 ¹ / ₈	5 ¹ / ₈	6 ¹ / ₈	9 ²³ / ₃₂	9 ²³ / ₃₂
D Width	6 ¹ / ₁₆	7 ¹ / ₈	7 ¹ / ₈	9 ¹ / ₁₆	11 ¹ / ₂	13 ¹ / ₈	16 ¹ / ₄	19 ¹ / ₈
Weight (lbs.)	33½	26½	37½	55½	98½	174	296	335
Shipping Weight (approx.)	37	31	40	64	105	183	308	347

Dimensions — Bronze

Meter size	1½"	2"	3"	4"	6"
A Overall length	10	10	12	14	18
B Center line to top	9	9	9½	10½	11½
C Center line to bottom	3 ³ / ₃₂	3 ³ / ₈	4 ³ / ₃₂	5	5 ²⁷ / ₃₂
D Width	7 ¹³ / ₃₂	7 ¹³ / ₃₂	7 ¹⁵ / ₁₆	9	11½
Weight (lbs.)	20	24	33	51	104
Shipping Weight (lbs.)	24	29	36	60	111



WATER

COMBINATION METER— Bronze—2", 3", 4" and 6"—1/4 to 2500 gpm.

Designed for those applications where large variations in flow are experienced, assuring metering accuracy at every flow.

This meter combines the accuracy and performance of both the C-700 on Page 2 and the Turbine 3000 on Page 3. Flows as low as 1/4 gpm are metered through the C-700. Then, as flow rate increases to a predetermined level, the built-in changeover valve closes and higher flows to 2500 gpm are metered through the turbine.

Pulsers are available for all standard sizes.

Specifications:

Flow Range	Min. Flow	Max. Rec. Flow	Peaking
2"	1/4 GPM	100 GPM	160 GPM
2"	1/4 GPM	325 GPM	650 GPM
4"	1/2 GPM	575 GPM	1150 GPM
6"	3/4 GPM	1560 GPM	2500 GPM

Operating temperature – 0-50°C(120°F)

Working pressure – 150 psi



HYDRANT METER

The Kent Fire Hydrant Meter has been designed to have the highest capacity available in the industry. The meter is constructed of a high silicon grade cast aluminum, which makes the unit very light weight yet durable. The internal mechanisms are interchangeable with the proven reliable Kent Series 3000. This design concept minimizes the need for spare parts.

Performance

Meter Size	2 1/2" x 3"
Normal Test Flow Range Min./Max. - 11/2%	6-750
Safe Max. Operating Capacity (gpm) - 11/2%	750
Max. Rate Continuous Duty (gpm) - 11/2%	600
Min. Operating Capacity (gpm) - 11/2%-5%	5
Max. Loss of Head at Safe Max. Operating Capacity (psi)	9
Min. Registration of Center - (gals.)	1
Min. Registration of Center - (gals.) Sweep Test Hand (cu. ft.)	1 1/10
Max Register Capacity (gals.) (cu. ft.)	1000 Millions 100 Millions

Max. working pressure 150 psi. Max. working temperature 120 F.



Dimensions

Meter Size	2 1/2" x 3"
Overall length (nominal) (A)	14 3/4"
Center line to top (B)	7 1/2"
Center line to bottom (C)	3"
Width	7 3/8"
Weight lbs.	16
Shipping Weight lbs. (approx.)	25

HOT WATER

ESJ-Q — 3/4" — 1.0 to 22 gpm — to 195°F

The low-cost ESJ-Q is a single jet, inferential type meter designed for commercial and industrial applications in measuring hot water consumption up to 195°F. Because of the compact size, it is extremely suitable for in-wall installation with conventional studding.

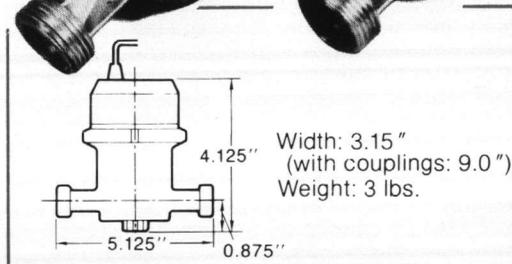
Available with either a standard register or a pulser / register combination, the ESJ-Q is the ideal flow element for interfacing with Rate of Flow Transmitters, Batch Controllers, etc.

The construction provides a magnetic coupling between a wetted gear train and the totalizing register. The magnetic coupling is through an O-ring sealed, polypropylene pressure plate.

Specifications

Maximum Operating Temperature	195 °F
Flow Range	1 to 22 gpm
Maximum Continuous Flow	11 gpm
Working Pressure	150 psig
Couplings	3/4" NPT

Pulse element is an SPST, dry contact switch, rated at 3 watts, noninductive. Contact closure rate: 1/gal.



MTR — 1" and 1 1/2" — 0.57 to 44 gpm, to 230°F



The MTR series are multijet hot water meters featuring a magnetically coupled register, designed for operation up to 230°F.

When provided with a pulser assembly, the MTR becomes an ideal flow element for interfacing with Rate of Flow Transmitter, as well as providing a contact closure for a remote counter.

Specifications

Flow Range (gpm)

Meter Size	Min. (-5%)	Min. (+2%)	Max. Cont. Flow	Peak Flow
1"	.57	1.54	8.0	17.6
1 1/2"	1.32	4.4	22.0	44.0

Pressure/Temperature Ratings

Temp. °F.	-20—150	200	230
Min. PSIG	—	6	25

Pressure—230 psi working pressure
Operating Temperature—to 230°F
Connections—NPT union connections
(Designed for horizontal installation only.)

Dimensions

Meter Size	1"	1 1/2"
A	10.24"	11.81"
B	14.76"	17.32"
C	5.43"	6.06"
D	3.81"	4.25"
Width	3.81"	5.35"
Weight (lbs.)	9.7	18.5

Specifications Flow Range (gpm)

Meter Size	TM 230				TM 350		
	Min. (-5%)	Min. (+2%)	Max. Cont. Flow	Peak Flow	Min. (-2%)	Max. Cont. Flow	Peak Flow
2"	2	9	53	110	4	53	110
3"	3	18	132	374	5	132	330
4"	4	26	220	550	7	220	528

Pressure/Temperature Ratings

Temp. °F.	-20—150	200	230	250	275	300	325	350
Min. PSIG	—	6	25	45	72	112	154	194

Pressure — 230 psi working pressure

Operating Temperature — 230°F and 350°F

Connections — ASA 125 lbs., raised face iron flanges
(Designed for horizontal installation only.)

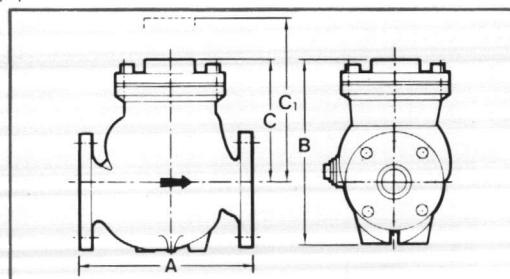
Dimensions

Meter Size	2"	3"	4"
A	10.6"	11.8"	14.2"
B	12.4"	13.9"	15.0"
C	8.46"	9.4"	9.4"
C ₁ (Height for removing measuring device)	16.9"	17.9"	18.5"
Width	6.5"	7.5"	7.9"
Weight (lbs.) - TM 230	46	68	86
Weight (lbs.) - TM 350	54	75	93

TM 230/350 — 2", 3" and 4" — 2 to 550 gpm, to 350°F

The TM 230/350 hot water meters are Woltman vertical impeller-type meters featuring a magnetic drive between the measuring element and the register, reducing the number of working parts actually in contact with the hot water.

The TM 230 is designed for maximum working temperature to 230°F; the TM 350 to 350°F. Selection of the correct meter for accurate registration and long-term reliability should be based on actual working conditions, e.g.: pressure, permanent and peak loads, minimum accurate registration, temperature, mounting position, etc., rather than nominal pipe size.



OIL METERS

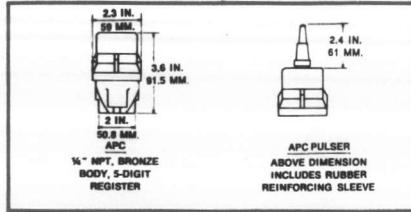
**HIGH-TEMPERATURE
HIGH-VISCOSITY**

MINI-MAJOR™ — Oil, most petroleum-base liquids 1/4" — 0.6 gph to 48 gph — to 400 psi

This oscillating piston meter provides high-accuracy measurement down to 0.6 gph on light oils. Peaks to 48 gph can be handled within the basic meter accuracy of $\pm 1\%$. Line leakage is sensed by a flow indicator which rotates with the slightest trickle through the meter. Register provides measurement resolution to better than 0.01 gallon by means of a disc indicator which rotates 1 revolution per 0.1 gallon. The pulser head provides a high-frequency contact closure to allow interfacing with Batch Controllers and Rate of Flow Transmitters.

Special ruggedized versions are available for monitoring fuel consumption in diesel engines, both in heavy vehicle service as well as stationary engines.

Magnetic coupling system eliminates packing gland leakage.



Specifications

- Operating Temperature—
 - Register model—up to 50°C (120°F)
 - Pulser model—up to 100°C (212°F)
- Working Pressure—400 psi
- Flow Range—0.6 to 48 gph (1.3 to 48 gph for water)
- Connections—1/4" NPT female
- Accuracy— $\pm 1\%$ from 0.6 to 48 gph
- Dimensions—
 - Register—3.6" high, 2" wide at connection ports
 - Pulser—add 2.4" to height



Materials of Construction—
Brass body and chamber. Nitrile, teflon or viton gaskets and o-rings. Carbon, aluminum or ebonite pistons.

METRON™ MULTI-VISCOSITY 1/2", 3/4", 1"



The Metron family of oil meters provides accurate measurement of flow from 1.8 to 1200 gph, over a wide viscosity range.

The 1/2" and 3/4" oil meters are ideally suited for fuel measurement in nozzle lines of oil burners. The 300°F @ 300 psi rating, flow rate capability down to 1.8 gph, and short piping length make this meter a

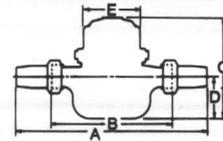
natural choice for fuel oil measurement. Available with a pulser for use in circulating loop burner systems.

A ruggedized version of the 1/2" meter is available for use with diesel engine injector systems having high flow rates.

Metron meters are also available with pulsers designed to interface with the KENT Rate of Flow Transmitter. The output from this transmitter is a process control signal such as 4-20 mdc, etc.

Specifications

Performance		1/2"		3/4"		1"	
Viscosity at operating temperature		up to 90 SSU	over 90 SSU	up to 90 SSU	over 90 SSU	up to 90 SSU	over 90 SSU
Accurate to 1% down to gph		18	4.8	30	6	48	12
Accurate to 2% down to gph		3.6	1.8	18	4.8	36	8.4
Maximum recommended continuous flow gph		160	160	350	350	500	500
Peak flow		300	300	780	780	1200	1200



Dimensions (in inches)

	1/2"	3/4"	1"
A	7 7/8"	10 1/2"	12 1/4"
B	4 1/2"	6 1/2"	7 7/8"
C	5 3/8"	5 3/8"	6 3/8"
D	2 1/8"	2 1/8"	2 7/8"
E	3"	3"	3"

Pressure

300 psi working pressure

Materials of Construction

Brass body and working chamber
Anodized aluminum piston (ebonite for water)

Operating Temperatures

0-80°C (176°F). Optional high trim available for operation to 150°C (302°F).

Net Weights

1/2"—5.25 lbs., 3/4"—6.50 lbs., 1"—12 lbs.

MASTER INDUSTRIAL — to 300°F, 1 1/2", 2", 3", — 1.0 to 210 gpm

The Master Industrial Oil meter line handles flows from 1 to 210 gpm, over a wide viscosity range. Available with pulsers for use with batching control systems, remote ticket

Specifications

Performance		1 1/2"		2"		3"	
Viscosity at operating temperature		up to 90 SSU	over 90 SSU	up to 90 SSU	over 90 SSU	up to 90 SSU	over 90 SSU
Accurate to 1% down to gpm		1.8	1.0	3.6	1.3	7.2	2.5
Accurate to 2% down to gpm		1.0	0.6	1.8	1.0	4.0	1.4
Maximum recommended continuous flow gpm		24	24	52	52	104	104
Peak flow		48	48	104	104	208	208

printers and Rate of Flow Transmitters.

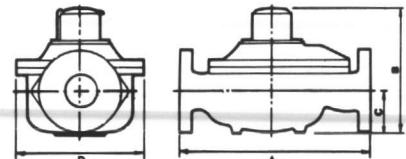
Straight-reading digital counter can be positioned at any one of four points relative to flow direction.

Pressure—150 psi working pressure

Operating Temperature—
High temperature trim for operation to 150°C (300°F)

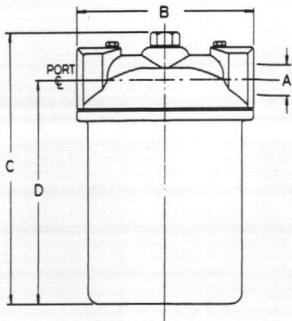
Materials of Construction—

- Iron body and cover
- Bronze working chamber
- Anodized aluminum piston
- Viton o-ring
- Asbestos fiber gasket



	1 1/2"	2"	3"
A	11.0	13.6	16.6
B	8.5	9.6	11.0
C	2.3	3.2	3.7
D	7.8	9.2	10.8

1/4 Inch Cartridge Filter



Filter p/n 2455-F4001

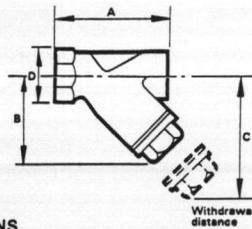
Connections: 1/4" NPT
 Filter: 25 micron
 Recommended Working Pressure: 50 psi
 Yield Pressure: 200 psi
 Materials: Cast iron, steel, wool
 Weight: 3.1 lbs.
 Dimensions: A = 1/4" NPT
 B = 4-3/8"
 C = 6-1/4"
 D = 5-5/16"
 Replacement Filter: 2455-F4002
 Service: Light Oils Only

Cartridge Filters Replacement Filters

"Y" Type Strainer Replacement Elements

1/2 Inch - 1 Inch "Y" Type Strainer

Maximum Working Pressure: 200 psi
 Material: Body - malleable iron
 Screen: 40 mesh st.st.



DIMENSIONS

Size	Part No.	A In.	B In.	C In.	D In.	Weight lb.	Replacement Element
1/2"	2455-S3013	2-7/8	2-1/8	3-3/8	1-7/17	1-1/4	2455-S3014
3/4"	2455-S3015	3-1/2	2-1/2	4-3/8	1-5/8	1-1/2	2455-S3016
1"	2455-S3017	4-1/8	2-7/8	5-1/8	2-1/16	2-1/4	2455-S3018

Totalizing Counters, Resettable, 115 VAC

Miniature electric counters for remote totalization of fluid flow, pushbutton resettable.

Figures 6
 Speed Up to 1000 cpm
 Figure Size 3/16" high
 Reset Pushbutton
 Mounting Base or panel

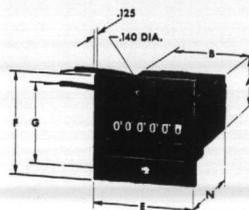
Finish Black self-extinguishing plastic
 Electrical Connections Wire leads, 10" long, AWG 20, stripped 3/8"
 Power Requirements Count coil 3 watts

Specify:
 a. 6-Y-41322-406-ME-Q, base mount
 b. 6-Y-41323-406-ME-Q, panel mount

Totalizing Counters, Non-Resettable, 115 VAC

7-Y-41349-406-ME, panel mounted, wire lead connection, 7 figure, non-reset type.

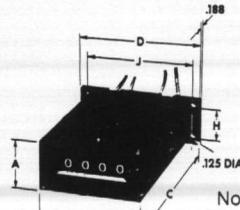
Totalizing Counters



PANEL MOUNTED

6-Y Counters

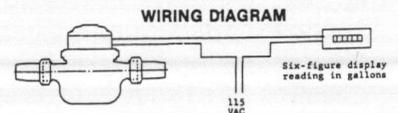
Dimension	Value
A.	1.00"
B.	1.97"
C.	2.64"
D.	2.58"
E.	2.25"
F.	1.80"
G.	1.40"
H.	.89"
J.	2.25"
N.	2.45"



BASE MOUNTED

7-Y Counters

Dimension	Value
A.	1.00"
B.	1.60"
C.	2.38"
D.	2.19"
E.	1.80"
F.	1.80"
G.	1.40"
H.	.89"
J.	1.88"
N.	2.19"



Note: Only 6 digit units are stocked.

Cut Out Dimension
 6-Figure Counter:
 2.09" x 1.11"
 7-Figure Counter:
 1.72" x 1.11"

ELECTRONICS

EBC Electronic Batch Controller

FEATURES

- Five-Digit LED Display with programmable decimal point.
- Non-Volatile Memory.
- Bi-Directional Count Control—reset to preset or reset to zero. Auto recycle or push-button reset.
- Two Stage Shutdown—EBC-2 provides a variable preset to initiate a partial valve closure (trickle flow) prior to closing the valve at the end of the batch.
- Computer Interface Options.
- Field Programmable, Micro-processor Based.



SPECIFICATIONS

Power Requirements AC operation: 120/240 VAC (+ 10% - 20%), 47 to 63 Hz.
Power: 18 watts maximum.

Environment Operating Temp.: 32 to 130°F (0-55°C)

Physical Display size 5-digit, 0.56" H (1.42cm) (with programmable decimal point location).

Output Rating - Relay Contacts: Type: Two Relays each with single set of Form C contacts.

Load Voltage: 120/240 VAC.
Load Current: 5 amps resistive.
1.5 amps at 80% power factor.

Time Out:

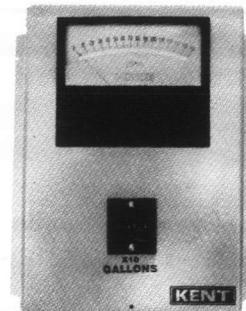
Duration: 0.01 to 99.99 seconds
Accuracy: + 0.01 second for time-out valves below 1 second. + 1 for time valves above 1 second.

Counters: Count Range: 5-digits (0 to 99,999) with rollover.
Present Range: 5-digits (0 to 99,999) (102 preset ranges)

RFTB Rate of Flow Transmitter

FEATURES

- Operable with any KENT flowmeter
- Provides analog output signal proportional to the flow rate
- Provides contact closure output at the rate of 1 contact/gallon, 1 contact/10 gallons or 1 contact/100 gallons
- Field calibrated



Specifications

Input —
Any KENT flowmeter or other contact output device pulsing at 100, 1, 0.1 or 0.01 contacts per gallon. Input frequency range at .03 to 250 Hz for full scale output. 12 mADC contact closure current at 12 VDC.

c) SPST, Form A, N/O 2A contact closing at the rate of 1 contact/gallon, 1 contact/10 gallons or 1 contact/100 gallons

Housing —
NEMA 1, normally 9" W x 10" H x 4" D.

Temperature —
- 20°F to + 120°F operating, - 40°F to + 165°F storage

Power Out —
+ 12 VDC at up to 50 mADC (available for field transmitters - not intrinsically safe design)

Power In —
115 / 1 / 60, 2 watts maximum

Optional Housings, Counters and Displays available — Consult factory.

Output —
a) 0-1 mADC into 0-700 ohms
b) 4-20 mADC into 0-1000 ohms



Represented by:

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073



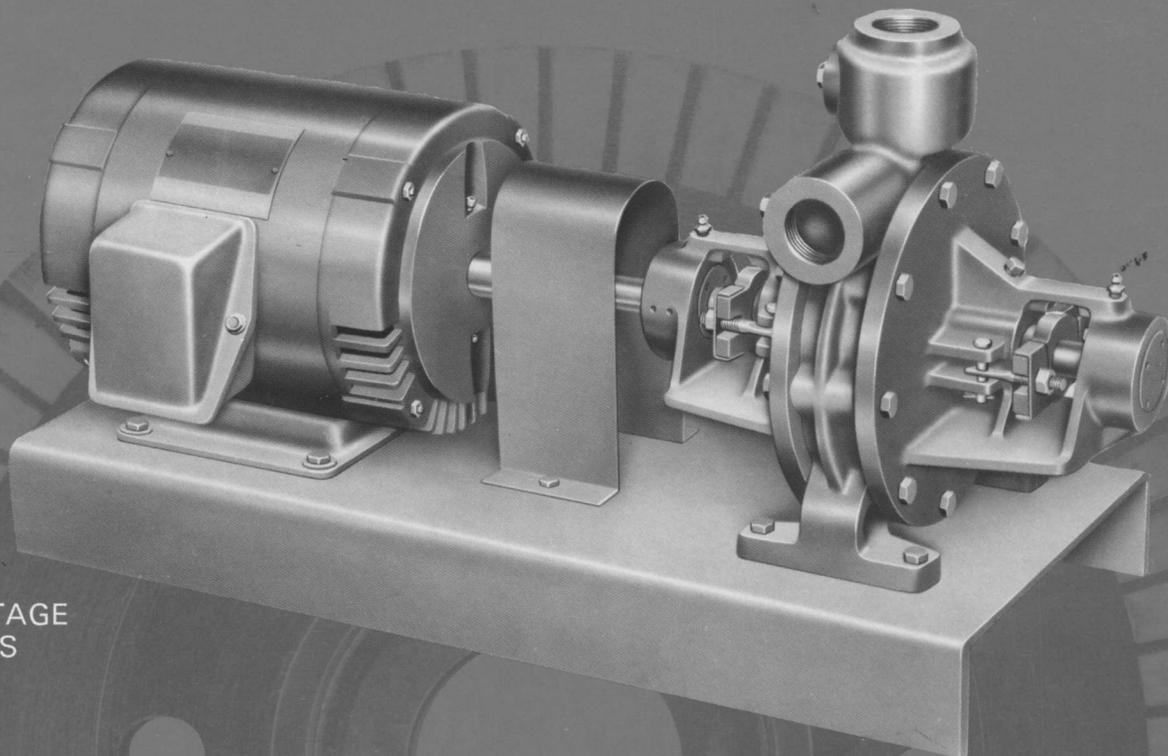
Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

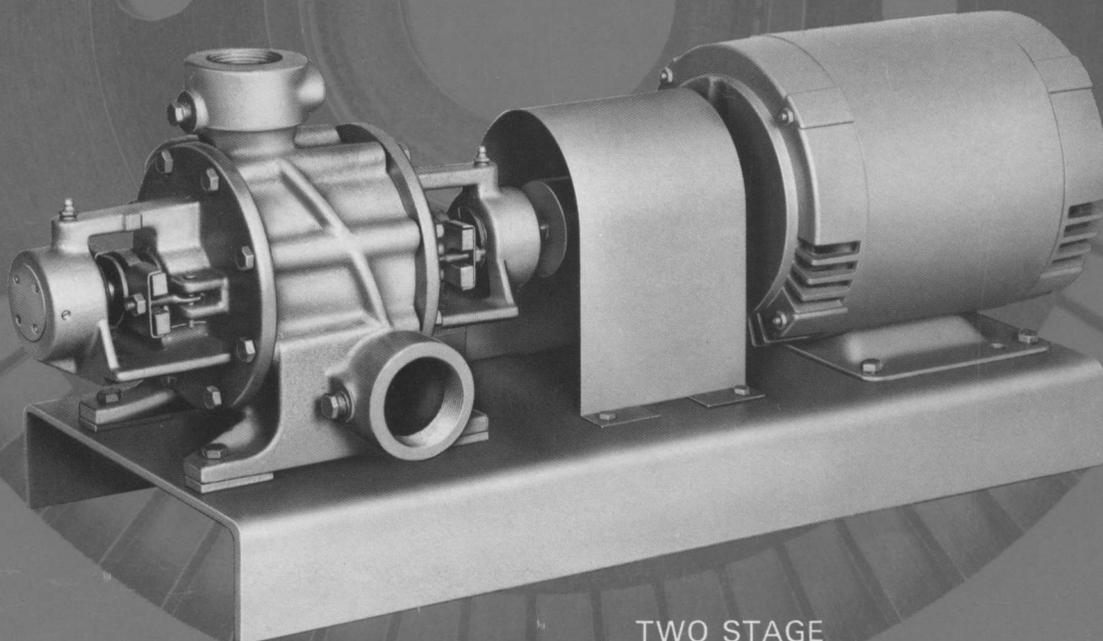
MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
1-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

AURORA PUMP

BULLETIN 110/120
110-120 SERIES
ONE & TWO STAGE
TURBINE TYPE
PUMPS—"APCO"
CAPACITIES TO 150 G.P.M.
HEADS TO 920 FEET
TEMPERATURES TO 275°F.



SINGLE STAGE
110 SERIES



TWO STAGE
120 SERIES

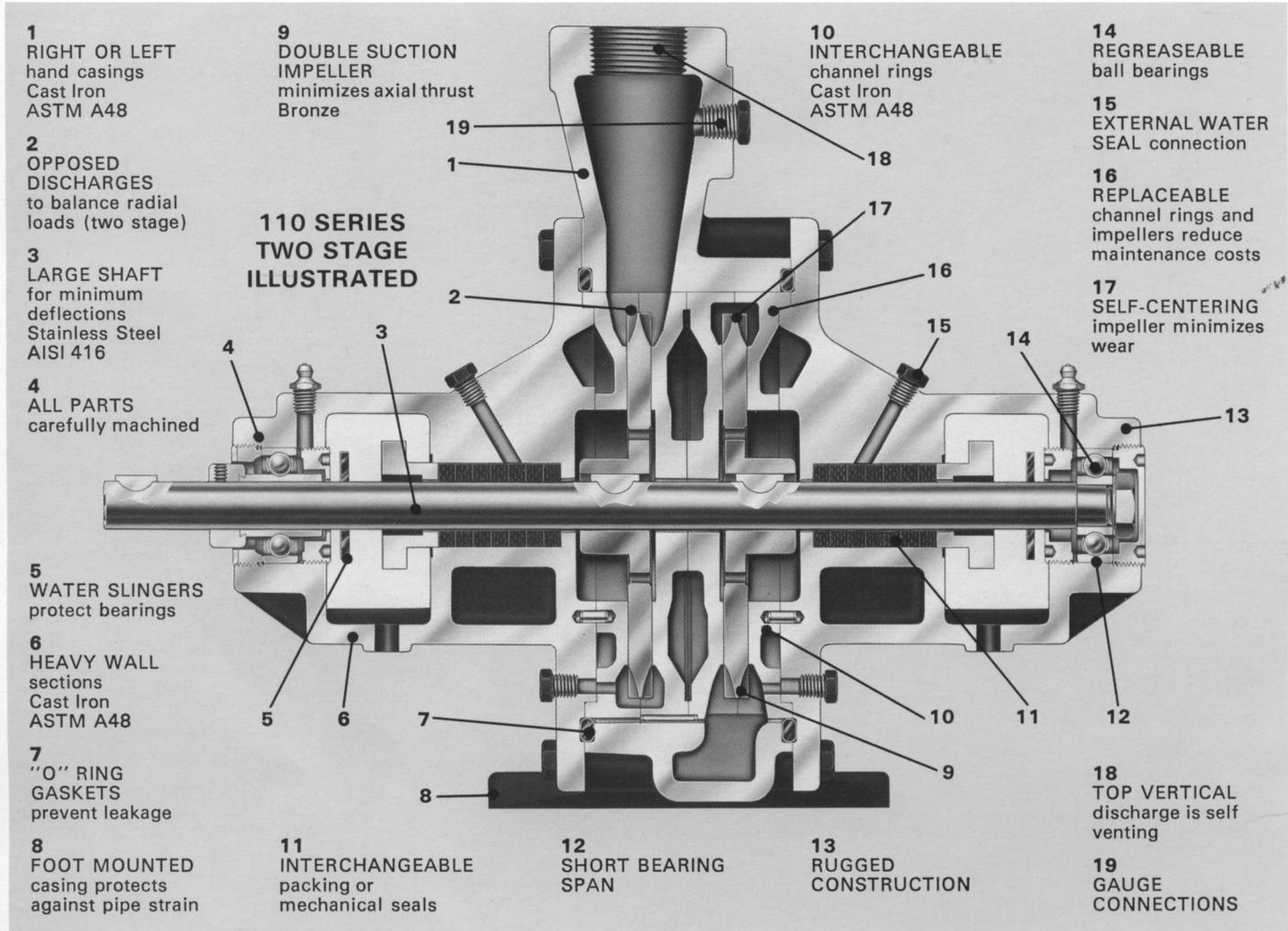
INTRODUCTION

AURORA TURBINE PUMPS

AURORA PUMP, a pioneer in turbine pump design, has long been the leader in the turbine pump industry. AURORA's leadership consistently offers the ultimate in turbine pump design. The regenerative turbine pump offers many advantages in the

area of low flow and moderate to high pressure. A turbine pump is efficient under low flow — high pressure conditions and delivers a steady stream of liquid free from pressure pulsations. There is no metal to metal contact existing within the operat-

ing parts of a turbine pump channel. Turbine pumps have solved many liquid handling problems. Because of this versatility, thousands of turbine pump units have been in use for over 50 years. Aurora offers an efficient, economical and proven pump.



QUICK REFERENCE APCO-TURBINE FEATURE SELECTOR

STANDARD

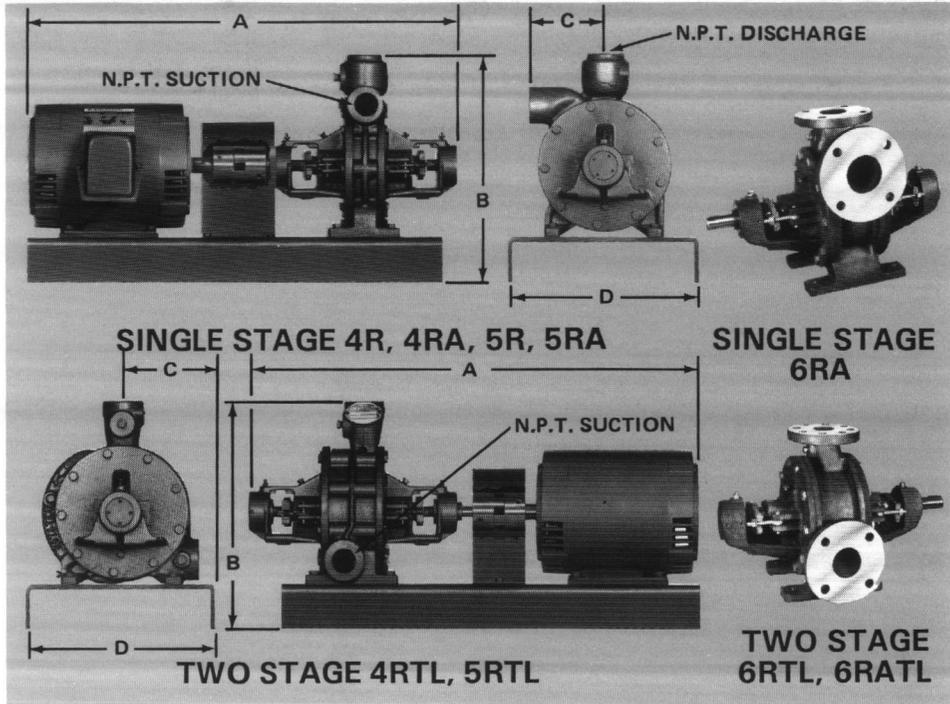
- Bronze fitted construction
- Hydraulically balanced bronze impeller
- Right or left hand rotation
- Regreaseable ball bearings
- Short bearing span
- 300# case working pressure (110)
- 400# case working pressure (120)
- Interwoven graphited fiber packing
- 416 stainless steel shaft
- Floating impellers
- Removable channel rings
- Coupling guard
- VIP TEST — Every pump hydrostatically tested and given running check consisting of head capacity and horsepower readings at your specified operating conditions.

OPTIONAL

- All iron, bronze ring, all bronze or special alloy construction
- Ductile iron, stainless steel or special alloy impeller
- Mechanical seals
- 316 stainless steel or monel shaft
- External sealing line to stuffing box
- Lantern ring (5 & 6 series 110) & 120
- Formed steel or drip-rim bases
- Double extended shaft
- Bypass with manual shut-off valves
- Bypass with relief valve
- Self priming features
- Certified performance test data can be supplied consisting of head capacity and horsepower readings taken over the full operating range of the pump.

ENGINEERING SPECIFICATIONS AND DIMENSIONS - 110 SERIES

The contractor shall furnish (and install as shown on the plans) an Apco regenerative turbine type pump model size (Bronze Fitted) (Bronze Ring) (All Iron) (All Bronze). Each pump shall have a capacity of G.P.M. when operating at a total head of feet at the specified temperature, viscosity, specific gravity, and NPSH. The speed of the pump shall not exceed 1750 R.P.M. The pump is to be furnished with (packing) (mechanical seals). The pump shall be of vertically split case design with removable bearing housings and the channel rings shall be replaceable without replacing the bearing housings. The suction and discharge connections shall be cast integral with the casing. The discharge shall be in a vertical position and the pump shall be self-venting. The casing and bearing housings shall be cast of 30,000 pound tensile strength cast iron. The impeller(s) shall be located on the stainless steel shaft between grease lubricated ball bearings. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Each pump shall be tested at the head and capacity specified prior to shipment. The pump shall be mounted on a (steel drip rim) (steel) baseplate and flexibly coupled to a HP phase hertz voltage R.P.M., horizontal (dripproof) (totally enclosed) (explosion proof) motor. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.



SINGLE STAGE										TWO STAGE							
4R	A35, A4, B4, C4, D4, E4, F4, G4, H4, I4, 14A				4RA	M4, P4, R4				NEMA Motor Frame	1750 R.P.M. H.P.	4RTL	D4T, E4T, F4T, G4T, I4T, 14TA				
Unit Wgt.	Disch. 1 1/2		Suct. 1 1/2		Unit Wgt.	Disch. 1 1/2		Suct. 1 1/2			Unit Wgt.	Disch. 1 1/2		Suct. 1 1/2			
	A	B	C	D		A	B	C	D			A	B	C	D		
86	24	12	4	7	125	27	11	4	9	56	1/3 1/2 3/4	125	25	11	4 1/2	9	
66	22	13	4	7	108	25	12	4	9	143T	1	105	23	12	4 1/2	9	
71	23	13	4	7	113	26	12	4	9	145T	1 1/2-2	110	24	12	4 1/2	9	
95	24	13	4	9	126	27	12	4	10	182T	3	126	25	13	4 1/2	10	
100	25	13	4	9	131	28	13	4	10	184T	5	131	26	13	4 1/2	10	
161	27	14	4	10	195	30	14	4	12	213T	7 1/2	195	28	14	4 1/2	12	
181	29	14	4	10	215	32	14	4	12	215T	10	215	30	14	4 1/2	12	
5R	D5, E5, F5, G5, H5, I5				5RA	J5, K5, L5, M5, N5, P5				NEMA Motor Frame	1750 R.P.M. H.P.	5RTL	D5T, E5T, F5T, G5T, H5T, I5T				
Unit Wgt.	Disch. 1 1/2		Suct. 1 1/2		Unit Wgt.	Disch. 1 1/2		Suct. 2			Unit Wgt.	Disch. 1 1/2		Suct. 1 1/2			
	A	B	C	D		A	B	C	D			A	B	C	D		
125	28	15	5	9						56	1/3 1/2 3/4						
111	26	15	5	10	128	28	15	5	10	143T	1	128	28	15	5	10	
116	27	15	5	10	133	29	15	5	10	145T	1 1/2-2	133	29	15	5	10	
126	28	15	5	10	143	30	15	5	10	182T	3	143	30	15	5	10	
133	29	15	5	10	148	31	15	5	10	184T	5	148	31	15	5	10	
195	31	16	5	12	214	33	16	5	12	213T	7 1/2	214	33	16	5	12	
219	33	16	5	12	234	35	16	5	12	215T	10	234	35	16	5	12	
332	36	18	5	13	347	38	18	5	13	254T	15	346	38	18	5	13	
357	38	18	5	13	381	40	18	5	13	256T	20	381	40	18	5	13	
6RA	G6, H6, J6, K6				NEMA Motor Frame	1750 R.P.M. H.P.	6RTL	D6T, E6T, F6T				6RATL	G6T, H6T, J6T, K6T				
Unit Wgt.	Disch. 2 1/2		Suct. 3				Unit Wgt.	Disch. 2		Suct. 2 1/2		Unit Wgt.	Disch. 2 1/2		Suct. 3		
	A	B	C	D			A	B	C	D		A	B	C	D		
245	35	18	6 1/2	12	182T	3	264	35	17	6 1/2	12	325	38	17	7	15	
249	36	18	6 1/2	12	184T	5	369	36	17	6 1/2	12	330	39	17	7	15	
341	38	19	6 1/2	13	213T	7 1/2	361	38	18	6 1/2	13	390	41	17	7	15	
361	40	19	6 1/2	13	215T	10	381	40	18	6 1/2	13	410	43	17	7	15	
436	43	19	6 1/2	13	254T	15	456	43	18	6 1/2	13	490	46	17	7	15	
475	45	18	6 1/2	15	256T	20	495	45	17	6 1/2	15	515	48	17	7	15	
545	46	19	6 1/2	15	284T	25	565	46	18	6 1/2	15	585	49	18	7	15	
575	48	19	6 1/2	15	286T	30	595	47	18	6 1/2	15	649	50	19	7	18	

1. Dimensions and weights are approximate.
2. Dimensions are in inches and may vary ± 1/16".
3. Not for construction purposes unless certified.
4. Frame sizes shown are for open dripproof motors only.
5. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
6. All flanges are standard flat face.
7. Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information without notice.

A UNIT OF GENERAL SIGNAL 

AURORA PUMP

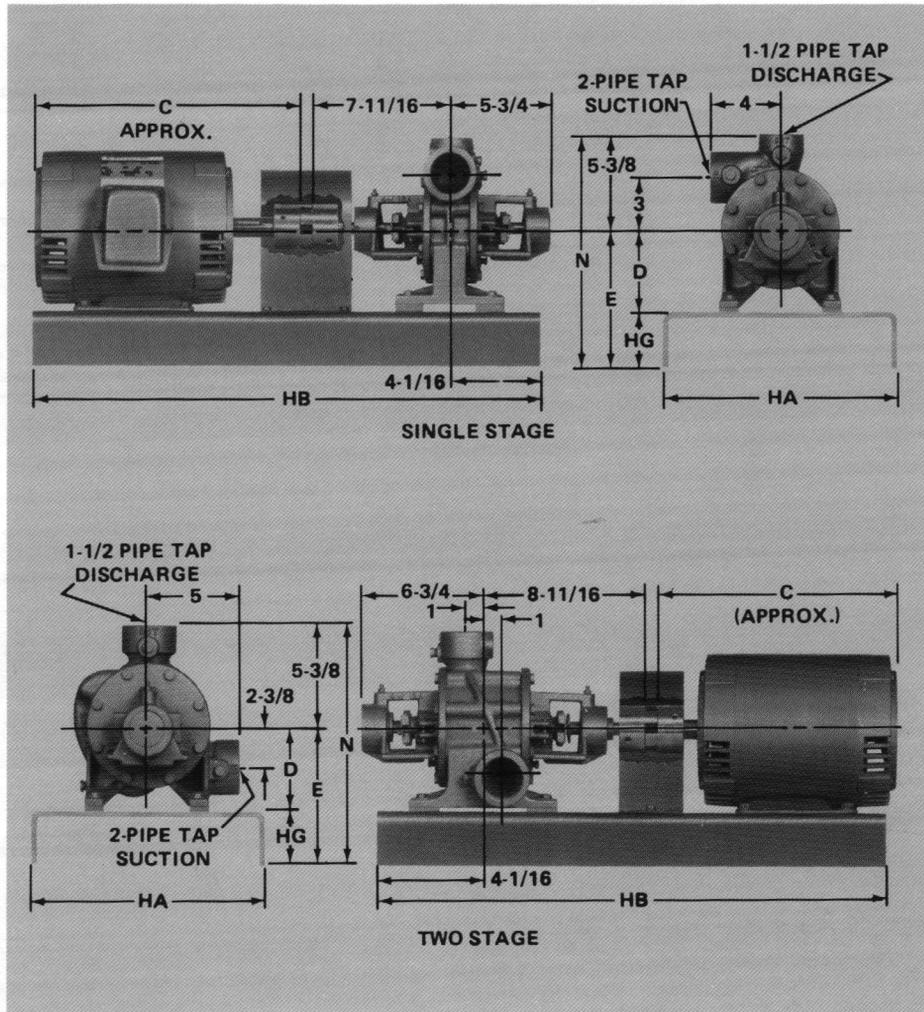
Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
 Industrial Equipment & Supplies
 Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
 I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
 Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
 OUTSIDE - NC TOLL FREE 1-800-845-6073



ENGINEERING SPECIFICATIONS AND DIMENSIONS - 120 SERIES

The contractor shall furnish (and install as shown on the plans) an Apco regenerative turbine pump model size (Bronze Fitted) (All Iron). Each pump shall have a capacity of G.P.M. when operating at a total head of feet at the specified temperature, viscosity, specific gravity, and NPSH. The speed of the pump shall not exceed R.P.M. The pump is to be furnished with (packing) (mechanical seals). The pump shall be of vertically split case design with removable bearing housings and the channel rings shall be replaceable without replacing the bearing housings. The suction and discharge connections shall be cast integral with the casing. The discharge shall be in a vertical position and the pump shall be self-venting. The casing and bearing housings shall be cast of 30,000 pound tensile strength cast iron. The impeller(s) shall be located on the stainless steel shaft between grease lubricated ball bearings. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Each pump shall be tested at the head and capacity specified prior to shipment. The pump shall be mounted on a (steel) baseplate and flexibly coupled to a HP phase Hertz voltage R.P.M., horizontal (drip-proof) (totally enclosed) (explosion proof) motor. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.



NOTES:
 1. Dimensions and weights are approximate.
 2. All dimensions are in inches and may vary $\pm 1/16"$.
 3. Frame sizes, "C" dimension and motor weight are for open drip-proof motors only.
 4. Conduit box is shown in approximate position. Dimensions are not specified as they vary with each motor manufacturer.
 5. Add pump, base and motor weight for unit weight.
 6. Not for construction purposes unless certified.
 7. Aurora Pump reserves the right to make revisions to its products and their specifications, and to this bulletin and related information, without notice.

MOTOR FRAME	D	E		HG		N		HA		HB	
		SINGLE STAGE	TWO STAGE								
56	4 1/8	6 3/8	—	2 1/2	—	12	—	9	—	21	—
143T	4 1/8	6 3/8	6 3/4	2 1/2	2 5/8	12	12 1/8	9	10	24	26
145T	4 1/8	6 3/8	6 3/4	2 1/2	2 5/8	12	12 1/8	9	10	24	26
182T	4 1/2	7 1/8	7 1/2	2 5/8	3	12 1/2	12 7/8	10	12	24	27
184T	4 1/2	7 1/8	7 1/2	2 5/8	3	12 1/2	12 7/8	10	12	26	27
213T	5 1/4	8 1/4	—	3	—	13 3/8	—	12	—	30	—
215T	5 1/4	8 1/4	—	3	—	13 3/8	—	12	—	30	—
254T	6 1/4	10 1/4	—	4	—	15 5/8	—	13	—	34	—
256T	6 1/4	10 1/4	—	4	—	15 5/8	—	13	—	34	38

LIMITATIONS-120 SERIES
 Maximum allowable suction pressure 125 P.S.I. based on standard stuffing boxes packed with packing approved for the liquid to be handled.
 Maximum Differential Pressure based on allowable shaft deflection for standard shafts.
 Case Working Pressure - P.S.I.
 -20°F to 150°F - 400 P.S.I.
 200°F - 370 P.S.I.
 225°F - 355 P.S.I.
 250°F - 340 P.S.I.
 275°F - 325 P.S.I.
 Maximum Temperature - 325°F Packing - 275°F
 Mechanical Seal - Material Code 755 - 225°F
 - Material Code 758 - 210°F

PUMP SIZE	MAXIMUM DIFFERENTIAL PRES. P.S.I.	MAXIMUM H.P.		Description	Material of Construction	MOTOR FRAME	HORSEPOWER		MOTOR WEIGHT IN LBS.	C
		3500 R.P.M.	1750 R.P.M.				3500 RPM	1750 RPM		
EX4	300			Adjusting Nuts	Steel	56	—	1/2	50	13
EX4T	400			Bearing Covers	Cast Iron ASTM A48	56	—	3/4	50	13
FX4	300			Casing	Cast Iron ASTM A48	143T	1 1/2	1	30	11
FX4T	400			Channel Rings	Cast Iron ASTM A48	145T	2	1 1/2	35	12
GX4	300			Glands	Cast Iron ASTM A48	145T	3	2	35	12
GX4T	325	20	7 1/2	Impellers	Bronze	182T	5	3	45	13
HX4	225			Packing	Graphitized Fiber	184T	7 1/2	5	50	14
HX4T	300			Shaft	Stainless Steel AISI 416	213T	10	7 1/2	120	16
IX4	175					215T	15	—	144	18
IX4T	190					254T	20	—	217	21
						256T	25	—	246	23

ENGINEERING DATA AND 120 SERIES SELECTION CHARTS

LIMITATIONS - 110 SERIES

Max. hydrostatic test pressure 450 P.S.I.
 Max. recommended case working pressure 300 P.S.I.
 Max. suction pressure 4 Series 75 P.S.I., 5 Series 150 P.S.I., 6 Series 300 P.S.I. (D6T, E6T and F6T — 275 P.S.I.)²

Max. Temperatures — Packing 225°F, Mechanical Seal 225°F, High temperature packing 275°F.

MAXIMUM DIFFERENTIAL PRESSURE - P.S.I.

PUMP SIZES	R4	90
	J6,K6	100
	P4	110
	I4A,M4,I4TA,P5,H6	125
	I4,I4T,H5,I5,M5,N5,G6	150
	L5	175
	A35,A4,B4,C4,D4, E4,F4,G4,H4,G4T	200
	K5	220
	G5	225
	J5	230
F4T,D5,E5,F5,H5T,I5T,J6T,K6T	250	
D4T,E4T,D5T,E5T,F5T,G5T, D6T,E6T,F6T,G6T,H6T	300	

NOTE: Maximum differential pressure based on allowable shaft deflection for standard shafts.

MAXIMUM HORSEPOWER

E4,F4,G4,H4,I4,I4A,D4T, E4T,F4T,G4T,I4T,I4TA	4
A35,A4,B4,C4,D4	7½
M4,P4,R4,D5,E5,F5,G5,H5, I5,D5T,E5T,F5T,G5T,H5T,I5T	10
J5,K5,L5,M5,N5,P5	20
G6,H6,J6,K6,D6T,E6T, F6T,G6T,H6T,J6T,K6T	40

NOTES: 110 SERIES

1. Selections indicate pump size in upper portion and motor H.P. in lower portion of each block.
2. A35, A4, B4, C4 and D4 pumps are also available for 3500 R.P.M. operation. See table on page 3.
3. Maximum suction pressure is based on standard stuffing boxes packed with packing approved for liquid handled.
4. All limitations are based on standard pumps constructed of standard materials and handling water.
 *Packing . . . Suction lift requires lantern ring. Seals . . . Above 100 PSI suction pressure requires balanced seals. (Not available on 4R, 4RA and 4RTL). Suction pressure . . . Above 150 PSI., the pump suction flange must be 250# rating.

SELECTION CHART 120 SERIES

1750 R.P.M.

TOTAL DYNAMIC HEAD IN FEET

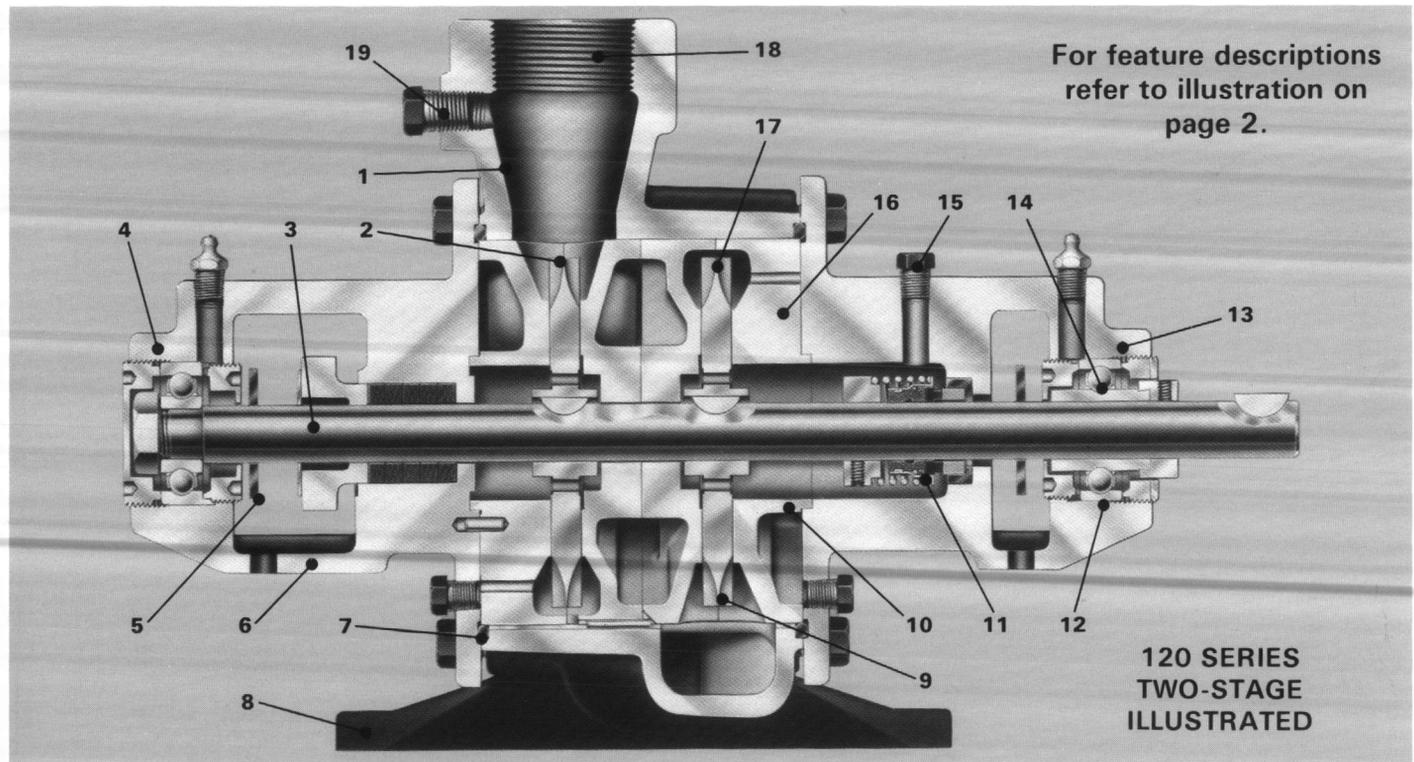
Capacity GPM	10	20	30	40	50	60	70	80	100	115	130	145	160	180	200	220	240	260	280	300	350	400	450	500	
2															EX4 ¼	FX4 ½	EX4T ½	EX4T ½	EX4T ½	EX4T ½					
4													EX4 ¼	FX4 ½	EX4T ½	EX4T ½	EX4T ½	EX4T ½							
6										EX4 ½	FX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾										
8							EX4 ½	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾														
10			EX4 ½	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																		
12	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4 ½	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾
14	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	FX4 ½	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾
16	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	GX4 ½	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾
18	HX4 ½	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																		
20	HX4 ½	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																		
22	HX4 ½	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																		
24	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																			
26	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																			
28	HX4 ½	HX4 ¼	EX4T ¾	EX4T ¾	EX4T ¾	EX4T ¾																			
30	HX4T 1																								

SELECTION CHART 120 SERIES

3500 R.P.M.

TOTAL DYNAMIC HEAD IN FEET

Capacity GPM	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850
5										EX4 5	EX4 7½	EX4T 7½	EX4T 7½				
10						EX4 3	EX4 5	EX4 5	EX4 5	EX4 5	EX4 7½	EX4T 7½	EX4T 7½				
15		EX4 2	EX4 2	EX4 3	EX4 3	EX4 3	EX4 5	EX4 5	EX4 5	EX4 7½	EX4T 7½	EX4T 7½					
20		EX4 2	EX4 3	EX4 3	EX4 3	EX4 5	EX4 5	EX4 5	EX4 7½	EX4T 7½	EX4T 7½						
25	FX4 3	FX4 3	FX4 3	GX4 5	GX4 5	GX4 5	GX4 7½	EX4T 7½	EX4T 7½								
30	FX4 3	FX4 3	GX4 5	GX4 5	GX4 5	GX4 5	HX4 10	EX4T 7½	EX4T 7½								
35	GX4 3	GX4 3	GX4 3	HX4 7½	HX4 7½	HX4 7½	HX4 10	EX4T 7½	EX4T 7½								
40	HX4 5	HX4 5	HX4 5	HX4 7½	HX4 7½	HX4 7½	HX4 10	EX4T 7½	EX4T 7½								
45	HX4 5	HX4 5	HX4 5	HX4 10	EX4T 7½	EX4T 7½											
50	HX4 5	IX4 7½	IX4 10	EX4T 7½	EX4T 7½												
55	IX4 7½															EX4T 7½	EX4T 7½



For feature descriptions refer to illustration on page 2.

120 SERIES
TWO-STAGE
ILLUSTRATED



Manufacturer's Representatives and Distributors

MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service

MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

McDONNELL & MILLER

BOILER CONTROLS
FLOW SWITCHES
LIQUID LEVEL CONTROLS
RELIEF VALVES

THE
FIRST NAME IN
BOILER
CONTROLS

NEW PRODUCTS!

Pages 15, 16, 20, 21, 22, 26 & 27

	Page
Air Flow Switches	23-25
Boiler Water Feeders	2,3-7
Feeder Cut-off Combinations	2,3
Float Operated Switches	12
Float Operated Valves	5
Liquid Flow Switches	18-22
Liquid Level Controls	13-16
Low Water Cut-offs	6-12,26
Make-up Water Feeders	4,5,26
Pressure Relief Valves	27
Proportioning Regulators	11
Pump Controllers	10-12
Replacement Head Mechanism	17

Bulletin C-84

McDONNELL & MILLER **ITT**
FLUID HANDLING DIVISION

Boiler Water Feeders and Feeder Cut-Off Combinations

McDonnell Boiler Water Feeders and Feeder Cut-off Combinations are used to provide automatic operation, and to safeguard steam and hot water boilers against the hazards of a low water condition.

A feeder cut-off combination mechanically adds water as needed to maintain the required minimum water level, and electrically stops the firing device in case of an emergency. McDonnell Feeder Cut-off Combinations include time-proven features such as—

- Packless Construction
- Cool Feed Valve
- Straight Thrust Valve Action
- Stainless Steel Valve and Seat

NOTE: All McDonnell & Miller products must be installed by qualified personnel in accordance with all applicable codes.

NOTE: Maintenance and periodic testing procedures packaged with each product must be followed.

HOW TO SELECT

FOR STEAM BOILERS

Steam Heating Boilers are classified as boilers in closed heating systems where all condensate is returned to boiler. Best recommendation for all automatically fired boilers is a feeder cut-off combination. It adds water as needed to maintain a safe operating level, and stands by to interrupt circuit to burner if water level drops into emergency zone.

Steam Process Boilers are classified as boilers in systems where not all the condensate is returned, and some make-up water is needed. A separate feeder and separate cut-off are recommended, so operating levels can be set for the wider differential required in such service.

How to Select. Selection of the correct feeder cut-off combination, or feeder, depends upon:

1. Maximum boiler pressure.
2. Differential between water supply pressure and the pressure setting of the steam pop safety valve.
3. Boiler size. (See chart below.)

Helpful Conversion Formulas Based on Sq. Ft. of Steam

$$\text{Boiler Horsepower} = \frac{\text{Sq. Ft. of Steam}}{138}$$

$$\text{Lbs. of Water Per Hour} = \frac{\text{Sq. Ft. of Steam}}{4}$$

$$\text{Gallons per Minute} = \frac{\text{Sq. Ft. of Steam}}{2000}$$

$$\text{Btu. per Hour} = \text{Sq. Ft. of Steam} \times 250$$

Boiler Size—Mfr. Gross Rating Sq. Ft. of EDR							McDonnell Products to Use				
Differential Pressure* 10 psi	Differential Pressure* 20 psi	Differential Pressure* 30 psi	Differential Pressure* 40 psi	Differential Pressure* 50 psi	Differential Pressure* 60 psi	Differential Pressure* 70 psi	Maximum Boiler Pressure	Heating Boilers		Process Boilers	
								Automatic Fired Jobs	Hand Fired Jobs	Boiler Water Feeder	Low Water Cut-off
		All Boilers up to 5000 sq. ft.					25 psi	No. 47-2	No. 47		
		All Boilers up to 5000 sq. ft.					30 psi	No. 247-2	No. 247	No. 247	No. 63
8,600	12,000	15,000	17,600	20,000	21,800	23,400	35 psi	No. 51-2	No. 51	No. 51	No. 63
10,500	17,500	22,400	26,500	30,000	32,600	35,000	35 psi.	No. 51-S-2	No. 51-S	No. 51-S	No. 63
8,600	11,600	14,600	17,000	18,800	20,600	22,100	75 psi.	No. 53-2	No. 53	No. 53	No. 150

*Differential pressure should be based on water supply pressure at boiler, minus pressure setting of steam pop safety valve.

FOR HOT WATER SPACE HEATING BOILERS

Best recommendation for all automatically-fired boilers is a feeder cut-off combination. It adds water if needed to match the discharge capacity of the relief valve, and stands by to interrupt circuit to burner if water level drops into emergency zone.

How to Select. Selection of the correct feeder cut-off combination, or feeder, depends upon:

1. Maximum boiler pressure.
2. Differential between water supply pressure and the pressure setting of the safety relief valve.
3. Boiler size.

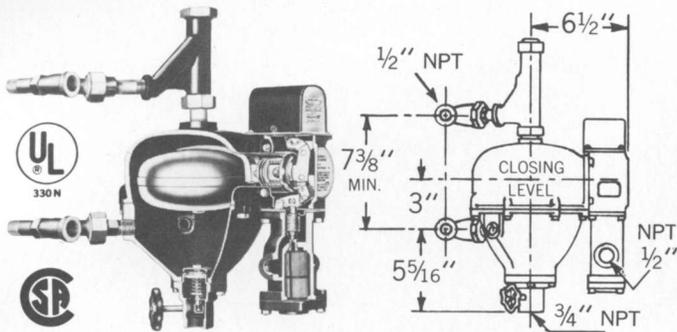
Boiler Size Btu/hr. Output Capacity					McDonnell Products to Use		
Differential Pressure† 10 psi	Differential Pressure† 20 psi	Differential Pressure† 30 psi	Differential Pressure† 40 psi	Differential Pressure† 50 psi	Maximum Boiler Pressure	Automatically Fired Jobs	Hand Fired Jobs
1,000,000	1,400,000	1,800,000	2,100,000	2,350,000	30 psi	No. 247-2	No. 247
2,000,000	3,000,000	3,750,000	4,400,000	5,000,000	35 psi	No. 51-2	No. 51
2,800,000	4,300,000	5,600,000	6,700,000	7,500,000	35 psi	No. 51-S-2	No. 51-S
2,100,000	2,800,000	3,300,000	4,200,000	4,750,000	75 psi	No. 53-2	No. 53

For larger size boilers, the McDonnell No. 93 and a motorized valve of adequate size may be used instead of a feeder cut-off combination.

†Differential pressure should be based on water supply pressure at boiler, minus pressure setting of safety relief valve.

Boiler Water Feeders and Feeder Cut-Off Combinations

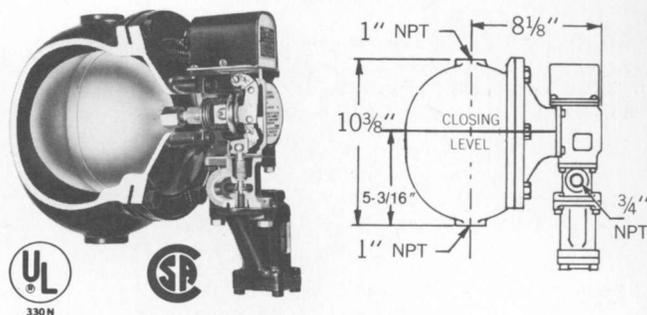
No. 47-2 and No. 47



Most widely used feeder cut-off combination for the closed steam heating system boiler up to 5000 sq. ft. capacity. Has time-saving Quick Hook-up Fittings for installation in gauge glass tapplings, and Self-Closing Blow-off Valve. No. 47 is boiler feeder only, without cut-off switch. See selection tables on page 2.

Maximum boiler pressure, 25 psi.
Maximum water supply pressure, 150 psi.

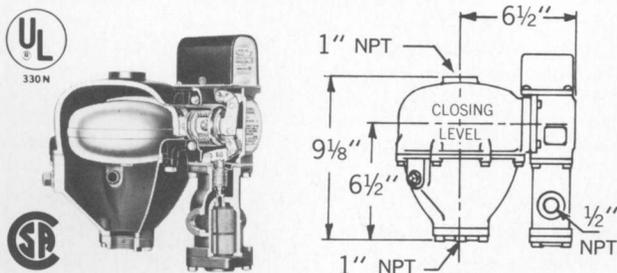
No. 51-S-2 and No. 51-S



Largest feeding capacity of all McDonnell Feeder Cut-off Combinations, for low pressure service. Used on steam and hot water boilers. No. 51-S is boiler feeder only, without cut-off switch. See selection tables on page 2.

Maximum boiler pressure, 35 psi.
Maximum water supply pressure, 100 psi.

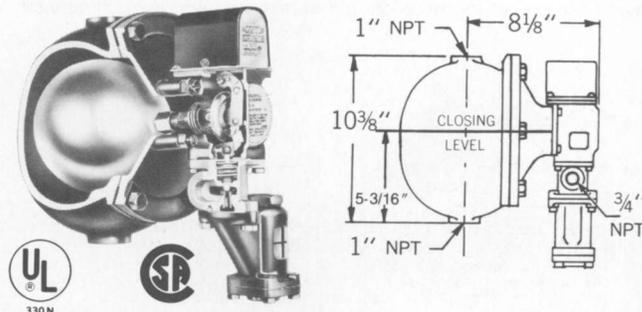
No. 247-2 and No. 247



For steam heating and process boilers up to 5000 sq. ft. and small hot water boilers. Similar to No. 47-2 but without Quick Hook-up Fittings or Self-Closing Blow-off Valve. No. 247 is boiler feeder only, without cut-off switch. See selection tables on page 2.

Maximum boiler pressure, 30 psi.
Maximum water supply pressure, 150 psi.

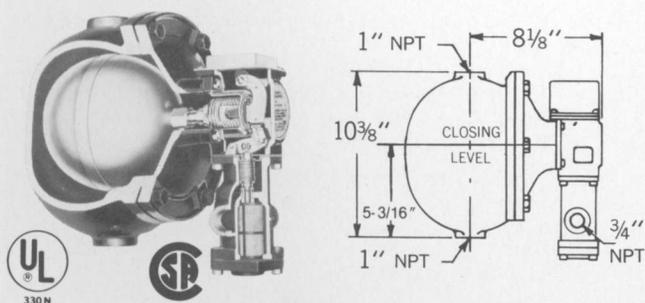
No. 53-2 and No. 53



Built for higher pressure service. Used on steam and hot water boilers. No. 53 is boiler feeder only, without cut-off switch. See selection tables on page 2.

Maximum boiler pressure, 75 psi.
Maximum water supply pressure, 150 psi.

No. 51-2 and No. 51



Has larger feeding capacity than the No. 47-2, for steam boilers above 5000 sq. ft. capacity, and for hot water boilers. No. 51 is a boiler feeder only, without cut-off switch. See selection tables on page 2.

Maximum boiler pressure, 35 psi.
Maximum water supply pressure, 150 psi.

No. 2 and No. 2M Cut-off and Alarm Switch (Model 2)



Used to add electrical low water cut-off to mechanical water feeder. Supplied as a part of the feeder cut-off combinations above (Nos. 47-2, 247-2, 51-2, 51-S-2 and 53-2) or can be purchased separately and added to boiler feeders. Has high voltage terminals for low water cut-off and for low water alarm. Order No. 2 for automatic reset, No. 2M for manual reset.

ELECTRICAL RATINGS (Underwriters Listed) AMPERE RATING

	120 VAC	240 VAC
Motor Duty	10.2	5.1
Full Load	61.2	30.6
Locked Rotor		

Pilot Duty: 120-240 VAC 60 Hertz, 125 VA or 115 VDC, 0.5 Amps

Make-up Water Feeders

In higher pressure boiler feed systems, a make-up feeder, like those shown on these pages, is usually provided on the condensate receiver. It serves to add make-up water to the receiver when necessary so there is always an adequate supply for boiler demand.

McDonnell Make-up Feeders provide large feeding capacity. Unless otherwise indicated, valves and seats are of stainless steel and protected by a large integral strainer. Positive alignment of the valve is assured by McDonnell cam-and-roller, straight-thrust action.

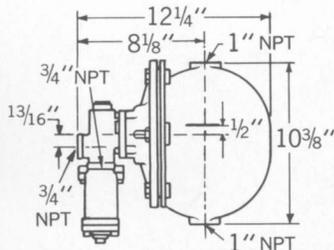
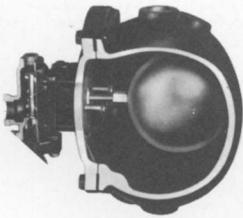
These make-up feeders, and other McDonnell Feeders such as shown on page 3, can also be used for many other liquid level control applications.

*Check factory for application information and limitations.

Water Feeding Capacity in Pounds per Hour

Product Number	City Water Supply Pressure Minus Tank Pressure								
	10 psi	20 psi	30 psi	40 psi	50 psi	60 psi	70 psi	80 psi	100 psi
25A	3100	4500	5600	6550	7400	8150	8800	9400	10200
21 Series	4100	6000	7500	8600	9600	10500	11300	12000	13200
847	1000	1500	1800	2100	2400	2600	2800	3000	3300
851	2000	3000	3700	4300	4800	—	—	—	—
851-S	3000	4000	5000	6200	—	—	—	—	—
27W	3600	5200	6000	6900	7500	8400	8900	9500	10200
551-S	2500	3600	4500	5200	5800	6500	7000	7600	8800
3155	5200	7500	9200	—	—	—	—	—	—

No. 25A

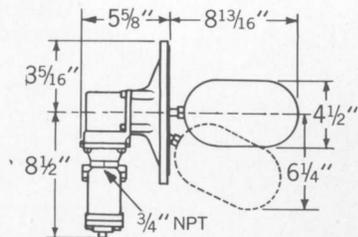


A dependable float-operated feeder used to add make-up water to condensate receiving tanks. It is mounted to the tank with 1" NPT top and bottom equalizing lines and feeds water through a separate pipe, permitting anti-syphon air gap. Has large capacity, with composition valve disc and Monel seat.

Maximum body pressure, 35 psi.

Maximum water supply pressure, 100 psi.

No. 21 and No. 221

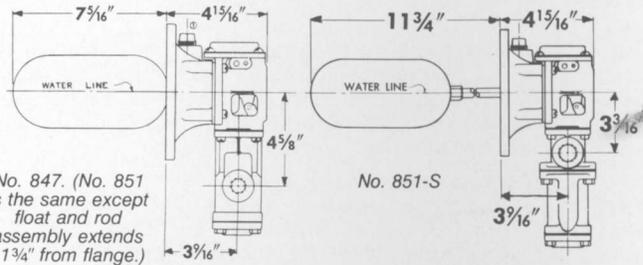
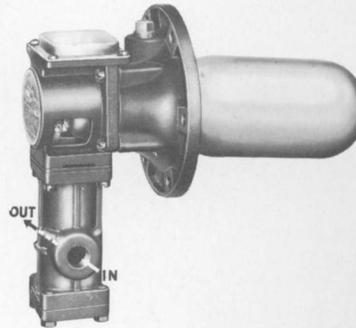


For supplying make-up water to condensate receivers. Flange mounts on side of receiver with six bolts—saves space and simplifies piping. Make-up water is fed through an integral strainer, through valve, and directly into tank. Flange bolt circles: No. 21—5 3/4"; No. 221—8 1/2".

Maximum receiver pressure, 35 psi.

Maximum water supply pressure, 150 psi.

No. 847, No. 851 and No. 851-S



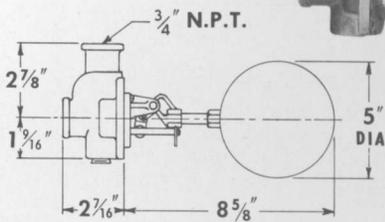
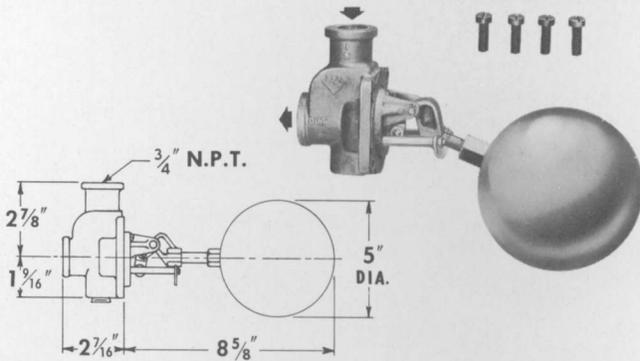
No. 847. (No. 851 is the same except float and rod assembly extends 11 3/4" from flange.)

No. 851-S

These make-up water feeders mount directly on the receiver, need no equalizing connections. They feed water through a separate line, permitting anti-syphon air gap in discharge into receiver. Operating mechanisms and capacities same as standard No. 47, 51 and 51-S feeders. Features include completely packless construction; isolated cool feed valve; straight-thrust valve action; and large built-in strainer. Mounting flanges have six 7/16" bolt holes, on 5 3/4" diameter circle.

Product Number	No. 847	No. 851	No. 851-S
Maximum Receiver Pressure	25 psi	35 psi	35 psi
Maximum Supply Pressure	150 psi	150 psi	100 psi
Feed Water Tappings, NPT	1/2"	3/4"	3/4"

No. 27W



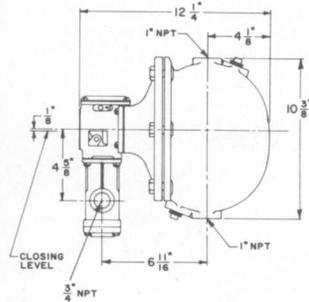
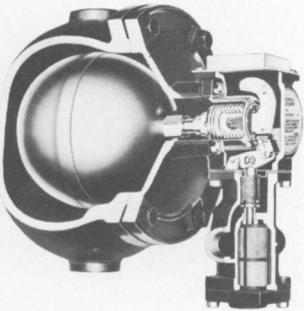
A large capacity float and valve mechanism for many liquid level control applications, particularly on open tanks. Has McDonnell cam-and-roller straight-thrust valve action, and precision valve guides to provide positive alignment. Valve has composition disc; seat is Monel. All other wetted parts are of brass, copper, Monel and solder.

Maximum body pressure, 35 psi.

Maximum supply pressure, 100 psi.

Make-up Water Feeders

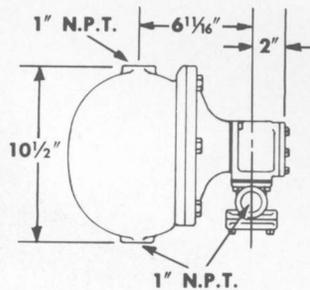
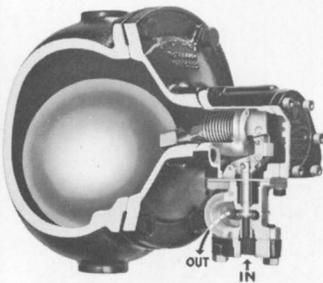
No. 551-S



This float-operated feeder is designed especially for use where heated water is added to steam separators, receivers, tanks or other vessels. The float chamber is sealed from the valve assembly through the use of two Monel bellows. This construction provides an air gap between the receiver tank or vessel and the available water supply. The valve disc is an elastomer compound; the valve seat is Monel. Both are protected by a large integral strainer.

Maximum body pressure, 25 psi.
Maximum supply pressure, 75 psi.

No. 3155 Solvent Still Regulator

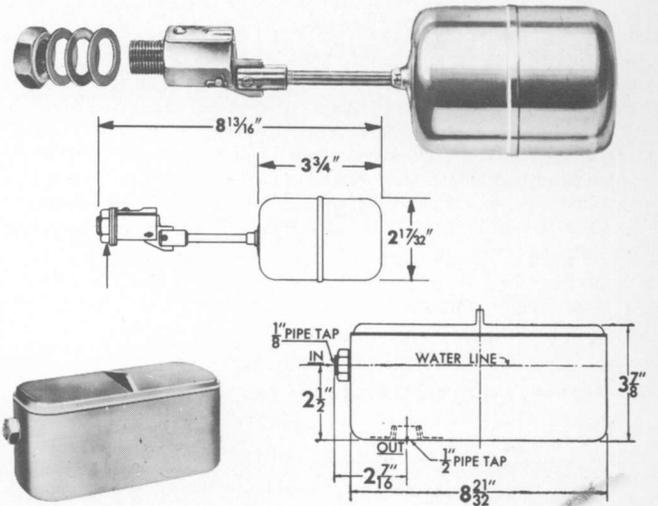


This is a larger capacity regulator, used to maintain proper solvent levels automatically in medium size and larger stills. At 5 psi difference between supply and still pressures, the No. 3155 feeds at the rate of approximately 4000 lbs. of water per hour. The operating mechanism features stainless steel valve and seat, Monel bellows, and McDonnell straight-thrust valve action.

Maximum body pressure, 15 psi.
Maximum supply pressure, 25 psi.

Float Valves

18 Series

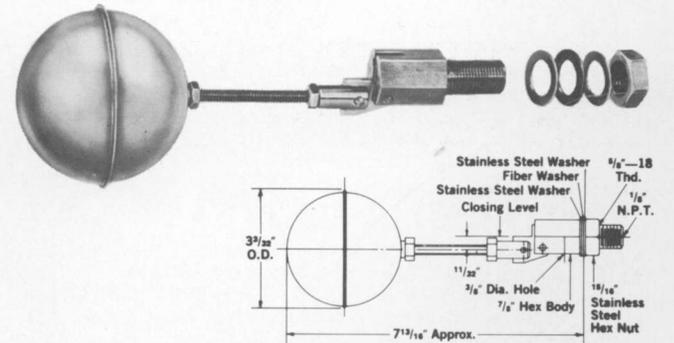


The 18 Series offers a small, rugged float-operated valve for general use. It represents a simple answer for hundreds of liquid level control jobs. Construction has been refined to only a few simple parts. Valve disc is Viton; all other parts are of brass, soft solder and copper. Valve opens to full capacity with small float drop, seats tightly against supply pressures up to 100 psi. No. 18 consists of float and valve mechanism only, with 5/8" mounting. No. 518 includes a float chamber with cover; float chamber has 1/2" NPT equalizer connection in bottom. Both have internal 1/8" thread for water connection.

Water Supply Pressure	20 psi	40 psi	60 psi	80 psi	100 psi
1/8" Pipe Feed Capacity when tank pressure is 0 (Lbs. of water per hour)	650	900	1125	1325	1475

Maximum supply pressure, 100 psi.

No. 18-SS



The No. 18-SS is designed to satisfy the need for a device to control water and other liquid levels automatically in pharmaceutical, laboratory and special industrial applications where stainless steel construction is required. It is constructed of Type 302, 303, and 304 stainless steel, with Viton disc and a fiber washer. The No. 18-SS provides thoroughly dependable performance with long service life and can be quickly and easily disassembled for inspection and maintenance. Has 5/8" mounting and internal 1/8" NPT thread for water connection.

Water Supply Pressure	20 psi	40 psi	60 psi	80 psi	100 psi
1/8" Pipe Feed Capacity when tank pressure is 0 (Lbs. of water per hour)	1190	1625	1950	2225	2450

Maximum supply pressure, 100 psi.

Low Water Cut-offs for Low Pressure Steam Boilers

McDonnell Low Water Cut-offs are float actuated electrical switches, and are used to protect boilers against the hazard of a low water condition. In operation, they will interrupt the electrical current to the automatic firing device if the water line drops to an unsafe level.

The McDonnell Cut-offs listed in the selection table below all have the same operating mechanism, including the desirable twin switch construction. This provides an additional circuit for a low water alarm, or for controlling a McDonnell NO. 101A Electric Water Feeder described on opposite page.

HOW TO SELECT

All McDonnell Cut-offs listed in the selection table below have the same service range:

- For boilers of any size;
- For boilers operating at pressures up to 20 psi.

Whenever they can be used, the external type of cut-off with a blow-off valve is recommended. This provides a convenient means of dropping the water level in the float chamber, and testing the control and firing device through a complete "on-off" cycle of operation. Condensed selection table below lists method of installation for each cut-off.

Product No.	Method of Installation	Integral Blow-off Valve on Cut-off	Separate Blow-off Valve Required
No. 67	"Quick Hook-up" fittings	Yes	No
No. 61	1" NPT equalizing pipes	No	Yes
69 Series	"Built-in" type. Fits 2½" NPT boiler tapping. No sediment chamber		
No. 70-	Direct mounted. Fits 2½" NPT boiler tapping. Has sediment chamber.	No	Yes
No. 70-B	Direct mounted. Fits 2½" NPT boiler tapping. Has sediment chamber.	Yes	No
No. 767	Side mounted with 2½" NPT nipple. Has extra deep sediment chamber.	Yes	No

ELECTRICAL RATINGS (Underwriters Listed)

All McDonnell Cut-offs listed in selection table above have the same No. 11 electrical switch. Standard line voltage switches have black terminal panel and are rated for 120 VAC, 240 VAC or 24 VAC service. (Low voltage switches have red panels; see below.)

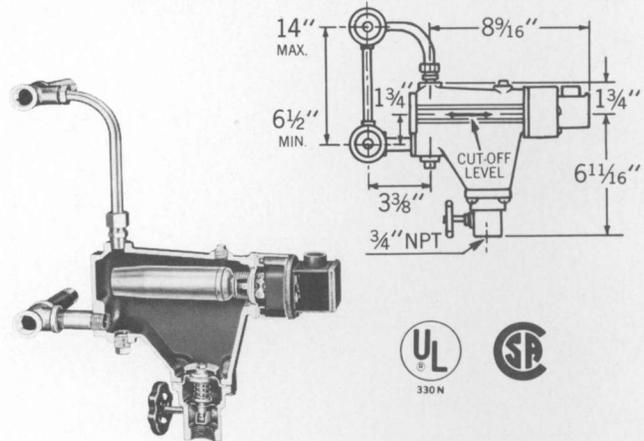
AMPERE RATING

Motor Duty	120 VAC	240 VAC
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

Pilot Duty: 120-240 VAC, 125 VA

Millivolt Burner Service—The No. 67 Cut-off, upon request, can be furnished with special low voltage switches for use on self-generating millivolt circuits. (This switch can also be used for 24 volt AC circuits.) Specify No. 67G. Low voltage switches have red terminal panels.

No. 67 Series



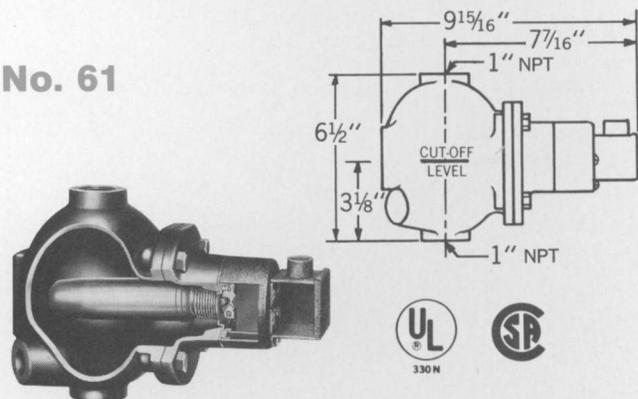
This is the most widely used control of its kind. It interrupts electrical service to the burner when the water level falls below the prescribed cut-off level.

The time-saving "Quick Hook-up" fittings permit installation in the boiler gauge glass tapings, a feature which positions the control properly and provides correct reproduction of the boiler water level in the float chamber and gauge glass. Other features include deep sediment chamber, large area self-closing blow-off valve, adjustable conduit outlet, and ¼" NPT pressure control tapping.

The twin switch construction provides an extra switch which closes on small drop in water level without stopping burner, and which can be used to operate low water alarm or to control the McDonnell No. 101A Electric Water Feeder shown on opposite page.

*For boilers of any size.
Maximum steam pressure, 20 psi.*

No. 61



For installation on boilers where "Quick Hook-up" fittings cannot be used. Installed with 1" steam and water equalizing lines, and requires a separate blow-off valve.

*For boilers of any size.
Maximum steam pressure, 20 psi.*

Note—In addition to the low pressure cut-offs listed in the selection table, the No. 63 and No. 64 cut-offs, shown on page 8, can also be used on steam boilers. They are suitable for pressures up to 50 psi.

Low Water Cut-offs for Low Pressure Steam Boilers

"Built-in" Low Water Cut-offs 69 Series



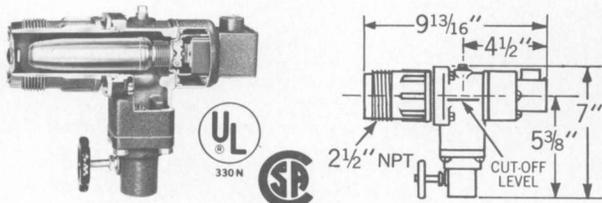
For installation in 2 1/2" NPT tapplings provided by some boiler manufacturers. Selection of the particular model depends upon the insertion length into the boiler. Order the "Built-in" that provides maximum insertion length within the boiler. Electrical ratings shown on page 6.

Product Number	69	169	269	369	469*
Insertion Length (Dimension "A")	4 1/8"	3 1/8"	2 1/4"	1 3/4"	1 3/16"

*No. 569 same as 469 but includes 1/4" pressure control tapping.

For boilers of any size.
Maximum steam pressure, 20 psi.

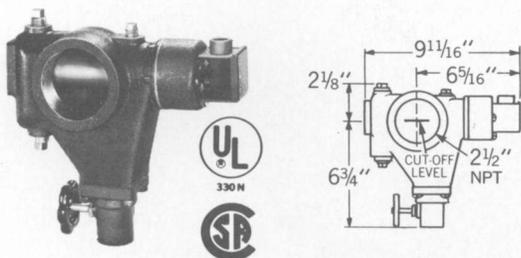
No. 70 and No. 70-B



For installation in 2 1/2" NPT tapping. Both models have a sediment chamber and a 1/4" NPT pressure control tapping. No. 70 requires a separate blow-off valve. No. 70-B has an integral self-closing blow-off valve. Electrical ratings shown on page 6.

For boilers of any size.
Maximum steam pressure, 20 psi.

No. 767



Self-contained cut-off for side, close nipple, connection to 2 1/2" NPT boiler tapping. Has extra deep sediment chamber, integral self-closing blow-off valve, and 1/4" NPT pressure control tapping. Electrical ratings shown on page 6.

For boilers of any size.
Maximum steam pressure, 20 psi.

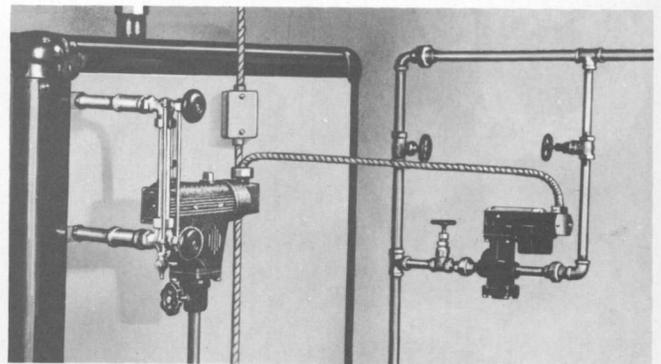
Electric Water Feeders

The No. 101A Electric Water Feeder is designed for use on steam boilers up to 5000 sq. ft. capacity, to convert a low water cut-off installation into the equivalent of an electrical feeder and cut-off combination. The cut-off has the task of turning off the burner should the boiler water line drop below the required level. The electric feeder operates automatically to keep the water line above this level.

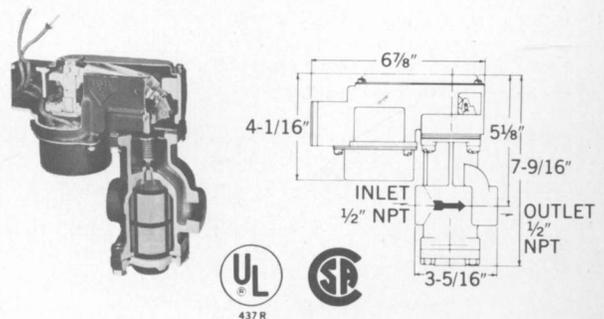
The No. 101A is controlled by the No. 11 switch provided in all McDonnell Cut-offs listed in the selection table on opposite page. The "feeder" switch operates at a level slightly higher than the cut-off point.

Adding an electric water feeder to a cut-off installation eliminates the necessity of adding water to boiler manually. It contributes to heating comfort, and minimizes danger of freeze-up during an absence, by going into action immediately to maintain or restore the required operating level.

The No. 101A can be installed in any horizontal run of cold water supply pipe, either above or below the boiler water line.



No. 101A



The No. 101A Electric Water Feeder has the same packless construction, straight-thrust valve action and built-in strainer perfected in other McDonnell Feeders. It closes tight against supply pressures up to 150 psi.

For Oil Boilers—The standard No. 101A Electric Water Feeder is furnished with 120VAC coil.

For Gas Boilers—The No. 101A is also available with low voltage coil and companion transformer for use on gas fired boilers having 24 volt control circuits. Order No. 101A-24 V (includes transformer).

Maximum boiler size, 5000 sq. ft. steam.
Maximum water pressure, 150 psi.
Maximum boiler pressure, 25 psi.

Low Water Cut-offs for Hot Water Space Heating Boilers

HOW TO SELECT

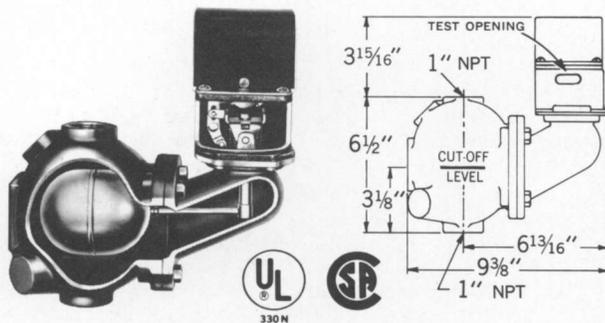
Essentially the construction of a hot water boiler and a steam boiler are the same. Many of the reasons why low water can occur in a steam boiler will also hold true for a hot water boiler.

The McDonnell Low Water Cut-offs shown here are specially designed to protect hot water boilers against the hazards of a low water condition. In operation they will interrupt the electrical current to the firing device if the water in the system drops below the prescribed cut-off level. The low water cut-off switch also has an additional circuit for low water alarm.

Boiler pressure and the method of mounting are the two main factors to consider in selecting the low water cut-off. The No. 764 and the 900 Series can be mounted directly into boiler tapplings provided by some manufacturers. All others are mounted on the boiler, or to the piping directly above the boiler, with 1" NPT equalizing connections. As shown in table, the No. 150 (see page 10) can also be used.

Product No.	Boiler Size	Maximum Boiler Pressure	Method of Installation
No. 63	Any size	50 psi	1" NPT top & bottom equalizing pipes
No. 64	Any size	50 psi	1" NPT top & bottom equalizing pipes
No. 64A	Any Size	50 psi	"Quick Hook-up" fittings
No. 764	Any size	50 psi	2½" NPT side tapping for nipple connection to boiler opening
No. 150	Any size	150 psi	1" NPT top & bottom equalizing pipes
900 Series	Any size	160 psi	¾" NPT connection for direction mounting

No. 63



This is the control that pioneered the use of low-water cut-offs on hot water boilers. Heavy duty construction throughout. Uses the No. 2 Switch shown on page 3. Installed with 1" NPT equalizing pipes.

The No. 63 offers two operating advantages not available in other McDonnell float-operated low pressure cut-offs:

1. A test opening is provided directly below the switch housing, so that a screwdriver may be inserted to manipulate the float to a lower position. This provides a check on the switch operation.
2. The No. 63 is available with a "manual reset" type switch. If desired, specify No. 63M.

The No. 63 can also be used on steam boilers.

ELECTRICAL RATINGS

(Underwriters Listed)

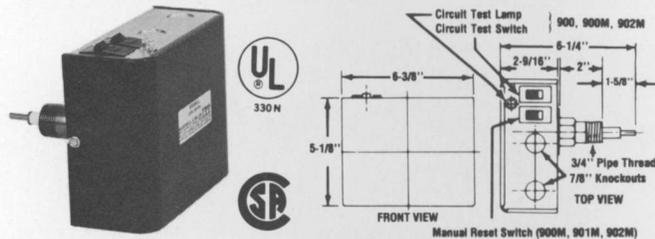
AMPERE RATING: 115 VDC, 0.5 Amps

Motor Duty	120 VAC	240 VAC
Full Load	10.2	5.1
Locked Rotor	61.2	30.6

Pilot Duty: 120-240 VAC 60 Hertz, 125 VA

For boilers of any size.
Maximum boiler pressure, 50 psi.

900 Series Electronic Probe Level Control



The 900 Series utilizes an electrode inserted into the liquid, and the conductivity of the liquid, to complete the circuit to ground. When the boiler water drops below the probe, the control automatically breaks the electrical circuit to the burner. As listed in the table, controls are available with different operating features: Automatic or manual reset; test lamp to check circuitry (and resistance of boiler water); 30-second retard to prevent nuisance tripping from short power breaks.

The 900 Series can be used for many other liquid level control applications—controlling alarms, signal lights, feed or drain pumps, electric valves, and other equipment.

Product No.	Automatic Reset	Manual Reset*	Test Light	Retard Circuit	Burner Test
No. 900	X		X		
No. 900C	X				X
No. 900M		X	X		
No. 901	X				
No. 901M		X			
No. 902M		X	X	X	

*Manual Reset Feature Pat. 3, 834,357

ELECTRICAL RATINGS

(Underwriters Listed)

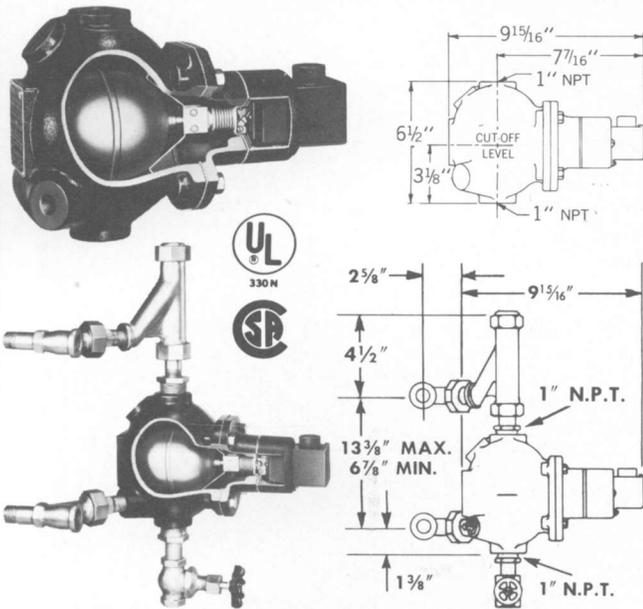
AMPERE RATING

Motor Duty	120 VAC	240 VAC
Full Load	5.8	2.9
Locked Rotor	34.8	17.4

Pilot Duty: 120-240 VAC, 125 VA

For boilers of any size.
Maximum boiler pressure, 160 psi.
Maximum temperature, 250 F.

Low Water Cut-Offs for Hot Water Space Heating Boilers No. 64 and No. 64-A

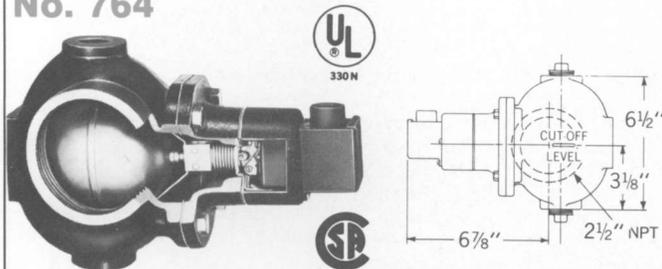


These controls are compact in size and built for the pressures encountered in hot water service. They utilize the McDonnell No. 11 Switch, which provides an extra switch, operating at a different level, for low water alarm. Both controls can be used for steam service, and differ only in method of installation. No. 64 requires 1" NPT equalizing pipes; No. 64-A has "Quick Hook-Up" fittings to permit installation right in the gauge glass tapplings of low and medium pressure steam boilers.

Electrical ratings are shown below.

For boilers of any size.
Maximum boiler pressure, 50 psi.

No. 764



Designed with 2 1/2" NPT side tapping for installation with close nipple in 2 1/2" tapping available on some hot water boilers. Can also be used on steam service. Has same construction and operation as No. 64, utilizing McDonnell No. 11 Switch.

Electrical ratings shown below.

For boilers of any size.

Maximum boiler pressure, 50 psi.

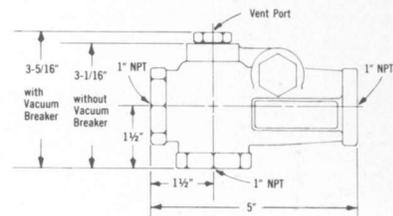
ELECTRICAL RATINGS (Underwriters Listed) AMPERE RATING

	120 VAC	240 VAC
Motor Duty	120 VAC	240 VAC
Full Load	7.4	3.7
Locked Rotor	44.4	22.2

Pilot Duty: 120-240 VAC, 125 VA

Test-N-Check® Valves Model TC-4

Simplify Testing of Low Water Cut-offs on Hot Water Boilers
(Patent No. 3831429)



Maximum Pressure—50 psi
Maximum Temperature—250 F

Good operating practice requires installation of a low water cut-off on a hot water boiler and that it be checked regularly to make certain the control will function properly in event of a low water condition. Boiler owners and installers have long wanted a quick way to test a low water cut-off on a hot water boiler.

Simply opening a blow-off valve below the float chamber may not serve as a valid test and is excessively wasteful of boiler water and fuel. The water level in the float chamber, and the float, must drop far enough to start the control through its cycle of operation. However, water flowing in through the equalizing piping may replenish the level in the float chamber fast enough to delay the necessary float drop, or prevent it altogether.

McDonnell Test-N-Check® Valves have been specially designed for such installations. In normal operation, they allow free circulation of water through the equalizing piping and float chamber. But any sudden onrush of water, such as caused by opening the blow-off, snaps shut a damper in each valve to restrict flow to the float chamber. Water level in the float chamber falls quickly to start the control through its operating cycle, with a minimum loss of boiler water. When blow-off is closed, dampers return to normally open position.

McDonnell Test-N-Check® Valves simply replace the crosses above and below the control in the equalizing lines. Valves have same dimensions as standard crosses and nipple in the horizontal leg, and allow normal rod clean-out of pipe in both directions. Connections are 1" NPT female tapplings.

Upper and lower valves are identical, except that upper valve has vacuum breaker built in to allow for rapid evacuation of the float chamber. They are furnished in sets—one upper and one lower valve, to equip one equalizing line. They can be used with all McDonnell Low Water Cut-Offs for hot water boilers.

Model TC-4 Replacement Valves

Description	Part No.
TC-U Upper Valve, with vacuum breaker	317350
TC-L Lower Valve	317353

Pump Controllers and High Pressure Low Water Cut-offs

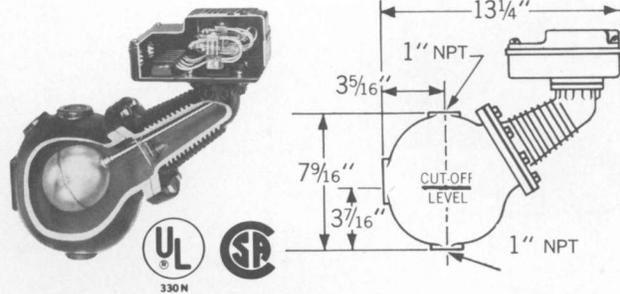
McDonnell Pump Controllers are float actuated electrical switches used to control boiler feed pumps as they should ideally be controlled—directly from the boiler water level. They represent the proven best method of keeping the boiler water level within the limits recommended for maximum steaming efficiency and fuel economy. These controls also include a second switch, operating at a lower level which provides a circuit for stopping the automatic burner and sounding an alarm—an excellent safeguard for emergency conditions such as electrical current interruption to the pump or failure of make-up water supply.

McDonnell Pump Controllers can also be used on storage tanks and pressure vessels to start or stop pumps, or provide alarm or automatic cut-off, at high level and/or low level.

All McDonnell Pump Controllers have completely packless construction. Electrical operating parts are sealed from the float chamber. The controls have been designed for high pressure, high temperature service.

In addition to controllers listed in the table, the liquid level controls shown on pps. 13-16 can also be used on high pressure boilers.

No. 150



The most widely used control of its kind. Packless construction utilizes Monel bellows. Has mercury tube type switches. Can also be used as a cut-off and alarm on many higher pressure hot water space heating boilers. Available with manual reset on cut-off switch; order No. 150-M.

For boilers of any size.
Maximum boiler pressure, 150 psi.

HOW TO SELECT

McDonnell Pump Controllers serve boilers of any size. Selection of proper control depends upon boiler operating pressure and method of installation.

Product No.	Maximum Pressure	Switches	Characteristics
No. 42	50 psi	Mercury tube	For boilers with separate water columns
No. 42-A	50 psi	Mercury tube	"Quick Hook-up" fittings
150 Series	150 psi	Mercury tube	For boilers with separate water columns
157 Series	150 psi	Mercury tube	Water column type body, with all tappings for steam trim
No. 93*	150 psi	Magnetic—open contact	Permits wider adjustment of operating levels
No. 193A*	150 psi	Magnetic—open contact	Water column type
No. 94*	250 psi	Magnetic—open contact	Similar to No. 93, but for higher pressure
No. 194*	250 psi	Magnetic—open contact	Water column type body

*These controls have 3/4" NPT opening in body and 1/2" NPT opening in head castings, for float blocking.

ELECTRICAL RATINGS (Underwriters Listed)

For 150 Series, 157 Series, and 42 Series
Ampere Rating for Pump and Cut-off Circuits

Motor Duty	120VAC	240VAC	120VDC	240VDC
Full load	7.4	3.7	2.4	1.2
Locked Rotor	44.4	22.2	24.0	12.0

Pilot Duty Service: 345VA, 120 and 240VAC

Ampere Rating for Alarm Circuit

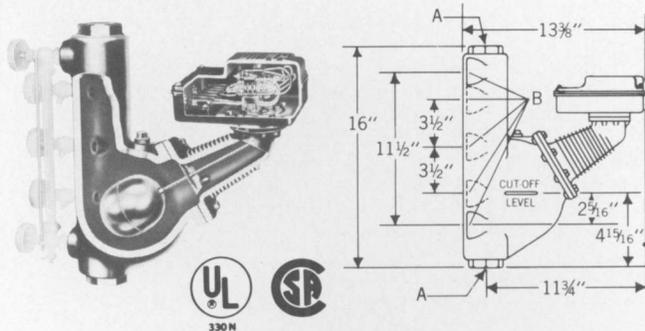
	120VAC	240VAC	120VDC	240VDC
	1	1/2	1/2	1/4

For 93 Series and 94 Series

Pilot Duty Service: 120 or 240VAC, 345 VA

Note: For supply connections of 94 Series, use wire suitable for at least 75 C.

157 Series

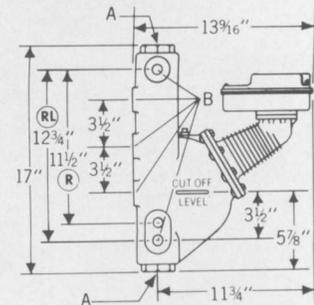


No. 157 is basically the same as the No. 150, but has integral water column type of float chamber that simplifies installation and includes all necessary tappings for gauge glass and tricocks.

No. 157-A is same as No. 157 but with larger tappings for equalizing piping and steam trim (see table below).

No. 157R and No. 157RL—Gauge glass tappings in side of body. No. 157RL recommended for boilers where higher visible water line is required, or for boilers with both a feed pump and a combination water feeder cut-off.

All 157 Series also available with manual reset on cut-off switch: order No. 157-M, 157A-M, 157R-M or 157RL-M.

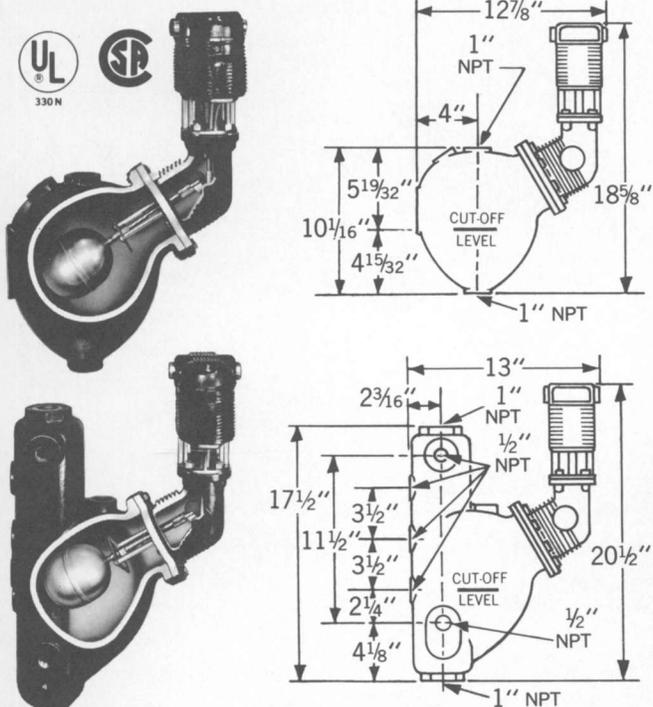


Product No.	No. 157	No. 157A	No. 157RL
Equalizing Tappings "A"	1" NPT	1 1/4" NPT	1 1/4" NPT
Gauge Glass and Tricock Tappings "B"	1/2" NPT	3/4" NPT	1/2" NPT

Maximum boiler pressure, 150 psi.

Pump Controllers and High Pressure Low Water Cut-Offs

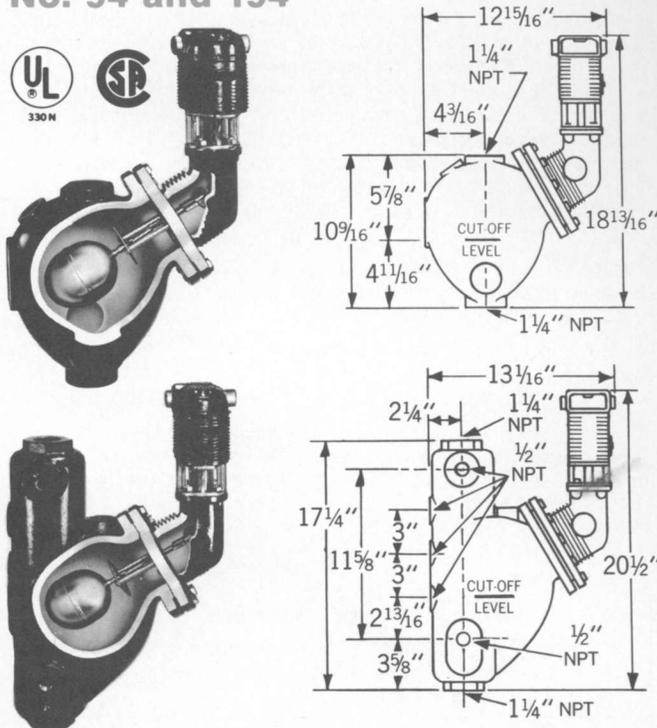
No. 93 and No. 193A



Utilizes the principle of repulsion magnetic operation for positive opening and closing. Permits wider adjustment of operating levels between pump switch and cut-off switch. No. 93 is for boilers with separate water columns. No. 193A has water column type body with integral tapplings for gauge glass tricocks. For manual reset of cut-off switch order No. 93-M and No. 193A-M. (Electrical ratings on page 10.)

For boilers of any size.
Maximum boiler pressure, 150 psi.

No. 94 and 194



Magnetic switching controls for high pressure boilers, up to 250 psi. Permit wide adjustment of operating levels. No. 94 is for boilers with separate water columns. No. 194 has water column type body with integral tapplings for gauge glass and tricocks. For manual reset of cut-off switch order No. 94-M and No. 194-M. (Electrical ratings on page 10.)

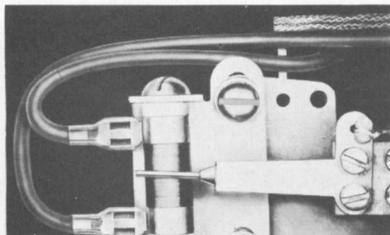
For boilers of any size.
Maximum boiler pressure, 250 psi.

Electric Proportioning Controls

These controls are used where it is desirable to modulate the supply of feed water into a boiler in proportion to the boiler load. Proportioning action is obtained by use of a potentiometer slide wire, which follows the water level through a float mechanism and controls a proportioning type electric valve in the feed water supply line. Valve operates so amount of make-up water flowing through the valve is in proportion to boiler demand at that particular time; valve automatically closes when no make-up water is needed. Controls also include a cut-off switch to stop burner if water supply fails.

Potentiometer Slide Wire 93-7B Series and 94-7B Series Controls

Potentiometer Slide Wire 135 ohms 24 VAC

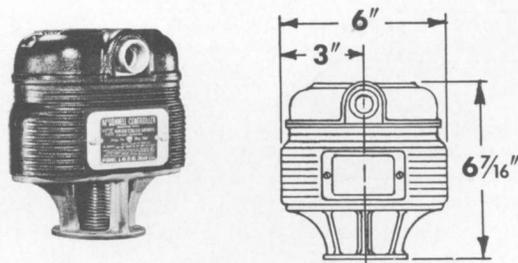


No. 93-7B and No. 94-7B—For boilers with separate water columns. Basic construction and dimensions like No. 93 and No. 94.

No. 193A-7B and No. 194-7B—Has water column type body with all tapplings for steam trim. Basic construction and dimensions like No. 193A and No. 194.

Maximum boiler pressure: No. 93-7B and No. 193A-7B, 150 psi.
No. 94-7B and No. 194-7B, 250 psi.

No. 5, No. 6 and No. 7B Switch Assemblies



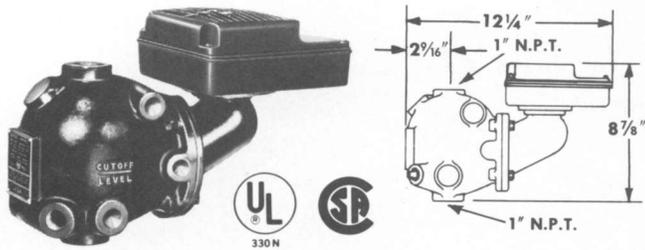
These are repulsion magnetic switches as used on McDonnell 93 and 94 Series Pump Controllers. Switch assemblies are interchangeable.

No. 5 has two switches, operating at two different levels; No. 6 has one switch. All switches are single pole, double throw type. Manual reset available; order No. 5-M or No. 6-M. (Electrical ratings on page 10.)

No. 7B Switch is used with Proportioning Controllers and has one switch for low water cut-off; write factory for data.

Pump Controllers and Low Water Cut-offs

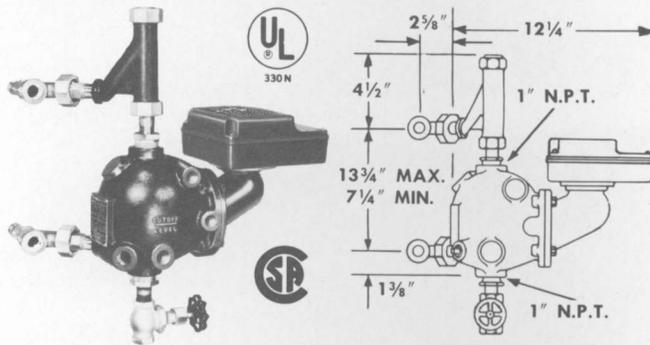
No. 42



This is a float operated controller, with two mercury switches operating at different levels, to control the boiler feed pump according to the boiler water level itself, and cut off electrical current to the burner in event of any emergency low water condition. Switches are single pole, single throw mercury type. Construction is completely packless. Installed with 1" NPT equalized pipes. Electrical ratings same as for No. 150, on page 10.

For boilers of any size.
Maximum boiler pressure, 50 psi.

No. 42-A

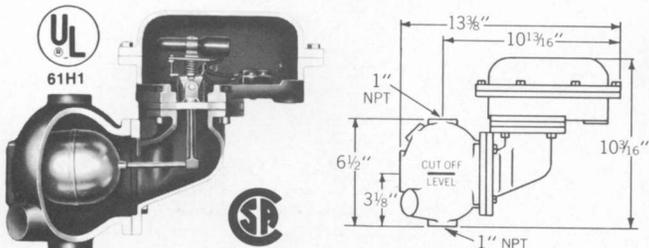


Same construction and operation as No. 42 at left, but fitted with "Quick Hook-up" fittings for installation right in gauge glass tapplings. Electrical ratings same as No. 150, on page 10.

For boilers of any size.
Maximum boiler pressure, 50 psi.

Float Operated Switches

No. 65 and No. 65R (Hazardous Duty) No. 165 and No. 165R (Vapor-Proof)



Float operated controllers for water tanks, receivers and other liquid* storage systems. Can be used to make or break electrical circuit at either high or low liquid levels—circuit to motors, signal lamps, electrical elements, etc.

No. 65 opens circuit with falling level; reverse acting No. 65R closes circuit with falling level. Underwriters Listed for use in following hazardous atmospheres: Class 1—Group C and D; Class 2—Group E, F and G.

No. 165 and No. 165R offer same operation in vapor-proof construction.

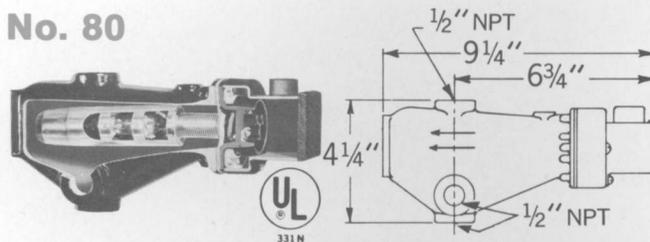
*Check factory for application information and limitations.

ELECTRICAL RATINGS (Underwriters Listed)

		Pilot Duty Rating	
AC	1/2 Hp. 120 or 240 V	AC	125 VA, 120 or 240 V
AC	25 Amps 120 V; 12.5 Amps 240 V (Non-Inductive)	DC	57.5 VA, 120 or 240 V

Maximum pressure: No. 65 and No. 65R, 40 psi.
No. 165 and No. 165R, 50 psi.

No. 80

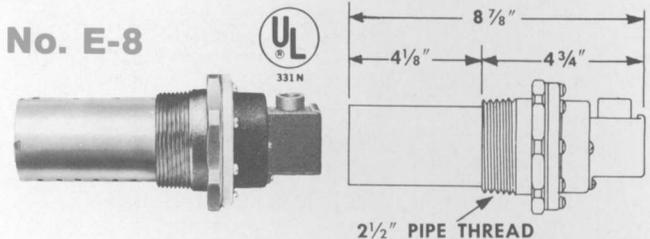


Float operated, single pole, double throw switch which provides circuits for high or low level alarm or for starting pump when liquid level rises or falls. Has mercury switch inside float. Underwriters Listed for service on oil tanks (grade 2 fuel oil with a specific gravity of 0.85 or greater). Has 1/2" NPT tapplings at top, bottom and sides.

Electrical ratings same as for No. 64 on page 9.

Maximum pressure, 5 psi.
Maximum temperature, 190 F.

No. E-8



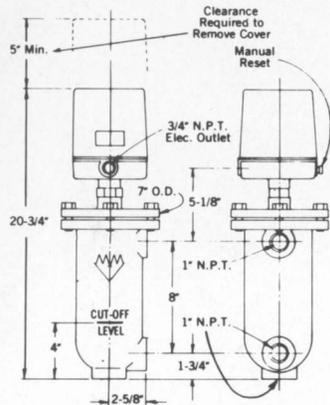
Has operating mechanism of No. 80 above in No. 69 body. Underwriters Listed for use on oil tanks (grade 2 fuel oil with a specific gravity of 0.85 or greater). Designed to be threaded into 2 1/2" NPT tapped opening in side of tank.

Electrical ratings same as for No. 64 on page 9.

Maximum pressure, 5 psi.
Maximum temperature, 190 F.

Liquid Level Controls

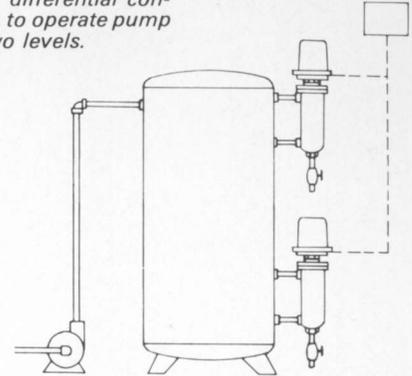
Model VFC



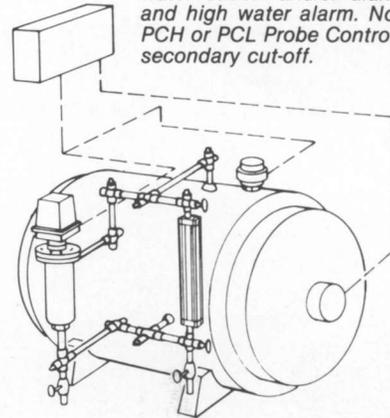
Float operated mercury or snap switch control. Used to guard against low or high levels, or to start and stop auxiliary devices. Available three ways: with one switch for low water cut-off; with two switches to add pump control; or three switches to add high level alarm. Provides up to six operating level functions, wide adjustment, precise field settings. Electrical enclosures either NEMA 1 General Purpose or Vapor-Proof.

TYPICAL APPLICATIONS

Installed as differential control on tank, to operate pump between two levels.



Installed as boiler control to provide low water cut-off and/or alarm, pump control and high water alarm. Note use of Model PCH or PCL Probe Control (see page 14) as secondary cut-off.



ELECTRICAL RATINGS

(Underwriters Listed)

Maximum Control Rating—2000 VA

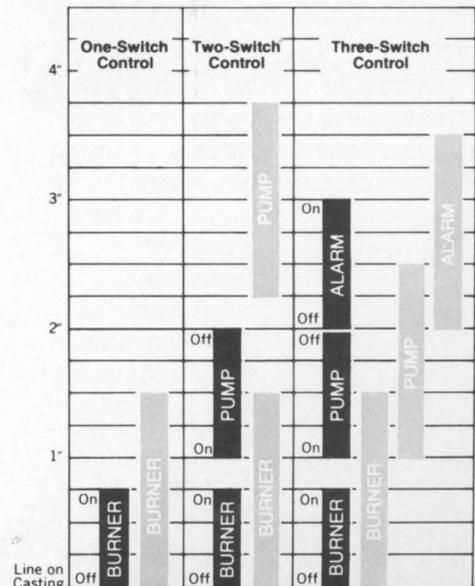
Switch Capacities:	120 VAC	240 VAC	Pilot Duty
Low Water Cut-off (SPDT)	7.4 Amps	3.7 Amps	120-240 VAC, 360 VA
Pump Control (SPST)	7.4 Amps	3.7 Amps	120-240 VAC, 360 VA
High Water Alarm (SPDT)	1.8 Amps	0.9 Amps	120-240 VAC, 360 VA

Catalog Number		NEMA 1 Enclosure	Reset Operation	Number of Switches
Mercury Switch	Snap Switch			
VFC-1A-G	VFS-1A-G	General Purpose	Automatic	One (SPDT)
VFC-1A-V	VFS-1A-V	Vapor-Proof	Manual	
VFC-1M-G	VFS-1M-G	General Purpose	Automatic	Two (SPDT, SPST)
VFC-1M-V	VFS-1M-V	Vapor-Proof	Manual	
VFC-2A-G	VFS-2A-G	General Purpose	Automatic	Three (SPDT, SPST, SPDT)
VFC-2A-V	VFS-2A-V	Vapor-Proof	Manual	
VFC-2M-G	VFS-2M-G	General Purpose	Automatic	Manual
VFC-2M-V	VFS-2M-V	Vapor-Proof	Manual	
VFC-3A-G	VFS-3A-G	General Purpose	Automatic	Manual
VFC-3A-V	VFS-3A-V	Vapor-Proof	Manual	
VFC-3M-G	VFS-3M-G	General Purpose	Automatic	Manual
VFC-3M-V	VFS-3M-V	Vapor-Proof	Manual	

Maximum pressure, 250 psig.
 Maximum boiler temperature, 406F.
 Maximum flooded chamber temperature, 360 F.
 Maximum ambient temperature, Mercury Switch Models, 120 F.
 Maximum ambient temperature, Snap Switch Models, 110 F.

ADJUSTABLE OPERATING LEVELS

Factory (Minimum) settings shown in black, possible field adjustments in color

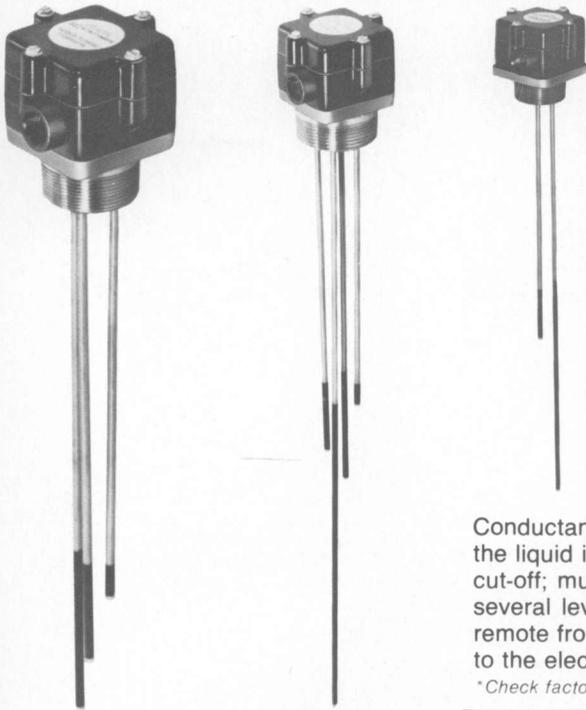


Note: Levels may vary from 1/16" to 3/16"

Liquid Level Controls

Models PCH and PCL*

Single and Multiple Probe Conductance Actuated Controls



PCH/PCL-3, 4 SERIES
CONTROL AND RS-2, 3 & 4
SERIES SENSORS

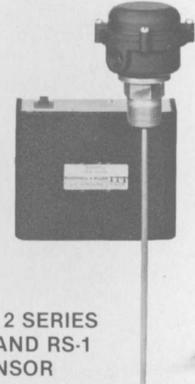


ELECTRICAL RATINGS
(Underwriters Listed)
Input to control: 120 VAC
Switch Capacity: At 120 VAC, 7.4 Amps
At 240 VAC, 3.7 Amps
Pilot Duty—360 VA,
120-240 VAC

Maximum pressure, 250 psig.
Maximum temperature at Probe, 406 F.
Maximum ambient temperature, 120 F.



PCH/PCL-1, 2 SERIES
CONTROL AND RS-1
SERIES SENSOR



Conductance actuated controls, which utilize an electrode and the conductivity of the liquid itself to sense levels. Single probe controls for low or high level alarm or cut-off; multi-probe controls for starting and stopping auxiliary equipment between several levels. For tight quarters, or underground tanks, control can be mounted remote from sensor. Models PCH and PCL differ in the secondary voltage supplied to the electrode and input sensitivity.

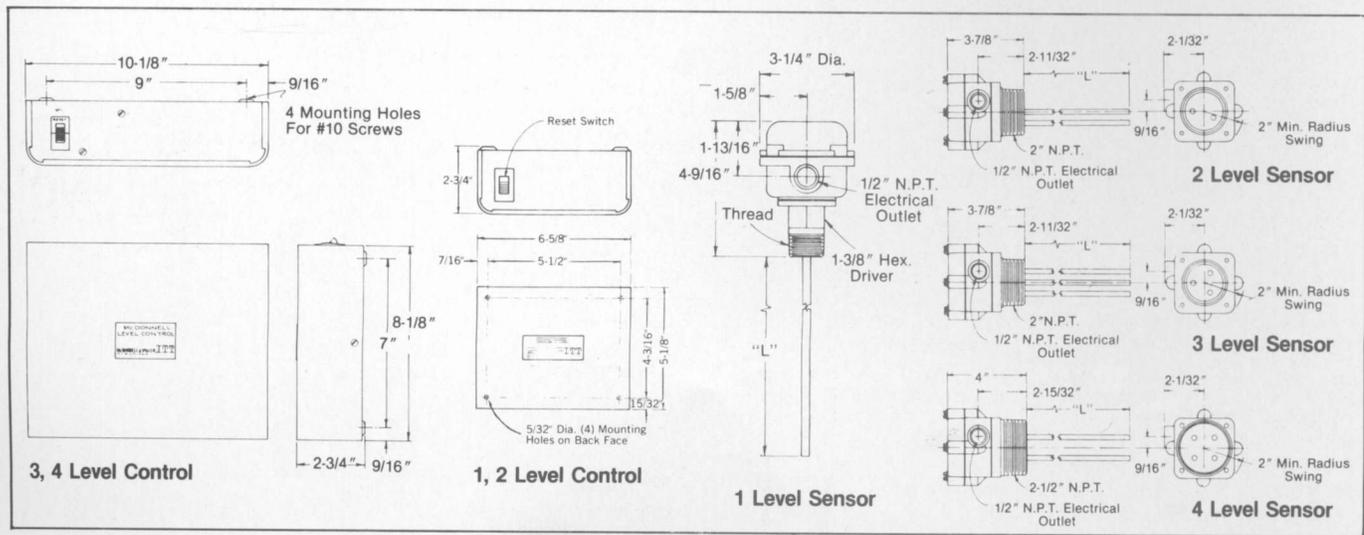
*Check factory for application information and limitations on service other than water.

How to Select and Specify

The table below shows the combinations of Controls, Sensors, and Probes available for each type of service. Select Control according to anticipated use. Probe voltage, and the type of reset desired. The Sensor should be selected according to the number of Probes required. The Probes are ordered separately according to length needed. The Control, Sensor and each Probe must be specified separately, using the appropriate catalog numbers.

SERVICE	Open Circuit Probe Voltage	CONTROLS		No. of Electrodes	SENSORS Catalog No.	PROBES Number & Length	SPACER
		Automatic Reset Catalog No.	Manual Reset Catalog No.				
1 Level Control Low or High Level Cut-off and/or Signal	125V	PCH-G-A-1 PCH-G-A-1K*	PCH-G-M-1 PCH-G-M-1K*	1	RS-1-BR-1	P-1-SS P-2-SS P-3-SS P-4-SS P-5-SS P-6-SS	SPACER S-4 Use when 2 or more probes are greater than 3 feet long
	28V	PCL-G-A-1	PCL-G-M-1				
2 Level Control Differential Control	125V	PCH-G-A-2		2	RS-2-BR-1	P-1-SS P-2-SS P-3-SS P-4-SS P-5-SS P-6-SS	SPACER S-4 Use when 2 or more probes are greater than 3 feet long
	28V	PCL-G-A-2					
3 Level Control Differential Control plus Low or High Level Cut-off and/or Signal	125V	PCH-G-A-3	PCH-G-M-3	3	RS-3-BR-1	P-1-SS P-2-SS P-3-SS P-4-SS P-5-SS P-6-SS	SPACER S-4 Use when 2 or more probes are greater than 3 feet long
	28V	PCL-G-A-3	PCL-G-M-3				
4 Level Control Differential Control plus Low and High Level Cut-offs and/or Signals	125V	PCH-G-A-4	PCH-G-M-4	4	RS-4-BR-1	P-1-SS P-2-SS P-3-SS P-4-SS P-5-SS P-6-SS	SPACER S-4 Use when 2 or more probes are greater than 3 feet long
	28V	PCL-G-A-4	PCL-G-M-4				

*Internal wiring differs from other controls. See wiring diagrams



Liquid Level Controls Models DFC and DFS Displacer Type

These controls can be used to start and stop pumps and other equipment according to the level of liquid in a vessel. The operating principle utilizes the buoyancy of submerged displacers to decrease the force on a spring loaded switching mechanism. Inherent characteristics allow wide field adjustment of operating levels, limit false starts from surging or foaming liquids, and withstand certain corrosive materials. McDonnell offers these controls with one, two or three switches to respond to as many as four operating levels, and a choice of either mercury or snap switches.

Displacer type controls, like float operated controls, rely on the buoyancy of the liquid to sense its level within vessels. Unlike floats, displacers are heavier than liquid. Consequently they can be immersed in multiples to increase or decrease the cumulative buoyancy at any desired level. Displacer type controls are a good choice for a broad range of corrosive liquids and environments as long as they are compatible with the wetted materials of construction and ratings. The operating principle of displacer type controls permits wide differentials in operating levels and reduces false starts caused by turbulence or foaming.

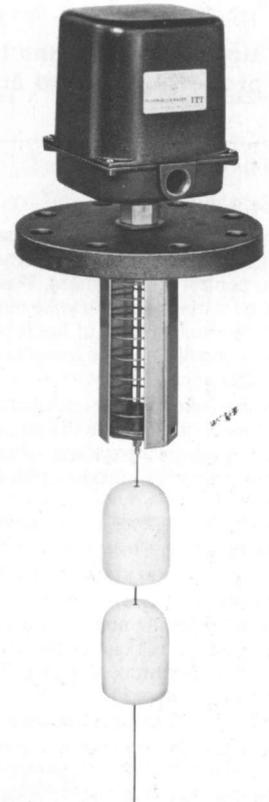
Simple, Direct Operation—The McDonnell design utilizes a top-loaded coil spring. The displacers are hung below the spring on a stainless steel cable. Fitted to the top of the spring is an armature which moves within a non-magnetic tube. The buoyant force decreases the load, actuating a magnetic proximity switch external to the tube.

Isolated Switches—The armature tube completely seals the switches from the vessel. There is no packing or mechanical linkage of any kind requiring periodic servicing between the switch housing and the vessel contents.

Broad Operating Spectrum—McDonnell Displacer Controls are available with one, two or three switches stacked on the armature tube, to respond to as many as four different operating levels. The standard displacer cable is 10 feet long; longer cables can be furnished. There is also a choice of switches: Model DFC has mercury switches, and Model DFS has snap action switches.

Easy to Install and Adjust—Displacer cable is flexible, and mounting requires only a small amount of headroom. Displacers are held in position on the cable by simple locking collars. Operating levels can be set or changed, quickly and accurately. In installations where flow exists in the vessel, a stillwell is recommended.

Traditional McDonnell Quality—Spring, spring housing, cable and locking collars are stainless steel. Displacers are porcelain, or stainless steel, mounting flange is cast iron or stainless steel. Electrical enclosure is aluminum, available either NEMA 1, or Vapor-Proof.



Ceramic Displacer shown.

Model DFC has mercury switches, Model DFS has snap-action air-gap switches. Both models available with 1, 2 or 3 switches, to respond to as many as four different operating levels.

Catalog Number		NEMA 1 Enclosures	Flange Material	Displacer Material	No. of Switches	No. of Displacers	Liquid Specific Gravity Range
Mercury Switches	Snap Switches						
DFC-1A-G-AC	DFS-1A-G-AC	General Purpose	Cast Iron	Porcelain	1	2	1.7 to 0.75
DFC-1A-V-AC	DFS-1A-V-AC	Vapor Proof					
DFC-2A-G-AC	DFS-2A-G-AC	General Purpose	Cast Iron	Porcelain	2	3	1.6 to 0.75
DFC-2A-V-AC	DFS-2A-V-AC	Vapor Proof					
DFC-3A-G-AC	DFS-3A-G-AC	General Purpose	Cast Iron	Porcelain	3	4	1.3 to 0.90
DFC-3A-V-AC	DFS-3A-V-AC	Vapor Proof					
DFC-1A-G-AS	DFS-1A-G-AS	General Purpose	Cast Iron	316SS	1	2	1.6 to 0.75
DFC-1A-V-AS	DFS-1A-V-AS	Vapor Proof					
DFC-2A-G-AS	DFS-2A-G-AS	General Purpose	Cast Iron	316SS	2	3	1.5 to 0.80
DFC-2A-V-AS	DFS-2A-V-AS	Vapor Proof					
DFC-3A-G-AS	DFS-3A-G-AS	General Purpose	Cast Iron	316SS	3	4	1.2 to 0.90
DFC-3A-V-AS	DFS-3A-V-AS	Vapor Proof					
DFC-1A-G-SS	DFS-1A-G-SS	General Purpose	316SS	316SS	1	2	1.6 to 0.75
DFC-1A-V-SS	DFS-1A-V-SS	Vapor Proof					
DFC-2A-G-SS	DFS-2A-G-SS	General Purpose	316SS	316SS	2	3	1.5 to 0.80
DFC-2A-V-SS	DFS-2A-V-SS	Vapor Proof					
DFC-3A-G-SS	DFS-3A-G-SS	General Purpose	316SS	316SS	3	4	1.2 to 0.90
DFC-3A-V-SS	DFS-3A-V-SS	Vapor Proof					

SERVICE RANGE

All Models rated for:

Standard 125 class Flange Duty,

175 psi @ 150 F

125 psi @ 350 F

Maximum Ambient Temperature,

Mercury Switch Models—120 F

Maximum Ambient Temperature,

Snap Switch Models—110 F

Specific Gravity of Liquids—Specific gravity does affect the buoyancy of the displacers, and the resulting spring travel that actuates the switches. McDonnell Displacer Controls, with adjustment, will perform satisfactorily in liquids with specific gravities as shown in the table above. For lesser or greater specific gravities, different springs, or spring adjustments, can be provided. Please consult factory.

Temperature of Liquid—Within limitations of the control (see above) temperature is a factor only in so far as it changes the specific gravity of the liquid.

ELECTRICAL RATINGS

(Same for both Mercury and Snap Switches)

Single and Two Switch

Controls:

Each switch rated

At 120 VAC—7.4 amp

At 240 VAC—3.7 amp

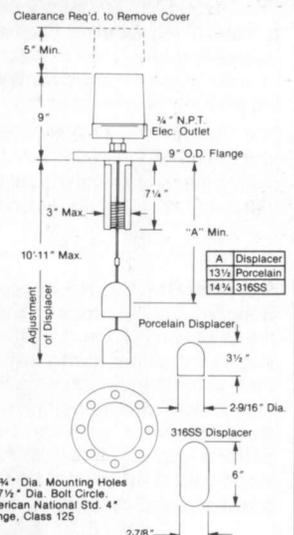
Pilot Duty AC—360 VA,
120-240V

Three Switch Controls:

Maximum Control Rating
—2000 VA

Pilot Duty AC—360 VA,
120-240 VAC each switch

Dimension Details Model DFC and Model DFS



Pneumatic Level Controls Models PFC and PDC

- Modulating controls hold desired levels more closely than differential controls
- Pneumatic controls are ideal for hazardous locations
- Modulating pneumatic controls have proportional band adjustment

McDonnell modulating pneumatic controls, when used with a pneumatically operated control valve, will maintain the liquid level in a tank or pressure vessel. They function by modulating the air pressure supplied to the control valve. The control valve can be installed in either the supply or discharge of the tank or pressure vessel.

Modulating controls improve system efficiency by adjusting the feed or discharge rate to match the actual demand, thus maintaining levels more precisely. Pneumatic controls are particularly well suited for duty in certain hazardous locations since no electrical service is required. They frequently permit lower system installation and operating costs.

The flow actuated pneumatic control is designed to actuate pneumatic valves or pneumatic relays in heating, air conditioning and process systems.

Model PFC Modulating Pneumatic Liquid Level Float Control

The Model PFC employs a float to sense liquid level change. Fitted to the end of the float arm is an armature which travels inside a sealed tube in the control compartment. The armature is magnetically coupled to permanent magnets on a yoke outside the tube. While the yoke continuously follows the position of the float arm there is no mechanical linkage between the two and the tube completely isolates the float chamber from the control compartment.

As the yoke changes position it modulates a pressure reducing valve to increase or decrease the air pressure supplied to the control valve in the supply or discharge line. The Model PFC is constantly balancing tank discharge with supply to maintain liquid level at or near the set point at all times.

The Model PFC can be field adjusted for proportional bands of 50% to 100%, which allows for 1" to 2" liquid level change to give the full output pressure range shown in the chart.

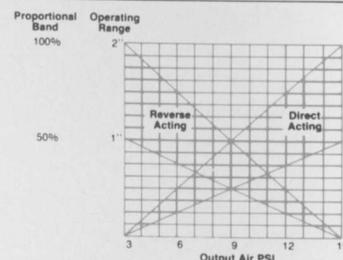
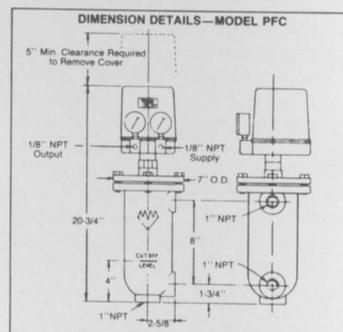
Operation is factory set for direct or reverse acting, but can be field set for the opposite action. The set point is factory established at a mark on the casting, but can be adjusted on the job from 3/4" to 1-1/4" depending on the proportional band. The Model PFC is a non-bleed type of pneumatic control.

The control can be installed easily on the side of a tank or boiler by means of two equalizing pipes. Two gauges are furnished on the control to show both supply and output pressures. For convenience in hook-up, the manifold has alternate tapings for air connections.

Model Number	Description	Water Level Range Adjustment
PFC-1-G	Direct Acting	1" to 2"
PFC-1-GR	Reverse Acting	1" to 2"



- Supply Air Pressure, 20 psi
- Output Air Pressure, 3 to 15 psi
- Maximum tank pressure, 250 psi
- Maximum temperature, 406 F



Output with Proportional Bands of 50% and 100% (ranges of 1" to 2").

Model PDC Modulating Pneumatic Liquid Level Displacer Control

The Model PDC employs a displacer to sense liquid level change. Unlike a float, a displacer is heavier than the liquid. The operating principle utilizes the buoyancy of the submerged displacer to decrease the force on a spring loaded armature which is magnetically coupled to a modulating pneumatic mechanism.

The control can be installed easily on the top of a tank or boiler by means of a 2-1/2" NPT connection. Two gauges are furnished on the control to show both supply and output pressures. For convenience in hook-up, the manifold has alternate tapings for air connections.

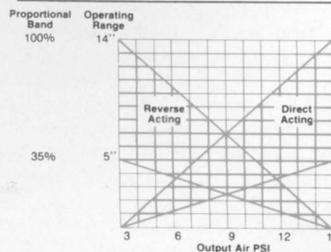
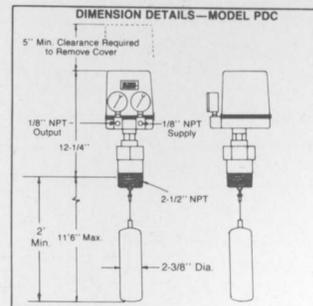
Specific Gravity of Liquids- Specific gravity does affect the buoyancy of the displacer and the resulting spring travel that actuates the pneumatic mechanism. McDonnell pneumatic displacer controls will perform satisfactorily in liquids with a range of specific gravities shown at right.

Model Number	Description
PDC-1-G	Direct Acting
PDC-1-GR	Reverse Acting

Sp. Gr	Level Range Adjustment	
	Min	Max
0.75	7"	14"
1.0	5"	14"
1.7	4"	8"



- Supply Air Pressure, 20 psi
- Output Air Pressure, 3 to 15 psi
- Maximum tank pressure, 250 psi
- Maximum temperature, 406 F



Output in water systems with Proportional Bands of 35% and 100% (ranges of 5" to 14")

Replacement Head Mechanisms for Feeders, Cut-offs and Pump Controllers



Complete replacement operating mechanisms are available for many McDonnell Feeders, Low Water Fuel Cut-offs, and Pump Controllers. They include all operating parts—everything but the float bowl. They can be installed without disturbing equalizing connections.

These replacement heads provide the most satisfactory way to repair controls in the field. They save all the labor and expense of disassem-

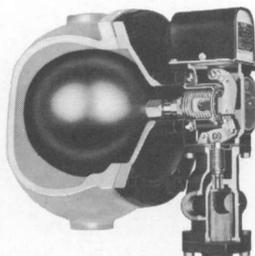
bly and reassembly required when replacing component parts; eliminate the risk of disturbing factory adjustments; provide the equivalent of a brand new control, with all the latest refinements in design and materials.

Replacement Head Mechanisms are shipped with all necessary gaskets and installation instructions.

No. 51-2-HD

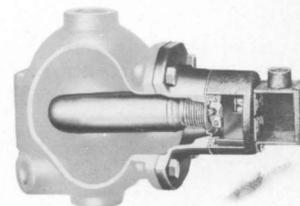
No. 51-2-HD (with No. 2 Cut-off Switch) can be used on No. 51-2.

No. 51-HD (without No. 2 Switch) can be used on No. 51.



No. 61-HD

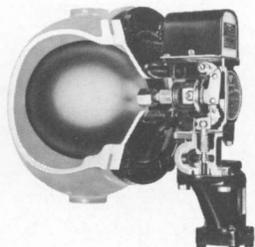
Can be used on:
No. 61



No. 51-S-2-HD

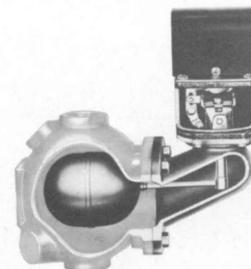
No. 51-S-2-HD (with No. 2 Cut-off Switch) can be used on No. 51-S.

No. 51-S-HD (without No. 2 Switch) can be used on No. 51-S.



No. 63-HD

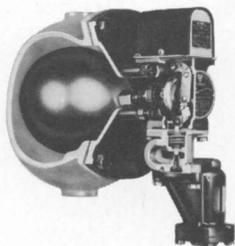
No. 63-HD, or No. 63M-HD (Manual Reset), can be used on 63 Series.



No. 53-2-HD

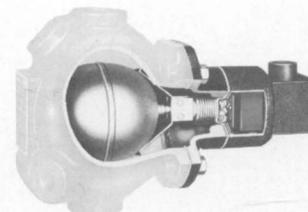
No. 53-2-HD (with No. 2 Cut-off Switch) can be used on No. 53-2.

No. 53-HD (without No. 2 Switch) can be used on No. 53.



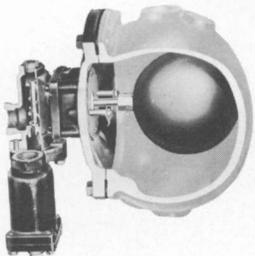
No. 64-HD

Can be used on 64 Series and 764 Series.



No. 25A-HD

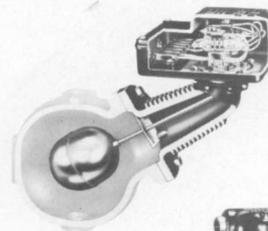
Can be used on:
No. 25A No. 421



No. 150-HD

No. 150-HD, or No. 150M-HD (Manual Reset), can be used on:

150 Series
157 Series



No. 6667

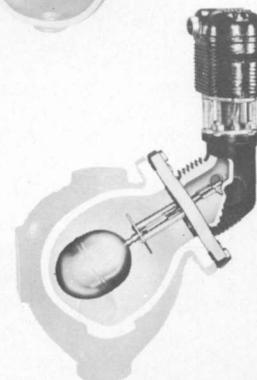
Can be used on:
61 Series
67 Series
69 Series
70 Series
No. 767



No. 93-HD and No. 94-HD

No. 93-HD, or No. 93M-HD (Manual Reset), can be used on 93 Series and 193 Series.

No. 94-HD, or No. 94M-HD (Manual Reset), can be used on 94 Series and 194 Series.



Flow Switches

McDonnell Flow Switches offer a dependable way to make or break an electrical circuit when flow in a pipeline starts or stops. Compact in size, they serve to make operation safer or more automatic in air conditioning, heating and water systems, and in processing work. Shown at right are just a few examples of the many uses for McDonnell Flow Switches.

McDonnell Air Flow Switches perform the same function in air ducts; see pages 24 and 25.

HOW TO SELECT

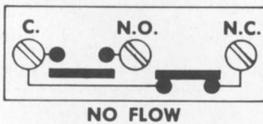
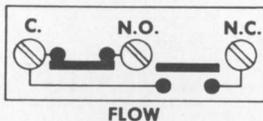
Flow switches are selected basically according to the flow rates prevailing in the pipeline. Other determining factors might include: maximum pressure and temperature; material in contact with liquids; special construction such as vapor proof and explosion proof; diameter of the pipeline.

The flow rates required for operation are listed with the various McDonnell Flow Switches shown here and on other pages. Flow rates are given both in gallons per minute (GPM) and in feet per second (FPS).

Schematics of "FLOW" and "NO FLOW"

In the tables of flow rates the word "FLOW" means that the switch will close one circuit, and open the other, when the flow rate is increased to the GPM shown.

The words "NO FLOW" mean the switch will reverse position—will open the first circuit and close the second—when the flow rate is decreased to the GPM shown.



ELECTRICAL RATINGS (Underwriters Listed)

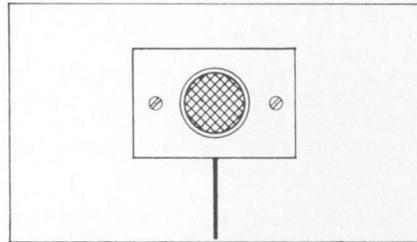
All McDonnell Flow Switches shown on the following pages have single pole double throw switches.

AMPERE RATING

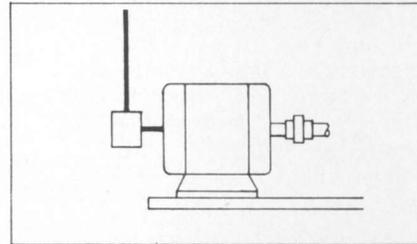
Motor Duty	120 VAC	240 VAC
Full Load	7.4	3.7
Locked Rotor	44.4	22.2
	115 VDC	230 VDC
	0.3	0.15

Pilot Duty: 120-240 VAC, 125 VA

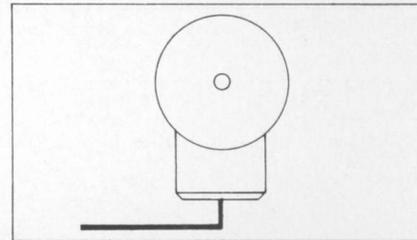
SOME OF THE BASIC USES



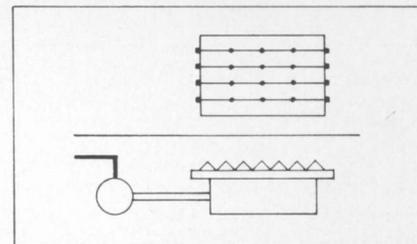
Signal Devices—In this era of automation, knowledge of flow, or no-flow, is important. A flow switch can provide a visual or audible report from any location, either nearby or remote.



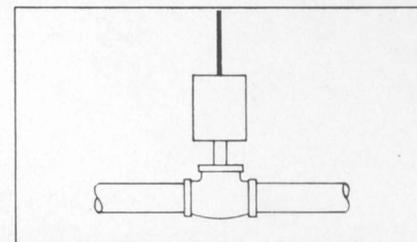
Motors—The operation of pumps, compressors and similar apparatus frequently depends upon fluid flow in a pipeline. A flow switch provides a dependable way to control such motors or other prime movers, or to add greater safety.



Alarms—Where flow failure is critical, or where a flow occurs in an emergency line—as in a fire sprinkler system—a flow switch can warn of trouble and pinpoint its exact location.



Heating Units—The widespread use of water heaters and duct heaters ranges from commercial processing to personal comfort. A flow switch in pipe or duct can start the heating unit to speedy recovery, or stop it if flow fails.



Metering Devices—Many liquids are improved or altered between their source and point of use—chlorination of domestic water, for example. A flow switch can start and stop the additive equipment as flow dictates.

Flow Switches

No. FS1 and FS1-W

The FS1 series flow switch is a self-contained control that mounts directly in a 1/2" NPT pipe system. The FS1 flow switch is offered in two models; FS1 equipped with a NEMA 1 electrical enclosure, and FS1-W equipped with a NEMA 4X electrical enclosure.

The FS1 offers an economical and dependable answer for the many jobs inside buildings, such as air conditioning, heating and water systems, and processing work.

The FS1-W adds versatility to those characteristics by allowing use outdoors and in environments where humidity or airborne particles are a problem.

Both have large flow-through capacities, yet remain sensitive to small flow rates. Each can be used to activate signal lights, alarms, motors, burners or metering devices, either when flow starts, or stops. The FS1 and FS1-W are ideally suited to any application where low flow rates are encountered.



FS1

Underwriters Listed.
Maximum pressure, 100 psi.
Maximum temperature, 225°F.
NEMA-1 Enclosure.



FS1-W

Underwriters Listed.
Maximum pressure, 100 psi.
Maximum temperature, 225°F.
NEMA-4X Enclosure.

G.P.M. Flow Rates Required to Actuate Switch

Factory or Minimum Adjustment	FLOW	0.41 G.P.M.
	NO FLOW	0.24 G.P.M.
Maximum Adjustment	FLOW	1.81 G.P.M.
	NO FLOW	1.28 G.P.M.

Tabulated flow rates are averages, may vary $\pm 10\%$

Flow Capacity of all FS1 Flow Switches

Differential Pressure	10 psi.	20 psi.	30 psi.	40 psi.	50 psi.	60 psi.	70 psi.	80 psi.	90 psi.
G.P.M. Capacity	8.35	11.50	13.60	15.75	17.75	19.75	21.25	23.00	24.25

FS5 and FS5-S

Offered in several variations to suit a wide range of applications. Two basic models; No. FS5 and FS5-S have one SPDT switch; No. FS5-D and FS5-DS have two SPDT switches to handle two separate circuits. Available with brass bodies, tapped either 3/4" or 1" NPT, or stainless steel tapped 1" NPT. Electrical ratings on page 18.

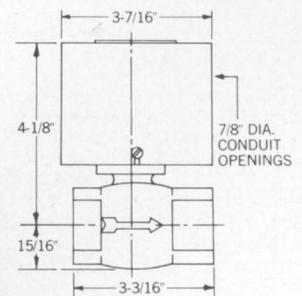
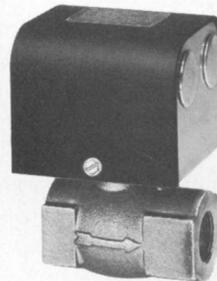
Time delay relays are available to eliminate false signals caused by turbulence; see page 23.

Maximum pressure, 150 psi.

Maximum temperature:

No. FS5 & No. FS5-D, 250 F.

No. FS5-S & No. FS5-DS, 225 F.



Flow Rates Required to Actuate FS5 Series

Water flow rates in gallons per minute (GPM)

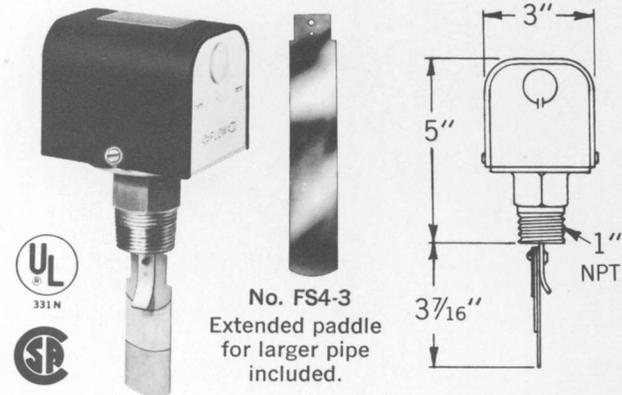
Velocity in feet per second (FPS)

Pipe Size	Brass	Stainless	Minimum Adjustment		Maximum Adjustment					
			FLOW GPM	NO FLOW FPS	FLOW GPM	NO FLOW FPS				
3/4"	FS5-3/4" FS5-D-3/4"	Not Available	1.5	0.9	1.1	0.7	15.0	9.0	10.0	6.0
1"	FS5-1" FS5-D-1"	FS5-S-1" FS5-DS-1"	1.5	0.6	1.1	0.4	15.0	5.6	10.0	3.7

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

Flow Switches

No. FS4-3, No. FS4-3D, No. FS4-3S, and FS4-3DS



No. FS4-3
Extended paddle
for larger pipe
included.

The FS4-3 is a compact, moderately priced flow switch for service on water lines principally. Has single pole, double throw switch—can be wired to make one circuit, break a second, when flow or no-flow occurs. All parts in contact with liquid in pipe are of brass, solder and Monel. Features include completely packless construction, and easy adjustment of switch sensitivity. Individual paddles are adaptable for pipe 1" to 3" NPT; an extended paddle for larger pipe also included. Installs in tee or welding neck in horizontal pipe; has 1" NPT threaded connection.

No. FS4-3 and FS4-3S have one SPDT switch. No. FS4-3D and FS4-3DS have two SPDT switches to handle two separate circuits. Electrical ratings page 18.

The FS4-3S incorporates Stainless Steel wetted part components and is ideally suited for use in processes where compatible corrosive liquids are monitored. These flow switches are also available with time delay relays, to eliminate false signals caused by turbulence (see page 23). Order No. FS4-3-5R for 5-second delay on break, No. FS4-3-20 for 20-second delay on make.

Maximum pressure, 150 psi. Maximum temperature, 300 F.

Flow Rates Required to Actuate No. FS4 Series

Water flow rates in gallons per minute (GPM)
Velocity in feet per second (FPS)

Pipe Size	Factory or Minimum Adjustment				Maximum Adjustment			
	FLOW		NO FLOW		FLOW		NO FLOW	
	GPM	FPS	GPM	FPS	GPM	FPS	GPM	FPS
1"	6.0	2.24	3.6	1.34	10.2	3.91	9.2	3.43
1¼"	9.8	2.11	5.6	1.21	16.8	3.62	15.0	3.23
1½"	12.7	2.00	7.0	1.10	23.0	3.62	19.5	3.07
2"	18.8	1.80	9.4	0.90	32.8	3.14	24.0	2.29
2½"	24.3	1.63	11.6	0.78	42.4	2.74	37.5	2.51
3"	30.0	1.30	12.0	0.52	52.1	2.26	46.1	2.00
4"*	39.7	1.00	19.8	0.50	73.5	1.86	64.2	1.62
5"*	58.7	0.94	29.3	0.47	115.0	1.85	92.0	1.48
6"*	79.2	0.88	39.6	0.44	166.0	1.84	123.0	1.37

*Equipped with extended paddle (cut for 4" and 5" pipe).
Flow rates are averages which may vary ± 10% from tabulated values.

No. FS4-3F and No. FS7-4F Waterflow indicators

Listed by Underwriters Laboratories for service as a waterflow indicator on branch piping of fire sprinkler systems. Used to pinpoint location of open sprinkler heads—to speed the fire fighting and minimize water damage. Construction dimensions and electrical ratings same as for No. FS4-3 (above) and No. FS7-4 (page 21).

No. FS4-3F can be furnished with time delay relay (see page 23); order No. FS4-3F-20. Time delay relay is also available for use with No. FS7-4F (see page 23).

Minimum Flow Rates Required to Actuate Waterflow Indicators

No. FS4-3F – For 1", 1¼" and 1½" branch piping.

No. FS7-4F – For 1¼", 1½", 2" and 2½" branch piping.

Both Waterflow Indicators are actuated by a flow rate of 4 to 10 gallons per minute (GPM) in all pipe sizes listed above.

Maximum pressure: No. FS4-3F, 150 psi.
No. FS7-4F, 300 psi.
Maximum temperature, 300 F.



FS6 Series

NEMA 4X Model now available

Similar to the No. FS1. A check arrangement in the valve body, combined with a large size orifice, permits unusually large flow-through capacity. Available with bodies tapped for either ¾" or 1" pipe. Easily adjusted for sensitivity to flow. Electrical ratings on page 18.

An additional model, the FS6W, is now available. NEMA 4X rated (Water-tight, Dust-tight, corrosion resistant), it is similar to the FS1W. Flow rates and other specifications are identical for both Models FS6 and FS6W. Valve body dimensions are the same for both models, and the FS6W's switch housing is identical to the FS1W's.

Time delay relays are available to eliminate false signals caused by turbulence; see page 23.

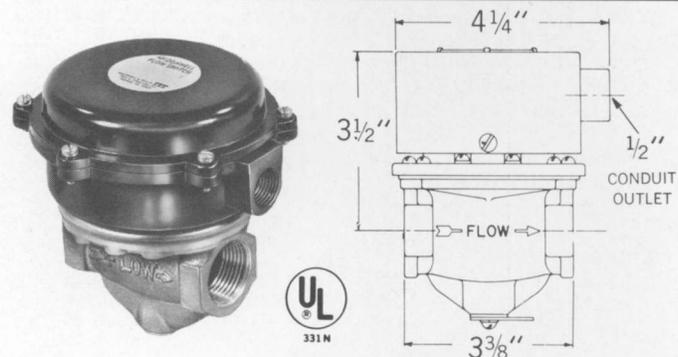
Maximum pressure, 100 psi.
Maximum temperature, 225 F.

Flow Rates Required to Actuate FS6 Series

Water flow rates in gallons per minute (GPM)
Velocity in feet per second (FPS)

Product Number	Minimum Adjustment				Maximum Adjustment			
	FLOW		NO FLOW		FLOW		NO FLOW	
	GPM	FPS	GPM	FPS	GPM	FPS	GPM	FPS
FS6&FS6W-¾"	0.12	0.072	0.06	0.036	2.50	1.505	1.50	0.903
FS6&FS6W-1"	0.12	0.045	0.06	0.022	2.50	0.930	1.50	0.555

Flow rates are averages which may vary ± 10% from tabulated values.



FS6 Series Pressure Drop

Differential Pressure	5 psi	10 psi	20 psi	30 psi	50 psi	70 psi	90 psi
GPM Capacity	15.2	22.2	33.0	38.3	49.5	58.5	66.4

Equivalent Velocities in Feet per Second

No. FS6 & FS6W-¾"	9.1	13.4	19.9	23.1	29.8	35.2	40.0
No. FS6 & FS6W-1"	5.6	8.3	12.3	14.6	18.5	21.8	24.7

Flow Switches

FS7-4 Series

Now available in NEMA 4X rated models

The FS7-4 Series Flow Switches are designed for industrial duty service. Available in standard, vapor-proof or hazardous duty construction, with wetted parts either brass or stainless steel.

Now available in NEMA 4X (Watertight, Dust-tight, and corrosion resistant) Models; NEMA 7 and 9 Models (Hazardous Duty); and Standard Models; the FS7-4 Series is the most versatile in the extensive McDonnell & Miller Flow Switch Line. Availability in either Brass or Stainless Steel construction further adds to the series' wide variety of possible applications. Models FS7-4W and FS7-4SW (NEMA 4X) are ideal for outdoor use in ambient and/or fluid temperatures as low as -65° F. Models FS7-4E and FS7-4ES (NEMA 7 & 9) are Underwriters' Laboratories, Inc. listed for use in Hazardous Locations — Standard Models may be ordered in both single and double switch versions.

The hazardous duty models are Underwriters' Listed for use in Class 1, Group C and D, and Class 2, Groups E, F and G, atmospheres. Switch compartment is sealed from the line. Extended paddle for larger pipe sizes is included.

Two models are available in the series: No. FS7-4 has wetted parts of brass; No. FS7-4S has wetted parts of stainless steel. Both models available in general purpose, NEMA 4X, or hazardous duty enclosures.

The FS7-4D Series Flow Switches have all the features of the FS7-4 Series, plus two single pole double throw switches. The FS7-4D Series can be used to make or break two separate electrical circuits with flow or no-flow in a pipe; or to make one circuit and break a second circuit with a flow or no-flow.

Two general purpose models are available in the series: No. FS7-4D has wetted parts of brass; No. FS7-4SD has wetted parts of stainless steel.

The No. FS7-4A is a variation of the No. FS7-4 which substitutes an air valve for the electrical switch, so it can be used to control pneumatic operated relays or valves when flow in a pipe starts or stops. It is connected by an air line to the pneumatic control system. When flow in the pipeline drops below the necessary rate, the air valve opens, bleeding pressure from the control system and allowing the relay or valve to switch position.

Electrical ratings are shown on page 18.

Time delay relays are available to eliminate false signals caused by turbulence; see page 23.

Flow Rates Required to Actuate FS7-4 Series

Water flow rates in gallons per minute (GPM)

Velocity in feet per second (FPS)

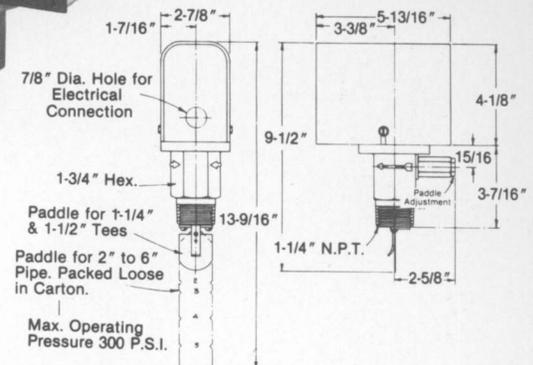
Pipe Size	Minimum Adjustment				Maximum Adjustment			
	FLOW		NO FLOW		FLOW		NO FLOW	
	GPM	FPS	GPM	FPS	GPM	FPS	GPM	FPS
1 1/4"	4.8	1.03	3.0	0.65	7.7	1.66	5.9	1.27
1 1/2"	6.3	0.99	3.6	0.57	10.0	1.57	7.0	1.10
2"	9.9	0.95	5.9	0.56	15.8	1.51	11.0	1.05
2 1/2"	15.3	1.03	9.5	0.64	23.7	1.59	17.0	1.14
3"	24.4	1.05	15.4	0.67	35.5	1.54	29.2	1.27
4"	33.3	0.84	21.1	0.53	61.4	1.55	37.7	0.95
5"	44.4	0.71	31.0	0.50	84.0	1.35	51.0	0.85
6"	56.3	0.63	48.7	0.54	114.8	1.27	71.5	0.79
8"	104.0	0.67	89.0	0.57	210.0	1.35	131.0	0.84
10"	184.0	0.75	157.0	0.64	369.0	1.50	231.0	0.94
12"	289.0	0.82	247.0	0.70	582.0	1.65	363.0	1.03
14"	387.0	0.90	323.0	0.75	753.0	1.75	495.0	1.15
16"	513.0	0.90	428.0	0.75	998.0	1.75	656.0	1.15

*Equipped with 6" paddle.

Flow rates are averages which may vary ± 10% from tabulated values.

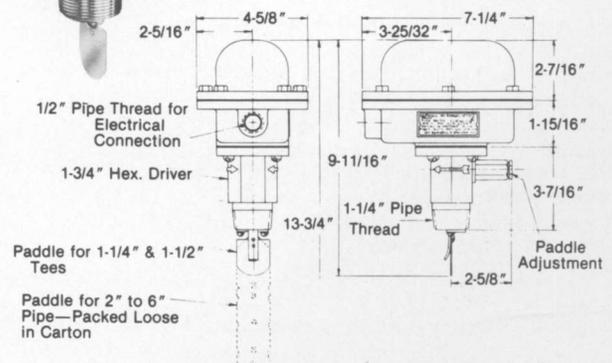
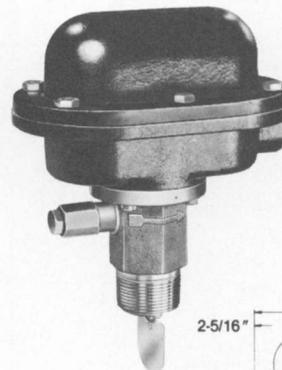
Product Number	FS7-4	FS7-4S	FS7-4E	FS7-4SE	FS7-4W	FS7-4SW	FS7-4D	FS7-4SD	FS7-4A
Max. Pressure	300 psi	1000 psi	300 psi	1000 psi	300 psi	1000 psi	300 psi	1000 psi	300 psi
Max. Temperature	300 F	300 F	300 F	300 F	300 F	300 F	300 F	300 F	300 F
Material of Wetted Parts	Brass	Stainless Steel	Brass	Stainless Steel	Brass	Stainless Steel	Brass	Stainless Steel	Brass
Construction	General Purpose		Hazardous Duty		Vapor-Proof		General Purpose		

FS7-4 General Purpose Enclosure

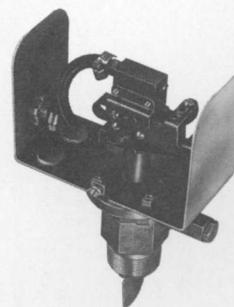


FS7-4E Hazardous Duty Enclosure

(NEMA 4X models identical in appearance and dimensions)



FS7-4A Pneumatic Control

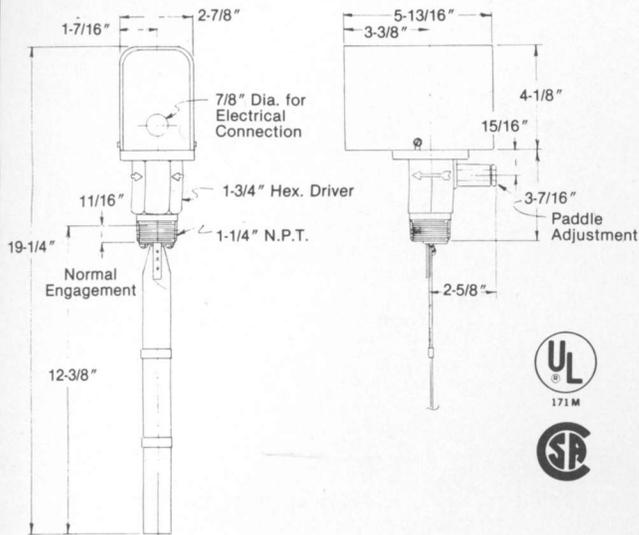


FS7-4A:

Maximum pressure, Air Valve, 50 psi.
Air Line Connection, Pipe Tap, 1/8" NPT.

Flow Switches

FS7-4L Series



These are same as the FS7-4 Series but fitted with a longer paddle to provide greater sensitivity to flow when used in larger pipes. Wetted parts are of brass. Dimensions are same as for corresponding FS7-4 models, except for those shown in drawing.

Electrical ratings shown on page 18.

No. FS7-4L has standard construction, like No. FS7-4.
 No. FS7-4VL has vapor-proof construction, like No. FS7-4V.
 No. FS7-4EL has hazardous duty construction, like No. FS7-4E.
 Underwriters Listed for use in Class 1, Group C and D, and Class 2, Group E, F and G, atmosppheres.

Time Delay Relays are available to eliminate false starts caused by turbulence, see page 23.

Maximum pressure, 300 psi.
 Maximum temperature, 300 F.

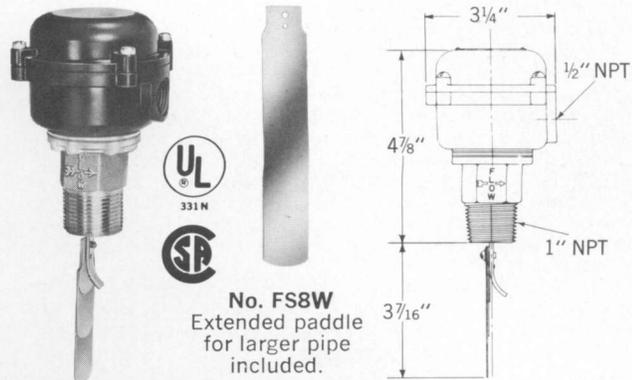
Flow Rates Required to Actuate FS7-4L Series.

Water flow rates in gallons per minute (GPM)
 Velocity in feet per second (FPS)

Pipe Size	Minimum Adjustment		Maximum Adjustment	
	FLOW GPM FPS	NO FLOW GPM FPS	FLOW GPM FPS	NO FLOW GPM FPS
8"	94 0.60	47 0.30	140 0.90	125 0.80
10"	148 0.60	74 0.30	221 0.90	197 0.80
12"	211 0.60	106 0.30	317 0.90	282 0.80
14"	258 0.60	129 0.30	387 0.90	344 0.80
16"	342 0.60	171 0.30	513 0.90	456 0.80
20"	520 0.60	260 0.30	780 0.90	693 0.80
24"	752 0.60	376 0.30	1128 0.90	1002 0.80
30"	1177 0.60	589 0.30	1766 0.90	1570 0.80
36"	1723 0.60	861 0.30	2584 0.90	2297 0.80

Flow rates are averages which may vary ± 10% from tabulated values.

No. FS8W



No. FS8W
 Extended paddle
 for larger pipe
 included.

All models now NEMA 4X rated

Provides NEMA 4X (Watertight, Dust-tight, Corrosion Resistant) construction in an economically priced, compact-size flow switch. Particularly suited for use in areas of high humidity, and for out-of-doors installation. Has adjustment for sensitivity to flow, packless construction, wetted parts of brass, solder and Monel. Individual paddles are adaptable for pipe 1" to 3"; extended paddle for larger pipe is also included. Installs in tee or welding neck in horizontal pipe; 1" threaded connection.

Electrical ratings shown on page 18.

Time delay relays are available to eliminate false signals caused by turbulence; see page 23.

Maximum pressure, 150 psi
 Maximum temperature, 225 F.

Flow Rates Required to Actuate No. FS8W

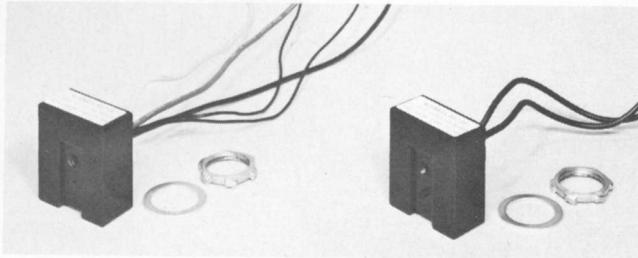
Water flow rates in gallons per minute (GPM)
 Velocity in feet per second (FPS)

Pipe Size	Factory or Minimum Adjustment				Maximum Adjustment			
	FLOW		NO FLOW		FLOW		NO FLOW	
	GPM	FPS	GPM	FPS	GPM	FPS	GPM	FPS
1"	4.9	1.82	3.4	1.25	17.6	6.53	15.0	5.56
1 1/4"	7.5	1.60	5.3	1.14	29.0	6.23	24.6	5.28
1 1/2"	9.4	1.48	6.7	1.05	37.8	5.95	32.2	5.07
2"	13.7	1.31	9.4	0.90	56.4	5.39	47.4	4.53
2 1/2"	17.9	1.20	12.1	0.81	71.3	4.78	59.2	3.97
3"	24.2	1.05	16.4	0.71	89.0	3.87	72.5	3.15
4"	35.3	0.89	27.0	0.68	118.0	2.98	105.0	2.64
5"	48.6	0.78	37.4	0.60	178.0	2.86	160.0	2.57
6"	60.3	0.67	46.8	0.52	245.0	2.72	225.0	2.50

*Equipped with extended paddle (cut for 4" and 5" pipe).
 Flow rates are averages which may vary ± 10% from tabulated values.

Time Delay Relays

No. T-5R and No. T-20

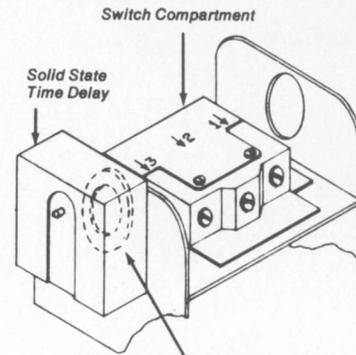


With many applications of liquid or air flow switches, a short time delay in making or breaking electrical circuits can be very desirable. It can eliminate false signals to control circuits, computer circuits and alarm circuits due to paddle or piston flutter caused by system pulsations and turbulence.

Two Time Delay Relays are offered, which can be used with all McDonnell Liquid and Air Flow Switches. No. T-5R provides a 5-second delay in breaking, or opening, the electrical circuit. No. T-20 provides a 20-second delay in making, or closing, the electrical circuit. Both relays are available for supply voltages as listed in table below.

These are solid state devices, 100% encapsulated. Each is furnished with a locknut for standard 1/2 inch conduit fitting, spacing washer and 10 inch lead wires.

McDonnell Time Delay Relays can be mounted directly on the switch housings of No. FS4-3 and No. FS4-3D (page 20), FS5 Series (page 19), and AF-1, AF-2, and AF-3 Series air flow switches (pages 24 and 25). With all other McDonnell Flow Switches, relays can be mounted on conduit boxes affixed to switch housings or at the control panel.



Place space washer on conduit connector before attaching time delay to knockout opening with locknut fitting.

ELECTRICAL RATINGS

Input: 120 Volt AC
Output: 1 Ampere RMS steady state maximum,
20 milliamperes minimum.

Note: As there is no polarity involved, either lead wire may be connected to electrical circuit.

Electrical Supply	Product Number	
	5-second delay on break	20-second delay on make
120 Volt AC	No. T-5R	No. T-20
24 Volt AC	No. T-5R-24V	No. T-20-24V
24 Volt DC	—	No. T-20-24VDC
240 Volt AC	No. T-5R-240V	No. T-20-240V

Air Flow Switches

McDonnell Air Flow Switches perform the same function in air ducts that McDonnell Liquid Flow Switches do in pipe lines. They make or break an electrical circuit when air flow starts or stops, and can be used to control almost any type of electrically operated equipment—signal lights, alarms, motors, duct heaters and metering devices. Their broad range of applications includes air conditioning systems; exhaust or make-up systems; equipment or processes requiring air cooling or heating; anywhere air flow is essential.

McDonnell Air Flow Switches sense air flow or flow failure by responding only to velocity of air movement. Thus, they will detect such emergencies as a closed damper, loose fan wheel, broken fan belt, clogged or dirty filter, or overload of fan motor start switch.

The AF1 Series are designed for medium and higher velocity systems; the Nos. AF2 and AF3 for systems where there are lower air flow velocities.

HOW TO SELECT

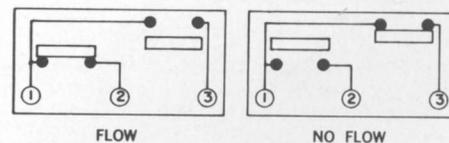
Air Flow Switches are selected basically according to the air flow rates prevailing in the duct. Other determining factors might include size of the air duct, maximum temperature, chemical fumes or other airborne elements, and manner of installation in the duct.

All McDonnell Air Flow Switches are designed to be installed in a horizontal run of duct either at the top, side or bottom. They may also be installed in a vertical duct with upward air flow, and under certain conditions in a vertical duct with downward air flow; for further information write the factory.

SWITCH OPERATION SCHEMATICS

In the tables of flow rates given in this bulletin for air flow switches the word "Flow" means that the switch will close circuit 1-2, and open circuit 1-3—when the air flow rate is increased to the FPM shown.

The words "No Flow" mean the switch will reverse position—will open circuit 1-2, and close circuit 1-3—when the air flow rate is decreased to the FPM shown.



FLOW

NO FLOW

ELECTRICAL RATINGS

All McDonnell Air Flow Switches shown in this booklet have single-pole double-throw switches.

Ampere Ratings (Underwriters Listed)

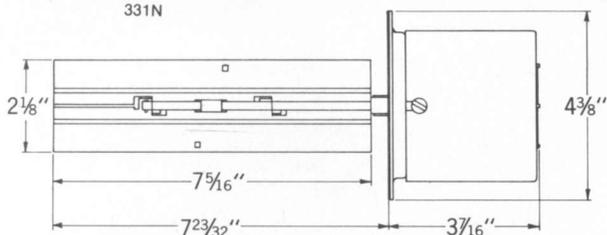
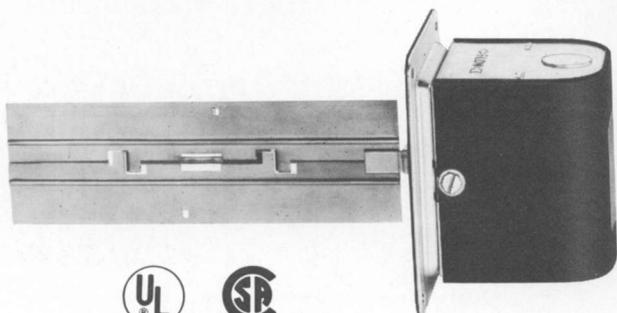
	120 VAC	240 VAC
Motor Duty	120 VAC	240 VAC
Full Load	7.4	3.7
Locked Rotor	44.4	22.2
	115 VDC	230 VDC
	0.3	0.15

Pilot Duty: 125 VA, 120-240 VAC

A.C. Non-Inductive Load:
15 Amps., 120V., 240V., 277V.

Air Flow Switches

No. AF1 and No. AF1-S



These air flow switches are designed for medium and higher velocity systems up to 2500 FPM. Switch sensitivity to air flow can be readily adjusted. Standard paddle fits into 8" minimum duct, and may be trimmed to fit duct as small as 6".

No. AF1 parts which are exposed to the inside of the duct are made of brass, steel and Teflon. Switch compartment is isolated from the duct by a chrome-plated spherical bearing, revolving against a flat Teflon seat; this is not a completely tight seal.

No. AF1-S parts which are exposed to the inside of the duct are made of 18-8, 302 and 316 stainless steel, and Viton. Viton has excellent chemical resistance characteristics. Switch compartment is sealed from duct by a Viton flexible rolling seal; this is a completely tight seal.

Electrical ratings are shown on page 23.

Time Delay Relays are available to eliminate false signals caused by turbulence; see page 23.

Maximum duct temperature, 300 F.

Air Flow Velocities Required to Actuate No. AF1 and No. AF1-S (Based on Standard Air 0.075 Pounds per Cubic Foot)

HORIZONTAL DUCT (Preferred Installation)

Paddle Length	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
Standard (7 1/4")	480	185	1385	1160
Trimmed 2" (5 1/4")	700	220	2230	1820

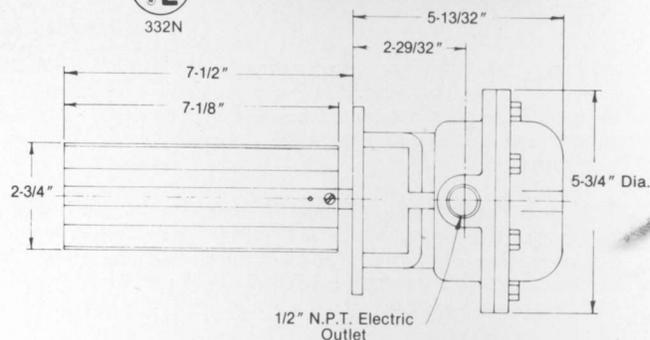
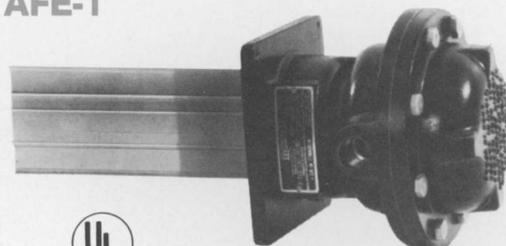
Flow rates are averages which may vary ± 10% from tabulated values.

VERTICAL DUCT, UPWARD FLOW (For Downward Flow, write factory)

Paddle Length	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
Standard (7 1/4")	910	785	1610	1460
Trimmed 2" (5 1/4")	1235	1050	2560	2410

Flow rates are averages which may vary ± 10% from tabulated values.

No. AFE-1



The No. AFE-1 Air Flow Switch is designed for use in ducts with medium air flow velocities where a hazardous environment is present. Switch sensitivity to flow can be readily adjusted. Parts exposed to the inside of the duct are made of brass, steel, and aluminum. Switch compartment is isolated from the duct by use of a magnetic proximity switch. Underwriters Listed for use in Class 1, Group C and D and Class 2, Group E, F and G atmospheres.

Electrical ratings are shown on page 23.

Time Delay Relays are available to eliminate false signals caused by turbulence; see page 23.

*Maximum duct temperature, 275F.
Maximum ambient temperature 120F.*

Air Flow Velocities Required to Actuate No. AFE-1 (standard paddle)

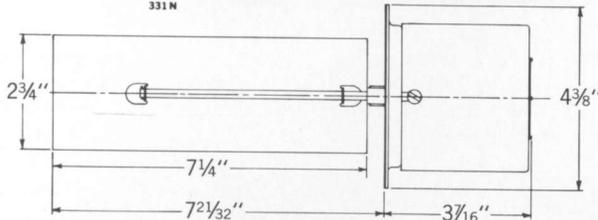
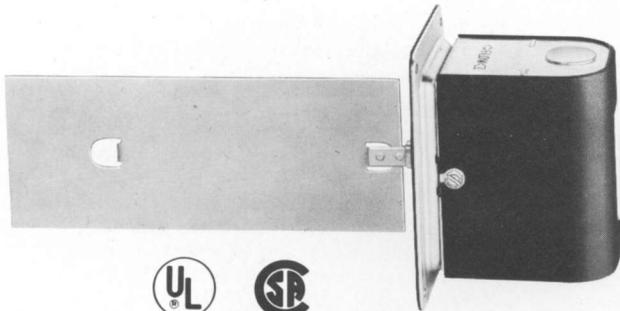
(Based on Standard Air 0.075 Pounds per Cubic Foot)

HORIZONTAL DUCT (Preferred Installation)

Mounting or duct	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
Top (Preferred)	300	100	1900	500
Side	350	100	1950	900

Flow rates are averages which may vary ± 10% from tabulated values.

No. AF2



The No. AF2 Air Flow Switch is designed for use in ducts with lower air flow velocities. It is similar in design to the No. AF3. Switch sensitivity to flow can be readily adjusted. Parts exposed to the inside of the duct are made of brass, steel, aluminum and Teflon. Switch compartment is isolated from the duct by a chrome-plated spherical bearing revolving against a flat Teflon seat; this is not a completely tight seal.

Electrical ratings are shown on page 23.

Time Delay Relays are available to eliminate false signals caused by turbulence, see page 23.

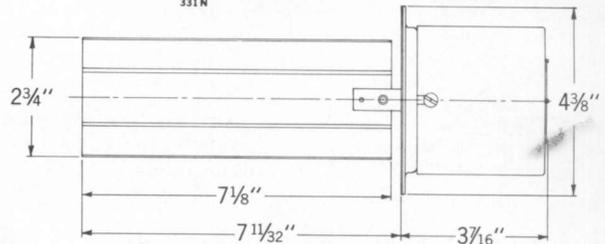
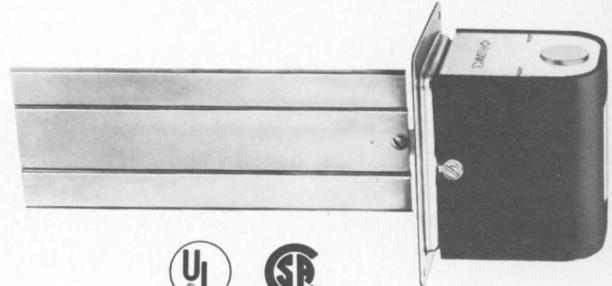
Maximum duct temperature, 300 F.

Air Flow Velocities Required to Actuate No. AF2 (Based on Standard Air 0.075 Pounds per Cubic Foot)

HORIZONTAL DUCT INSTALLATION

Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
380	210	1250	1000

No. AF3 and No. AF3-D



These air flow switches are designed for use in air ducts where response to low flow velocities is required. Switch sensitivity to flow can be readily adjusted. Parts exposed to the inside of the duct are made of brass, steel, aluminum and Teflon.

No. AF3 has one SPDT switch. It can be wired to make one circuit, and break a second electrical circuit, when air flow starts or stops. No. AF3-D has two SPDT switches. It can be wired to make or break two separate electrical circuits when flow starts or stops, or to make one and break another when flow starts and then reverse both when flow stops.

Time Delay Relays are available to eliminate false signals caused by turbulence; see page 23.

Maximum duct temperature, 275 F.

Air Flow Velocities Required to Actuate No. AF3 and No. AF3-D (Based on Standard Air 0.075 Pounds per Cubic Foot)

HORIZONTAL DUCT (Preferred Installation)

Model No.	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
AF3	235	175	1445	1365
AF3-D	295	220	1445	1000

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

VERTICAL DUCT, UPWARD FLOW (For Downward Flow, write factory)

Model No.	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
AF3	450	430	1470	1395
AF3-D	560	540	1470	1030

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

PS 800 Series Steam Probe Controls

Low Water Cut-Offs for Low Pressure Steam Boilers

- Completely Electronic Operation
- No Moving Parts to Wear or Adjust
- No Blowdown Required
- Inexpensive to Own and Operate

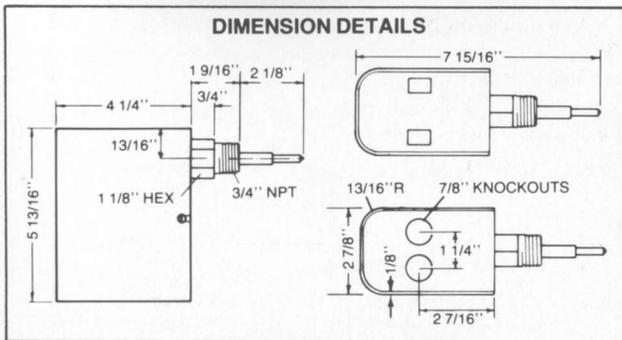


McDonnell & Miller PS 800 Series Controls utilize modern solid-state electronic circuitry to sense liquid levels. Designed specifically for low pressure steam boilers, this circuitry incorporates a time retard feature to prevent nuisance burner cut-off due to rapid water level fluctuations. Yet, the cut-off circuit will respond quickly in the event the water level drops below minimum operating level. When level returns to normal, automatic models will return the burner to operation. On manual models, the reset must be actuated to set the control to normal functioning. All models include provision for adding an automatic water feeder incorporating time-retard operation, to return boiler to normal levels without overfilling.

Model PS 800 Series Controls — Low Initial Cost, Minimum Maintenance, Reliable Electronic Operation. The state-of-the-art in Low Water Cut-Offs for low pressure steam boilers.



MODEL SHOWN:
PS-800M-24
PS-800M-120



AVAILABLE MODELS

24 VAC Models	120 VAC Models
PS-801-24 Automatic Reset	PS-801-120 Automatic Reset
PS-801M-24 Manual Reset	PS-801M-120 Manual Reset
PS-800-24 Manual Test Automatic Reset	PS-800-120 Manual Test Automatic Reset
PS-800M-24 Manual Test and Reset	PS-800M-120 Manual Test and Reset

PRODUCT SPECIFICATIONS

- Maximum pressure - 15 psi
- Maximum water temperature - 250 F
- Maximum ambient temperature - 120 F
- Probe control connection - 3/4" NPT
- Probe control sensitivity - 3000 ohms at 120 VAC or 24 VAC supply
- Time retard - Nominal 10 sec.
- Control power consumption - 3 VAC
- Voltage across probe to ground - 12 VAC

WF 2 Series Water Feeders

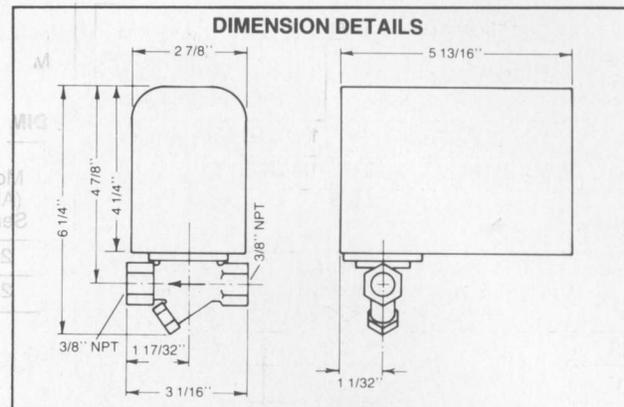
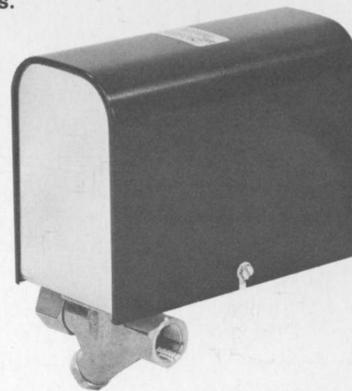
For Low Pressure Steam Boilers

- Electronic/Electromechanical Operation
- Simple Mechanism Minimizes Wear
- Low Maintenance, No Adjustments Necessary
- Inexpensive to Own and Operate



McDONNELL & MILLER WF 2 Series Water Feeders use modern electronic circuitry in conjunction with a solenoid valve to maintain a minimum operating level in low pressure steam boilers. Designed to compliment the new McDonnell PS 800 Series Probe-Type Low Water Cut-Offs, the combined system provides state-of-the-art ability to maintain minimum levels while preventing nuisance burner cut-offs. This integrated feeder/cut-off system features very low maintenance requirements. The WF 2 Water Feeder's low initial cost, advanced features, and minimum maintenance make it ideal for many types of systems requiring minimum operating level protection.

McDONNELL WF 2 Series Water Feeders—Low initial cost, Minimum Maintenance, Reliable electro-mechanical operation. The state-of-the-art in Water Feeders for low pressure steam boilers.



AVAILABLE MODELS

24 VAC Models	120 VAC Models
WF 2-24	WF 2-120

PRODUCT SPECIFICATIONS

- Maximum boiler size - 500,000 BTU/hr
- Maximum water supply pressure - 150 psi
- Maximum boiler pressure - 15 psi
- Maximum water temperature - 175 F
- Maximum ambient temperature - 100 F
- 120 VAC and 24 VAC models available
- Power consumption 24 VAC - 15 watts
- Power consumption 120 VAC - 20 watts
- Connections - 3/8" NPT

Pressure Relief Valves 250 and 260 Series

FEATURING:

- Bronze or Cast Iron Construction
- Full ASME Certification
- Highest BTUH Ratings
- Positive Operating Diaphragm Design
- Complete Range of Sizes and Ratings



Designed to guard against over-pressure in hydronic heating systems and tanks, McDONNELL & MILLER Relief Valves are manufactured, tested and labeled in accordance with Section IV of the ASME Boiler and Pressure Vessel Code.

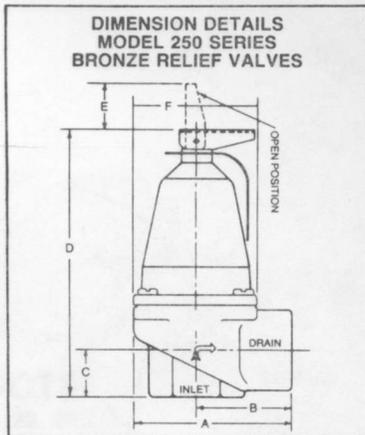
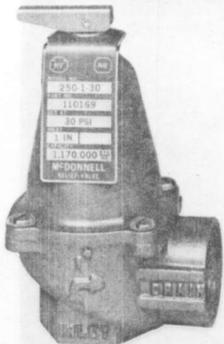
This diaphragm type design allows a low differential of less than three psi. between opening and closing pressures. This low differential works to minimize hammering under flash steam conditions.

The diaphragm also seals the spring chamber from discharge water and vapor, inhibiting corrosive action and build-up of deposits.

McDONNELL & MILLER Relief Valves have a diaphragm seal area that is five times larger than other designs, providing much greater opening power during operation.

250 Series Bronze Relief Valves

- 3/4" Inlet and Discharge Models
- 1" Inlet and Discharge Models



CONSTRUCTION (WETTED PARTS)

Body and Seat: Bronze
Seat Retainer: Bronze
Diaphragm and Seat Disc: EPT Rubber
Maximum Working Pressure: 125 psig
Maximum Working Temperature: 250° F.

DIMENSIONS

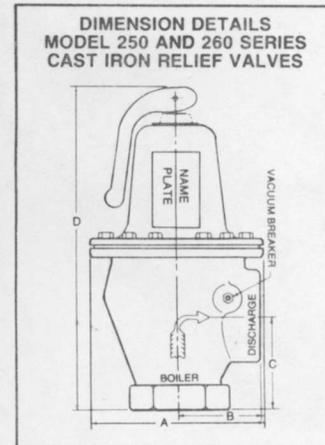
Model (All in Series)	Inlet & Outlet	Dimensions (Inches)						Approx. Shipping Weight (LBS)
		A	B	C	D	E	F	
250	3/4	2 9/16	1 1/2	3/4	4 9/16	1 1/32	2 3/32	1.2
250	1	2 7/8	1 3/4	7/8	4 15/16	1 1/32	2 1/4	1.5

PERFORMANCE

Model Number	Inlet & Outlet Size (Inches)	Opening Pressure (PSIG)	ASME Rating (BTUH)
250-3/4-30	3/4	30	790,000
250-3/4-36		36	900,000
250-3/4-45		45	1,065,000
250-3/4-50		50	1,160,000
250-3/4-75		75	1,615,000
250-3/4-100		100	2,075,000
250-3/4-125	1	125	2,535,000
250-1-30		30	1,170,000
250-1-36		36	1,330,000
250-1-45		45	1,575,000
250-1-50		50	1,710,000
250-1-75		75	2,385,000
250-1-100		100	3,060,000
250-1-125		125	3,735,000

250 and 260 Series Cast Iron Relief Valves

- 1 1/2" Inlet, 2" Discharge-260 Models
- 2" Inlet, 2" Discharge-250 Models



CONSTRUCTION (WETTED PARTS)

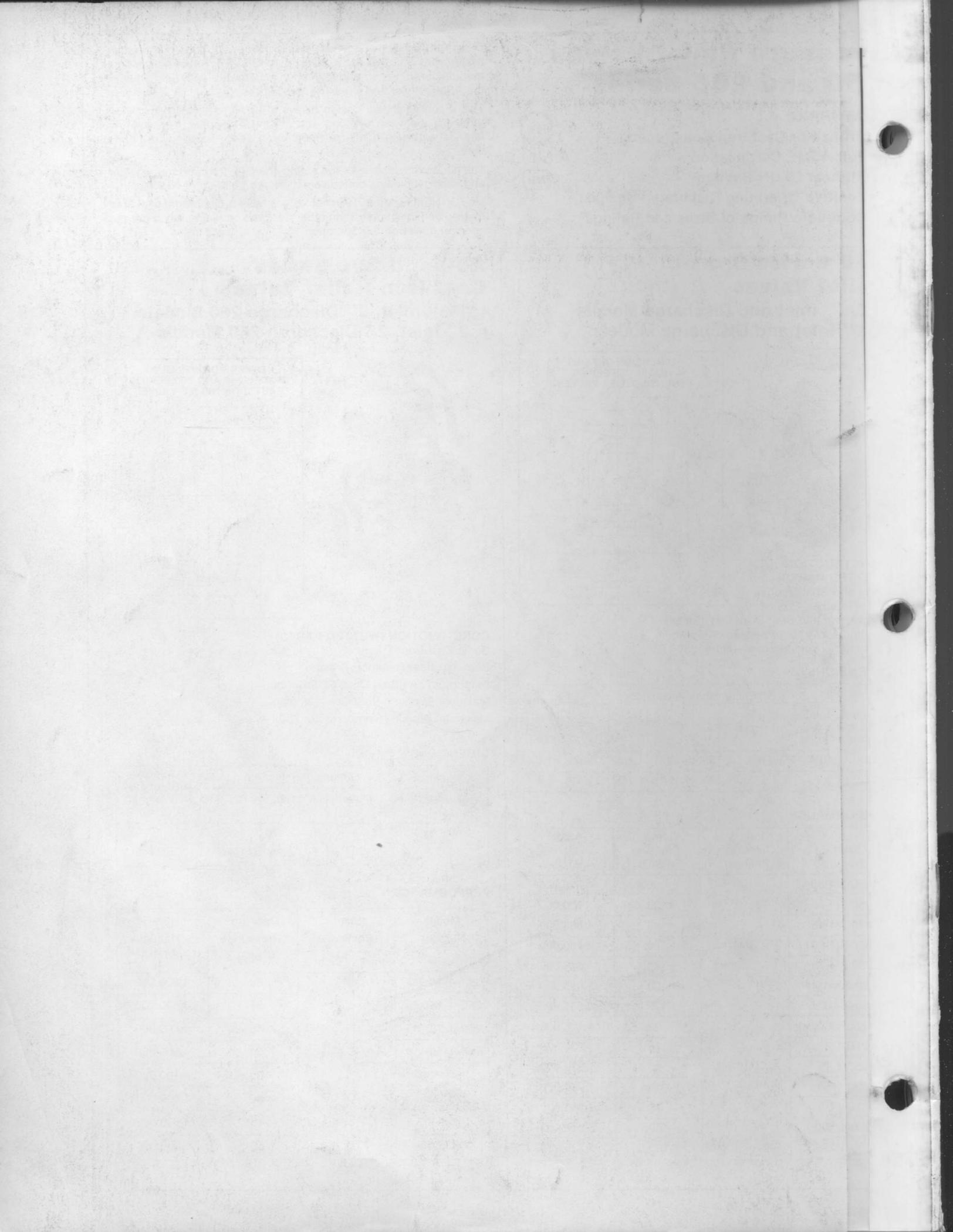
Body: Cast Iron
Seat and Seat Retainer: Brass
Diaphragm and Seat Disc: EPT Rubber
Maximum Working Pressure: 125 psig
Maximum Working Temperature: 250° F.

DIMENSIONS

Model (All in Series)	Dimensions (Inches)						Approx. Shipping Weight (LBS)
	Inlet	Outlet	A	B	C	D	
260	1 1/2	2	6	2 7/8	3 1/4	11	17
250	2		6	2 7/8	3 1/4	11	17

PERFORMANCE

Model Number	Size (Inches)		Opening Pressure (PSIG)	ASME Rating (BTUH)
	Inlet	Outlet		
260-1 1/2-30	1 1/2	2	30	3,300,000
260-1 1/2-36			36	3,800,000
260-1 1/2-45			45	4,500,000
260-1 1/2-50	50		4,900,000	
250-2-30	2		30	4,100,000
250-2-36			36	4,600,000
250-2-45		45	5,500,000	
250-2-50		50	5,900,000	



McDONNELL & MILLER

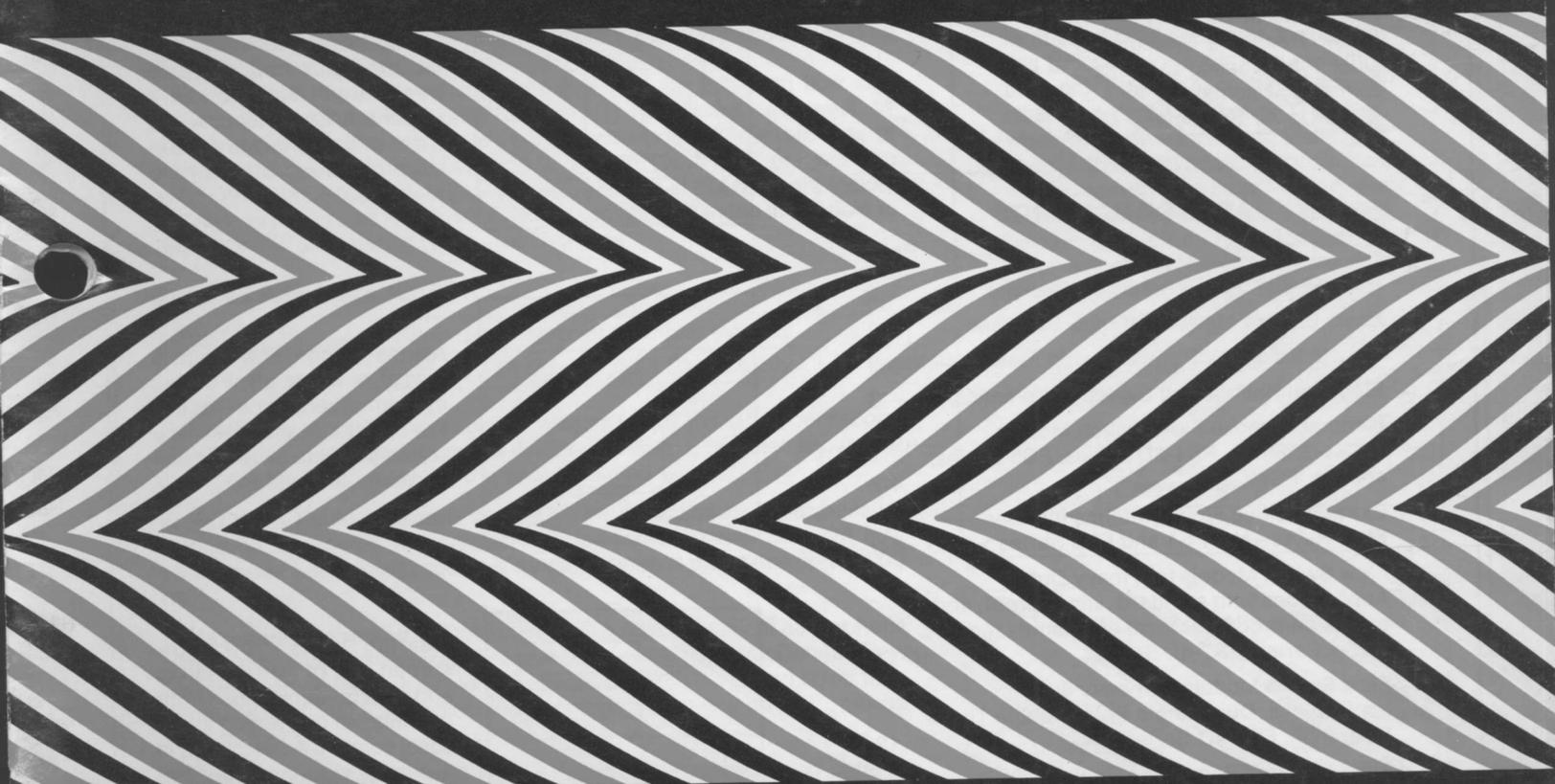
Bulletin SL-FSC



Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY

Industrial Equipment & Supplies
Boiler & Burner—Sales & Service
Interstate Hwy. 85-S—Mail Route 7, Box 170
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
GREENSBORO, NORTH CAROLINA 27407-9799

McDONNELL FLOW SWITCH CATALOG



McDONNELL & MILLER **ITT**
FLUID HANDLING DIVISION

McDONNELL FLOW SWITCHES

Versatile controls actuated by liquid or air flow
Widely used as automatic controllers

The flow of liquids in pipelines and air in ducts plays an important role in industry and commerce. Under most circumstances it is essential to know whether or not there is a flow in a pipeline or duct, and to act upon that knowledge. That is the reason for, and the function of, McDonnell Flow Switches.

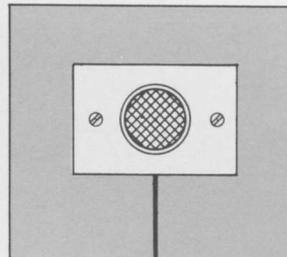
A complete line of McDonnell Flow Switches has been developed for a wide range of applications and literally hundreds of uses, including:

- Air Conditioning Systems
- Hot Water Space Heating Systems
- Hot Water Supply Systems
- Pump Systems
- Water Cooled Equipment
- Blending or Additive Systems
- Liquid Transfer Systems
- Fire Sprinkler Systems
- Water Treatment Systems
- Duct Type Heating Systems
- Exhaust Systems
- Make-Up Air Systems

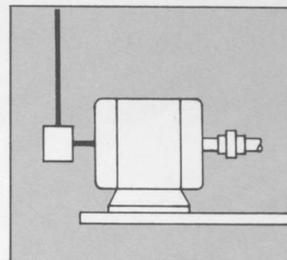
TABLE OF CONTENTS

	Page
Introduction and General Applications	2
Basic Uses of McDonnell Flow Switches	2
How to Select McDonnell Liquid Flow Switches	3
Electrical Ratings and Switch Schematics	3
General Purpose Flow Switch Models — FS4-3 Series, FS4-3D Series, FS5 Series, and No. FS8V	4-7
Extra Sensitive Flow Switches for Low Flow Rates— No. FS1 and FS6 Series	8-9
Flow Switch Models for Heavy Duty Applications with standard, vapor-proof, and explosion-proof electrical enclosures models. FS7-4 Series, FS7-4L Series	10-11
Flow Switch Models for heavy duty applications. Dual Single Pole, Double Throw Operation. FS7-4D Series	12
Flow Actuated Pneumatic Control — No. FS7-4A	12
Waterflow Indicators for Sprinkler System Branch Piping— FS4-3F Series and No. FS7-4F	13
General Engineering Data for Liquid Flow Switches	14
How to Select McDonnell Air Flow Switches	15
Air Flow Switches for Low, Medium, and Higher Velocities— AF1 Series, AFE-1, No. AF-2, No. AF-3, No. AF-3-D	16-19
McDonnell Time Delay Relays	19

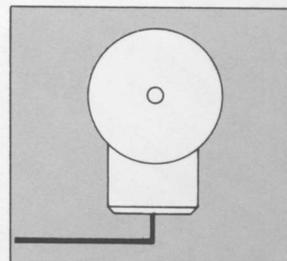
THESE ARE ONLY A FEW OF THE BASIC USES OF McDonnell FLOW SWITCHES



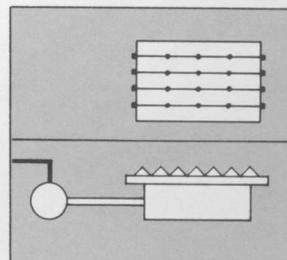
Signal Devices—With increasing automation, knowledge of flow, or no-flow, is important. A flow switch can provide a visual or audible report from any location, either nearby or remote.



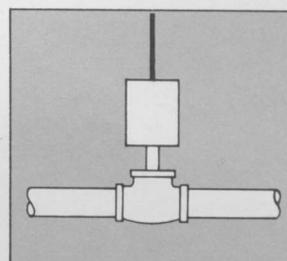
Motors—The operation of pumps, compressors and similar apparatus frequently depends upon fluid flow in a pipeline. A flow switch provides a dependable way to control such motors or other prime movers.



Alarms—Where flow failure is critical, or where a flow occurs in an emergency line—as in a fire sprinkler system—a flow switch can warn of trouble and pinpoint its location.



Heating Units—The widespread use of water heaters and duct heaters ranges from commercial processing to personal comfort. A flow switch in a pipe or duct can start the heating unit to speed recovery, or stop it if flow fails.



Metering Devices—Many liquids are improved or altered between their source and point of use—chlorination of domestic water, for example. A flow switch can start and stop additive equipment as flow dictates.

McDonnell LIQUID Flow Switches/HOW TO SELECT

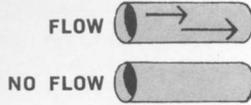
The following discussion of the various factors to be considered will serve as a guide in selecting the proper McDonnell Flow Switch.

1. What function will the flow switch perform? McDonnell Flow Switches are equipped with either one or two SPDT switches except for No. FS7-4A (Pneumatic). They can make or break an electrical circuit when flow starts or when flow stops, and can be used, for example, to:

- Actuate a signal when flow stops;
- Start a motor with flow;
- Shut off an alarm when flow is adequate;
- Stop a motor with no flow.

2. Size of pipe? McDonnell Flow Switches may be used on pipe sizes 1/2" through 36".

3. How much flow is present? The flow rate at which the flow switch is to respond should be determined next. McDonnell Flow Switches are actuated (make or break) with an increase in flow, and will reverse switch position (break or make) with a decrease in flow. Throughout this brochure the term "Flow" represents the actual movement (velocity) of liquid within a pipe sufficient to actuate the switch. The term "No-Flow" represents a decrease in velocity, or a total flow stoppage, which will permit the switch to return to its original position. **Important:** In operation the switch must be actuated by "Flow" before it can be reversed again by "No-Flow."



For example, the partial table below indicates the minimum flow rate required to actuate the McDonnell No. FS1. (1) There must be at least .41 gpm "Flow" before the flow switch will be actuated; the flow rate may of course be higher. (2) Should flow drop to .24 gpm "No-Flow," or lower, the switch will reverse position. Note: The values shown in this table are factory settings; all McDonnell Flow Switches can easily be adjusted in the field to require a higher actuating "Flow," or "No-Flow."

Required Flow Rates No. FS1

(Factory setting;
Minimum adjustment)

Flow	0.41 gpm (or 0.43 fps) Velocity
No-Flow	0.24 gpm (or 0.25 fps) Velocity

Complete flow rate tables in gallons per minute (gpm) and in feet per second (fps) for each model are included in the product data. Flow rates shown are averages which may vary ± 10% from tabulated values.

4. Maximum liquid pressure in pipe? The maximum pipeline pressure should be considered when selecting a particular model. Different flow switch models can accommodate a range of pipeline pressures up to 1000 psi.

5. Maximum temperature? Determine the liquid and ambient atmospheric temperature when selecting the flow switch model. Various McDonnell Flow Switches can be used at ambient temperatures from 32 F. and liquid temperatures up to 300 F. If ambient temperatures are lower than 32 F., please write factory.

6. Type of liquid? McDonnell Flow Switch models have wetted parts of brass, monel or stainless steel. Depending on the particular model they may be used with water, certain light viscous fluids, some oils, various caustic solutions and other fluids.

7. Atmosphere surrounding flow switch? It should be determined if the location will be subject to high humidity, weather conditions or explosive atmospheres. Standard, vapor-proof and hazardous duty flow switch models are available.

8. Installation? It is recommended that all models be installed upright in a horizontal run of pipe and that any valves, elbows, orifices or other restrictions be removed at least five pipe diameters from either side of the flow switch. Specific installation instructions are provided with each control.

For specific information regarding particular applications or conditions please call or write your McDonnell representative.

ELECTRICAL RATINGS

(Underwriters Laboratories Inc. Listed)

Except for Pneumatic Control on page 12, all liquid flow switches in this booklet have same type single-pole double-throw switch. Electrical ratings for all models:

Ampere Rating

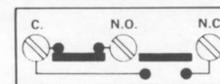
Motor Duty	120 V.A.C.	240 V.A.C.
Full Load	7.4 Amps.	3.7 Amps.
Locked Rotor	44.4 Amps.	22.2 Amps.
	120 V.D.C.	240 V.D.C.
	0.3 Amps.	0.15 Amps.

Pilot Duty: A.C. 125 V.A., 120-240 V.

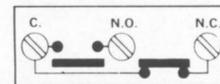
SWITCH OPERATION SCHEMATICS

In the tables of flow rates included in this brochure for liquid flow switches, the word "Flow" means that switch will close one circuit, and open the other, when flow rate is increased to the gpm shown. (See schematic "Flow.")

The words "No-Flow" mean the switch will reverse position—open first circuit and close the second—when flow rate is decreased to the gpm shown. (See schematic "No-Flow.")

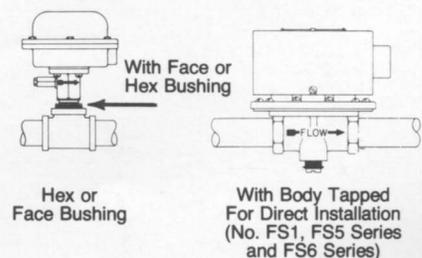
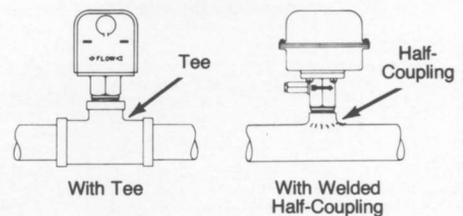


FLOW



NO FLOW

TYPICAL INSTALLATIONS



LIQUID Flow Switches/General Purpose Models

The flow switches described on pages 4, 5, 6 and 7 are used primarily as automatic controls in air conditioning, heating and water systems and in process work. They include the FS4-3 Series, the FS5 Series, and the No. FS8V which offers vapor-proof construction.

McDonnell FS4-3 Series Flow Switches



- Maximum pressure, 150 psi
- Maximum temperature, 300 F.

No. FS4-3 Flow Switch shown mounted in a 2-inch tee.

The FS4-3 Series are compact, moderately-priced flow switches for service on water lines principally. All parts in contact with the liquid in the pipe are of brass, solder and monel. The FS4-3 Series is installed in a tee or half coupling in a horizontal pipe. Note outstanding design features listed below.

Flow rates required to actuate the FS4-3 Series are shown on opposite page. For electrical ratings and switch schematics see page 3.

No. FS4-3 has a single-pole double-throw switch. It can be wired to make one circuit, break a second circuit, when flow starts or stops. Other variations, shown on opposite page, offer integral time delay relay or two-switch construction.

Note: For use in self-generating control systems, flow switches with single-pole single-throw millivolt switches are available. No. FS4-MV completes circuit with flow; No. FS4R-MV breaks circuit with flow.

The FS4-3 series is also available in "S" models incorporating wetted components of stainless steel monel & silver solder construction. The S models are ideally suited for use in processes where compatible corrosive liquids are monitored. Standard, double-switch, and time delay models are available, and are designated by a "S" suffix.

McDONNELL QUALITY THROUGHOUT

Easy Wiring—Cover completely removable. No cramped quarters, no danger of kinked wires interfering with operation.

Two Knockouts—Connect conduit at either side of housing.

Switch—Single-pole, double throw. Compact in size. Snap action assures dependable operation.

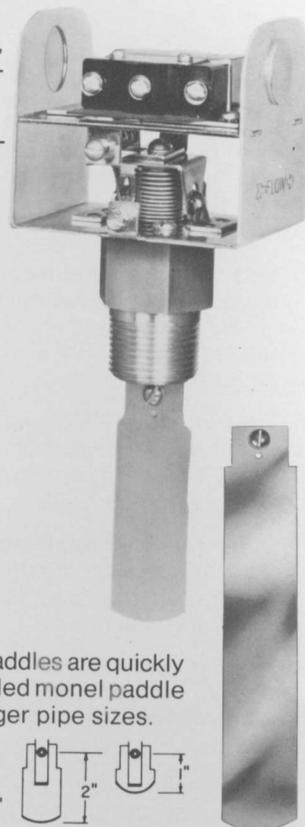
Knife-Edged Bearings of stainless steel minimize friction.

Adjusting Screw—Provides simple way to field adjust sensitivity to flow.

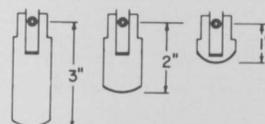
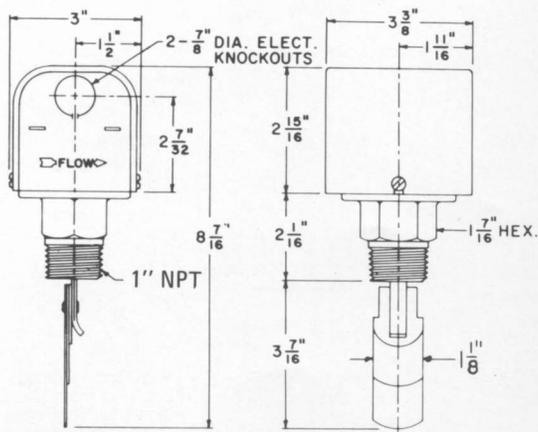
Packless—Monel bellows seals switch assembly from line.

Chromate Treatment of all zinc-plated parts inside the electrical enclosure adds extra corrosion resistance.

3-in-1 Paddle—Individual monel paddles are quickly adaptable for 1" to 3" pipe. Extended monel paddle illustrated is also included for larger pipe sizes.



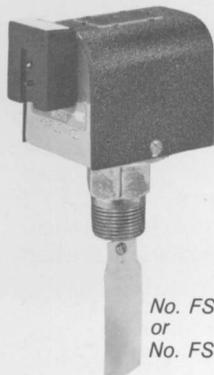
Dimension Details FS4-3 Series



McDonnell FS4-3 Series Flow Switches with Time Delay Relays

FS4-3-20—Provides a factory-fixed 20 second delay on make

FS4-3-5R—Provides a factory-fixed 5 second delay on break

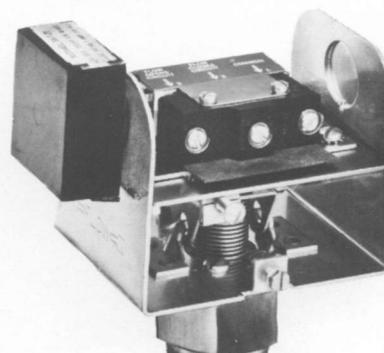


No. FS4-3-20
or
No. FS4-3-5R

These flow switches are offered for use where temporary surges in flow, water hammer or minor fluctuation in system pressure might cause false starts or switch fluttering. McDonnell Time Delay Relays are 100% encapsulated, mounted right on switch housing as shown. Input—120 volt AC; output—1 ampere RMS steady state maximum, 20 milliamperes minimum.

Operating range and construction including individual and extra length paddles are same as for No. FS4-3 shown on opposite page. Flow rates required to actuate switches are shown below. For electrical ratings and schematics of switch operation, see page 3.

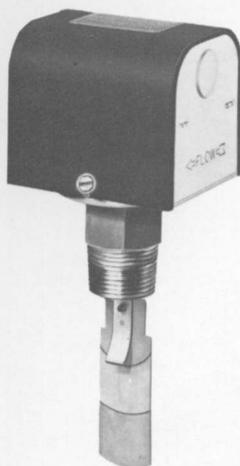
For further details on McDonnell Time Delay Relays, see page 19.



Flow switch with cover removed, showing how time delay relay can be mounted on switch housing. Time delay relay is shipped loose in the carton.

McDonnell FS4-3 Series Flow Switch with Two Separate Switches

FS4-3D Flow Switch



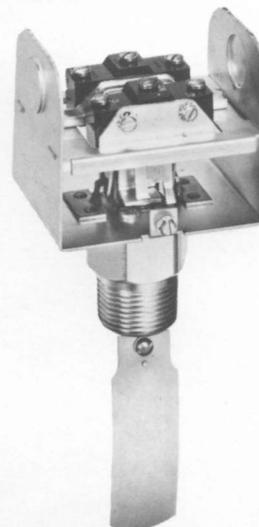
No. FS4-3-D

The McDonnell No. FS4-3-D includes all the features of the most widely used McDonnell Flow Switch, and adds an extra single-pole double-throw switch. By incorporating two separate switches it provides complete versatility in wiring two individual circuits.

The No. FS4-3-D can be hooked up to make or break two separate circuits when flow occurs in a pipe, or when flow stops. Or it can make one circuit and break a second with flow, and reverse them again with no-flow.

Operating range and construction, including individual and extra length paddles, are same as for No. FS4-3 shown on opposite page. Flow rates required to actuate switches are shown below. For electrical ratings and schematics of switch operation, see page 3.

Time Delay Relays are available to eliminate false signals caused by turbulence; see page 19.



No. FS4-3D, with cover removed, to show twin-switch construction.

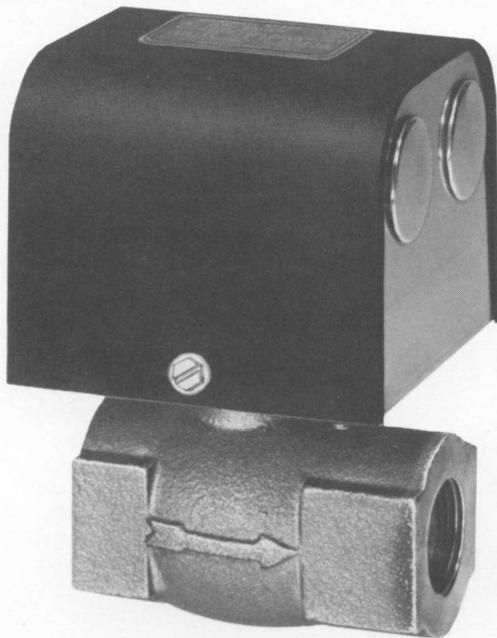
FLOW RATES REQUIRED TO ACTUATE FS4-3 SERIES FLOW SWITCHES

Flow rates in gallons per minute (GPM) shown in black. Velocity in feet per second (FPS) shown in color.

Pipe Size in Which Flow Switch Installed			1"	1¼"	1½"	2"	2½"	3"	4"*	5"*	6"*
Factory or Minimum Adjustment	Flow	GPM	6.00	9.80	12.7	18.8	24.3	30.0	39.7	58.7	79.2
		FPS	2.24	2.11	2.00	1.80	1.63	1.30	1.00	0.94	0.88
Maximum Adjustment	Flow	GPM	3.60	5.60	7.00	9.40	11.6	12.0	19.8	29.3	39.6
		FPS	1.34	1.21	1.10	0.90	0.78	0.52	0.50	0.47	0.44
Maximum Adjustment	Flow	GPM	10.2	16.8	23.0	32.8	42.4	52.1	73.5	115.0	166.0
		FPS	3.91	3.62	3.62	3.14	2.74	2.26	1.86	1.85	1.84
	No Flow	GPM	9.20	15.0	19.5	24.0	37.5	46.1	64.2	92.0	123.0
		FPS	3.43	3.23	3.07	2.29	2.51	2.00	1.62	1.48	1.37

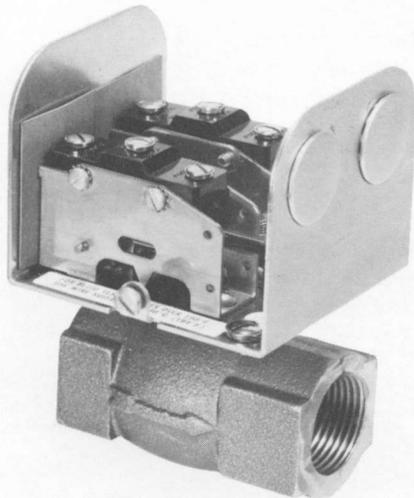
Flow rates are averages which may vary ± 10% from tabulated values. *Equipped with extended paddle trimmed to pipe size.

McDonnell FS5 Series Flow Switches



FS5 Series Flow Switches fit right in the pipeline.

Patent 3,963,889



No. FS5-D with cover removed to show twin switch construction.

- Maximum working pressure, 150 psi
- Maximum temperature: No. FS5 and No. FS5-D, 250 F.
No. FS5-S and No. FS5-DS, 225 F.

The McDonnell FS5 Series Flow Switches offer a dependable way to start or stop many electrical devices. They are particularly sensitive switches, designed for use where flow rates are insufficient to actuate other types of flow switches. This series is offered with brass or stainless steel bodies, and with one or two single-pole double-throw switches. Stainless models have bodies threaded for 1" NPT, brass models for either 3/4" or 1" NPT.

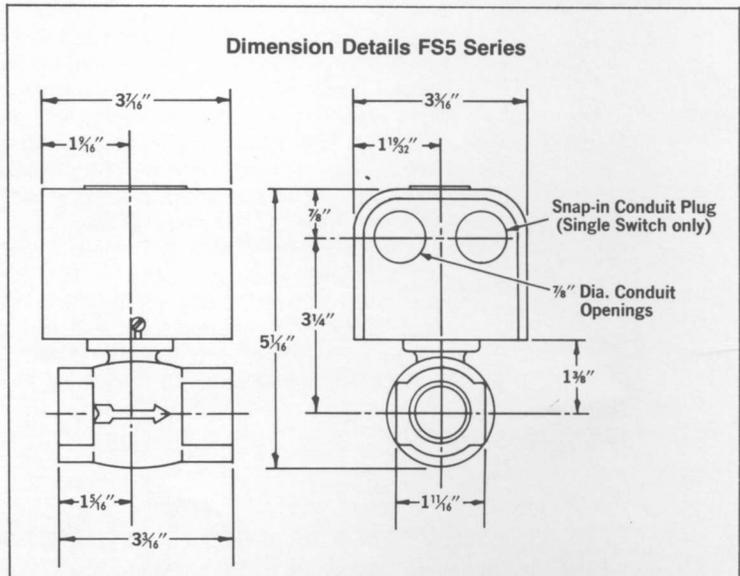
No. FS5 and No. FS5-S have one single-pole double-throw switch. They can be wired to make one circuit and break another circuit when flow starts or stops.

No. FS5-D and No. FS5-DS have two separate single-pole double-throw switches, for complete versatility in wiring two individual circuits. Can be hooked up to make or break two circuits simultaneously, or to make one and break the other.

No. FS5 and No. FS5-D have wetted parts of brass, carbon and EDPM Elastomer; they are suitable for water service. No. FS5-S and No. FS5-DS have wetted parts of stainless, carbon and Buna N; they are suitable for water or water and petroleum base compound mixtures.

For electrical ratings and schematics of switch operation, see page 3.

For time delay relays to eliminate false starts from turbulence, see page 19.



FLOW RATES REQUIRED TO ACTUATE FS5 SERIES FLOW SWITCHES IN HORIZONTAL PIPE

Flow rates in gallons per minute (GPM) shown in black. Velocity in feet per second (FPS) shown in color.

Pipe Size	Flow Switch Number		Number of Switches	Minimum Adjustment				Maximum Adjustment			
	Brass*	Stainless		FLOW		NO FLOW		FLOW		NO FLOW	
				GPM	FPS	GPM	FPS	GPM	FPS	GPM	FPS
3/4"	FS5-3/4"	Not Available	One	1.5	0.9	1.1	0.7	15.0	9.0	10.0	6.0
	FS5-D-3/4"		Two								
1"	FS5-1"	FS5-S-1"	One	1.5	0.6	1.1	0.4	15.0	5.6	10.0	3.7
	FS5-D-1"	FS5-DS-1"	Two								

*Not to be used with petroleum base products.
For use with other liquids besides water, contact factory.
Flow rates are averages which may vary ± 10% from tabulated values.

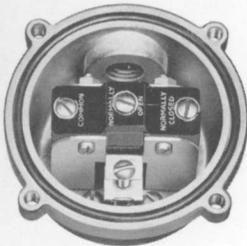
McDonnell FS8V Vapor-Proof Flow Switch

- Maximum pressure, 150 psi
- Maximum temperature, 225 F

The No. FS8V provides vapor-proof construction in an economically priced, compact size flow switch. It is particularly suited for use in areas of high humidity and for out-of-doors installation. It has single-pole double-throw switch, and offers a positive way to start and stop almost anything electrically operated in air conditioning, heating and water systems, and in process work. All wetted parts are of brass, solder and monel. It can be installed easily in a tee or half coupling fitting in any horizontal pipe.

For electrical ratings and schematics of switch operation, see page 3. For time delay relays to eliminate false starts caused by turbulence, see page 19.

McDONNELL QUALITY THROUGHOUT



Packless Construction—Monel bellows seals switch assembly from the line.

Adjusting Screw—Provides easy way to adjust sensitivity to flow.

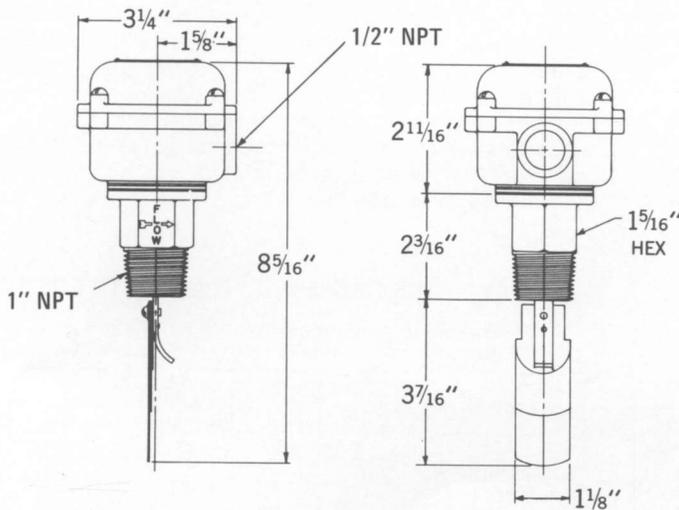
Conduit Connection—Threaded to accept standard vapor-proof connectors.

Easy Wiring—Cover removable for easy access to terminals. No danger of kinked wires interfering with operation.



No. FS8V Vapor-proof Flow Switch. Individual monel paddles adapt quickly for 1", 2", or 3" pipe. Extended paddle also included for larger pipe.

Dimension Details No. FS8V



FLOW RATES REQUIRED TO ACTUATE NO. FS8V FLOW SWITCH

Flow rates in gallons per minute (GPM) shown in black. Velocity in feet per second (FPS) shown in color.

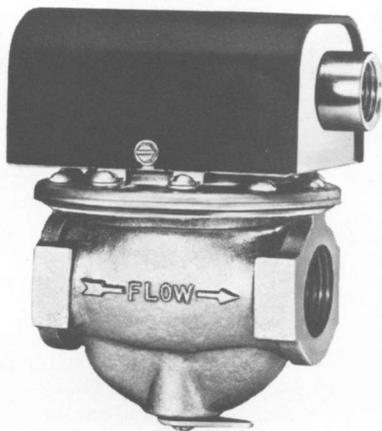
Pipe Size in Which Flow Switch Installed			1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"*	5"*	6"*
Factory or Minimum Adjustment	Flow	GPM	4.9	7.5	9.4	13.7	17.9	24.2	35.3	48.6	60.3
		FPS	1.82	1.60	1.48	1.31	1.20	1.05	0.89	0.78	0.67
	No Flow	GPM	3.4	5.3	6.7	9.4	12.1	16.4	27.0	37.4	46.8
		FPS	1.25	1.14	1.05	0.90	0.81	0.71	0.68	0.60	0.52
Maximum Adjustment	Flow	GPM	17.6	29.0	37.8	56.4	71.3	89.0	118.0	178.0	245.0
		FPS	6.53	6.23	5.95	5.39	4.78	3.87	2.98	2.86	2.72
	No Flow	GPM	15.0	24.6	32.2	47.4	59.2	72.5	105.0	160.0	225.0
		FPS	5.56	5.28	5.07	4.53	3.97	3.15	2.64	2.57	2.50

*Equipped with extended paddle trimmed to pipe size. Flow rates are averages which may vary ± 10% from tabulated values.

LIQUID Flow Switches/HIGH SENSITIVITY MODELS

The No. FS1 and the FS6 Series Flow Switches are designed to respond to very low flow rates, yet allow large flow-through capacity; These flow switches find particular application in domestic, municipal and industrial water treatment systems; cooling systems for electronic tubes, bearings, compressors, booster pumps; jobs requiring instant switch action, etc. Bodies are tapped for installation right in the pipeline.

McDonnell FS6 Series Flow Switches



- Maximum pressure, 100 psi
- Maximum temperature, 225 F

The FS6 Series Flow Switches incorporate the two desirable features of sensitivity to low flow rates and large flow-through capacity. Some of their many uses are on small and medium sized water treatment systems and on cooling systems for resistance welders, compressors, induction heaters, etc.

Two models are available: No. FS6- $\frac{3}{4}$ IN. is tapped for direct connection into $\frac{3}{4}$ " pipelines; No. FS6-1 IN. is tapped for 1" pipelines. In all other respects the two models are identical, with single-pole double-throw switch totally sealed from the liquid in the line and easily adjusted for sensitivity to flow.

For electrical ratings and schematics of switch operation, see page 3. For time delay relays to eliminate false starts caused by turbulence, see page 19.

FS6 Series Flow Switches, available with bodies tapped for either $\frac{3}{4}$ " or 1" pipelines.

FLOW RATES REQUIRED TO ACTUATE FS6 SERIES

Flow rates in gallons per minute (GPM) shown in black.
Velocity in feet per second (FPS) shown in color.

Adjustment		GPM	Flow	
			No. FS6- $\frac{3}{4}$ IN.	No. FS6-1 IN.
Minimum Adjustment	Flow	0.12	0.072	0.045
	No Flow	0.06	0.036	0.022
Maximum Adjustment	Flow	2.50	1.505	0.930
	No Flow	1.50	0.903	0.555

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

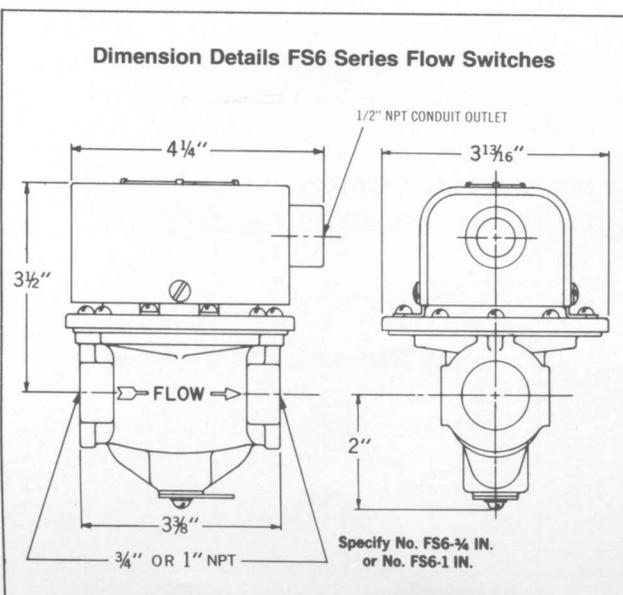
FS6 SERIES FLOW SWITCHES PRESSURE DROP

Differential Pressure	5 psi	10 psi	20 psi	30 psi	50 psi	70 psi	90 psi
GPM Capacity	15.2	22.2	33.0	38.3	49.5	58.5	66.4

Equivalent Velocities in Feet per Second

FPS Velocity No. FS6- $\frac{3}{4}$ IN.	9.1	13.4	19.9	23.1	29.8	35.2	40.0
FPS Velocity No. FS6-1 IN.	5.6	8.3	12.3	14.6	18.5	21.8	24.7

Dimension Details FS6 Series Flow Switches



McDonnell **FS1 Series** Flow Switches



FS1

Maximum pressure, 100 psi.
Maximum temperature, 225°F.
NEMA-1 Enclosure.



FS1-W

Maximum pressure, 100 psi.
Maximum temperature, 225°F.
NEMA-4X Enclosure.



The FS1 Series flow switch is a self-contained control that mounts directly in a 1/2" NPT pipe system. The FS1 flow switch is offered in two models; FS1 equipped with a NEMA 1 electrical enclosure, and FS1-W equipped with a NEMA 4X electrical enclosure.

The FS1 offers an economical and dependable answer for the many jobs inside buildings, such as air conditioning, heating and water systems, and processing work.

The FS1-W adds versatility to those characteristics by allowing use outdoors and in environments where humidity or airborne particles are a problem.

Both have large flow-through capacities, yet remain sensitive to very small flow rates. Each can be used to activate signal lights, alarms, motors, burners or metering devices, either when flow starts, or stops. The FS1 and FS1-W are ideally suited to any application where low flow rates are encountered.

FS1 series flow switches may be used with water, certain light, viscous liquids, fuel oil, and some oils. Write for further information on use with liquids other than water. On both, the switch mechanism is magnetically activated and has no physical contact with the liquid. The switch compartment is totally sealed from the liquid in the line and all wetted parts are brass, stainless steel, and viton. The FS1 series is threaded 1/2" NPT on both inlet and outlet sides and requires no further pipe fittings. Provision for adjusting the sensitivity of the unit is by a screw at the base. All electrical connections are under an easily-removed metal cover, and a standard 1/2" NPT conduit outlet is provided.

In addition to the features above, the FS1-W incorporates a water tight, corrosion resistant cast housing. The cover is secured by six screws, and is sealed by an "O" ring. The 1/2" NPT conduit outlet allows use of a weather tight fitting. The FS1-W is rated NEMA type 4X (water tight, dust tight, and corrosion resistant) and is not intended for use in hazardous atmospheres.

Both the FS1 and the FS1-W are constructed of quality materials for long, reliable service on the job.

Flow rates in gallons per minute (GPM) shown in black.
Velocity in feet per second (FPS) shown in color.

Minimum Adjustment	Flow	GPM	0.41
	No Flow	FPS	0.43
Maximum Adjustment	Flow	GPM	0.24
	No Flow	FPS	0.25
Minimum Adjustment	Flow	GPM	1.81
	No Flow	FPS	1.91
Maximum Adjustment	Flow	GPM	1.28
	No Flow	FPS	1.35

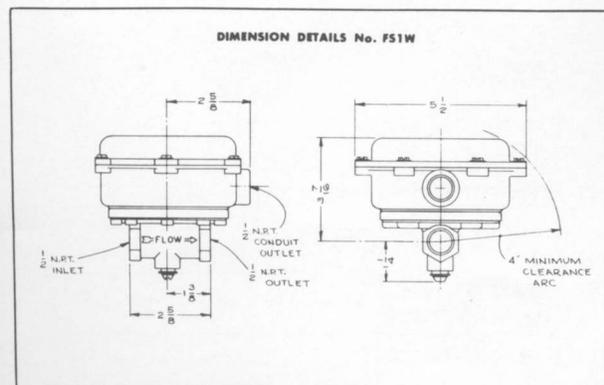
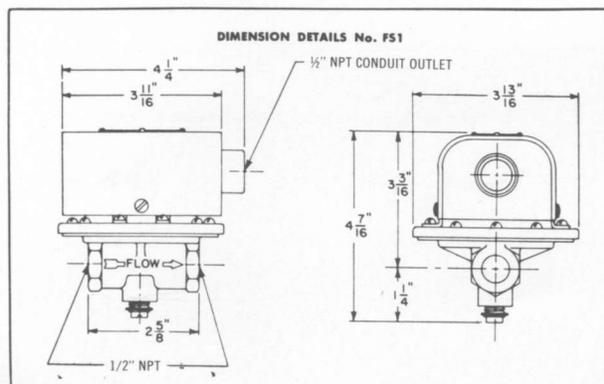
Flow rates are averages which may vary ± 10% from tabulated values.

NO. FS1 FLOW SWITCH PRESSURE DROP

Differential Pressure	10 psi	20 psi	30 psi	40 psi	50 psi	70 psi	90 psi
GPM Capacity	8.35	11.50	13.60	15.75	17.75	21.25	24.25

Equivalent Velocities in Feet per Second

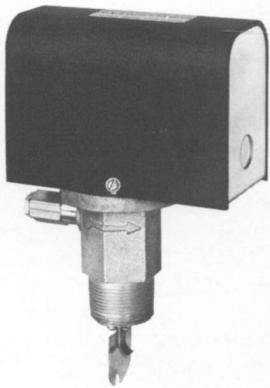
FPS Velocity	8.82	12.30	14.35	16.62	18.74	22.44	25.61
--------------	------	-------	-------	-------	-------	-------	-------



LIQUID Flow Switches/For Industrial Applications

The flow switches described on pages 10, 11 and 12 are designed for industrial service or for use with process liquids. They are available in standard, vapor-proof or hazardous duty construction, with wetted parts of either brass or stainless steel. Variations of the basic FS7-4 Series, described on this page, include the FS7-4L Series for larger pipe sizes, described on page 11; the FS7-4D Series which has two separate SPDT switches, and the No. FS7-4A Actuated Pneumatic Control, described on page 12.

McDonnell FS7-4 Series Flow Switches



Standard No. FS7-4 (or FS7-4S) Flow Switch.



Hazardous duty No. FS7-4E (or FS7-4SE). Vapor-proof No. FS7-4V (or FS7-4SV) are similar in appearance.

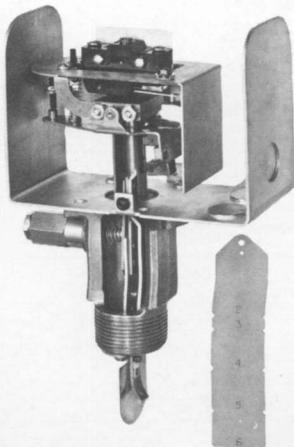
• For maximum pressures and temperatures, see table of models available, on opposite page.

The FS7-4 Series Flow Switches can be used for a wide variety of applications in air conditioning, heating, water systems and in process work. They have a single-pole double-throw switch which can be wired to make one circuit and break a second circuit when flow stops or starts. Some of the many outstanding features of design are listed below.

The standard No. FS7-4 has brass, stainless steel, bronze, solder and Buna N elastomer wetted parts. The No. FS7-4S Stainless Steel model has stainless steel and Teflon wetted parts. In addition to the standard construction, the FS7-4 Series includes vapor-proof and hazardous duty models, as detailed on opposite page. Flow rates required to actuate the FS7-4 Series are also shown on opposite page. For electrical ratings and switch schematics, see page 3.

For time delay relays to eliminate false starts from turbulence, see page 19.

McDONNELL QUALITY THROUGHOUT



Switch—Dependable snap-action type, compact in size.

Foolproof Wiring — Wiring completely shielded from switch action.

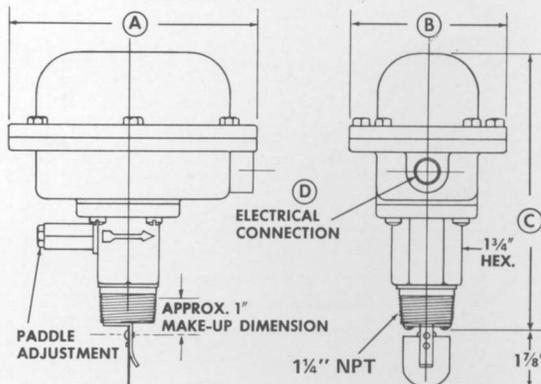
Magnetic Switching — Eliminates all mechanical connection between paddle arm and switching assembly.

Packless — Sealed tube of non-magnetic stainless steel isolates switch compartment from liquid and pressure in the pipe.

Easily Adjusted — for sensitivity to flow.

Convertible Paddle — Extended paddle, for pipe sizes over 1 1/4", quickly job-trimmed to size for optimum performance.

Dimension Details FS7-4 Series



Flow Switch Number	A	B	C	D
FS7-4 & FS7-4S	5-13/16"	2-7/8"	7-9/16"	Conduit Opening
FS7-4E, FS7-4SE, FS7-4V & FS7-4SV	7-1/4"	4-5/8"	7-13/16"	1/2" NPT

MODELS AVAILABLE IN FS7-4 SERIES

Product Number	FS7-4	FS7-4S	FS7-4E	FS7-4SE	FS7-4V	FS7-4SV
Maximum Pressure	300 psi	1000 psi	300 psi	1000 psi	300 psi	1000 psi
Maximum Temperature	300 F	300 F	300 F	300 F	300 F	300 F
Material of Wetted Parts	Brass Bronze Stainless	Stainless Steel	Brass Bronze Stainless	Stainless Steel	Brass Bronze Stainless	Stainless Steel
Construction	Standard		Hazardous Duty		Vapor-Proof	

HAZARDOUS DUTY MODELS

No. FS7-4E and No. FS7-4SE Flow Switches are Underwriters Laboratories Inc. Listed for use in these hazardous atmospheres:

Class 1, Group C—Ethyl-ether vapors, ethylene or cyclopropane.

Class 1, Group D—Gasoline, petroleum naphtha, benzene, butane, propane, alcohols, acetone, benzol, lacquer solvent vapors or natural gas.

Class 2, Group E—Dust of aluminum, magnesium, or their commercial alloys.

Class 2, Group F—Carbon black, coal or coke dust.

Class 2, Group G—Flour, starch or grain dusts.

FLOW RATES REQUIRED TO ACTUATE FS7-4 SERIES FLOW SWITCHES

Flow rates in gallons per minute (GPM) shown in black. Velocity in feet per second (FPS) shown in color.

Pipe Size in Which Flow Switch Installed			1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"
Factory or Minimum Adjustment	Flow	GPM	4.8	6.3	9.9	15.3	24.4	33.3	44.4	56.3	104.0	184.0	289.0	387.0	513.0
		FPS	1.03	0.99	0.95	1.03	1.06	0.84	0.71	0.63	0.67	0.75	0.82	0.90	0.90
No Flow	GPM	3.0	3.6	5.9	9.5	15.4	21.1	31.0	48.7	89.0	157.0	247.0	323.0	428.0	
	FPS	0.65	0.57	0.56	0.64	0.67	0.53	0.50	0.54	0.57	0.64	0.70	0.75	0.75	
Maximum Adjustment	Flow	GPM	7.7	10.0	15.8	23.7	35.5	61.4	84.0	114.8	210.0	369.0	582.0	753.0	998.0
		FPS	1.66	1.57	1.51	1.59	1.54	1.55	1.35	1.27	1.35	1.50	1.65	1.75	1.75
No Flow	GPM	5.9	7.0	11.0	17.0	29.2	37.7	51.0	71.5	131.0	231.0	363.0	495.0	656.0	
	FPS	1.27	1.10	1.05	1.14	1.27	0.95	0.85	0.79	0.84	0.94	1.03	1.15	1.15	

*Equipped with 6" paddle.
Flow rates are averages which may vary ±10% from tabulated values.

McDonnell FS7-4L Series Flow Switches



- Maximum pressure, 300 psi
- Maximum temperature, 300 F

These are same as the FS7-4 Series, but are fitted with a longer paddle to provide greater sensitivity to flow when used in larger pipes. They are available in standard, vapor-proof and hazardous duty models. Wetted parts are brass, stainless steel, bronze, solder and Buna N elastomer. Operating features and dimensions—except for the paddle—are same as for corresponding FS7-4 Series Models:

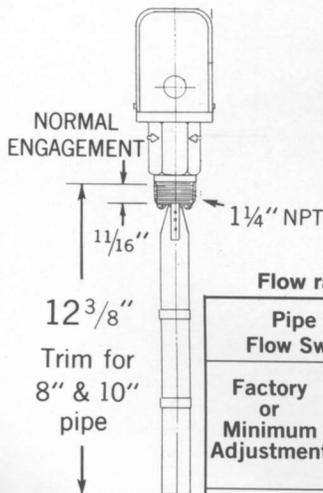
No. FS7-4EL has hazardous duty construction, like No. FS7-4;

No. FS7-4VL has vapor-proof construction, like No. FS7-4V;

No. FS7-4EL has hazardous duty construction, like No. FS7-4E, and is Underwriters Listed for use in hazardous atmospheres listed at top of page.

For electrical ratings and switch schematics, see page 3.

For time delay relays to eliminate false starts from turbulence, see page 19.



FLOW RATES REQUIRED TO ACTUATE FS7-4L SERIES

Flow rates in gallons per minute (GPM) shown in black. Velocity in feet per second (FPS) shown in color.

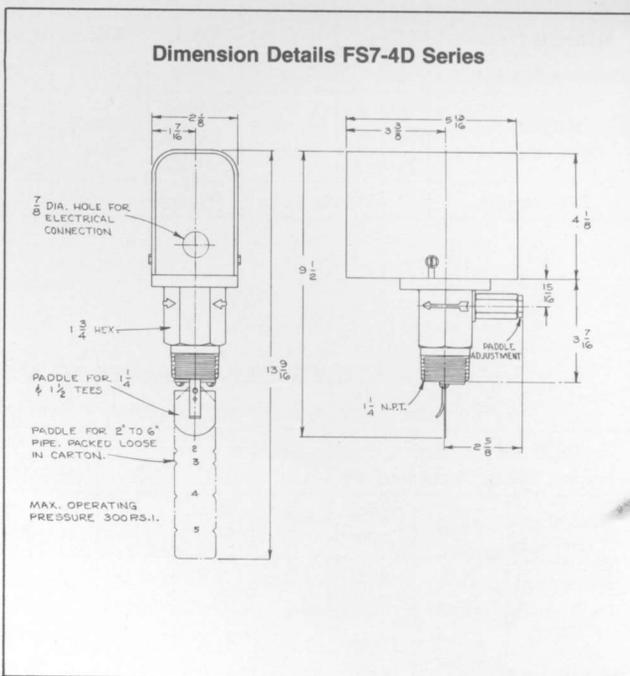
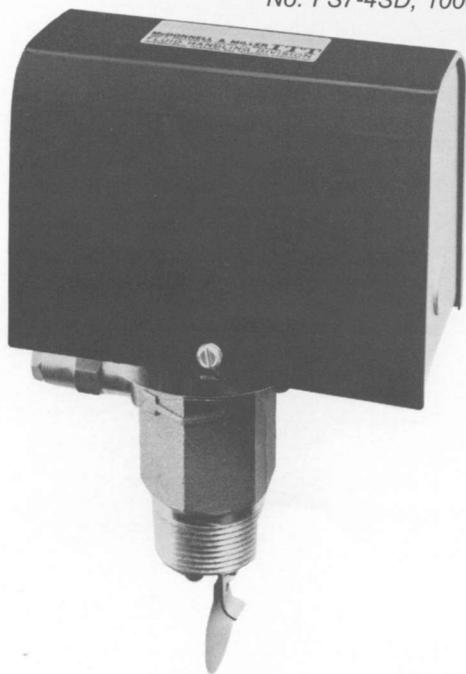
Pipe Size in which Flow Switches Installed			8"	10"	12"	14"	16"	20"	24"	30"	36"
			Sch. 40	Sch. 40S	Sch. 40S	Sch. 30S	Sch. 30S	Sch. 40	Sch. 40	Sch. 40	Sch. 40
Factory or Minimum Adjustment	Flow	GPM	94	148	211	258	342	520	752	1177	1723
		FPS	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
No Flow	GPM	47	74	106	129	171	260	376	589	861	
	FPS	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Maximum Adjustment	Flow	GPM	140	221	317	387	513	780	1128	1766	2584
		FPS	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
No Flow	GPM	125	197	282	344	456	693	1002	1570	2297	
	FPS	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80

Flow rates are averages which may vary ± 10% from tabulated values.

McDonnell FS7-4D Series Flow Switches



- Maximum temperature, 300 F
- Maximum pressure; No. FS7-4D, 300 psi
No. FS7-4SD, 1000 psi



The FS7-4D Series Flow Switches have all the features of the FS7-4 Series, plus an additional switch. The two single-pole double-throw switches provide complete flexibility in wiring two individual circuits. The FS7-4D Series can be used to make or break two separate circuits with flow or no-flow; or to make one circuit and break a second circuit with flow or no-flow.

Two models are available in the series: No. FS7-4D has wetted parts of brass, stainless steel, bronze, solder and Buna N elastomer; No. FS7-4DS has wetted parts of stainless steel and teflon. Both models include extended paddle for larger pipe sizes.

Flow rates required to actuate the FS7-4D Series are same as for FS7-4 Series, as shown on page 11. For electrical ratings and switch schematics, see page 3.

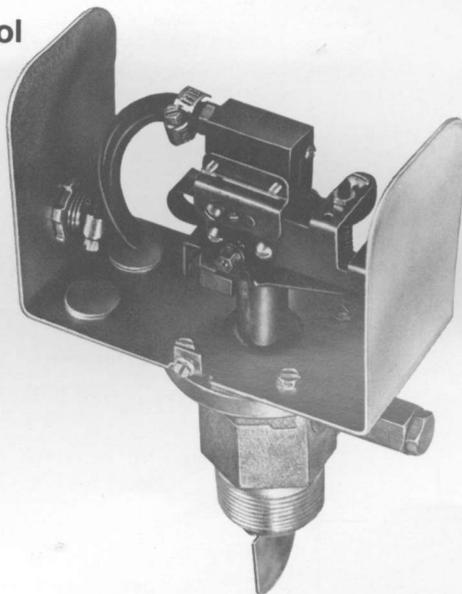
For time delay relays to eliminate false starts from turbulence, see page 19.

McDonnell FS7-4A Flow Actuated Pneumatic Control

- Maximum pipeline pressure, 300 psi
- Maximum pipeline temperature, 300 F
- Maximum pressure, Air Valve, 50 psi
- Air Line Connection, 1/8" NPT Tapping

The No. FS7-4A is a variation of the No. FS7 which substitutes an air valve for the electrical switch, so it can be used to control pneumatic operated relays or valves when flow in a pipeline starts or stops. It is connected by an air line to the pneumatic control system. When flow in a pipeline drops below the necessary rate, the air valve in the No. FS7-4A opens, bleeding pressure from the control system and allowing the relay or valve to switch position.

Flow rates required to actuate the No. FS7-4A, and dimensions, are same as for No. FS7-4; see pages 10 and 11.



LIQUID Flow Switches/**Waterflow Indicators**

For Branch Piping of Sprinkler Systems

The McDonnell FS4-3F Series and No. FS7-4F Waterflow Indicators provide an economical and positive way to detect the flow of water in a fire sprinkler system. They can be connected electrically to various types of alarms or signals, to indicate immediately the location of an open sprinkler head or heads. By quickly detecting the fire and pinpointing its exact location, they can speed fire fighting, minimize the amount of water damage and assist safe evacuation of the building.

McDonnell **FS4-3F**



No. FS4-3F (or No. FS4-3DF)

Waterflow Indicators

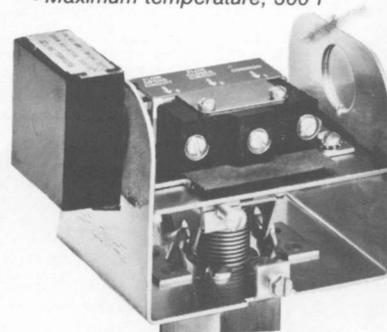


Underwriters Laboratories Inc. Listed as a Waterflow indicator for service on mainline or branch piping of fire sprinkler systems. Designed for use in size range from 1" to 1½" pipe. All wetted parts are brass, solder and monel.

There are eight models in the series. No. FS4-3F has similar dimensions, and similar construction, as the standard No. FS4-3 on page 4. No. FS4-3DF has two switches like No. FS4-3D on page 5. No. FS4-3F-20 and No. FS4-3DF-20 include a solid state Time Delay; this provides a factory-fixed 20 second delay on make to prevent false alarms which might be caused by variations in system pressure, temporary surges or water hammer (see page 19.) All above models designed for use in 1" to 1½" NPT pipe systems. Models FS4-3FC, FS4-3DFC, FS4-3FC-2, FS4-3DCF-20 have same features as above except they are designed for use in 1" Copper Tube systems only.

FLOW RATES REQUIRED TO ACTUATE FS4-3F SERIES
4 to 10 gallons per minute (GPM)
in 1", 1¼" and 1½" branch piping

- Maximum pressure, 150 psi
- Maximum temperature, 300 F



No. FS4-3F-20 (or No. FS4-3DF-20) with cover removed, showing how time delay relay can be mounted on switch housing. Time delay relay is shipped loose in carton.

ELECTRICAL RATINGS FS4-3F Series

7.4 Amps	120 Volts AC
3.7 Amps	240 Volts AC
0.3 Amps	6-125 Volts DC

McDonnell **FS7-4F**



Waterflow Indicators



- Maximum pressure, 300 psi
- Maximum temperature, 300 F

Underwriters Laboratories Inc. Listed as a Waterflow Indicator for service on mainline or branch piping of fire sprinkler systems. Designed for use in pipe sizes from 1¼" to 2½". All wetted parts are of brass, stainless steel, solder and Buna N.

There are two models in the series, No. FS7-4F has similar dimensions, and similar construction, as the standard No. FS7-4 on page 10. No. FS7-4DF has two switches like the No. FS7-4D on page 12.

For time delay relays to eliminate false starts from turbulence see page 19.

FLOW RATES REQUIRED TO ACTUATE FS7-4F SERIES

4 to 10 gallons per minute (GPM)
in 1¼", 1½", 2" and 2½" branch piping

ELECTRICAL RATINGS FS7-4F Series

7.4 Amps	120 Volts AC
3.7 AMPS	240 Volts AC
0.3 Amps	6-125 Volts DC

LIQUID Flow Switches/General Engineering Data

TABLE OF FLOW VELOCITIES IN PIPE
In equivalent gallons per minute (GPM)

Flow in Ft./Sec. (FPS)	Pipe Size											
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"
.2	.19	.33	.54	.94	1.27	2.1	3.0	4.8	6.2	7.9	12.5	18.0
.4	.38	.66	1.08	1.88	2.54	4.2	6.0	9.6	12.4	15.8	25.0	36.0
.6	.57	.99	1.62	2.92	3.81	6.2	8.9	13.4	18.6	23.7	37.5	54.0
.8	.76	1.32	2.16	3.76	5.08	8.3	11.9	19.2	24.8	31.6	50.0	72.0
1.0	.95	1.66	2.70	4.70	6.30	10.5	14.9	23.0	30.8	39.7	65.4	90.0
1.5	1.42	2.50	4.05	7.10	9.48	15.8	22.4	34.5	46.2	59.6	98.1	135
2.0	1.89	3.32	5.40	9.40	12.6	21.0	29.8	46.0	61.6	79.4	131	180
2.5	2.37	4.16	6.75	11.8	15.8	26.3	37.3	57.5	77.0	99.3	164	225
3.0	2.84	4.94	8.10	14.1	19.0	31.5	44.7	69.0	92.4	119	196	270
3.5	3.31	5.82	9.45	16.5	22.1	36.8	52.2	80.5	108	139	229	315
4.0	3.78	6.65	10.8	18.8	25.3	42.0	59.6	92.0	123	159	262	360
4.5	4.26	7.48	12.2	21.2	28.4	47.3	67.1	104	139	179	294	405
5.0	4.74	8.32	13.5	23.5	31.6	52.5	74.5	115	154	199	327	450
6.0	5.68	9.99	16.2	28.2	37.9	63.0	89.4	138	185	238	392	540
7.0	6.62	11.6	18.9	32.9	44.2	73.5	104	161	216	278	458	630
8.0	7.56	13.3	21.6	37.6	50.5	84.0	119	184	246	318	523	720
9.0	8.52	15.0	24.3	42.3	56.8	94.5	134	207	277	357	589	810
10.0	9.48	16.6	27.0	47.0	63.0	105	149	230	308	397	654	900

FORMULA FOR LARGER PIPE, HIGHER VELOCITIES

1. Velocity in ft. per sec. (FPS) = $\frac{\text{GPM} \times 0.321}{\text{Pipe Area in sq. in.}}$
 Example: With a flow of 1200 GPM through an 8" pipe, determine velocity.
 Velocity = $\frac{1200 \times 0.321}{50.0}$ or 7.7 ft. per sec.

2. GPM = $\text{Velocity in ft. per sec.} \times \text{Pipe Area sq. in.} \times 0.321$
 Example: With a flow of 6.5 ft. per sec. through a 10" pipe, determine GPM.

GPM = $\frac{6.5 \times 78.9}{0.321}$ or 1600 GPM.

Standard Pipe Size	Pipe Schedule No.	Area (Sq. In.)
8"	40S	50.0
10"	40S	78.9
12"	30S	113.1
14"	30S	138.0
16"	30S	183.0

CORRECTION FOR SPECIFIC GRAVITY

The tables of flow rates required to actuate McDonnell Flow Switches are based on water with a specific gravity of 1.00. Shown below are the approximate flow rate correction factors for fluids with other specific gravities.

Specific Gravity of Fluid	Correction Factor (Multiplier)
1.40	0.84
1.35	0.86
1.30	0.88
1.25	0.90
1.20	0.91
1.15	0.93
1.10	0.95
1.05	0.97
1.00	1.00
0.95	1.02
0.90	1.05
0.85	1.08
0.80	1.12
0.75	1.15
0.70	1.19
0.65	1.24
0.60	1.29
0.55	1.35
0.50	1.41

Example:

Determine whether No. FS7-4SE Flow Switch will be actuated by a flow of 40 gpm of gasoline (Specific Gravity 0.75) in a 3" pipeline.

Water cut-in flow rate for No. FS7-4SE in a 3" pipe (see table page 11) is 24.4 gpm.

24.4 x 1.15 (Correction Factor) = 28.06 gpm.

This 28.06 gpm cut-in point is less than 40 gpm flow rate; therefore No. FS7-4SE is acceptable.

PRESSURE DROP (PSI)

Pipe Size	Flow Switch Model	Flow Rate (GPM)															
		.2	.5	1.0	2.0	4.0	8.0	10.0	15.0	20.0	25.0	30.0	50.0	75.0	100.0	150.0	200.0
1/2"	No. FS1	.26	.32	.47	.72	2.74	9.74	14.4									
3/4 & 1"	FS6 Series	.01	.02	.03	.04	.36	1.44	2.16	4.86	7.94	12.3						
3/4"	FS5-3/4 IN.				1.75	2.25	2.80	3.10									
1"	FS5-1 IN.				1.75	2.25	2.80	3.10									
1"	FS4-3 Series					.15	.32	.54	1.26	2.20							
1"	FS8-V			.01	.05	.20	.33	.74	1.30								
1 1/4"	FS7-4 Series				.03	.08	.17	.39	.72								
2"	FS7-4 Series					.02	.02	.04	.09	.13	.19	.51	.90				
3"	FS4-3									.01	.01	.02	.05	.10	.18	.40	.79
3"	FS8-V									.01	.01	.02	.06	.10	.13	.17	.19
4"	FS7-4 Series											.01	.02	.03	.05	.06	
6"	FS7-4 Series													.01	.01	.02	.02

NEMA ENCLOSURES

The following is a list of the general types of NEMA enclosures, along with the McDonnell Flow Switches which conform.

NEMA Enclosure	McDonnell Flow Switches
Type 1—General Purpose Indoor	All Models
Type 4X—Watertight, Dusttight, and Corrosion Resistant	Nos. FS1-W
Type 7—Hazardous Location (Class I—Group C or D)	Nos. FS7-4E, FS7-4SE, FS7-4EL
Type 9—Hazardous Location (Class II—Group E, F or G)	Nos. FS7-4E, FS7-4SE, FS7-4EL

McDonnell/AIR Flow Switches/HOW TO SELECT

The following factors should be considered when selecting McDonnell Air Flow Switches.

1. What function will the Air Flow Switch perform? McDonnell Air Flow Switches are equipped with single-pole double-throw switches; consequently, they can be used to make or break an electrical circuit either when flow starts or when flow stops. For example, the Flow Switch can be used to:

- (1) Actuate a signal when flow stops.
- (2) Start a motor with flow.
- (3) Shut off an alarm when flow is adequate.
- (4) Stop a motor with no flow.

2. How much flow is present? The air flow velocity at which the Air Flow Switch is to respond should be determined first. McDonnell Air Flow Switches are actuated (make or break) with an increase in velocity and will reverse switch position (break or make) with a decrease in velocity. Throughout this brochure the term "Flow" represents the actual movement of air (velocity) within a duct sufficient to actuate the switch. The term "No Flow" represents a decrease in velocity or a total air flow stoppage, which will permit the switch to return back to the original position. Important: In operation the switch must be actuated by "Flow" before it can be reversed again by "No Flow."

For example, the partial table below indicates the minimum air flow rate required to actuate the McDonnell No. AF3. (1) There must be at least 235 FPM "Flow" before the flow switch will be actuated; the velocity, of course, may be higher. (2) Should the flow then drop to 175 FPM "No Flow" or lower, the switch will reverse position. Note: The values shown in this table are factory settings; all McDonnell Flow Switches can easily be adjusted to require a higher actuating "Flow" or "No Flow."

Required Air Flow Rates No. AF3
(Factory Setting; Minimum Adjustment)

"Flow"	235 FPM Velocity
"No Flow"	175 FPM Velocity

Complete flow rate tables in feet per minute (FPM) for each model are included in the product data. Velocities shown are averages which may vary plus or minus 10% from tabulated values.

3. Size of duct? McDonnell Air Flow Switches are designed for installation in ducts six inches and larger.

4. Maximum temperature? Air temperature inside and outside of the duct should be considered. Different McDonnell Air Flow Switches can be used at temperatures from 32 F. up to 300 F.

5. Maximum velocities? The McDonnell AF1 Series is designed for medium and higher velocity applications up to 2500 FPM. The No. AF2, AF3, and AF3-D are designed for lower air flow velocities with a maximum of 2000 FPM and 1200 FPM respectively.

6. Type of air? Depending on the model, McDonnell Air Flow Switches have brass, steel, aluminum, stainless steel, Viton and Teflon parts exposed to the inside of the duct. In addition to use with normal air, they may be used in applications where certain chemical fumes or other air-borne elements are present.

7. Installation? It is generally recommended that all models be located in a horizontal duct, 10 duct diameters downstream from a fan or 7 duct diameters downstream from an elbow, junction or other cause of disturbance.

Often the actual flow rates in the duct appreciably exceed the flow rate required to actuate the switch. If the flow switch must be located closer than 10 duct diameters from a fan, it is recommended that the flow switch be installed on the suction side of the fan.

For installation in vertical duct, see specific information under each model description (Pages 16-19).

ELECTRICAL RATINGS (Underwriters Laboratories Inc. Listed)

All McDonnell Air Flow Switches described in this brochure have the same single-pole double-throw switch.

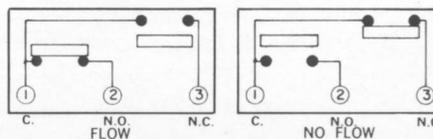
	Ampere Rating	
Motor Duty	120 V.A.C.	240 V.A.C.
Full Load	7.4 Amps.	3.7 Amps.
Locked Rotor	44.4 Amps.	22.2 Amps.
	120 V.D.C.	240 V.D.C.
	0.3 Amps.	0.15 Amps.

Pilot Duty A.C. 125 V.A., 120-240 V.
A.C. Non-Inductive Load:
15 Amps. 120 V., 240 V., 277 V.A.C.

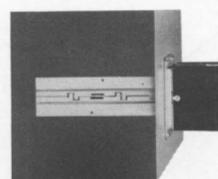
SWITCH OPERATION SCHEMATICS

In the tables of flow rates given in this brochure for air flow switches the word "Flow" means that the switch will close circuit 1-2, and open circuit 1-3, when the air flow rate is increased to the FPM shown. (See schematic "Flow.")

The words "No Flow" mean the switch will reverse position—open circuit 1-2, and close circuit 1-3—when air flow rate is decreased to the FPM shown. (See schematic "No Flow.")

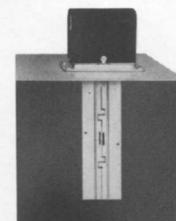


TYPICAL INSTALLATIONS

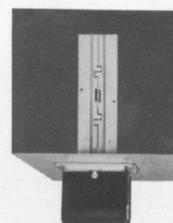


Horizontal Duct Side Mounting

Horizontal Duct Top Mounting.



Horizontal Duct Bottom Mounting.



AIR Flow Switches/For Low, Medium and Higher Velocities

McDonnell Air Flow Switches sense air flow or no flow by responding only to velocity of air movement. They provide a positive and economical way to detect change or loss of air flow velocity caused by a closed damper or fan inlet, a loose fan wheel, a slipped or broken fanbelt, a dirty or clogged filter, or an overload of a fan motor switch.

The AF1 Series are designed for medium and higher velocity systems, Nos. AF2, AF3 and AF3-D are for systems with lower air flow velocities.

McDonnell AF1 Series Air Flow Switches/For Duct Installation



The AF1 Series are designed for medium and higher velocity systems. They have a single-pole double-throw switch, can be wired to make one circuit, break a second circuit, when air flow starts or stops in a duct.

They can be installed in the side, top or bottom of a horizontal duct and, if necessary, in a vertical duct with upward air flow. If the only possible installation is in a vertical duct with downward air flow, write factory for instructions, giving duct size and air flow velocities.

The Standard No. AF1 has parts exposed to inside of duct made of brass, steel and Teflon. Switch compartment is sealed from duct by a chrome plated spherical bearing, revolving against a flat Teflon seat; this is not a completely tight seal.

The Stainless Steel No. AF1-S has parts exposed to inside of duct made of 18-8, 302 and 316 stainless steel, and Viton; Viton has excellent chemical resistance characteristics. Switch compartment is sealed from duct by a Viton flexible rolling seal; this is a completely tight seal.

For electrical ratings and switch schematics, see page 15.

For time delay relays to eliminate false starts from turbulence, see page 19.

McDONNELL QUALITY THROUGHOUT

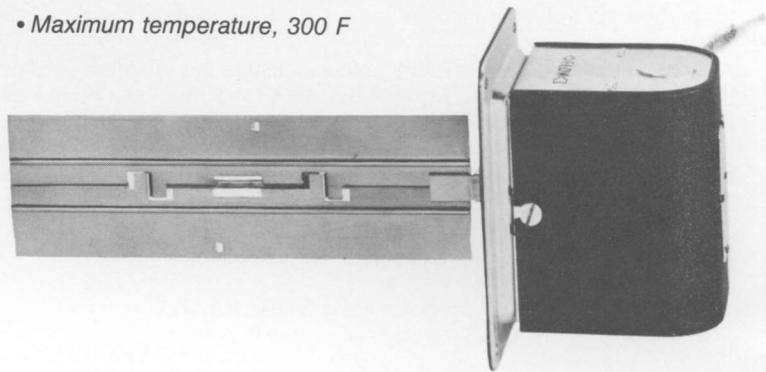
Readily Adjusted—Conveniently located screw provides ease of adjustment to air flow velocity.

Easy Wiring—Cover completely removable, no cramped quarters.

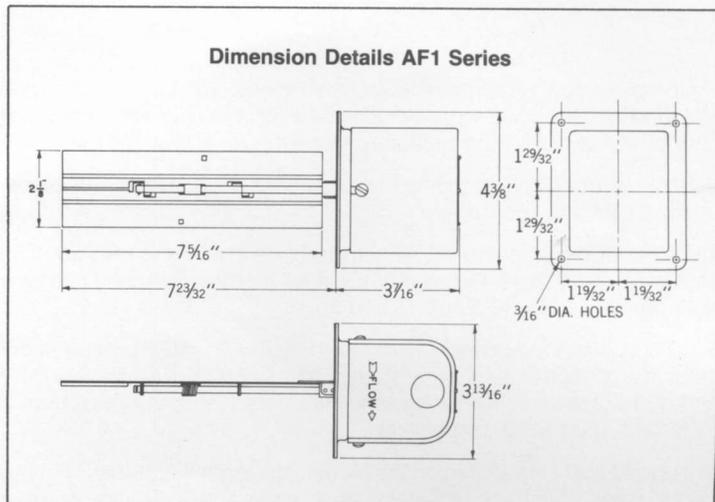
Convenient Electrical Knockouts—Connect conduit to either side of switch housing.

Dependable Switch—Single-pole double-throw for universal usage. Snap-action assures reliability.

- Maximum temperature, 300 F



Dimension Details AF1 Series



AIR FLOW VELOCITIES REQUIRED TO ACTUATE FS1 SERIES (Based on Standard Air 0.075 Pounds per Cubic Foot)

Horizontal Duct (Preferred Installation)

Paddle Length	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
Standard (7 1/4")	480	185	1385	1160
Trimmed 2" (5 1/4")	700	220	2230	1820

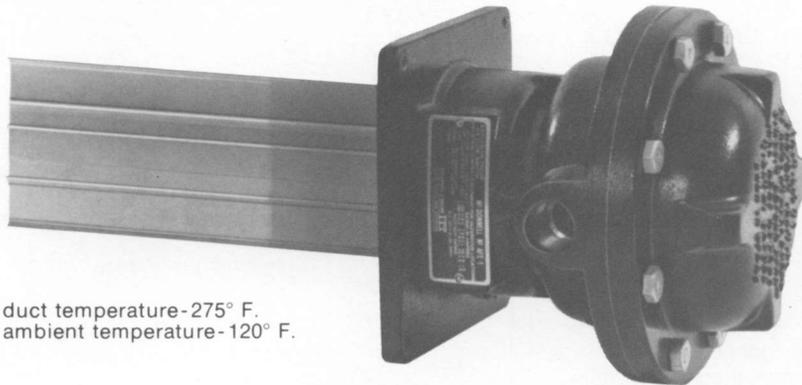
Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

Vertical Duct, Upward Flow (For Downward Flow, write factory)

Paddle Length	Minimum Adjustment		Maximum Adjustment	
	Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
Standard (7 1/4")	910	785	1610	1460
Trimmed 2" (5 1/4")	1235	1050	2560	2410

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

McDonnell AFE-1 Air Flow Switch/For Duct Installation



Maximum duct temperature-275° F.
Maximum ambient temperature-120° F.

Designed for industrial applications where a hazardous environment atmosphere is present, the AFE-1 Air Flow Switch is Underwriters Laboratories Inc. Listed for use in Class 1 Group C & D and Class 2 Group E, F & G hazardous atmospheres.

The AFE-1 responds to medium air flow velocities and switch sensitivity may be readily adjusted to specific rates of flow.

Parts exposed to the inside of the duct are made of brass, steel and aluminum. The switch compartment is isolated from the duct by use of a magnetic proximity switch.

The versatile AFE-1 meets the needs of many applications where the detection of flow or loss of Air Flow must be accomplished in hazardous atmospheres under less-than-ideal conditions.

Easy Wiring—The AFE-1 cast cover is removable allowing access to the wiring terminals.

Convenient Electrical Provisions—A cast boss threaded for a hazardous duty conduit fitting is an integral part of the AFE-1 design.

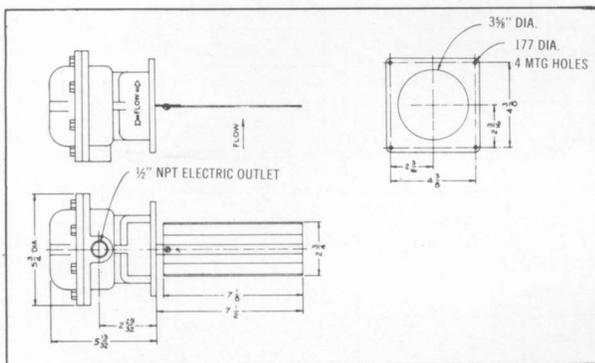
Switch—the single pole, double throw design provides versatile utility, while magnetic proximity actuation isolates the mechanism from the duct.

Readily Adjustable—Conveniently located external screw provides easy adjustment of actuation at varying flow rates.

Time Delay Available—A time delay relay is available to prevent actuation by momentary fluctuation in flow rate.

For electrical ratings and switch schematics, see page 15.

For time delay relays to eliminate false starts from turbulence, see page 19.



AIR FLOW VELOCITIES IN FEET PER MINUTE (F.P.M.) REQUIRED TO ACTUATE SWITCH

(Based on standard air 0.075 Pounds Per Cubic Foot)

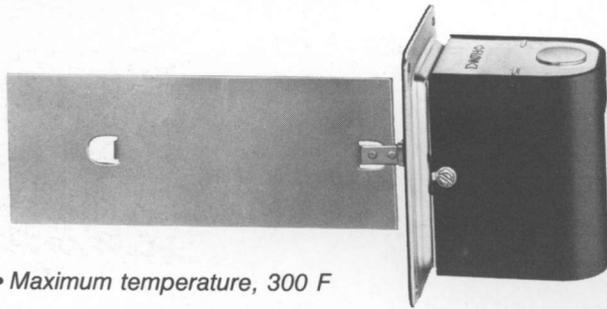
Maximum air flow velocity -2000 F.P.M.

HORIZONTAL DUCTS

INSTALLED IN HORIZONTAL DUCT		TOP MOUNT (PREFERRED)	SIDE MOUNT
Factory or Minimum Adjustment	FLOW	350 F.P.M.	400 F.P.M.
	NO FLOW	100 F.P.M.	100 F.P.M.
Maximum Adjustment	FLOW	1900 F.P.M.	1900 F.P.M.
	NO FLOW	500 F.P.M.	900 F.P.M.

Flow rates are averages which may vary ± 10% from tabulated values

McDonnell AF2 Air Flow Switch/For Duct Installation



- Maximum temperature, 300 F

The No. AF2 is designed for systems where lower air flow velocities are present. Equipped with a single-pole double-throw switch it can be wired to make one circuit, break a second circuit when air flow starts or stops. It can be installed in the side, top or bottom of a horizontal duct. If installation can only be made in a vertical duct, write factory for instructions, giving direction of air flow (up or down), air flow velocity and duct size.

The No. AF2 has the same mechanical features as the standard No. AF1. Parts exposed to inside of duct are brass, steel, aluminum and Teflon.

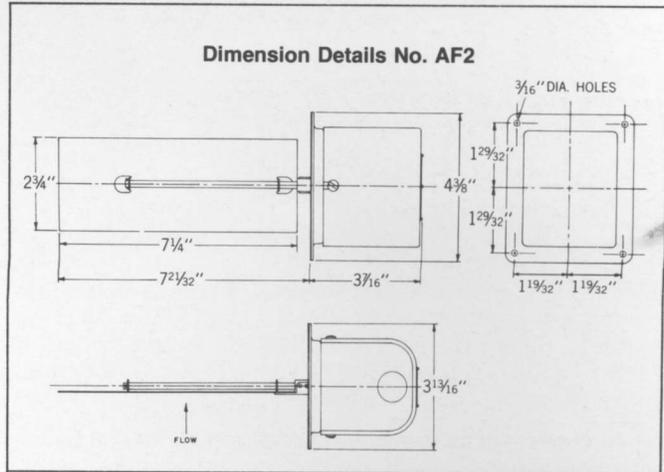
For electrical ratings and switch schematics, see page 15.

For time delay relays to eliminate false starts from turbulence, see page 19.

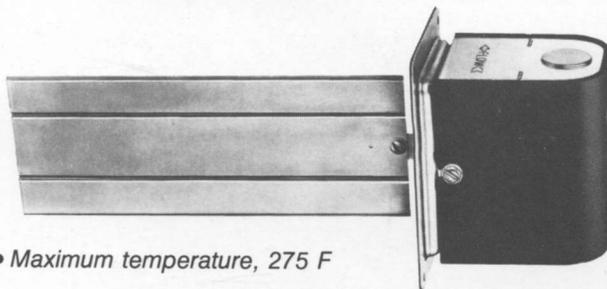
AIR FLOW VELOCITIES REQUIRED TO ACTUATE NO. AF2 (Based on Standard Air 0.075 Pounds per Cubic Foot)

Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
380	210	1250	1000

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.



McDonnell AF3 Air Flow Switch For Duct Installation



- Maximum temperature, 275 F

The No. AF3 is actuated by low air flow velocities in a duct. It is equipped with a single-pole double-throw switch, can be wired to make one circuit, break a second circuit when air flow starts or stops. It can be installed in the side, top or bottom of a horizontal duct and, if necessary, in a vertical duct with upward air flow. If the only possible installation is in a vertical duct with downward air flow, write factory for instructions, giving duct size and air flow velocities.

The No. AF3 is similar in design to the No. AF2. Parts exposed to inside of duct are brass, steel, aluminum and Teflon.

For electrical ratings and switch schematics, see page 15.

For time delay relays to eliminate false starts from turbulence, see page 19.

Note: No. AF3 is also available with two SPDT switches, see No. AF3-D on page 19.

AIR FLOW VELOCITIES REQUIRED TO ACTUATE NO. AF3 (Based on Standard Air 0.075 Pounds per Cubic Foot)

Horizontal Duct (Preferred Installation)

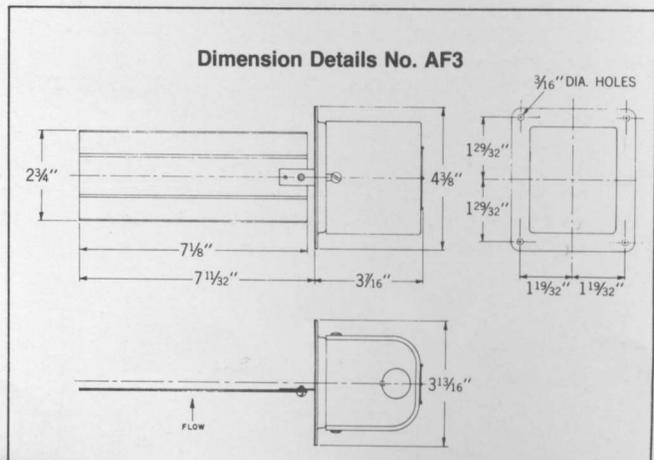
Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
235	175	1445	1365

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.

Vertical Duct, Upward Flow (for Downward Flow, Write Factory)

Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
450	430	1470	1395

Flow rates are averages which may vary $\pm 10\%$ from tabulated values.



McDonnell AF3-D Air Flow Switch/For Duct Installation



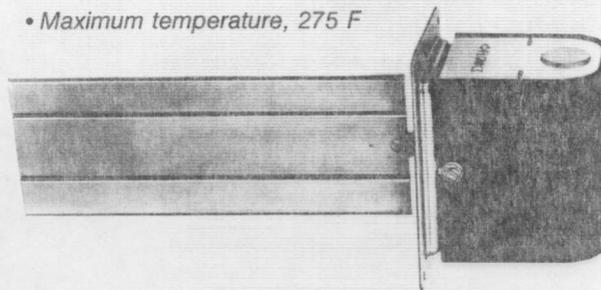
The McDonnell No. AF3-D offers the same low flow response of the No. AF3, plus a second SPDT switch. By incorporating two separate switches, it provides complete versatility in wiring two individual circuits. The No. AF3-D can be used to make or break two separate circuits when air flow in a duct starts or stops, or to make one circuit and break another when flow starts and reverse both circuits again when flow stops.

Design, construction and installation are the same as for No. AF3 on page 18.

For electrical ratings and switch schematics, see page 15.

For time delay relays to eliminate false starts from turbulence, see below.

• Maximum temperature, 275 F



AIR FLOW VELOCITIES REQUIRED TO ACTUATE NO. AF3-D (Based on Standard Air 0.075 Pounds per Cubic Foot)

Horizontal Duct (Preferred Installation)

Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
295	220	1445	1000

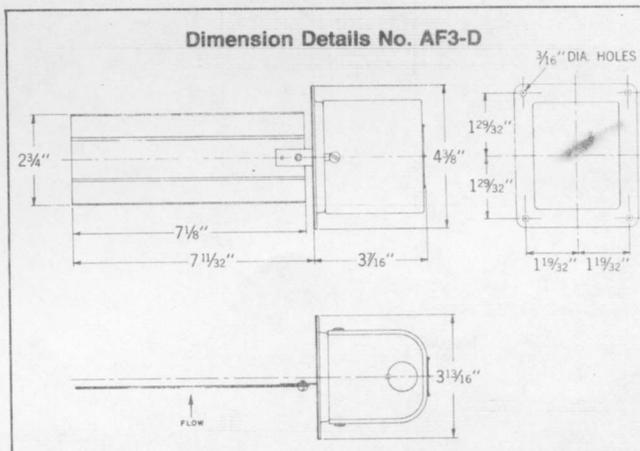
Flow rates are averages which may vary ± 10% from tabulated values.

Vertical Duct, Upward Flow (For Downward Flow, write factory)

Minimum Adjustment		Maximum Adjustment	
Flow FPM	No Flow FPM	Flow FPM	No Flow FPM
560	540	1470	1030

Flow rates are averages which may vary ± 10% from tabulated values.

Dimension Details No. AF3-D



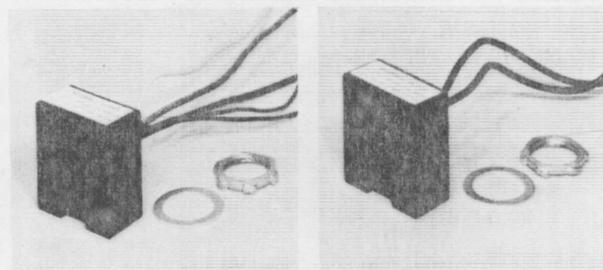
McDonnell T-20 and T-5R Time Delay Relays

With many applications of liquid or air flow switches, a short time delay in making or breaking electrical circuits can be very desirable. It eliminates false signals to control circuits, computer circuits and alarm circuits due to paddle or piston flutter caused by system pulsations or turbulence.

Two Time Delay Relays are offered, which can be used with all McDonnell Liquid and Air Flow Switches. No. T-5R provides a 5-second delay in breaking, or opening, the electrical circuit. No. T-20 provides a 20-second delay in making, or closing, the electrical circuit. Both relays are available for supply voltages as listed in table below.

These are solid state devices, 100% encapsulated. Each is furnished with a locknut for standard 1/2" conduit fitting, spacing washer and 10" lead wires.

McDonnell Time Delay Relays can be mounted directly on the switch housings of No. FS4-3 (page 4), No. FS4-3D (page 5), FS5 Series (page 6) and AF-1, AF-2 and AF-3 Series air flow switches (pages 16, 18 and 19). With all other McDonnell Flow Switches, relays can be mounted on conduit boxes affixed to switch housings or at the control panel.



ELECTRICAL RATINGS

Input: 120 Volt AC
Output: 1 Ampere RMS steady state maximum;
20 milliamperes minimum.

Electrical Supply	Product Number	
	5-second delay on break	20-second delay on make
120 Volt AC	No. T-5R	No. T-20
24 Volt AC	No. T-5R-24V	No. T-20-24V
24 Volt DC	—	No. T-20-24VDC
240 Volt AC	No. T-5R-240V	No. T-20-240V

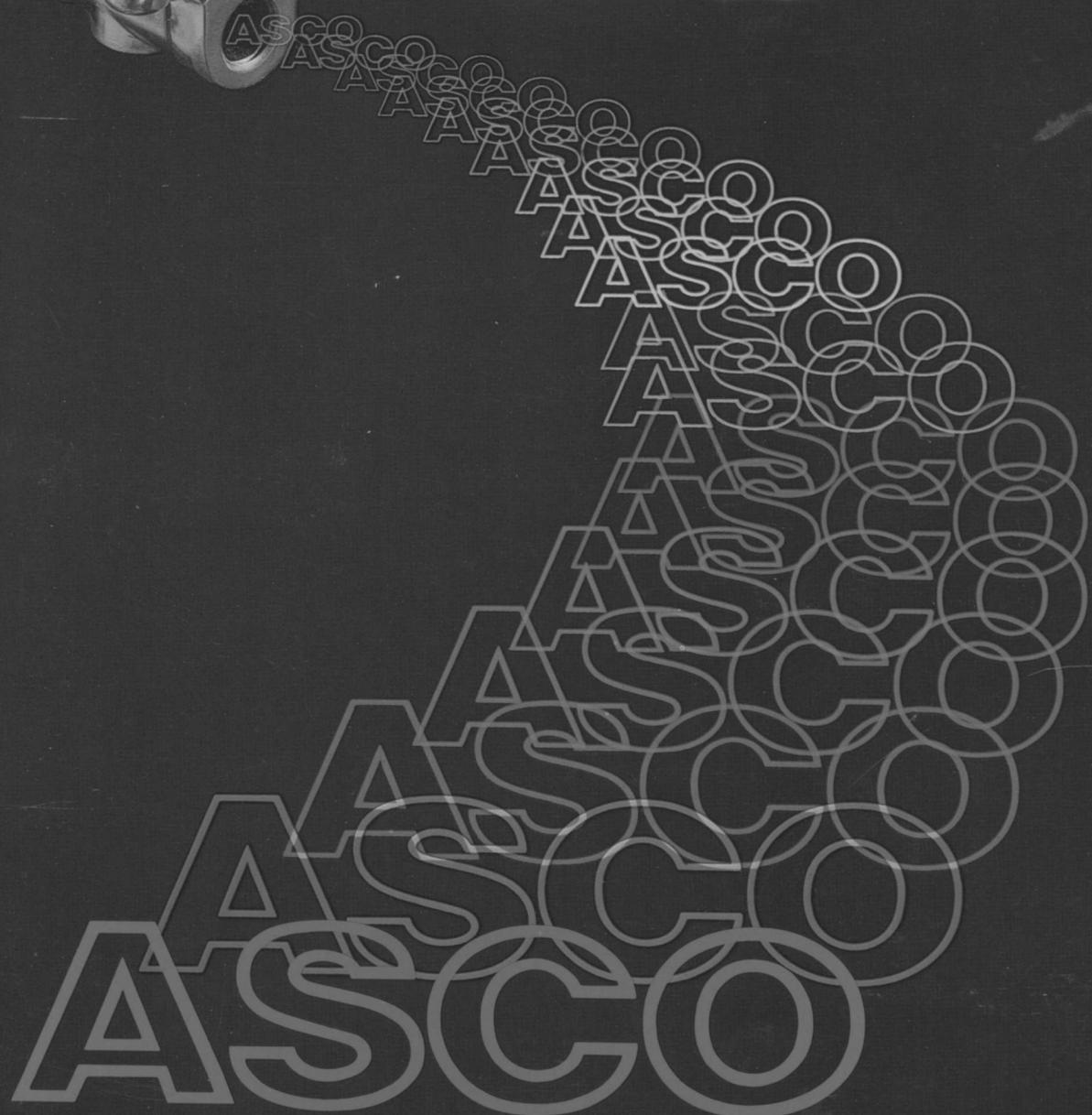


Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service
MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

Catalog No. 31



ASCO® Red-Hat® Solenoid Valves



Your Source for 2, 3 and 4 Way Solenoid Valves

Automatic Switch Co.
FLORHAM PARK, NEW JERSEY

Automatic Switch Co.



FLORHAM PARK, Principal Office and Plant

always pioneering in the design and development of solenoid operated valves — resulting in a line of solenoid valves that is recognized as the finest and most complete anywhere in the world. One of ASCO's first accomplishments was the evolution of the packless valve solenoid in the form we still use today. A full line of Air Operated Valves, Air Controls, Check Valves and Accessories also is available.

ASCO's manufacturing, sales and service facilities are strategically located in North and South America, Europe, Japan, South Africa, and the British Commonwealth to provide every type of industry with complete, immediate assistance on all solenoid valve needs. Valves made at our international facilities meet the codes and requirements of most standards organizations, such as: ISO, IEC, CEN, CENELEC, CEE, VDE, DIN, BASEEFA, PTB, BGC, BSI, JEM and JIS.

United States

Principal Office and Plant:
Florham Park, New Jersey
Factory Branches and Warehouses:
Chicago, Illinois and
Los Angeles, California

Australia

Manufacturing & Marketing Subsidiary
ASCOMATION PTY. LTD.
Sydney, New South Wales

Brazil

Manufacturing & Marketing Subsidiary
ASCOVAL INDUSTRIA E.
COMERCIO LTDA.
Barueri, São Paulo

Canada

Manufacturing & Marketing Subsidiary
ASCOELECTRIC LIMITED
Brantford, Ontario

England

Manufacturing & Marketing Subsidiary
ASCO (UK) LTD.
Skelmersdale, Lancashire

Mexico

Manufacturing & Marketing Subsidiary
ASCOMATICA S.A. de C.V.
Mexico, D.F.

South Africa

Manufacturing & Marketing Subsidiary
ASCOREG (PTY.) LTD.
Johannesburg, Transvaal

Switzerland

Marketing Subsidiary of
Automatic Switch Co.:
ASCO CONTROLS A.G., Zug

The Netherlands

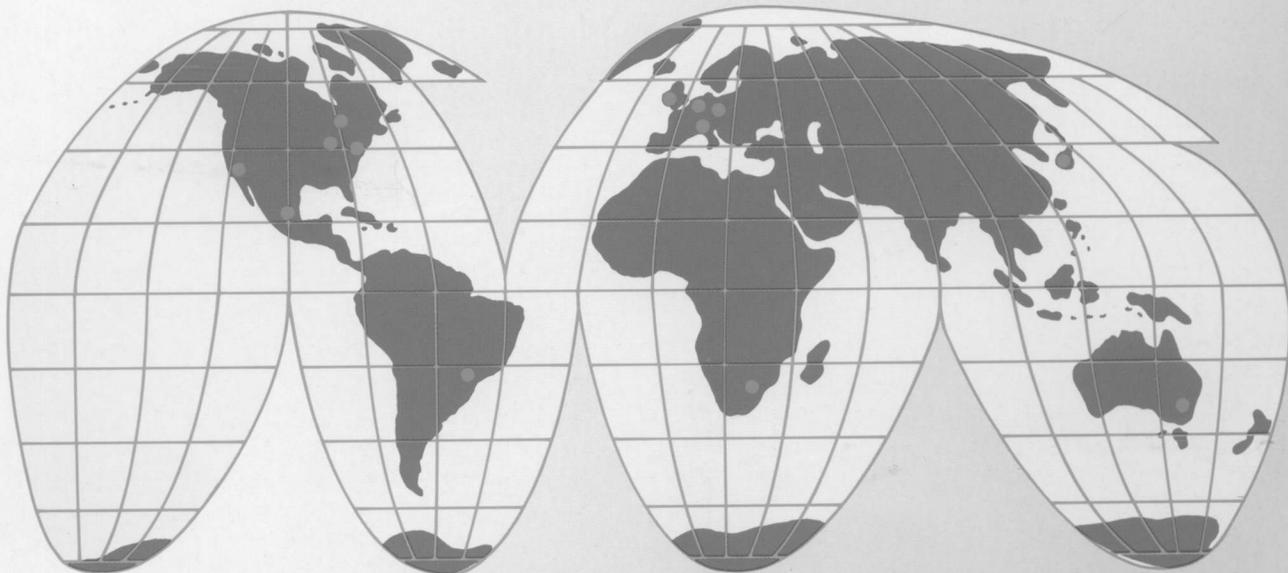
Manufacturing & Marketing Subsidiary of
ASCO CONTROLS A.G.:
CONTROLASCO B.V., Scherpenzeel (Gld)

West Germany

Marketing Subsidiary of
ASCO CONTROLS A.G.:
ASCO GmbH, Ratingen (Düsseldorf)

Japan

Manufacturing & Marketing Affiliate
KONAN ASCO CO., LTD.
Nishinomiya, Hyogo



ASCO® TITLE INDEX

	PAGE
Numerical Listing of Bulletin Numbers	2
GENERAL INFORMATION Includes: How to Order, Whom to Contact, Optional Features, Valve Selection Guide for corrosive and non-corrosive fluids.	3-15
2 WAY SOLENOID VALVES	16-34
3 WAY SOLENOID VALVES	35-52
4 WAY SOLENOID VALVES	53-66
MANUAL RESET 2, 3 AND 4 WAY SOLENOID VALVES	67-70
SPECIAL PURPOSE VALVES <ul style="list-style-type: none">• Vacuum Service• Cryogenic Service• Long Life Valve Construction• Coolant Valves• Redundant Control Valves• Shielded Core Valves• Dual Solenoid "Hot and Cold" Laundry Valves• Liquid CO₂ Valves• Dust Collector Valves and Controls• Gasoline Dispensing Valves• Intrinsically Safe Valves• Solenoid Operators• Sub-Miniature — Gang Mounting 2 and 3 Way Valves	71-85
COMBUSTION VALVES FOR FUEL GAS AND FUEL OIL SERVICE <ul style="list-style-type: none">• Blocking (Shut-Off) Valves• Valves with 5 lb. Closing Spring• Vent Valves• FM "Proof of Closure" Construction• LP Gas System Valves• "Free Handle" Manual Reset Valves• Light Fuel Oil Valves• Heavy Fuel Oil Valves (Shut-Off, Bypass, Normally Open)• 3 Way Fuel Oil Diversion Valves	86-95
AIR OPERATED 2, 3 AND 4 WAY VALVES	96-104
ACCESSORIES <ul style="list-style-type: none">• Check Valves • Flow Control Valves • Quick Exhaust/Shuttle/Shut-Off Valves• Strainers • Mini-Proximity Sensors • Air/Electric Switches • AC Solenoids	105-112
ENGINEERING INFORMATION Includes: Description of solenoid valve types, solenoid enclosures, agency approvals, valve sizing, coil constructions and coil replacement selection guide.	113-127
ASCO® TRI-POINT® PRESSURE AND TEMPERATURE SWITCHES	128
ASCO® CONTROL PRODUCTS	Inside Back Cover
ASCO MANUFACTURING AND SALES ORGANIZATION For Terms and Conditions of Sale Refer to Separate List Price Schedule.	Back Cover

Numerical Listing of Bulletin Numbers and Fluid Application Guide

Page	Bulletin Number	Air-Inert Gas	Air Only	Water	Hot Water	Light Oil		Fuel Gas	Fuel Oil	Steam	Sea Water	Gasoline	Coolant	Photo Solutions	Corrosive
						300 SSU	45 SSU								
112	8001														
112	8003														
69	8015	•		•			•								
112	8016														
112	8017														
69	8025	•		•			•								
17	8030	•		•		•		①							
17	8031	•		•		•		①							
70	8037	•		•			•								
17	8040	•						①							
17	8041	•													
88	8042							•							
89	8043							•							
70	8044							•							
70	8047	•		•											
84	8200	•		•		•									
84	8201	•		•		•									
19	8210	•		•	•	•		①							•
19	8211	•		•	•	•		①							•
22	8215	•						①							
23	8220									•					
23	8222									•					
25	8223	•		•		•									
26	8225	•		•		•									
27	8260	•		•		•									
29	8261	•		•		•									
29	8262	•		•		•		①	①						
29	8263	•		•		•				•					
77	8264														
93	8266								•						
34	8267									•					
85	8280	•													
79	8292			•		•						•			
36	8300	•		•		•									•
36	8302	•		•		•									•
69	8308	•		•											
69	8309	•		•											
69	8310	•		•											
69	8311	•		•											
38	8314	•		•			•								
36	8315									•					
40	8316	•		•											
42	8317	•		•			•								
43	8318		•												
43	8319		•												
45	8320	•		•		•									
48	8321	•		•		•									
75	8323	•		•		•									
49	8324	•		•											
52	8325	•		•			•								
84	8329	•		•		•									
54	8340		•												
57	8342	•		•		•									
58	8344	•		•		•									
60	8345	•		•			•								
61	8346		•												
63	8347	•		•		•									
64	8349	•													
77	8350			•	•										
75	8352												•		
78	8353	•													
50	8360	•		•											
94	8377								•						
85	8380	•													
65	8400		•												
69	8408	•		•											
69	8409	•		•											
69	8410	•		•											
69	8411	•		•											
109	8600	•		•		•				•					
109	8601	•		•		•				•					
109	8602	•		•		•									
109	8604	•		•											
106	V012	•		•		•									
107	V022	•		•		•									
108	V043		•												
105	Accessories Section														
86	Combustion Section														
71	Special Purpose										•	•	•	•	•

Note: ① Refer to Combustion Section, page 86, for additional listings.

General Information

This catalog contains the widest variety of solenoid valves you can find — anywhere. Complementing these valves are listings of air operated valves, air controls and other accessory items.

You'll find complete information on all items including engineering and sizing data, listings by function and application, optional features and dimensions and other data which will help you select the proper valve for your application.

How to Use This Catalog

The ASCO bulletin number is the first four digits of the catalog number. The index under "Numerical Listing of Bulletin Numbers" will tell you the page on which the catalog number is listed.

In addition, a "Title Index" on page 1 will lead you to each section of the catalog

(e.g., 2 way, 3 way, 4 way, etc.) where other indexes will help you find the exact valve you need.

How to Select and Order

Selection of the valve should be made on the basis of pipe and orifice sizes, materials compatible with the fluid, pressure and temperature ratings.

A Valve Material Selection Guide is provided on page 11 to further help in determining material compatibility.

Order by catalog number, voltage and frequency, fluid handled and operating pressure (for your application).

Example: Catalog No. 8262C1
Voltage and Frequency 120/60
Fluid Air
Pressure 125 psi

Whom to Contact

ASCO has a nationwide sales and service organization staffed by factory-trained sales engineers. All field personnel are highly qualified to help you select the proper products for your applications.

You can contact the main office in Florham Park, New Jersey by calling:

Valve Sales Department (201) 966-2012
Valve Service Department Parts (201) 966-2062
Service (201) 966-2066

To find the ASCO Authorized Stocking Distributor nearest you — check the "Yellow Pages" in your phone book, or contact your local ASCO Sales Office as listed on the back cover of this catalog.

ASCO valves have a wide variety of Optional Electrical and Construction Features available:

Optional Electrical Features

These include coils for high temperature applications; various terminations, spade and screw, in place of the standard leads; coils for battery service; open frame solenoids and a variety of enclosures from rainproof to explosion-proof for hydrogen atmospheres.

Optional Construction Features

These include manual operators; metering devices; special cleaning procedures and special materials for handling a wide variety of fluids.

How to Select and Specify

Optional Electrical Features are indicated by prefixes and Optional Construction Features by suffixes to the catalog number.

A list of prefixes and suffixes is shown here. All codes shown with a "•" can be selected from this catalog. For the remainder shown in the list and other requirements not covered here, contact your local ASCO sales office.

OPTIONAL FEATURES

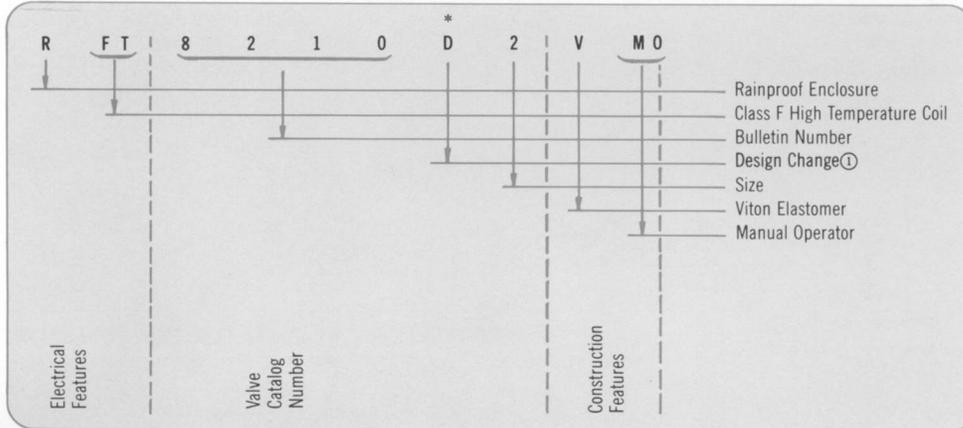
PREFIXES FOR OPTIONAL ELECTRICAL FEATURES

Code	Solenoid	Code	Coil	Code	Feature
• C	Conduit Adapter (1/2")	• DA	Class A — Dual Voltage	L	Non-Standard Continuous Leads 18" or Longer
• EP	Explosion-Proof Types 4 and 7	• DF	Class F — High Temperature — Dual Voltage	X	Other Special Constructions
F	Factory Assembled Manifolds	DP	Class F — Intermediate Power — Dual Voltage		
• GS	Strain-Relief Connector	• FT	Class F — High Temperature		
• HE	Type 7 Group B Explosion-Proof	FB	Class F — Intermediate Power		
• J	Type 1 Splice Box	• HT	Class H — High Temperature		
• JB	Junction Box	HB	Class H — Intermediate Power		
M	Metal Retaining Clip	• HC	Class H — Battery Charging Circuits		
• P	Panel Mount	IS	Intrinsically Safe		
• R	Rainproof	• K	Class A — Screw Terminals		
• T	Threaded Conduit (1/2")	KB	Class H — Intermediate Power — Screw Terminals		
• U	Open Frame	• KF	Class F — High Temperature — Screw Terminals		
• WP	Submersible Watertight Splice Box	KP	Class F — Intermediate Power — Screw Terminals		
		• S	Class A — Spade Terminals		
		SB	Class B — High Temperature — Spade Terminals		
		• SF	Class F — High Temperature — Spade Terminals		
		SP	Class F — Intermediate Power — Spade Terminals		

SUFFIXES FOR OPTIONAL CONSTRUCTION FEATURES					
SUFFIX I		SUFFIX II		SUFFIX III	
Code	Seat/Disc/Etc. Material	Code	Form	Code	Feature
B	For LP Gas Burners	† F	Form of Flow Normally Closed	† HW	Hot Water Diaphragm
• E	Ethylene Propylene	† G	Form of Flow Normally Open	† LT	Low Temperature
† I	Indicator Lights	† U	Form of Flow Universal	• M	Metering Device
• J	Neoprene			† MB	Mounting Bracket
† K	Air Operated, 3-30 psi			• MO	Manual Operator
† KK	Air Operated, 1.5-5 psi			• MS	Screw Type Manual Operator
† L	Metal Seat			† SW	Switch
• N	Oxygen			† VH	High Vacuum
† Q	Long Life Construction			† VM	Medium Vacuum
† R	Resilient				
• T	Teflon*				
• V	Viton*				

†Covered in the bulletin in which it is used.
 *DuPont Co. trademark.

An example of an ASCO valve catalog number with prefixes and suffixes is shown below.



① The Design Change Letter indicates a major design change affecting spare parts kits, rebuild kits and coils. The correct replacement parts for each change letter are shown in ASCO's Spare Parts Kits and Coils Catalog.

OPTIONAL ELECTRICAL FEATURES

Optional Electrical Feature Reference Table 1

ASCO solenoid valves are offered with both coil and solenoid enclosure optional features. Many of these options are UL listed, CSA certified and FM approved when included on a solenoid valve which has been approved.

Prefixes are used to describe the specific Optional Electrical Feature desired. All Optional Electrical Features are keyed to the Watt Rating/Class of Coil Insulation; e.g., 6/A. This can be found in the body of the bulletin Specification Table for a particular valve. Referring to Table 1, select a coil option from the description in the left-hand column.

With the Watt Rating/Class of Coil Insulation of the valve in question, read horizontally across for the solenoid enclosure option desired. Add the prefix designation indicated to the valve catalog number.

For example, to select the correct catalog number for an 8262C2 valve with a Class F spade terminal coil and an open frame solenoid construction, assuming the voltage to be 120 volts, AC, 60 Hz:

1. In the Specification Table for Bulletin 8262, the Watt Rating/Class of Coil Insulation is "6/A" for Catalog No. 8262C2.
2. Using Table 1, look for the listing "Spade Terminal Coil—Class F" (Group

6) in the left-hand column. In the column immediately to the right, find 6/A under AC Coils and then read horizontally across to the column headed "Group 9—Open Frame Solenoid" to find the prefix designation — "USF". To order, specify Catalog No. USF8262C2, 120/60. (Note: The voltage and frequency must always be specified.)

For detailed information on the coil and solenoid enclosure options available, refer to the Group numbers which appear in Table 1 and to the descriptions which follow.

TABLE 1 • Coil and Solenoid Enclosure Options

Coil Option Selected	Watt Rating/ Class of Coil Insulation		Coil Option Only	Group 9	Group 10	Group 11	Group 12	Group 14	Combination of Groups 11 and 14 ⑦	Combination of Groups 12 and 14 ⑦	Group 15	Combination of Groups 11 and 15 ⑦	Combination of Groups 12 and 15 ⑦	Group 17①	Group 18①	Group 19①
				Open Frame Solenoid	Panel Mount Construc- tion	1/2" Conduit Adapter	1/2" Threaded Conduit Hub	Type 1 Junction Box Enclosure ⑥⑦			Type 1 Splice Box Enclosure ⑥⑦			Type 3R Rainproof Enclosure	Type 6 Sub- mersible Watertight Splice Box	Type 7B Explosion- Proof Enclosure
				Use Prefix "U"	Use Prefix "P"	Use Prefix "C"	Use Prefix "T"	Use Prefix "JB"			Use Prefix "JBC"			Use Prefix "JBT"	Use Prefix "J"	Use Prefix "JC"	Use Prefix "JT"	Use Prefix "R"	Use Prefix "WP"	Use Prefix "HE"
No Coil Option. Standard Valve Construction	6/A 9/F 9.6/F 10.5/A 11/F 11/H 11.8/A 16.7/F	9.7/A 11.2/A	—	U	P	C	T	JB	JBC	JBT	J	JC	JT	R	WP①	②
	6.5/B 15.4/A 20/F 28/H	6.4/B 16.8/A 33/H	—	U	P	C	T	—	JBC	JBT	J	JC	JT	—	—	—
	28.2/A 59.5/H 66/H	—	—	—	—	C	T	—	—	—	—	—	—	R	—	—
	14.9/B 30.6/H	—	—	—	—	C	(STD)	—	—	—	—	—	—	—	—	—
Class F Coil (Group 1)	6/A 10.5/A 11.8/A 15.4/A	9.7/A 11.2/A 16.8/A	FT	UFT	PFT	CFT	TFT	JBFT	JBCFT	JBTFT	JFT	JCFT	JTFT	RFT	WPFT	HEFT②
	28.2/A	—	FT	—	—	CFT	TFT	—	—	—	—	—	—	RFT	—	—
	6.5/B 6.4/B	—	FB	UFB	PFB	CFB	TFB	—	—	—	JFB	JCFB	JTFB	RFB	WPFB	HEFB②
Class H Coil (Group 2)	6/A 9.6/F 10.5/A 11/F 11.8/A 15.4/A	9.7/A 11.2/A 16.8/A	HT	UHT	PHT	CHT	THT	JBHT	JBCHT	JBTHT	JHT	JCHT	JHT	RHT	WPHT	HEHT②
	28.2/A	—	HT	—	—	CHT	THT	—	—	—	—	—	—	RHT	—	—
	9/F 16.7/F	—	HB	UHB	PHB	CHB	THB	JBHB	JBCHB	JBTHB	JHB	JCHB	JTHB	RHB	WPHB	HEHB②
	14.9/B 9.7/A③ 11.2/A③ 16.8/A③	—	HC	UHC	PHC	CHC	THC	JBHC	JBCHC	JBTHC	JHC	JCHC	JTHC	RHC	WPHC	—
Dual Voltage Coils — Class A (Group 3)	6/A 10.5/A 11.8/A 15.4/A	—	DA	UDA	PDA	CDA	TDA	JBDA	JBCDA	JBTDA	JDA	JCDA	JTDA	RDA	WPDA	—
	6/A 10.5/A 11.8/A 15.4/A	—	DF	UDF	PDF	CDF	TDF	JBDF	JBCDF	JBTDF	JDF	JCDF	JTDF	RDF	WPDF	—
Dual Voltage Coils — Class F (Group 4)	9/F 16.7/F 20/F	—	DP	UDP	PDP	CDP	TDP	JBDF	JBCDF	JBTDF	JDF	JCDF	JTDF	RDF	WPDF	—
	6/A 10.5/A 11.8/A 15.4/A	—	DA	UDA	PDA	CDA	TDA	JBDA	JBCDA	JBTDA	JDA	JCDA	JTDA	RDA	WPDA	—
Spade Terminal Coils — Class A (Group 5)	6/A 10.5/A 11.8/A 15.4/A	9.7/A 11.2/A	S	US	PS	—	—	JBS	JBCS	JBTS	JS	JCS	JTS	—	WPS	—
	6.5/B 6.4/B	—	SB	USB	PSB	—	—	—	—	—	JSB	JCSB	JTSB	—	—	—
Spade Terminal Coils — Class F (Group 6)	6/A 10.5/A 11.8/A 15.4/A	9.7/A 11.2/A	SF	USF	PSF	—	—	JBSF	JBCSF	JBTSF	JSF	JCSF	JTSF	—	WPSF	—
	9.7/F 16.7/F 20/F	—	SP	USP	PSP	—	—	JBSP	JBCSP	JBTSP	JSP	JCSP	JTSP	—	WPSP	—
	6.5/B 6.4/B	—	SP	USP	PSP	—	—	—	—	—	JSP	JCSP	JTSP	—	—	—
Screw Terminal Coils — Class A (Group 7)	6/A 10.5/A 11.8/A 15.4/A	9.7/A 11.2/A	K	UK	PK	—	—	—	—	—	JK	JCK	JTK	—	WPK	—
	6.5/B 6.4/B	—	KB	UKB	PKB	—	—	—	—	—	—	—	—	—	—	—
Screw Terminal Coils — Class F (Group 8)	6/A 10.5/A 11.8/A 15.4/A	9.7/A 11.2/A	KF	UKF	PKF	—	—	—	—	—	JKF	JCKF	JTKF	—	WPKF	—
	9/F 16.7/F	—	KP	UKP	PKP	—	—	—	—	—	JKP	JCKP	JTKP	—	WPKP	—

Notes: ① Not available on Bulletins 8314, 8317, 8345, or 8347 valves.
 ② Available on most valves, consult ASCO office for details.
 ③ Not available on D8030.
 ④ Supplied standard with 1/2" threaded conduit hub.

⑤ The "HC" winding is specially designed to operate over a range of voltages, therefore, the wattage changes. Nameplates will be marked 13.3 watts instead of 9.7, 17.4 for the 11.2 and 24.2 for the 16.8 watt coils.
 ⑥ 6" leads standard on coils supplied with this enclosure.
 ⑦ Not available on steam valves.



OPTIONAL ELECTRICAL FEATURES



GROUP 1. Class F High Temperature Molded Coils with 18" Leads

Class F high temperature molded coils are suitable for temperatures higher than are possible with Class A coils.

- Suitable for ambient temperatures as high as 140°F.① on AC service.
- Suitable for higher than standard fluid temperature.②
- UL recognized insulation system.
- Epoxy molded coil.
- Suitable for both 50 and 60 Hertz.①
- Suitable for high humidity conditions.
- Fungusproof.

Ordering Information: Use catalog number prefix "FT" (example — FT8262C2) and specify voltage.

GROUP 2. Class H High Temperature Molded Coils with 18" Leads

Class H high temperature molded coils are suitable for temperatures higher than are possible with Class F coils.

- Suitable for ambient temperatures as high as 176°F.③ on AC service.
- Suitable for fluid temperatures above those possible with Class F coils.②
- Radiation resistant.
- UL recognized insulation system.
- Epoxy molded coil.
- Suitable for both 50 and 60 Hertz.①
- Suitable for high humidity conditions.
- Fungusproof.

Ordering Information: Use catalog number prefix "HT" or "HB" (example — HT8262C2) and specify voltage.

Notes:

- ① Can be supplied for 50 Hz service at a reduced voltage which is standard throughout the world, i.e., 120/60, 110/50.
- ② Consult ASCO to review acceptability of other valve components at higher temperatures.
- ③ Temperature listed meets UL requirements; for non UL applications, the maximum temperature is 167°F. on Class F (prefix "FT" only) coils — 212°F. on Class H (prefix "HT" only) coils.

GROUP 3. Class A Dual Voltage Molded Coils with 18" Leads

These Class A dual voltage molded coils provide versatility in allowing a valve to be energized from either one of two different voltages.

- Reduces number of valves to be stocked since each is suitable for use on two different voltages.
- Suitable for both 50 and 60 Hertz.①

Ordering Information: Use catalog number prefix "DA" (example — DA8262C2) and specify voltage.

GROUP 4. Class F High Temperature Dual Voltage Molded Coils with 18" Leads

These Class F dual voltage molded coils are suitable for temperatures higher than possible with Class A dual voltage coils.

- Same features as available with Class F molded coils (Group 1).
- Reduces number of valves to be stocked since each is suitable for use on two different voltages.
- Suitable for both 50 and 60 Hertz.①

Ordering Information: Use catalog number prefix "DF" or "DP" (example — DF8262C2) and specify voltage.



GROUP 5. Class A Molded Coils with Spade Terminals

These Class A molded coils have 1/4" spade terminals in place of leads. Especially recommended for use with "harness" type wiring when more than one valve is to be installed in a cabinet.

Specify only with solenoid option Group 9, 10, 15 or 18.

- Saves installation time since wire harness can be pre-assembled.
- Can be used with solenoid option Group 9 or 10 to obtain a lower cost valve.
- Can be used with solenoid option Group 14, 15 or 18 to reduce installation costs.

Ordering Information: Use catalog number prefix "S" plus appropriate solenoid option prefix (example — US8262C2) and specify voltage.

Note: Spade terminal coils are not available for above 250 volts, AC or DC.

GROUP 6. Class F High Temperature Molded Coils with Spade Terminals

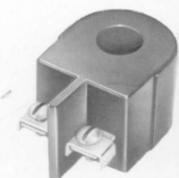
Class F high temperature molded coils with 1/4" spade terminals are suitable for temperatures higher than possible with Class A coils.

Specify only with solenoid option Group 9, 10, 14, 15 or 18.

- Same features as available with Class F coils (Group 1).
- Can be used with solenoid option Group 9 or 10 to obtain a lower cost valve.
- Saves installation time since wire harness can be pre-assembled.
- Can be used with solenoid option Group 14, 15 or 18 to reduce installation costs.

Ordering Information: Use catalog number prefix "SF" or "SP" plus appropriate solenoid option prefix (example — WPSF8262C2) and specify voltage.

Note: Spade terminal coils are not available for above 250 volts, AC or DC.



GROUP 7. Class A Molded Coils with Screw Terminals

These Class A molded coils have a terminal with a #6 screw.

Specify only with solenoid option Group 9, 10, 15 or 18.

- Offers same advantages and uses as spade terminal coils (Group 5).

Ordering Information: Use catalog number prefix "K" plus appropriate solenoid option prefix (example — UK8262C2) and specify voltage.

Note: Screw terminal coils are not available for above 250 volts, AC or DC.

**GROUP 8. Class F
High Temperature Molded Coils
with Screw Terminals**

Class F high temperature molded coils with #6 screw terminals are suitable for higher temperatures than possible with Class A coils.

Specify only with solenoid option Group 9, 10, 15 or 18.

- Same features as available with Class F coils (Group 1).
- Offers same advantages and uses as Class F spade terminal coils (Group 6).

Ordering Information: Use catalog number prefix "KF" or "KP" plus appropriate solenoid option prefix (example — PKF 8262C2) and specify voltage.

Note: Screw terminal coils are not available for above 250 volts, AC or DC.



**GROUP 9.
Open Frame
Solenoid**

Valves with open frame solenoid construction are intended for use where a solenoid enclosure is not needed. For example — mounting in a control cabinet.

- Provides a lower cost valve assembly.
- Allows use of coil option Group 5, 6, 7 or 8 to reduce installation costs.

Ordering Information: Use catalog number prefix "U" (example — U8262C2).

**GROUP 10.
Panel Mount Construction**

The panel mount construction is designed for applications where the solenoid valve will be mounted on a panel or within a cabinet.

- Provides a low cost means to install valves on a panel.
- Separates electrical portion of solenoid valve to inside of cabinet with other electrical components for ease of installation.
- Allows use of coil option Group 5, 6, 7 or 8 to reduce installation costs.

Ordering Information: Use catalog number prefix "P" (example — P8262C2).



**GROUP 11.
1/2" Conduit
Adapter**

An inexpensive adapter for use with 1/2" "BX" cable or "chase" nipple. These adapters are ideally suited for attaching the solenoid valve to a panel or cabinet with a chase nipple.

Available for Type 1 General Purpose Solenoid Enclosure, Groups 14 and 15.

- Provides means to reduce valve cost when "BX" cable is used.

Ordering Information: Use catalog number prefix "C" (example — C8262C2).



**GROUP 12.
1/2" Threaded
Conduit Hub**

This is the conventional threaded hub allowing connection with 1/2" "BX" cable.

- UL listed when supplied with UL listed valves.
- Supplied standard on Groups 16, 17, 18 and 19.

Ordering Information: Use catalog number prefix "T" (example — T8262C2).



**GROUP 13.
Strain-Relief
Connector**

Provides mechanical protection to resist leads being pulled out of coil.

Available for Type 1 General Purpose Solenoid Enclosure, Groups 14 and 15.

Ordering Information: Use catalog number prefix "GS" (example — GS8262C2).

**GROUP 14.
Type 1 Junction Box
Solenoid Enclosure**

Provides sufficient room to allow coil leads and wires to be spliced inside the enclosure.

- Reduces valve installation cost by eliminating the need for a separate junction box.
- Allows use of coil option Group 5 or 6.
- Grounding screw provided.
- Knock-outs provided on both sides of enclosure.

Ordering Information: Use catalog number prefix "JB" (example — JB8210D2).



**GROUP 15.
Type 1 Splice Box
Solenoid Enclosure**

Provides sufficient room to allow the coil leads and incoming wires to be spliced inside the enclosure.

- Reduces valve installation cost by eliminating the need for a separate junction box.
- Allows use of coil option Group 5, 6, 7 or 8 to reduce installation costs.
- Ground screw provided.

Ordering Information: Use catalog number prefix "J" (example — J8210D2).



**GROUP 16.
Types 4 and 7 (C and D)
Watertight and Explosion-Proof
Solenoid Enclosure**

This is a Combination Watertight and Explosion-Proof Solenoid Enclosure.

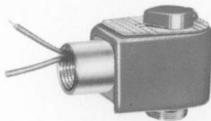
Refer to Engineering Section for details.

- Also meets Types 3 and 9 (E, F and G) solenoid requirements.
- Supplied standard with 1/2" threaded conduit hub.

Valves with this housing are listed separately in most bulletins.

For Type 4 Watertight Enclosure only, refer to Group 18.

Ordering Information: Use catalog number prefix "EP" where no construction of this type is shown (example — EP8025C89).



GROUP 17.
Type 3R Rainproof Solenoid Enclosure

Type 3R Rainproof Solenoid Enclosures are intended for use outdoors to provide protection against rain, sleet, and external ice formation. They are suitable for outdoor rooftop installations.

Important: Valves supplied with Type 3R enclosures must have molded coil and be mounted with the solenoid in a vertical position.

- Also meets Type 2 — Dripproof — Indoor enclosure requirements.
- Supplied standard with 1/2" threaded conduit hub.

Ordering Information: Use catalog number prefix "R" (example — R8262C2).



GROUP 18.
Type 6 Submersible Watertight Splice Box Solenoid Enclosure

Type 6 solenoid enclosures are intended for indoor or outdoor use to provide protection against the entry of water during occasional temporary submersion at a limited depth — 6 feet for 30 minutes.

- Provides sufficient room to allow coil leads and wires to be spliced inside the enclosure.
- Reduces valve installation cost by eliminating the need for a separate junction box.
- Allows the use of coil option Group 5, 6, 7 or 8 to reduce installation costs.
- Also meets Types 3, 3S, 4 and 4X enclosure requirements.
- Ground screw and 1/2" threaded conduit hub supplied as standard.

Ordering Information: Use catalog number prefix "WP" (example — WP8210D2).



GROUP 19.
Type 7 (B) Explosion-Proof Class I, Division 1, Group B Solenoid Enclosure

This enclosure is designed to meet the requirements for use in hazardous atmospheres containing hydrogen.

- Also meets Types 4, 7 (C and D) and 9 (E, F and G) enclosure requirements.
- Terminal compartment for #14 gauge wire is provided for incoming wires and grounding connections.
- Supplied standard with 1/2" threaded conduit hub.

Ordering Information: Use catalog number prefix "HE" (example — HE8262A213).

Notes:

- ① Can be supplied for 50 Hz service at a reduced voltage which is standard throughout the world, i.e., 120/60, 110/50.
- ② Consult ASCO to review acceptability of other valve components at higher temperatures.
- ③ Temperature listed meets UL requirements; for non UL applications, the maximum temperature is 167°F. on Class F (prefix "FT" only) coils — 212°F. on Class H (prefix "HT" only) coils.

OPTIONAL CONSTRUCTION FEATURES

Manual Operators are provided to operate the valve manually when electrical power is off.

There are basically two types of manual operators:

1. Push Type — Spring Return.
2. Screw Type — Manual Return.

Valves that can be fitted with either type are Bulletins 8318, 8320 and 8321. All other bulletins are available with one type as shown in Group 20 tables appearing on page 10.

To determine which type is available, check the Construction Reference Number of the particular valve in the Specification Table of each bulletin against Group 20 tables appearing on page 10. A schematic of the type of manual operator and how it is fitted to the valve is shown. If no manual operator is listed for the valve specified or a different type is required, consult your local ASCO office.

Add suffix "MO" or "MS" to the catalog number.

Metering Devices are used for obtaining an exact flow from a solenoid valve for dispensing, or for moving an air operator in a given time period.

Some valves are supplied with metering devices as standard construction and they are Bulletins 8318, 8324 and 8349.

Other valves which can be fitted with metering devices are Bulletin 8262 (1/8" N.P.T. size only) and Bulletins 8260 and 8342. Add suffix "M" to catalog numbers.

Special Cleaning and Testing Procedures: If special cleaning and testing procedures are required, they should be specified on the order as indicated on Table 2.

Note: These procedures cannot be done after the valve is built without complete disassembly.

OPTIONAL CONSTRUCTION FEATURES (continued)

TABLE 2 • ASCO Special Cleaning and Testing Procedures

Fluid	Description of Cleaning or Testing Procedure	Order by Specifying
Freon	All valve parts inspected for oil, grease, metal dust, and other foreign matter and degreased, if necessary. Assembled in clean, dry area and helium mass spectrometer tested for external leakage. Pipe connections sealed with plugs.	Clean and test per ASCO AP-1-005 Procedure
Oxygen	All valve parts degreased and "Blacklight" inspected for cleanliness. Assembled and tested in clean area using oil-free air or nitrogen. Helium mass spectrometer tested for external leakage. Pipe connections sealed with plugs. Each valve tagged covering certification of tests and put in a sealed bag.	Clean and test per ASCO AP-1-004 Procedure Add suffix "N" to catalog number.
Sanitary distilled water and other clean systems	All valve parts inspected for oil, grease, metal dust, and other foreign matter and degreased, if necessary. Valves assembled in clean area and tested with clean, dry air or nitrogen. Pipe connections sealed with plugs.	Clean and test per ASCO AP-1-008 Procedure

TABLE 3 • Special Construction Features for ASCO Solenoid Valves Handling Liquids and Gases^① Other than Air, Inert Gas, Water and Light Oil

Orders entered using this table MUST state actual fluid and pressure of application.

Pipe Size (ins.)	Bulletin Number or Valve Type	Valve Construction Number	Special Construction Features ^④				
			Ethylene Propylene Use Suffix "E"	Oxygen Service Use Suffix "N" ^①	Teflon Use Suffix "T" ^②	Viton Use Suffix "V"	Neoprene Use Suffix "J"
SOLENOID OPERATED VALVES							
3/8-3/4	8030, 8031 8040, 8041	1-10, 13			Not Available	②	
3/8-1 1/2	8210, 8211	1, 2, 5, 6, 7, 8, 9, 11, 12, 16, 18, 23, 24, 25, 26, 28, 29, 31-38			Not Available		
3/4-2 1/2	8210, 8211	10, 13, 14, 17, 19, 20, 21, 27, 30	Available on All Constructions	Available on All Constructions	Available	Available on All Constructions	Available on All Constructions
3/8-3	8215	All	Available on All Constructions	Available on All Constructions	Not Available	Available on All Constructions	Available on All Constructions
All	8260	All	Available on All Constructions	Available on All Constructions	Not Available	Available on All Constructions	Available on All Constructions
1/8-3/8	8262, 8263	1-7, 11, 12, 13, 16, 17	Available on All Constructions	Available on All Constructions	Available	Available on All Constructions	Available on All Constructions
1/8 & 1/4	8262	8, 9, 14	Available on All Constructions	Available on All Constructions	Available	Available on All Constructions	Available on All Constructions
3/8 & 1/2	8316	1, 2	Available on All Constructions	Available on All Constructions	Not Available	Available on All Constructions	Available on All Constructions
3/4 & 1	8316	3, 4, 5	Available on All Constructions	Available on All Constructions	Not Available	Available on All Constructions	Available on All Constructions
All	8320, 8324, 8360	All	Available on All Constructions	Available on All Constructions	Available	Available on All Constructions	Available on All Constructions
AIR OPERATED VALVES							
1/4	2 Way	1, 2, 22	Available on All Constructions	③	Available	Available on All Constructions	Available on All Constructions
3/8-3/4	2 Way	3, 4, 8	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions
3/8-3/4	2 Way	6, 7, 16, 17	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions
1 & 1 1/4	2 Way	10, 12, 18, 19	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions
1 1/2	2 Way	14, 20	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions
1/4	3 Way	1	Available on All Constructions	③	Available	Available on All Constructions	Available on All Constructions
3/8 & 1/2	3 Way	2	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions
3/4 & 1	3 Way	3, 4	Available on All Constructions	③	Not Available	Available on All Constructions	Available on All Constructions

Special Constructions for Handling Other than Air, Inert Gas, Water and Light Oil:

The construction materials for standard valves are shown in the Specifications. The ASCO Valve Material Selection Guide for a variety of liquids and gases other than air, inert gas, water and light oil starts on page 11. A solenoid valve must use certain construction materials for proper electrical function. If you cannot find the specific fluid in the Guide, we request that you consult your local ASCO office.

Certain fluids may also require that we change the solenoid shading coil. The standard valves use a copper shading coil. Aluminum and silver are also available and, due to the different magnetic properties of these materials, additional electrical changes may be necessary. When a change in shading coil material is indicated in the Guide, please consult your local ASCO office.

Table 3, at left, shows elastomers available for the various valve bulletin numbers. Construction references for each valve are shown on the particular bulletin page in the Specification Table.

Notes:

- ① For valves requiring special cleaning and/or testing procedures such as for oxygen, freon and sanitary service, refer to Table 2.
- ② Pressure ratings must be reduced by 25%.
- ③ Not available for valves with low pressure (1.5-5 psi) operator.
- ④ Unless otherwise indicated in the Catalog Specification Tables, all soft seating valves are supplied with Buna "N" discs, diaphragms or gaskets.

OPTIONAL CONSTRUCTION FEATURES (continued)

GROUP 20. Manual Operators

Two types are available:

- (a) **Suffix "MO":** Push Type — Spring Return. This is a "momentary" type, must hold in manually to actuate operator.
- (b) **Suffix "MS":** Screw Type — Manual Return. This is a "maintained" type, must manually disengage the operator to its original position.

MANUAL OPERATORS FOR 2 WAY SOLENOID VALVES

Bulletin Number	Pipe Size (ins.)	Valve Construction Number	Valve Body Materials	Manual Operator Suffix	Type of Manual Operator	Illustration Number
8030-31	3/8, 1/2	1, 2, 3, 4	Brass	MS	Maintained	5
8030-31	3/4	9, 10	Brass	MS	Maintained	3
8030-31	3/8, 1/2	1, 2, 3, 4	Stainless Steel	MS	Maintained	5
8030-31	3/4	10	Stainless Steel	MS	Maintained	3
8210-11	3/8, 1/2	1, 2	Stainless Steel	MS	Maintained	5
8210-11	3/8, 1/2	1, 2	Brass	MS	Maintained	5
8210-11	3/8 to 1 1/2	5, 6, 8, 9, 11, 12, 13, 16, 17, 18, 19, 20, 21	Brass	MS	Maintained	2
8210-11	3/4 to 1 1/2	10, 31, 32, 33	Brass	MS	Maintained	3
8210-11	1	14	Brass	MS	Maintained	4
8210-11	3/4 to 1	7, 15	Stainless Steel	MS	Maintained	2
8262	1/8	1, 8	Brass	MS	Maintained	3
8262	1/4	2, 3, 4, 5, 6	Brass	MS	Maintained	2
8262	1/8, 1/4	Normally Open Construction	Brass	MS	Maintained	3
	MO			Momentary	1	
8262	1/8	1, 8	Stainless Steel	MS	Maintained	3
8262	1/4	11, 12, 13	Stainless Steel	MS	Maintained	2

MANUAL OPERATORS FOR 3 WAY SOLENOID VALVES

8300-02	All	All	Brass	MS	Maintained	4
8300-02	All	All	Stainless Steel	MS	Maintained	4
8316	All	All	Brass	MS	Maintained	2
8318 } 8319 }	All	All	Zinc	MS	Maintained	3
				MO	Momentary	1
8320	1/8, 1/4	All	Brass	MS	Maintained	3
8320	1/8, 1/4	All	Stainless Steel	MO	Momentary	1
8321	All	All	Brass	MS	Maintained	3
				MO	Momentary	1
8324	All	All	Zinc	MS	Maintained	3

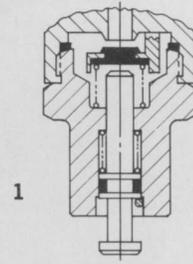
Note: ① Limited to 100 psi maximum on normally open and universal operation.

MANUAL OPERATORS FOR 4 WAY SOLENOID VALVES

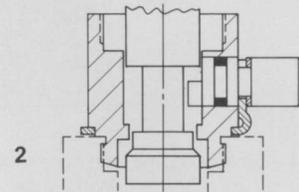
8340	1/4	See Bulletin Single Solenoid Only	Aluminum	MO	Momentary	1
8342	1/4, 3/8		Brass	MS	Maintained	4
8344 ③	All	All	Brass	MS	Maintained	2
8345	1/4	All	Brass	MS	Maintained	5
8346	All	All	Aluminum	②	Momentary	1
8347 ③	All	All	Brass	MS	Maintained	2
8400 ③	All	All	Aluminum	②	Momentary	1

Notes: ② Supplied as standard, no suffix required.

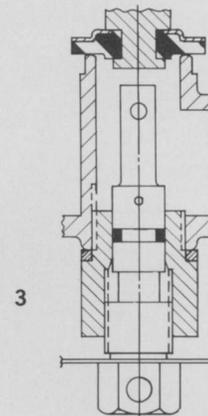
③ Two manual operators required for dual solenoid construction.



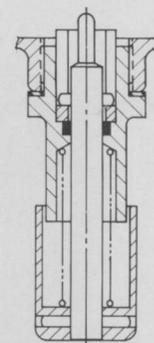
1 Push in and Hold



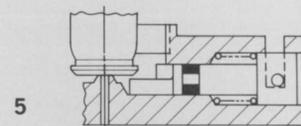
2 Rotary Stem in Bonnet



3 Threaded Stem in Body



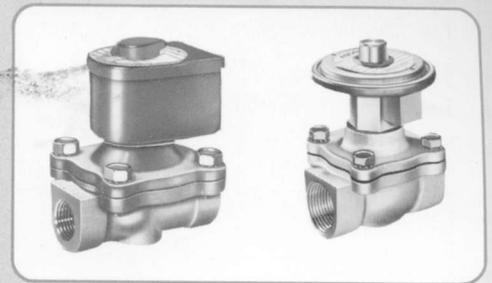
4 Push in and Lock



5 Rotary Stem in Body

ASCO Valve Material Selection Guide

FOR COMMONLY USED FLUIDS



NOTE: All orders entered using this guide **must state actual fluid, fluid pressure and fluid temperature of the application.** Actual fluid is extremely important when suffix letters are specified.

ASCO valves are available to control most acids, alcohols, bases, solvents, and corrosive gases and liquids. Modified or special designs are sometimes required depending upon the fluid and application.

Corrosion occurs either as a chemical or electrochemical reaction. Therefore, consideration must be given to both the gal-

vanic and electromotive force series, as well as to pressure, temperature, and other factors that might be involved in the application.

This guide provides information on types of valves and modifications that are readily available for most common corrosive and non-corrosive gases and liquids. For appli-

cations where abnormal conditions exist and for other types of valves, operations and fluid, consult your local ASCO office giving full details on operating conditions.

This guide is not intended as a specific recommendation since other factors beyond our control could affect valve operation or materials.

GENERAL INFORMATION ON ELASTOMER MATERIALS

BUNA "N"

Buna "N" is commonly referred to as a nitrile rubber, and is ASCO's standard synthetic elastomer for accomplishing resilient-type seating or sealing. It has excellent compatibility for most air, water and light oil applications up to the 180°F.-200°F. range.

NEOPRENE

Neoprene is principally used as an external seal in refrigeration applications. It is also utilized for oxygen service.

ETHYLENE PROPYLENE

Ethylene propylene is selected for applications which are above the Buna "N" temperature range such as for handling hot water and steam. The upper temperature limit is generally around 350°F., depending on design criteria, pressure, etc. Ethylene propylene has an extremely wide range of fluid compatibility but has the distinct disadvantage that it cannot be used with petroleum-based fluids or fluids so contaminated (such as lubricated air).

VITON*

Viton is a fluoroelastomer which was primarily developed for handling hydrocarbons such as jet fuels, gasolines, solvent, etc., which normally caused detrimental swelling to Buna "N". Viton has a high temperature range similar to ethylene propylene but has the advantage of being somewhat more resistant to "dry heat." Viton has a rather wide range of chemical compatibility.

TEFLON*

Teflon and teflon with fillers are considered more of a plastic than a resilient-type material. They are virtually unattacked by any fluid. Their temperature usage has ranged from discs for cryogenic valves to discs for steam valves. They are not easily fabricated and are known to have "cold flow" characteristics which may contribute to objectionable leakage particularly on gases.

*DuPont Co. trademark.

2 and 3 Way **Red-Hat** Solenoid and Air Operated Valves

Available for Handling Various Fluids

FLUIDS	QUALIFYING SERVICE INFORMATION	MATERIALS OF CONSTRUCTION AND ORDERING INFORMATION (Refer to Price Schedule for availability and prices of Special Features)	SOLENOID VALVES										AIR OPERATED VALVES (Refer to Catalog Pages 96-104)		
			Catalog Page Number Reference shown with Bulletin Numbers												
			2 WAY					3 WAY					Type of Operator		
			8030 Page 17	8040 Page 17	8210 Page 19 Diaphragm Type	8210 Page 19 Piston Type	8215 Page 22 Diaphragm Type	8223 Page 25 Teflon Seat	8261-3 Page 29 Soft Seat	8300 Page 36 Stainless Steel Seat	8316 Brass Body Page 40 Diaphragm Type	8320 Page 45	Low Pressure, and Instrument Air	Pneumatic	
Acetic Acid	Pure liquid (glacial) not as corrosive as diluted.	Stainless steel normally closed valves except with ethylene propylene elastomers. Add suffix "E" to catalog number.	●		●			●						①	
Acetone	Flammable solvent. Not corrosive to most metals.	Standard catalog valves except with ethylene propylene elastomers. Add suffix "E" to catalog number. Teflon* or metal seated valves also used.	●		●			●		●				●	●
Acetylene	Colorless gas. Highly flammable. Used in welding and cutting equipment. If moisture is present, copper, silver, and alloys containing more than 66% copper are not suitable.	Standard catalog aluminum, brass, steel, or stainless steel valves, and specify aluminum shading coil.	●	●	●	●	●	●	●	●	●	●	●	●	●
Air, Lubricated	Most sources of air carry lubrication from pumps and other equipment. Others are directly lubricated in lines.	Standard resilient seated catalog valves.	●	●	●	●	●	●	●	●	●	●	●	●	●
Air (or Gas), Dry, Unlubricated	Used in instrument air applications and telephone lines where moisture and oil cannot be tolerated.	Special constructions required. Refer to Long Life Solenoid Valve Constructions listed on page 74.	●	●	●		●	●						●	●
Alcohols Ethyl Alcohol (Denatured Alcohol)	A grain alcohol commonly used as a solvent. Also used as a radiator antifreeze and rocket fuel.	Standard resilient seated catalog valves.	●		●	●		●	●	●	●	●	●	●	●
Methyl Alcohol (Methanol)	A wood alcohol and flammable. Used in automotive antifreeze, general solvent, aviation and rocket fuel.	Standard catalog constructions; however, where high purity of liquid essential, use stainless steel designs.	●		●			●	●	●	●	●	●	●	●
Ammonia (Anhydrous or Dissociated)	Used in refrigeration and many other applications. Presence of slight trace of water moisture can be harmful to brass.	Stainless steel or steel construction with aluminum shading coil and neoprene elastomers are required. Specify aluminum shading coil.	●		●	●		●	●	●				●	●
Argon	The valves must be free of contaminants when filling incandescent lamps, luminescent tubes, gas thermometers, etc. Also used as an inert shielding gas in welding equipment.	Standard catalog aluminum and brass valves used in connection with welding equipment. Most other applications require stainless steel valves, specially cleaned to avoid contamination.	●	●	●	●	●	●	●	●	●	●	●	●	●
Benzene-Benzol	Coal-tar solvent or additive to motor fuels. Attacks most elastomers.	Standard catalog valves except with Viton* disc and gasket; add suffix "V" to catalog number.				●		●	●	●				●	●
Butane	One of the principal LP gases. Used as fuel for household and other industrial purposes. Also a refrigerant and a propellant in aerosol cans.	Special construction required. See "Propane."													
Carbon Dioxide (Gas or Liquid) (CO ₂)	Used in industrial refrigeration, refrigeration of foods and carbonated beverages. Also, as a fire extinguisher and inert atmosphere in welding equipment.	For gas pressures below 100 psi, use standard valves with Buna "N" discs. Above 100 psi use Bulletin 8264, page 77, specially designed for this service.	●	●	●	●	●	●	●	●	●	●	●	②	②
Carbon Tetrachloride ("Carbona")	Mainly used as a metal degreasing agent. Also used in fire extinguishers. It is a general solvent and dry-cleaning medium. It is toxic and should be handled in well-ventilated areas.	Standard catalog brass valves except with Teflon or Viton discs. Add suffix "T" or "V" to catalog number. Diaphragm valves must be equipped with Viton parts; add suffix "V" to catalog number. Metal seated valves also used.			●	●		●	●	●	●	●	●	●	●
Caustic Soda	See "Sodium Hydroxide."														
Cellulube	One of the phosphate ester lubricating fluids which are fire-resistant.	Standard catalog designs except with ethylene propylene elastomers. Add suffix "E" to catalog number. Teflon or metal seated valves also used.	●		●	●		●	●	●	●	●	●	●	●

● Indicates Valve Constructions Available

Notes: ① Special construction — metal disc holder required.

② Consult your local ASCO office with application details.

*DuPont Co. Trademark.

ASCO

Automatic Switch Co. 50-56 Hanover Road, Florham Park, New Jersey 07932, Tel. (201) 966-2000

FLUIDS	QUALIFYING SERVICE INFORMATION	MATERIALS OF CONSTRUCTION AND ORDERING INFORMATION (Refer to Price Schedule for availability and prices of Special Features)	SOLENOID VALVES										AIR OPERATED VALVES (Refer to Catalog Pages 96-104)		
			Catalog Page Number Reference shown with Bulletin Numbers										Type of Operator		
			2 WAY					3 WAY					Low Pressure and Instrument Air	Pneumatic	
			8030 Page 17	8040 Page 17	8210 Page 19 Diaphragm Type	8210 Page 19 Piston Type	8215 Page 22 Diaphragm Type	8223 Page 25 Teflon Seat	8261-3 Page 29 Soft Seat	8300 Page 36 Stainless Steel Seat	8316 Brass Body Page 40 Diaphragm Type	8320 Page 45			
LP Gas	See "Propane."	Refer to Combustion Section, page 86.												②	②
Liquid Natural Gas, Nitrogen and Oxygen		See Cryogenic Valves, page 73.												②	②
Manufactured Gas	Refined coke oven gas used in city applications.	Refer to Combustion Section, page 86.													
Mercury	Uses: Mercury cells and other electrical apparatus; mercury vapor boilers, lamps, barometers, thermometers, etc.	Use stainless steel body. Valve must be mounted upside down. Special construction required. Consult your local ASCO office with application details.												③	
Methyl Ethyl Ketone (MEK)	Used in lacquers, paint removers, cements and adhesives. It is a flammable liquid.	Standard catalog valves except with ethylene propylene elastomers. Add suffix "E" to catalog number. Teflon or metal seated valves also used.	●		●			●	●	●	●	●	●	●	●
Naphtha	A coal-tar solvent.	Standard resilient seated catalog valves.	●		●	●		●	●	●	●	●	●	●	●
Natural Gas	Common heating fuel.	Refer to Combustion Section, page 86.	●	●	●	●	●		●	●	●	●	●	●	●
Nitric Acid	Normally concentrations are 60% nitric acid and 40% water. This solution and red fuming, which is more than 86% nitric acid, are fairly easily handled with all stainless steel valves. White fuming, which is pure to 97.5% acid, and nitric acid vapors are very difficult to handle.	Stainless steel valves with aluminum shading coil and Teflon disc. (Add suffix "T" to catalog number.) Metal seated valves also used. Maximum temperature at which we can offer valve is 100°F. Specify aluminum shading coil. For white fuming acid, use appropriate ball valve with ASCO pilot.							●	●				②	②
Nitrogen	An inert gas used in heat treating, purging and welding.	Standard resilient seated catalog valves.	●	●	●	●	●	●	●		●	●	●	●	●
Oils, Lubricating or Motor	Common motor oils known as SAE oils and synthetic lube oils, etc.	Standard catalog valves for 300 SSU maximum. For higher SSU consult your local ASCO office. For compressor service involving refrigerants consult your local ASCO office for elastomer selection.	●		●	●		●	●	●	●	●	●	●	●
Oxygen, Gas	Used in conjunction with various fuels in furnaces, ovens, cutting torches, and welding and heat treating. A non-flammable gas, but contact with hydrocarbons will result in spontaneous combustion.	Metal body valves with Viton or neoprene elastomers specially cleaned to avoid contamination with hydrocarbons.	●	●	●	●	●		●		●	●	①	①	
Perchloroethylene ("Perk")	Same as tetrachloroethylene. Used as a dry-cleaning solvent and in vapor degreasing equipment.	Standard catalog items except with Viton elastomers. Add suffix "V" to catalog number. Special piston valves available. Do not use diaphragm valves. Consult your local ASCO office.	●			●		●	●					②	②
Phosphoric Acid	Used in pickling and rust-proofing metals, soft drinks, and flavoring syrups, as well as pharmaceuticals.	Use appropriate ball valve with ASCO 4 way auxiliary air pilot valve.													
Photographic Solutions	Also known as sodium thiosulfate or hypo. Most metals corrode sufficiently to cause solution contamination.	For low pressure and small flow refer to Shielded Core Valves, page 76.													
Potassium Sulfate	Used in fertilizers. Also in alum and glass manufacturing.	Standard stainless steel catalog valves.	●		●	●		●	●	●	●	●	●	●	●
Propane Gas	One of the principal LP gases commonly used in grain dryer applications and as bottled gas for heating and cooking.	Special construction required. Refer to Combustion Section, page 86.												②	②
"Pydraul" ("Monsanto")	A trademark for a series of fire-resistant hydraulic fluids. Used in automatic welding machines, hydraulic presses and air compressors. Also used in die-casting machines and forging and extrusion presses.	Standard catalog items except with Viton elastomers. Add suffix "V" to catalog number. Teflon or metal seated valves also used.	●		●	●		●	●	●	●	●	●	●	●
"Skydrol"	Trademark for fire-resistant jet aircraft hydraulic fluid.	Standard catalog items except with ethylene propylene elastomer. Add suffix "E" to catalog number. Teflon or metal seated valves also used.	●		●	●		●	●	●	●	●	●	●	●

● Indicates Valve Constructions Available

Notes: ① Special construction — metal disc holder required.

② Consult your local ASCO office with application details.



Automatic Switch Co. 50-56 Hanover Road, Florham Park, New Jersey 07932, Tel. (201) 966-2000

FLUIDS	QUALIFYING SERVICE INFORMATION	MATERIALS OF CONSTRUCTION AND ORDERING INFORMATION (Refer to Price Schedule for availability and prices of Special Features)	SOLENOID VALVES Catalog Page Number Reference shown with Bulletin Numbers										AIR OPERATED VALVES (Refer to Catalog Pages 96-104)	
			2 WAY					3 WAY					Type of Operator	
			8030 Page 17	8040 Page 17	8210 Page 19 Diaphragm Type	8210 Page 19 Piston Type	8215 Page 22 Diaphragm Type	8223 Page 25 Teflon Seat	8251-3 Page 29 Soft Seat	8300 Page 36 Stainless Steel Seat	8316 Brass Body Page 40 Diaphragm Type	8320 Page 45	Low Pressure and Instrument Air	Pneumatic
Sodium Hydroxide (Caustic Soda)	Used in pulp and paper industry. Included in detergents and soap. Also in textile processing. Solutions range between 50% and 73% commercial.	Stainless steel valves except with ethylene propylene disc or diaphragm. Add suffix "E" to catalog number. Stainless steel or Teflon seated valves also used.	●			●		●	●	●			●	
Sour Gas	See "Coke Oven Gas."													
Steam Condensate	This is return condensate from steam boilers which has various degrees of dissolved carbon dioxide or oxygen. Temperature is normally high to boiling point.	Brass valves suitable except with ethylene propylene elastomers. See Bulletins 8210 and 8222 Hot Water Service Listings. (Use suffix "E" on all others.)	●		●	●		●	●	●			①	①
Stoddard Solvent	This is a dry-cleaning solvent of usually high purity naphtha, clear and free of undissolved water. A coal-tar solvent.	Standard catalog items.	●		●			●	●	●	●	●	●	●
Sulfuric Acid		Use an appropriate ball valve with ASCO 4 way auxiliary air pilot valve. For low pressure and small flow refer to Shielded Core Valves, page 76.												
Toluene (Toluol)	One of the coal-tar solvents. Used in aviation and high octane gasolines. Also a solvent for paints, coatings, resins, etc. It is a flammable liquid.	Standard catalog valves except with Viton disc and gasket; add suffix "V" to catalog number.						●	●	●			②	②
Trichloroethylene ("Carbona")	Common degreasing solvent, non-combustible, but very toxic. Requires adequate ventilation.	Standard brass catalog valves, if dry, except use Viton elastomers (add suffix "V" to catalog number). If moisture is present, use stainless steel. Metal and Teflon seated valves also used.	●		●	●		●	●	●	●	●	●	●
Turpentine	Solvent or thinner for paints, varnishes and lacquers. Also, a rubber solvent and reclaiming agent. The liquid is volatile.	Standard resilient seated catalog valves.	●		●	●		●	●	●	●	●	●	●
Vacuum		See Vacuum Valves, page 72.											②	②
Vegetable Oils	Edible oils extracted from seeds, fruits, or plants, such as peanut oils, cottonseed oils, etc.	Standard resilient seated catalog valves.	●		●	●		●	●	●	●	●	●	●
Vinegar	A dilute impure solution of acetic acid.	Stainless steel valves except with ethylene propylene elastomers. Add suffix "E" to catalog number.	●		●	●		●					●	
Water, Boiler Feed	Commonly treated water with inhibitors to avoid corrosion of boiler tubes.	Standard stainless steel catalog valves.	●		●	●		●	●	●	●	●	●	●
Water, Distilled or Deionized	A purified water, sometimes called deionized water, neutral and free from contaminants.	Stainless steel valves except with ethylene propylene elastomers. Add suffix "E" to catalog number. Teflon and metal seated valves also used.	●		●	●		●	●	●	●	●	●	●
Water, Fresh		Standard resilient seated catalog valves. However, aerated water which is slightly acidic will cause seat erosion by process known as dezincification. Stainless steel or plastic valves should then be selected.	●		●	●		●	●	●	●	●	●	●
Water, High Pressure	When handling water to, generally, above 500 psi, erosion and water hammer must be considered.	Special designs for car wash applications, etc. Consult your local ASCO office.				●		●					②	②
Water, Hot	Water above 200°F. often flashes to steam due to regulators or other line restrictions. Below 200°F., this change of state is unlikely.	Standard catalog designs suitable to temperatures listed in catalog. Also see Bulletins 8210 and 8222 Hot Water Service Listings. For temperatures exceeding those listed, consult your local ASCO office.	●		●	●		●	●	●	●	●	①	①
Water, Sea, Brine, Brackish	Difficult to handle due to galvanic corrosion.	Use appropriate ball valve with ASCO air pilot valve.											②	②

● Indicates Valve Constructions Available

Notes: ① Special construction — metal disc holder required.

② Consult your local ASCO office with application details.

2 WAY SOLENOID VALVES • INDEX

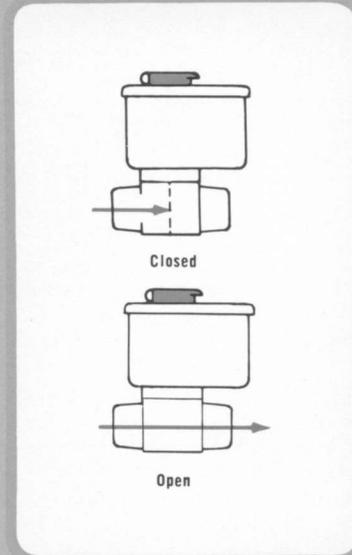
The solenoid valves listed in this section are the 2 way type with one inlet and one outlet connection. They are available in normally closed construction (closed when the coil is de-energized) and normally open construction (open when the coil is de-energized).

A variety of body materials is available to choose from, such as forged and bar stock brass, steel, stainless steel, aluminum and plastic. Valves are normally supplied with a Type 1 General Purpose Solenoid Enclosure having a 7/8" diameter hole for 1/2" conduit connection. Combination Watertight and Explosion-Proof Solenoid Enclosures conforming to Types 4 and 7 (C and D) standards, which also meet Types 3 and 9 (E, F and G), except where noted, are available.

Many optional features, such as high temperature molded coils, manual operators, metering devices, junction boxes, strain-relief connectors, etc., are available. Refer to the Optional Feature Section for details.

The table below gives, in condensed form, an indication of the pipe sizes, body materials, and general data for valves listed in this 2 way valve section.

Additional 2 way valves are listed in specialized sections of the catalog, i.e., Combustion, Air Operated, Manual Reset, Special Purpose. Consult the Title Index for the page reference.



INDEX

Pipe Size Range (ins.)	General Valve Description	Body Material	Bulletin Number	Page Number
1/8	Sub-Miniature	Brass, Stainless Steel	8225	26
1/8-3/8	Midget Size	Brass, Stainless Steel	8261, 8262, 8263	29-33
1/8-3/4	Low Pressure Valves	Brass, Aluminum, Stainless Steel	8030, 8031, 8040, 8041	17-18
1/4 and 3/8	Air, Water and Food Products	Plastic	8260	27-28
1/4-3/4	High Pressure Valves	Brass, Stainless Steel	8223	25
1/4-1 1/2	Steam Valves	Brass, Stainless Steel	8220, 8222	23-24
3/8-3/4	Straight-Thru Flow Steam Valves	Brass	8267	34
1/4-3	Air, Inert Gas, Water and Light Oil	Brass, Nylon, Stainless Steel	8210, 8211	19-21
3/8-3	Air, Gas	Aluminum	8215	22

LOW PRESSURE 2 Way Solenoid Valves

Brass, Aluminum or Stainless Steel Body • 1/8" to 3/4" N.P.T.

ASCO® Red-Hat®
BULLETINS
8030, 8031
8040, 8041

General Description

These direct lift solenoid valves are provided with Buna "N" discs for tight shut-off on low pressure service.

Important: No minimum operating pressure required.

Applications

These valves are used in a variety of low pressure applications, including:

- dispensing
- collating
- low vacuum systems (Refer to complete listing of vacuum valves in this catalog.)

IMPORTANT: For shut-off and vent valves for fuel gas service refer to Combustion Section.

Specifications

Operation: Two types available:

- (a) Normally Closed (open when energized, closed when de-energized).
- (b) Normally Open (closed when energized, open when de-energized).

Valve Parts in Contact with Fluid:

Body — Brass, 18-8 s.s., or Die-Cast Aluminum, as listed.

Seals and Disc — Buna "N."

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Spring — 302 s.s.

Shading Coil — Copper (brass and aluminum bodies); Silver (stainless steel body).

Normally Open Valves — Normally open valves also contain a nylon stem and a zinc plated steel bonnet.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

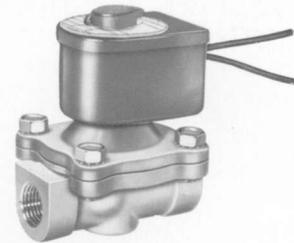
(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.



Coil: Continuous Duty Molded Class A, B or F, as listed.

Temperature:

Fluid: To 200°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

Approvals: CSA certified. UL listed as indicated below. Refer to Engineering Section for details and coding explanation.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)				Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water				Catalog Number	Constr. Ref. No.	UL Listing	Catalog Number	AC	DC	
			AC	DC	AC	DC	AC	DC							
NORMALLY CLOSED OPERATION, Brass Body for General Service															
1/4	1/4	1.3	5	—	5	—	180	—	803038	12	○	—	6.5/B	—	
3/8	1/4	1.3	5	—	5	—	180	—	803039	12	○	—	6.5/B	—	
	3/8	1.8	7	3	5	3	180	120	8030B10	1	○	8031B10	6/A	9.7/A	
1/2	3/8	1.8	15	3.5	15	3.5	180	150	8030B13	2	○	8031B13	10.5/A	11.2/A	
	7/16	2.8	4	—	6	—	180	—	8030A16	3	○	8031A16	6/A	—	
3/4	7/16	2.8	15	6	15	6	200	180	8030A17	4	○	8031A17	15.4/A	16.8/A	
	3/4	5.0	2	1	2	1	180	150	8030B3	9	○	8031B3	10.5/A	11.2/A	
3/4	3/4	5.0	4	—	4	—	180	—	8030B43	9	○	8031B43	16.7/F	—	
	NORMALLY OPEN OPERATION, Brass Body for General Service														
3/8	3/8	1.6	15	2.4	15	2	200	180	8030A70	5	●	8031A70	15.4/A	16.8/A	
1/2	7/16	2.2	15	2.5	15	2	200	180	8030A71	6	●	8031A71	20/F	16.8/A	
	3/4	5.0	2	—	2	—	180	—	8030B82	7	●	8031B82	10.5/A	—	
3/4	3/4	5.5	2	—	2	—	180	—	8030B83	8	●	8031B83	10.5/A	—	
NORMALLY CLOSED OPERATION, Stainless Steel Body for Corrosive Service															
3/8	3/8	1.8	7	3	5	3	180	120	8030A64	1	○	8031A64	6/A	9.7/A	
	3/8	1.8	15	3.5	15	3.5	180	150	8030B65	2	○	8031B65	10.5/A	11.2/A	
1/2	7/16	2.8	4	—	6	—	180	—	8030A66	3	○	8031A66	6/A	—	
	7/16	2.8	15	6	15	6	200	180	8030A67	4	○	8031A67	15.4/A	16.8/A	
3/4	5/8	5.4	2.5	—	2.5	—	180	—	8030C63	10	○	8031C63	10.5/A	—	
NORMALLY CLOSED OPERATION, Aluminum Body^① for Low Pressure Air-Inert Gas Service															
1/8	3/8	1.0	15	—	—	—	125	—	8040B6	11	○	—	6/A	—	
1/4	3/8	1.1	15	—	—	—	125	—	8040B7	11	○	—	6/A	—	
3/8	3/8	1.2	15	—	—	—	125	—	8040B8	11	○	—	6/A	—	
	3/4	3.9	2	—	—	—	104	—	8040A21	13	○	8041A21	11.8/A	—	
1/2	3/4	5.4	2	—	—	—	104	—	8040A22	13	○	8041A22	11.8/A	—	
3/4	3/4	9.5	2	—	—	—	104	—	8040A23	13	○	8041A23	11.8/A	—	

Note: ① Larger sized aluminum body valves available, refer to Bulletin 8215.

Printed in U.S.A.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	35.6	96-619	103-832
B	—	6.5	9.2	17.3	204-945	—
A	11.2	10.5	21	40	27-462	27-463
A	16.8	15.4	27	47.4	96-817	96-671
F	—	16.7	33	67	64-982	—
F	—	20	43	240	99-257	—
A	—	11.8	21.7	55.2	27-462	—

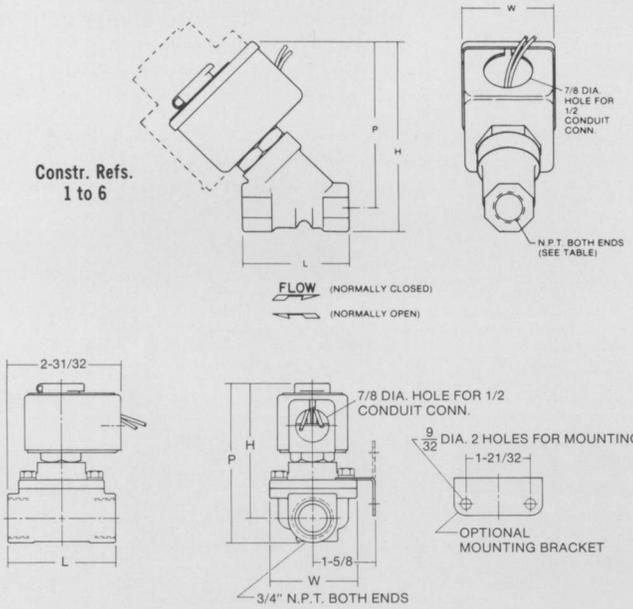
OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

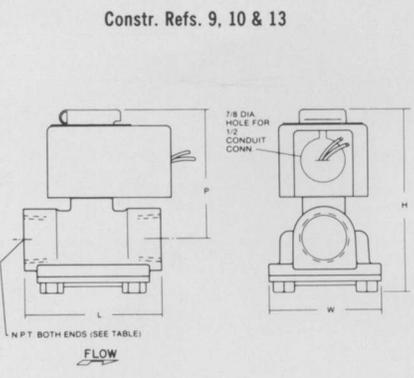
ORDERING INFORMATION
IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in, details available on request.)

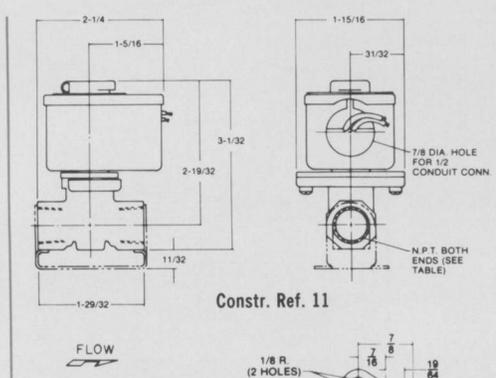


Constr. Ref.	Pipe Size	H	L	P	W	Constr.
1	3/8	3 19/32	1 29/32	3 5/32	1 21/32	Normally Closed
2	3/8	3 29/32	1 29/32	3 5/32	1 3/16	
3	1/2	3 7/8	2 9/32	3 11/32	1 21/32	
4	1/2	4 1/8	2 9/32	3 9/16	2 7/32	Normally Open
5	3/8	4 3/16	1 29/32	3 3/4	2 7/32	
6	1/2	4 11/32	2 9/32	3 13/16	2 7/32	
7	1/2	3 31/32	2 13/16	2 15/16	2 5/16	Normally Closed
8	3/4	3 31/32	2 13/16	2 15/16	2 5/16	
9	3/4	4 1/8	2 13/16	3 15/32	2 5/16	
10	3/4	4 7/32	2 13/16	3 15/32	2 5/16	Normally Closed
13	3/8 and 1/2	4 3/32	2 3/4	3 1/2	2 3/8	
	3/4	4 1/2	3 5/16	3 11/16	2 11/32	



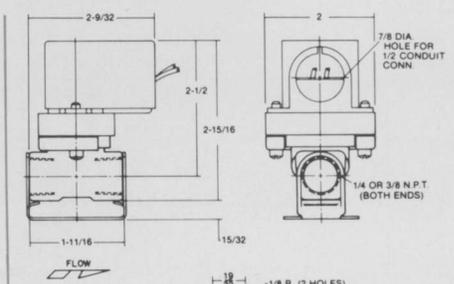
Constr. Refs. 9, 10 & 13

Constr. Refs. 7 & 8



Constr. Ref. 11

Bottom View of Mounting Bracket for Constr. Ref. 11



Constr. Ref. 12



2 Way Solenoid Valves

Normally Closed and Normally Open Operation
Brass, Stainless Steel and Nylon Bodies • 1/4" to 3" N.P.T.

ASCO® Red-Hat
BULLETINS
8210, 8211

General Description

These valves provide long trouble-free life on general service applications. A broad selection of body materials and operating pressures is available.

Applications

These dependable 2 way valves are used in:

- pumps
- spraying
- cooling
- air dryers
- pollution controls
- laundry equipment
- irrigation
- compressors
- dishwashers
- water treatment

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy-duty operation • clickless and quiet (no AC hum) operation. Refer to Long Life Construction.

Specifications

Operation: Two types available:

- (a) Normally Closed — valves closed when de-energized, open when energized.
- (b) Normally Open — valves closed when energized, open when de-energized.

Valve Parts in Contact with Fluid:

Body — Brass, Stainless Steel (Series 300), Nylon or Bronze, as listed.

Seals and Discs — Buna "N," Teflon* or Ethylene Propylene, as listed.

Disc Holder — Nylon, as listed.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper (brass and nylon body); Silver (stainless steel body).

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

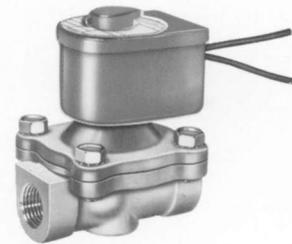
Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

*DuPont Co. trademark.



Coil: Continuous Duty Molded Class A, B, F and H, as listed.

Temperature:

Fluid: To 210°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Tables for envelope size and mounting.

Attitude: Valves may be mounted in any position except as noted in Dimensions Table.

Approvals: UL listed and CSA certified, as indicated. Refer to Engineering Section for details and coding explanation.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)										Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Minimum	Maximum						Maximum Fluid Temp. °F.		Catalog Number	Constr. Ref. No. ②	UL Listing	Catalog Number	UL Listing	AC	DC	
				Air-Inert Gas		Water		Light Oil @ 300 SSU											AC
NORMALLY CLOSED OPERATION, Forged Brass Body, Buna "N" or Teflon® Seating for General Service																			
1/4	5/16	1.2	5	125	—	120	—	—	—	—	180	—	8210B20	3D	•	—	—	6.5/B	—
3/8	1/4	1.2	5	125	—	125	—	—	—	—	180	—	8210B21	3D	•	—	—	6.5/B	—
	3/8	1.5	①	125	40	125	40	—	—	—	180	150	8210C73⑥	1P	•	8211C73⑥	•	6/A	11.2/A
	5/8	3	0	100	40	100	40	—	—	—	180	150	8210C93	5D	○	8211C93	○	11/A	11.2/A
	5/8	3	5	200	125	135	100	135	100	180	150	8210D1	6D	○	8211D1	○	6/A	11.2/A	
1/2	3/8	3	5	300	—	300	—	300	—	—	175	—	8210C6	5D	○	8211C6	○	16.7/F	—
	7/16	2.2	①	125	40	125	40	—	—	—	180	150	8210A15	2P	•	8211A15	•	6/A	11.2/A
	5/8	4	5	200	125	135	100	135	100	180	150	8210D2	6D	○	8211D2	○	6/A	11.2/A	
	5/8	4	0	100	40	100	40	—	—	—	180	150	8210C94	5D	○	8211C94	○	11/A	11.2/A
3/4	5/8	4	5	300	—	300	—	300	—	—	175	—	8210C7	5D	○	8211C7	○	16.7/F	—
	3/4	5	0	100	40	100	40	—	—	—	180	150	8210D95	8D	○	8211D95	○	11/A	11.2/A
	3/4	5	5	125	100	125	90	125	75	180	150	8210D9	9D	○	8211D9	○	6/A	11.2/A	
	3/4	6	0	350	200	300	180	200	180	200	77	8210B26⑧	10P	⑤	8211B26⑧	⑤	15.4/A	30.6/H	
1	3/4	6.5	5	250	125	150	125	100	125	180	150	8210D3	11D	○	8211D3	○	6/A	11.2/A	
	1	13	5	125	125	125	125	100	125	180	150	8210D4	12D	○	8211D4	○	6/A	11.2/A	
	1	13.5	10	300	225	300	200	300	200	200	180	8210B78⑧	13P	⑤	8211B78⑧	⑤	16.7/F	16.8/A	
	1	13.5	0	300	—	225	—	115	—	200	—	8210B27	14P	•	8211B27	•	20/F	—	
1 1/4	1	13	0	125	100	125	100	125	80	180	77	8210B54	31D	⑤	8211B54	⑤	15.4/A	30.6/H	
	1 1/8	15	5	125	125	125	125	100	125	180	150	8210D8	16D	○	8211D8	○	6/A	11.2/A	
	1 1/8	15	10	300	225	300	200	300	200	200	180	8210B80⑧	17P	—	8211B80⑧	—	16.7/F	16.8/A	
	1 1/8	15	0	125	100	125	100	125	80	180	77	8210B55	32D	⑤	8211B55	⑤	15.4/A	30.6/H	
1 1/2	1 1/4	22.5	5	125	125	125	125	100	125	180	150	8210D22	18D	○	8211D22	○	6/A	11.2/A	
	1 1/4	22.5	10	300	225	300	200	300	200	200	180	8210B82⑧	19P	—	8211B82⑧	—	16.7/F	16.8/A	
	1 1/4	22.5	0	125	100	125	100	125	80	180	77	8210B56	33D	⑤	8211B56	⑤	15.4/A	30.6/H	
2	1 3/4	43	5	125	50	125	50	90	50	180	150	8210I100	20P	—	8211I100	—	6/A	11.2/A	
2 1/2	1 3/4	45	5	125	50	125	50	90	50	180	150	8210I01	21P	—	8211I01	—	6/A	11.2/A	
3	3	101	10	250	—	250	—	250	—	200	—	8210B51③	22P	—	8211B51③⑤	—	28/H	—	

(Watertight a

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)									Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/ Class of Coil Insulation	
			Minimum	Maximum						Maximum Fluid Temp. °F.		Catalog Number	Constr. Ref. No. ②	UL Listing	Catalog Number	UL Listing	AC	DC
				Air-Inert Gas		Water		Light Oil @ 300 SSU		AC	DC							
				AC	DC	AC	DC	AC	DC									
NORMALLY OPEN OPERATION, ① Forged Brass Body, Buna "N" Seating for General Service																		
3/8	5/8	3	0	125	125	125	125	125	80	180	150	8210C33	23D	•	8211C33	•	10.5/A	11.2/A
1/2	5/8	4	0	125	125	125	125	125	80	180	150	8210C34	23D	•	8211C34	•	10.5/A	11.2/A
3/4	3/4	5.5	0	125	125	125	125	125	80	180	150	8210C35	25D	•	8211C35	•	10.5/A	11.2/A
		6.6	5	250	250	200	200	200	200	180	180	8210C13	24D	•	8211C13	•	15.4/A	16.8/A
1	1	13	0	125	—	125	—	125	—	180	—	8210B57	34D	•	—	—	20/F	—
		13	5	125	125	125	125	125	125	180	180	8210D14	26D	⑤	8211D14	—	15.4/A	16.8/A
1 1/4	1 1/8	15	0	125	—	125	—	125	—	180	—	8210B58	35D	•	—	—	20/F	—
		15	5	125	125	125	125	125	125	180	180	8210D18	28D	—	8211D18	—	15.4/A	16.8/A
1 1/2	1 1/4	22.5	0	125	—	125	—	125	—	180	—	8210B59	36D	•	—	—	20/F	—
		22.5	5	125	125	125	125	125	125	180	180	8210D32	29D	—	8211D32	—	15.4/A	16.8/A
2	1 3/4	43	5	125	125	125	125	125	125	180	150	8210I03	30P	—	8211I03	—	15.4/A	16.8/A
2 1/2	1 3/4	45	5	125	125	125	125	125	125	180	150	8210I04	27P	—	8211I04	—	15.4/A	16.8/A

NORMALLY CLOSED OPERATION, Forged Brass Body, Ethylene Propylene Diaphragm for Hot Water Service																		
3/8	5/8	3	5	—	—	125	100	—	—	210	150	8210D1HW	6D	⑤	8211D1HW	—	6/A	11.2/F
			④	—	—	100	40	—	—	210	150	8210C93HW	5D	⑤	8211C93HW	⑤	11/A	11.2/F
1/2	5/8	4	5	—	—	125	100	—	—	210	150	8210D2HW	6D	⑤	8211D2HW	—	6/A	11.2/F
			④	—	—	100	40	—	—	210	150	8210C94HW	5D	⑤	8211C94HW	⑤	11/A	11.2/F
3/4	3/4	5	5	—	—	125	100	—	—	210	150	8210D9HW	9D	⑤	8211D9HW	—	6/A	11.2/F
			④	—	—	100	40	—	—	210	150	8210D95HW	8D	⑤	8211D95HW	⑤	11/A	11.2/F

NORMALLY CLOSED OPERATION, Nylon Body, Buna "N" Diaphragm for General Service																		
3/8" O.D. Compression	5/16	1.2	5	125	—	125	—	—	—	130	—	8210B10	4D	•	—	—	6.5/B	—

NORMALLY CLOSED OPERATION, Stainless Steel Body, Buna "N" Diaphragm for Corrosive Liquids and Gases																		
3/8	3/8	1.5	①	125	40	125	40	—	—	180	150	8210A36⑥	1P	•	8211A36⑥	•	6/A	11.2/A
1/2	7/16	2.2	①	125	40	125	40	—	—	180	150	8210A37⑥	2P	•	8211A37⑥	•	6/A	11.2/A
			4	0	125	40	125	40	125	—	175	150	8210C87	7D	•	8211C87	•	16.7/F	11.2/A
3/4	5/8	4.5	0	125	40	125	40	125	—	175	150	8210C88	7D	•	8211C88	•	16.7/F	11.2/A
1	1	11.2	0	125	100	125	100	125	80	180	77	8210D89	15D	⑤	8211D89	⑤	15.4/A	30.6/H

NORMALLY OPEN OPERATION, Stainless Steel Body, Buna "N" Diaphragm for Corrosive Liquids and Gases																		
1/2	5/8	3	0	125	125	125	125	100	80	180	150	8210B30	37D	•	8211B30	—	10.5/A	11.2/A
3/4	5/8	3	0	125	125	125	125	100	80	180	150	8210B38	38D	•	8211B38	—	10.5/A	11.2/A

- Notes:** ① 5 psi on air and inert gas; 1 psi on water. ② Letter "D" denotes diaphragm construction; "P" denotes piston construction. ③ Main valve has bronze body. ④ "0" psi on AC construction, 1/4 psi on DC. ⑤ UL listed as General Purpose Valve on AC voltage only. ⑥ Valve includes Ryton (Phillips Petroleum trademark) piston. ⑦ Valve includes nylon disc holder, except 8210B57, 8210B58, 8210B59. ⑧ Valves provided with Teflon main seat. ⑨ Suitable for Types 4 and 7 (C and D) only and has a temperature range code T2B.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	6	15.6	34	96-619	27-463
F	11.2	—	—	—	—	66-611
A	16.8	10.5 & 11	23	55	27-462	96-671
H	30.6	—	—	—	—	74-073
A	—	15.4	23.6	70	96-817	—
F	—	16.7	35	78	64-982	—
F	—	20	43	240	99-257	—
H	—	28	57	250	222-345	—
B	—	6.5	9.2	17.3	204-945	—

OPTIONAL FEATURES

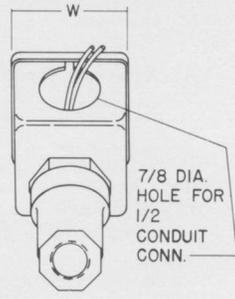
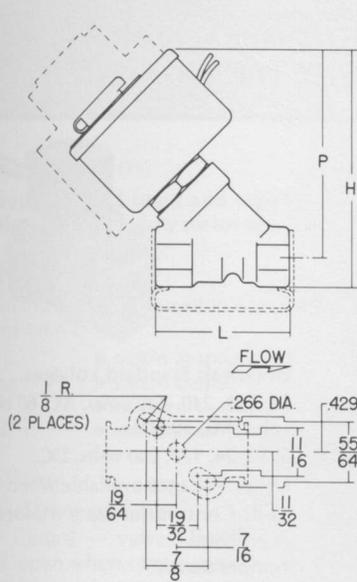
Many optional electrical and construction features are available, refer to Optional Feature Section

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Details available on request.)

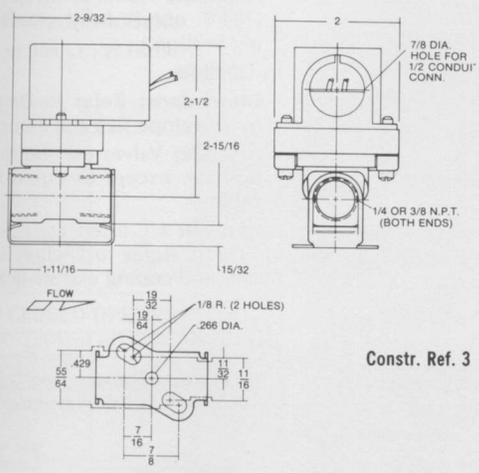


Mounting Bracket Available — refer to Price Schedule.

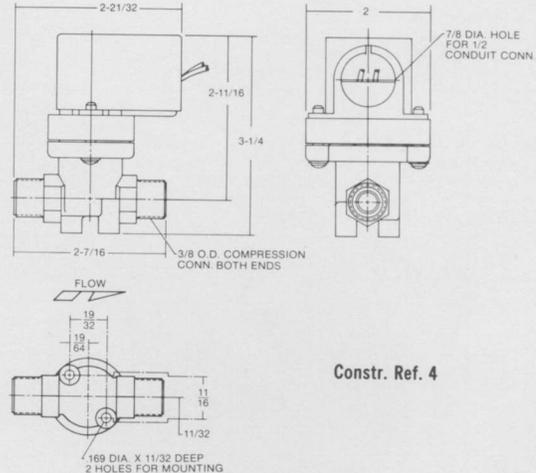
Constr. Ref.	H	L	P	W
1*	3 ¹⁵ / ₁₆	1 ²⁹ / ₃₂	3 ¹ / ₂	1 ¹³ / ₁₆
2*	3 ²⁹ / ₃₂	2 ⁹ / ₃₂	3 ³ / ₈	1 ²¹ / ₃₂

*DC dimensions slightly larger.

Constr. Refs. 1 and 2

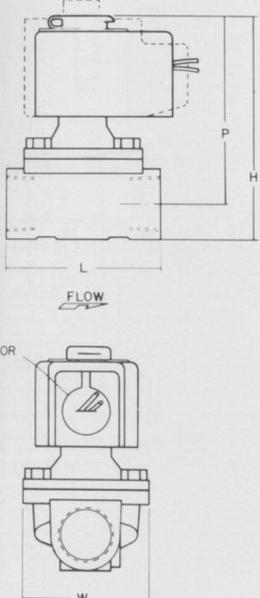


Constr. Ref. 3



Constr. Ref. 4

Constr. Refs. 5 to 38



Constr. Ref.	H	L	P	W
5	3 ²⁹ / ₃₂	2 ³ / ₄	3 ¹¹ / ₃₂	2 ⁹ / ₁₆
6*	3 ¹³ / ₃₂	2 ³ / ₄	2 ²⁷ / ₃₂	2 ⁹ / ₁₆
7	4 ⁷ / ₃₂	2 ¹³ / ₁₆	3 ¹ / ₂	2 ¹³ / ₃₂
8	4 ⁵ / ₃₂	2 ¹³ / ₁₆	3 ¹ / ₂	2 ⁹ / ₁₆
9*	3 ⁵ / ₈	2 ¹³ / ₁₆	3	2 ⁹ / ₁₆
10*#	5 ¹ / ₄	2 ¹³ / ₁₆	4 ¹⁹ / ₃₂	2 ⁹ / ₁₆
11*	4 ⁵ / ₃₂	3 ²⁵ / ₃₂	3 ¹⁷ / ₃₂	2 ³ / ₄
12*	5 ⁵ / ₈	3 ³ / ₄	4	2 ¹⁵ / ₁₆
13*	5 ⁷ / ₈	3 ³ / ₄	4 ¹ / ₄	4 ¹ / ₄
14#	6 ¹⁷ / ₃₂	3 ¹⁵ / ₁₆	5 ²³ / ₃₂	3 ¹ / ₄
15*	6 ³ / ₃₂	3 ³ / ₄	5 ⁷ / ₃₂	3 ²⁷ / ₃₂
16*	5 ⁵ / ₈	3 ²¹ / ₃₂	4	3 ³ / ₈
17*	5 ⁷ / ₈	3 ²¹ / ₃₂	4 ¹ / ₄	4 ¹¹ / ₁₆
18*	6 ¹ / ₈	4 ³ / ₈	4 ⁵ / ₃₂	3 ³ / ₄
19*	6 ³ / ₈	4 ³ / ₈	4 ¹³ / ₃₂	5 ¹⁹ / ₃₂
20*	7 ⁷ / ₁₆	5 ¹ / ₁₆	4 ⁹ / ₁₆	4 ¹¹ / ₁₆
21*	7 ⁵ / ₁₆	5 ¹ / ₂	4 ⁹ / ₁₆	5 ³ / ₁₆

Constr. Ref.	H	L	P	W
22#	13 ⁷ / ₈	10 ¹ / ₂	10 ⁵ / ₃₂	8 ¹⁵ / ₁₆
23	4 ¹³ / ₃₂	2 ³ / ₄	3 ²⁷ / ₃₂	2 ⁹ / ₃₂
24	5 ¹ / ₁₆	3 ²⁵ / ₃₂	4 ⁷ / ₁₆	2 ⁹ / ₄
25	4 ⁵ / ₈	2 ¹³ / ₁₆	4	2 ⁹ / ₃₂
26	6 ¹⁷ / ₃₂	3 ³ / ₄	4 ²⁹ / ₃₂	2 ¹⁵ / ₁₆
27	8 ⁷ / ₃₂	5 ¹ / ₂	5 ¹⁵ / ₃₂	5 ³ / ₁₆
28	6 ¹⁷ / ₃₂	3 ²¹ / ₃₂	4 ²⁹ / ₃₂	3 ³ / ₈
29	7 ¹ / ₃₂	4 ³ / ₈	5 ¹ / ₁₆	3 ³ / ₄
30	8 ⁷ / ₃₂	5 ¹ / ₁₆	5 ¹⁵ / ₃₂	4 ¹¹ / ₁₆
31*	5 ¹ / ₄	3 ³ / ₄	4 ⁷ / ₁₆	3 ¹ / ₄
32*	5 ¹¹ / ₁₆	3 ²¹ / ₃₂	4 ¹¹ / ₁₆	3 ¹ / ₄
33*	6 ¹ / ₁₆	4 ³ / ₈	4 ¹⁵ / ₁₆	3 ²⁹ / ₃₂
34#	6 ²⁹ / ₃₂	3 ³ / ₄	6 ³ / ₃₂	3 ¹ / ₄
35#	7 ¹¹ / ₃₂	3 ²¹ / ₃₂	6 ¹¹ / ₃₂	3 ¹ / ₄
36#	7 ²¹ / ₃₂	4 ³ / ₈	6 ⁹ / ₁₆	3 ²⁹ / ₃₂
37	4 ¹¹ / ₁₆	2 ¹³ / ₁₆	3 ³¹ / ₃₂	2 ¹³ / ₃₂
38	4 ¹¹ / ₁₆	2 ¹³ / ₁₆	3 ³¹ / ₃₂	2 ¹³ / ₃₂

*DC dimensions slightly larger.

All valves mountable in any position without affecting operation, except construction noted # which must be mounted with solenoid vertical and upright.

HIGH FLOW 2 Way Solenoid Valves

Normally Closed and Normally Open Operation
Aluminum Body • 3/8" to 3" N.P.T.

General Description

These aluminum bodied valves are designed to provide maximized flow for the size of the valve.

Applications

Bulletin 8215 valves are used in a variety of applications including:

- pollution control
- air dryers
- combustion systems
- low vacuum
- collating

IMPORTANT: Shut-off and vent valves available for fuel gas service, refer to Combustion Section.

Specifications

Operation: Two types available:

- (a) Normally Closed — valve is closed when coil is de-energized, open when energized.
- (b) Normally Open — valve is open when coil is de-energized, closed when energized.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)				Maximum Fluid and Ambient Temp. °F.		Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Minimum	Maximum		Catalog Number			Constr. Ref. No.	UL Listing	Catalog Number	UL Listing	AC	DC	
				Air-Fuel Gas	AC		DC	AC							DC
NORMALLY CLOSED OPERATION															
3/8	3/4	3.5	5	125	125	77	77	8215C1①	1	○	8215C12①	○	6/A	11.2/A	
	3/4	3.4	0	50	25	104	—	8215C10	2	○	8215C11	○	11.8/A	11.2/A	
1/2	3/4	4.4	0	50	25	104	—	8215C20	2	○	8215C21	○	11.8/A	11.2/A	
	3/4	4.8	5	125	125	77	77	8215C2①	1	○	8215C22①	○	6/A	11.2/A	
3/4	3/4	5.1	5	125	125	77	77	8215C3①	3	○	8215C32①	○	6/A	11.2/A	
	3/4	5.1	0	50	25	104	—	8215C30	4	○	8215C31	○	11.8/A	11.2/A	
	1 1/32	8.4	0	50	25	104	—	821535	5	○	821536	○	11.8/A	11.2/A	
1	1 1/8	21	0	25	25	104	—	8215B50	6	○	8215B51	○	15.4/A	14.9/B	
1 1/4	1 1/8	32	0	25	25	104	—	8215B60	6	○	8215B61	○	15.4/A	14.9/B	
1 1/2	1 1/8	35	0	25	25	104	—	8215B70	6	○	8215B71	○	15.4/A	14.9/B	
2	2 3/32	60	0	25	15	104	—	8215B80	7	○	8215B81	○	15.4/A	14.9/B	
2 1/2	3	117	0	5	—	104	—	8215A90	8	○	8215A91②	—	28.2/A	—	
3	3	138	0	5	—	104	—	8215A40	8	○	8215A41②	—	28.2/A	—	
NORMALLY OPEN OPERATION															
3/8	3/4	3.2	0	125	125	104	—	8215A13	9	●	8215A14	●	10.5/A	11.2/A	
1/2	3/4	4.0	0	125	125	104	—	8215A23	9	●	8215A24	●	10.5/A	11.2/A	
3/4	3/4	4.6	0	125	125	104	—	8215A33	10	●	8215A34	●	10.5/A	11.2/A	
	1 1/32	8.7	0	25	25	104	—	8215A37	11	●	8215A38	●	15.4/A	14.9/B	
1	1 1/8	22	0	25	15	104	—	8215C53	12	●	8215C54	●	15.4/A	14.9/B	
1 1/4	1 1/8	33	0	25	15	104	—	8215C63	12	●	8215C64	●	15.4/A	14.9/B	
1 1/2	1 1/8	37	0	25	15	104	—	8215C73	13	●	8215C74	●	15.4/A	14.9/B	
2	2 3/32	58	0	25	15	104	—	8215C83	14	●	8215C84	●	15.4/A	14.9/B	
2 1/2	3	117	0	5	—	104	—	8215B93	15	●	8215B94②	—	28.2/A	—	

Notes: ① Do not use for Fuel Gas.

② Suitable for Types 4 and 7 (C and D) only and have a temperature range code T2B. Refer to Engineering Section for details.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	10.5 & 11.8	23	55	27-462	27-463
B	14.9	—	—	—	—	62-691
A	—	15.4	24	70	96-817	—
A	—	28.2	51	384	206-408	—
A	—	6	15.6	34	96-619	—

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.



Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A and B, as listed.

Temperature:

Fluid: 32°F. to 104°F., as listed.

Ambient: Nominal Range, 32°F to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

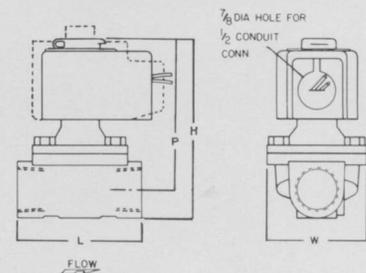
Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves may be mounted in any position except as noted in Dimensions Table.

Approvals: UL listed and CSA certified, as indicated. Refer to Engineering Section for details and coding explanation.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Details available on request.)



Constr. Ref.*	H	L	P	W
1	3 7/16	2 3/4	2 7/8	3 3/8
2	4 3/32	2 3/4	3 17/32	1 15/16
3	3 7/8	3 5/16	3 1/16	2 11/32
4	4 17/32	3 5/16	3 23/32	1 15/16
5#	4 27/32	4 1/2	3 31/32	4 9/16
6#	6 27/32	5	5 13/32	5 3/8
7#	7 7/16	6 3/32	5 15/16	6 5/16
8#	10 1/4	7 51/64	7 31/32	7 15/16
9	4 15/32	2 3/4	3 29/32	2 3/8
10	4 23/32	3 5/16	4 3/32	2 11/32
11	5 13/32	4 1/2	3 3/16	4 9/16
12	7 1/16	5	3 3/8	5 3/8
13	7 1/16	5	3 9/16	5 3/8
14⊕	7 11/16	6 3/32	3 13/16	6 3/16
15⊕	10 3/8	7 51/64	5 9/32	7 15/16

*Valves may be mounted in any position except all DC constructions and those marked # which must be mounted with the solenoid vertical and upright. Constructions marked ⊕ must be mounted with the solenoid vertical and upright or horizontal only.

STEAM SERVICE

2 Way Solenoid Valves

Normally Closed and Normally Open Operation
Brass or Stainless Steel Body • 1/4" to 1 1/2" N.P.T.

ASCO® Red-Hat®
BULLETINS
8220, 8222



General Description

These are rugged forged brass and stainless steel body valves for heavy-duty steam service.

Applications

These dependable valves are used in a variety of applications such as:

- laundry
- dry cleaning
- molding
- steam irons
- steam atomization
- steam baths
- sterilizers
- autoclaves

Specifications

Operation: Two types available:

(a) Normally Closed — valves closed when de-energized, open when energized.

(b) Normally Open — valves closed when energized, open when de-energized.

Valve Parts in Contact with Fluid:

Body — Brass or 304 s.s., as listed.

Disc — Teflon* or Ethylene Propylene (Diaphragm), as listed.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — Inconel or 17-7PH s.s.

Shading Coil — Copper (brass body); Silver (stainless steel body).

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

Other voltages available when required.

Coil: Molded Class F and H, as listed.

*DuPont Co. trademark.

Temperature:

Fluid: To 388°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves may be mounted in any position except as noted in Dimensions Table.

Approvals: CSA certified. UL listed as indicated in specification table. Refer to Engineering Section for details and coding information.

SPECIFICATIONS • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation
			Minimum	Maximum		Catalog Number	Constr. Ref. No.	UL Listing		
			Steam						AC	AC	Catalog Number	AC
NORMALLY CLOSED OPERATION, Forged Brass Body, Teflon Disc or Ethylene Propylene Disc^①										
1/4	3/8	1.2	1	80	324	8222A68	1	•	8222A69	6/F
		1.2	1	125	353	8222A70	1	•	8222A71	6/H
3/8	5/8	2.5	1	80	324	8222A64	1	•	8222A65	6/F
		3	5 ^②	50	300	82201 ^③	4	•	82202 ^③	9.6/F
		3	5 ^②	125	353	822019	4	•	822020	10.5/H
1/2	5/8	2.5	1	80	324	8222A66	1	•	8222A67	6/F
		4	5 ^②	50	300	82203 ^③	4	•	82204 ^③	9.6/F
		4	5 ^②	125	353	822021	4	•	822022	10.5/H
3/4	1/2	5	5 ^②	50	300	82205 ^③	7	•	82206 ^③	9.6/F
		5	5 ^②	125	353	822023	7	•	822024	10.5/H
		4.6	5	200	388	8222A5 ^①	2	—	8222A6 ^①	7.1/H
1	1	13.5	5 ^②	50	300	82207 ^③	8	•	82208 ^③	9.6/F
		13.5	5 ^②	125	353	822025	8	•	822026	10.5/H
		12.0	0	200	388	822299	15	—	8222100	28.2/H
1 1/4	1 1/8	15	5 ^②	50	300	82209 ^③	10	•	822010 ^③	9.6/F
		15	5 ^②	125	353	822027	10	•	822028	10.5/H
1 1/2	1 1/4	22.5	5 ^②	50	300	822011 ^③	11	•	822012 ^③	9.6/F
		22.5	5 ^②	125	353	822029	11	•	822030	10.5/H
NORMALLY OPEN OPERATION, Forged Brass Body, Teflon Disc										
3/8	3/8	2.5	5	125	353	8222A15	3	—	8222A18	11.7/H
1/2	3/8	2.5	5	125	353	8222A16	3	—	8222A19	11.7/H
3/4	1/2	4.6	5	125	353	8222A17	3	—	8222A20	11.7/H
1	1	13.5	5	125	353	8222B14	12	—	8222B54	15.4/H
1 1/4	1 1/8	15.0	5	125	353	8222B84	13	—	8222B85	15.4/H
1 1/2	1 1/4	22.5	5	125	353	8222B86	14	—	8222B59	15.4/H
NORMALLY CLOSED OPERATION, Stainless Steel Body, Teflon Disc or Ethylene Propylene^① Diaphragm										
1/2	5/8	4.0	0	50	300	8222B60 ^③	5	—	8222B61 ^③	9.6/F
		4.0	0	125	353	8222C87	6	—	8222C25	16.7/H
3/4	5/8	4.5	0	50	300	8222B62 ^③	5	—	8222B63 ^③	9.6/F
		4.5	0	125	353	8222C88	6	—	8222C26	16.7/H
1	1	11.2	5	125	353	8222B89	9	—	8222C27	10.5/H

Notes: ^① Valve has bronze piston; slight leakage can be expected.

^② Once opened upon energization at a higher pressure, valve will remain open to zero pressure at inlet.

^③ Valves have ethylene propylene diaphragms or discs and are limited to 50 psi maximum pressure and 300°F. maximum temperature saturated steam. Do not use with a higher pressure source and pressure reducing valve since this can result in super heated steam which will exceed the valve temperature rating.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil Part No.
	AC			
	Watts	VA Holding	VA Inrush	AC
F	6	15.6	36	99-216
H	6	15.6	36	222-344
F	9.6	17.4	46.2	212-653
H	10.5	20	44	216-758
H	16.7	33	98	216-758
H	15.4	23.6	70	222-345
H	28.2	55	220	204-806
H	7.1	15	42	216-758
H	11.7	25.6	74	222-345

OPTIONAL FEATURES

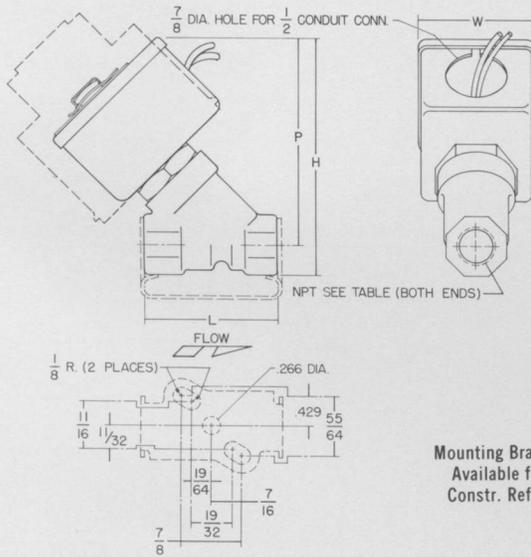
Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches) (Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in, details available on request.)

Constr. Refs. 1 to 3

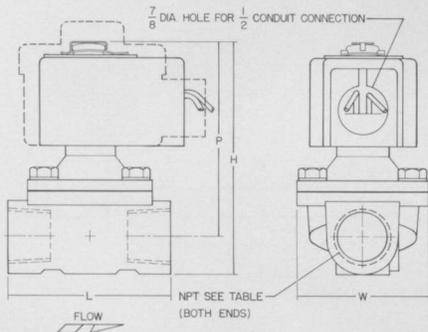


Constr. Ref.	H	L	P	W
1	3 ⁷ / ₈	2 ⁹ / ₃₂	3 ¹¹ / ₃₂	1 ²¹ / ₃₂
2	4 ⁵ / ₈	2 ³ / ₄	3 ¹³ / ₁₆	1 ¹³ / ₁₆
3	5 ¹ / ₈	2 ³ / ₄	4 ¹¹ / ₃₂	2 ⁷ / ₃₂

All valves supplied with metal clip.

Mounting Bracket Available for Constr. Ref. 1

Constr. Refs. 4 to 15



Constr. Ref.	H	L	P	W	Constr. Ref.	H	L	P	W
4	4 ¹ / ₃₂	2 ³ / ₄	3 ¹¹ / ₃₂	3 ¹⁵ / ₃₂	10	5 ²⁵ / ₃₂	3 ²¹ / ₃₂	4 ⁵ / ₃₂	3 ¹¹ / ₃₂
5	4 ¹ / ₄	2 ¹³ / ₁₆	3 ¹⁷ / ₃₂	2 ⁵ / ₁₆	11	6 ⁹ / ₃₂	4 ³ / ₈	4 ⁵ / ₁₆	3 ⁷ / ₈
6	5	2 ¹³ / ₁₆	4 ⁹ / ₃₂	2 ⁵ / ₁₆	12	6 ¹⁵ / ₃₂	3 ²⁷ / ₃₂	4 ²⁷ / ₃₂	4 ⁹ / ₃₂
7	4 ¹ / ₄	2 ¹³ / ₁₆	3 ⁵ / ₈	2 ⁵ / ₁₆	13	6 ¹⁵ / ₃₂	3 ²³ / ₃₂	4 ²⁷ / ₃₂	4 ²⁵ / ₃₂
8	5 ²⁵ / ₃₂	3 ³ / ₄	4 ⁷ / ₃₂	2 ²⁹ / ₃₂	14	6 ²⁹ / ₃₂	4 ⁷ / ₁₆	5	5 ¹¹ / ₁₆
9	5 ¹³ / ₁₆	3 ³ / ₄	4 ³ / ₁₆	4 ⁷ / ₁₆	15*	8	3 ³ / ₄	6 ⁹ / ₁₆	3 ⁵ / ₁₆

All valves supplied with metal clip.

*This valve must be mounted with solenoid vertical and upright.

HIGH PRESSURE 2 Way Solenoid Valves

Normally Closed Operation
Forged Brass or Stainless Steel Body • 1/4" to 3/4" N.P.T.

ASCO® Red-Hat®
BULLETIN
8223

General Description

These are 2 way normally closed solenoid valves for high pressure applications.

Applications

These valves are used in a variety of high pressure and fluid power applications, including:

- pumps
- spraying

- pneumatic controls — machines and engines
- car wash equipment
- compressors

Specifications

Operation: Normally Closed — valves closed when de-energized, open when energized.

Valve Parts in Contact with Fluid:

Body — Forged Brass or Series 300 Stainless Steel, as listed.

Seals and Discs — Teflon* and Buna "N" (also nylon on brass valves).

*DuPont Co. trademark.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper (brass body) or Silver (stainless steel body).

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages are available, consult your local ASCO office.

Coil: Continuous Duty Molded Class A and F, as listed.



Temperature:

Fluid: 32°F. to 200°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table.

Attitude: Valves may be mounted in any position.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)				Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Minimum	Maximum		Catalog Number			Constr. Ref. No.	Catalog Number	AC	DC		
				AC	DC								AC	DC
FORGED BRASS BODY														
1/4	5/16	1.5	10	750	400	200	150	8223A21	1	8223A22	10.5/A	11.2/A		
	5/16	1.5	10	1500	500	200	150	8223A25	1	8223A26	16.7/F	19.7/F		
3/8	5/16	1.5	10	750	400	200	150	8223A23	1	8223A24	10.5/A	11.2/A		
	5/16	1.5	10	1500	500	200	150	8223A27	1	8223A28	16.7/F	19.7/F		
1/2	3/8	3.2	25	1500	500	200	150	8223A3	2	8223A4	16.7/F	19.7/F		
3/4	3/4	7.8	25	750	300	200	150	8223B5	3	8223B6	16.7/F	11.2/A		
STAINLESS STEEL BODY														
1/2	3/8	3.2	25	1500	500	200	150	8223A10	4	8223A11	16.7/F	19.7/F		
3/4	3/4	7.8	25	750	300	200	150	8223A12	5	8223A13	16.7/F	11.2/A		

ELECTRICAL INFORMATION

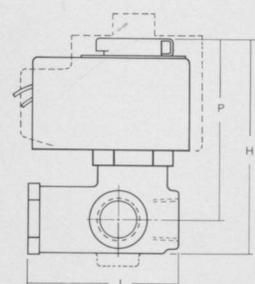
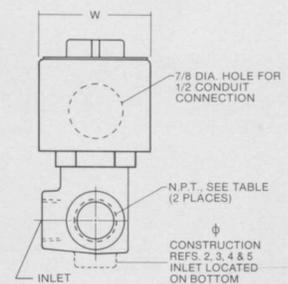
Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	10.5	23	55	27-462	27-463
F	19.7	16.7	35	78	64-982	66-611

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in, details available on request.)



Constr. Refs. 1 to 5

Constr. Ref.	H	L	P	W
1	3 ⁷ / ₁₆	2 ⁷ / ₁₆	2 ¹⁵ / ₁₆	1 ¹³ / ₁₆
2φ	4 ³ / ₈	3 ¹ / ₃₂	3 ³ / ₁₆	1 ¹³ / ₁₆
3φ	5 ³ / ₃₂	3 ¹⁹ / ₃₂	3 ¹¹ / ₁₆	2
4φ	5 ¹ / ₁₆	3 ¹³ / ₃₂	3 ⁹ / ₁₆	3
5φ	4 ³ / ₈	3 ³ / ₃₂	3 ³ / ₁₆	1 ¹³ / ₃₂

SUB-MINIATURE 2 Way Solenoid Valves

Brass or Stainless Steel Body • 1/8" N.P.T.

General Description

These compact, low-cost, direct-acting valves are suitable for a wide range of requirements.

Important: No minimum operating pressure required.

Applications

Offered for the control of air, inert gas, water, light oil and other fluids compatible with brass or stainless steel. Some typical applications are:

- automation
 - copying equipment
 - gas sampling
 - welding equipment
 - robots
 - vending machines
 - instrumentation
 - industrial machinery
- Manifold construction available — refer to Bulletin 8280.

Specifications

Operation:

Normally Closed (open when energized, closed when de-energized).

Valve Parts in Contact with Fluid:

- Body — Brass or 303 s.s., as listed.
- Seals and Discs — Buna "N."
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Core Spring — 302 s.s.
- Shading Coil — Copper.

Solenoid: Open Frame Solenoid.

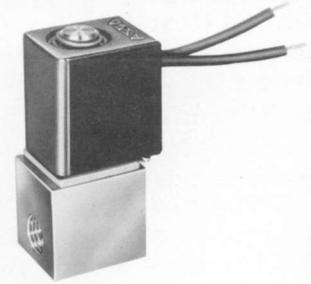
Electrical:

- Standard Voltages: 24, 120, 240 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).
- 6, 12, 24, 120, 240 volts, DC.
- Other voltages available when required.

Coil: Continuous Duty Molded Class A.

Temperature:

- Fluid:** To 180°F. Maximum.
- Ambient:** Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



Installation:

- Dimensions:** Refer to Dimensions for envelope size and mounting.
- Attitude:** Mountable in any position without affecting operation.

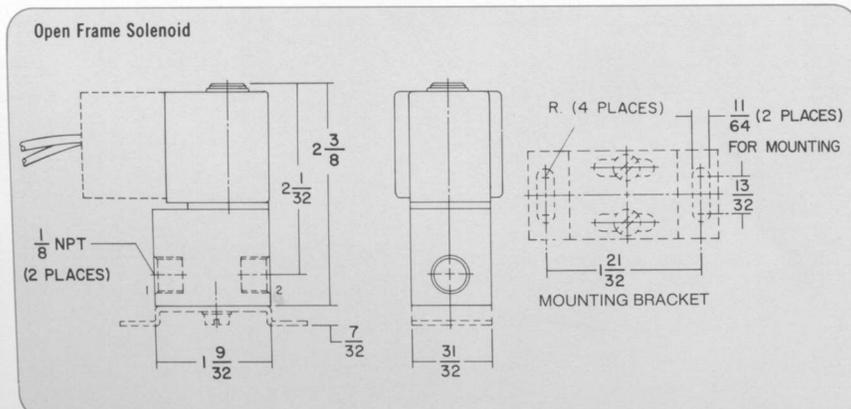
OPTIONAL FEATURES

- Type 1 General Purpose or Type 4 Watertight Solenoid Enclosure
- Spade Terminal Coil with Ground Terminal (in accordance with DIN 43650)
- Mounting Bracket
- 1/2" Threaded Conduit Hub

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Open Frame Solenoid Catalog Number	Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 300 SSU		AC	DC		AC	DC
			AC	DC	AC	DC	AC	DC			AC			DC
Brass Body with Buna "N" Disc													
1/8	3/64	.05	500	225	300	225	300	225	180	77	U82251	6.2/A	7/A
	1/16	.07	300	175	250	175	250	175	180	77	U82252	6.2/A	7/A
	3/32	.17	175	50	175	50	175	50	180	77	U82253	6.2/A	7/A
	1/8	.23	125	30	125	30	125	30	180	77	U82254	6.2/A	7/A
Stainless Steel Body with Buna "N" Disc													
1/8	3/64	.05	500	225	300	225	300	225	180	77	U82255	6.2/A	7/A
	1/16	.07	300	175	250	175	250	175	180	77	U82256	6.2/A	7/A
	3/32	.17	175	50	175	50	175	50	180	77	U82257	6.2/A	7/A
	1/8	.23	125	30	125	30	125	30	180	77	U82258	6.2/A	7/A

DIMENSIONS (in inches) (Type 1 Enclosure shown dotted-in)



ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC			AC	DC
		Watts	VA Holding	VA Inrush		
A	7	6.2	8.6	13.6	224-604	224-605

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

PLASTIC BODY

2 Way Solenoid Valves

with 1/4" and 3/8" Hose Bib, Flare or Compression Connections

ASCO® Red-Hat®
BULLETIN
8260

General Description

These direct acting solenoid valves feature compact plastic bodies with various end connections to accommodate plastic, rubber or metal tubing.

Applications

Ideally suited for dispensing-vending machines and processes. They will handle air, water, soft drinks, carbonated and non-carbonated water, syrups and alcoholic beverages†.

For corrosive and non-contaminating applications, refer to Shielded Core Valves.

†For alcoholic beverages consult ASCO sales office for appropriate resilient materials.

Specifications

Operation: Normally Closed — closed when de-energized, open when energized.

Connections: 1/4" SAE tube fitting, male flare inlet and outlet; bib for 1/4" I.D. flexible tubing or hose on inlet and outlet; 1/4" and 3/8" O.D. compression connections for plastic or metal tubing.

Valve Parts in Contact with Fluid:

Body — Nylon, Acetal or Polypropylene, as listed.

Seals and Discs — Buna "N" (dispensing-vending construction meets FDA requirements).

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — Stainless Steel.

Shading Coil — Copper (air-water construction); Silver (dispensing-vending construction).

Solenoid Constructions: Type 1 — General Purpose and Open Frame Solenoid, as listed.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz). **Note:** The 6.5 watt AC coil is limited to 24, 120 volts, 60 Hz.

6, 12, 24, 120, 240 volts, DC. **Note:** The 6.4 watt DC coil is limited to 6, 12, 24 volts.

Other voltages available when required.

Coil: Continuous Duty Molded Class A and B, as listed.

Temperature:

Fluid: 130°F. Maximum AC, 120°F. Maximum DC.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



Installation:

Dimensions: Refer to Dimensions for size and mounting.

Attitude: May be mounted in any position.

Approvals: UL recognized component and CSA certified. Dispensing-vending construction listed by National Sanitation Foundation. Refer to Engineering Section for details.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

SPECIFICATIONS

Pipe Connections	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Dispensing-Vending Construction	Air-Water Construction	Watt Rating/Class of Coil Insulation	
			Air-Water		AC	DC			Catalog Number	Catalog Number	AC	DC
			AC	DC	AC	DC				
ACETAL BODY, Type 1 General Purpose Solenoid Enclosure and Coil with Leads										
1/4" Male Flare	9/64	.35	120	50	130	120	8260A2	8260A42	6/A	9.7/A
Bib for 1/4" I.D. Tube	9/64	.33	120	50	130	120	8260A14	8260A54	6/A	9.7/A
1/4" O.D. Compression ^①	9/64	.33	120	50	130	120	8260A31	8260A71	6/A	9.7/A
POLYPROPYLENE BODY, Open Frame Solenoid and Spade Terminal Coils										
1/4" O.D. Compression ^①	1/16	.09	150	60	130	120	US826077	US826073	6.5/B	6.4/B
	3/32	.19	100	20	130	120	US826078	US826074	6.5/B	6.4/B
	1/8	.31	60	10	130	120	US826079	US826075	6.5/B	6.4/B
	5/32	.43	35	5	130	120	US826080	US826076	6.5/B	6.4/B
NYLON BODY, Open Frame Solenoid and Spade Terminal Coils										
3/8" O.D. Compression ^①	5/16	1.3	5	—	130	—	US826090	US826089	6.5/B	—

Note: ^①Fittings not supplied with valve. To order fittings, refer to Price Schedule.

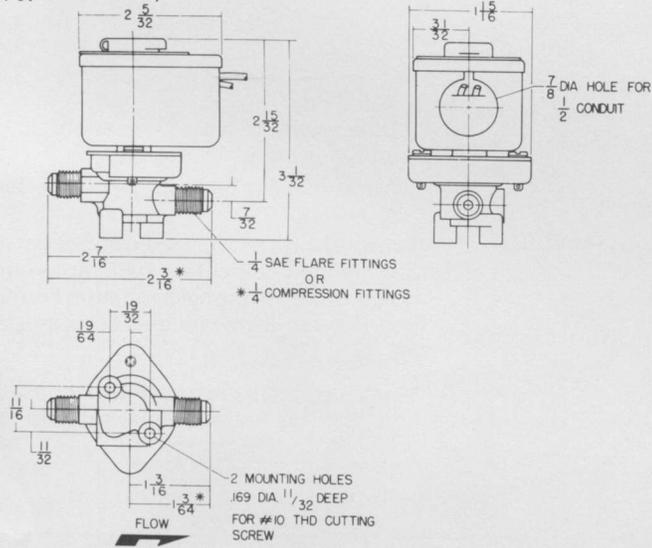
ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832
B	6.4	6.5	9.2	17.3	174-879	180-555

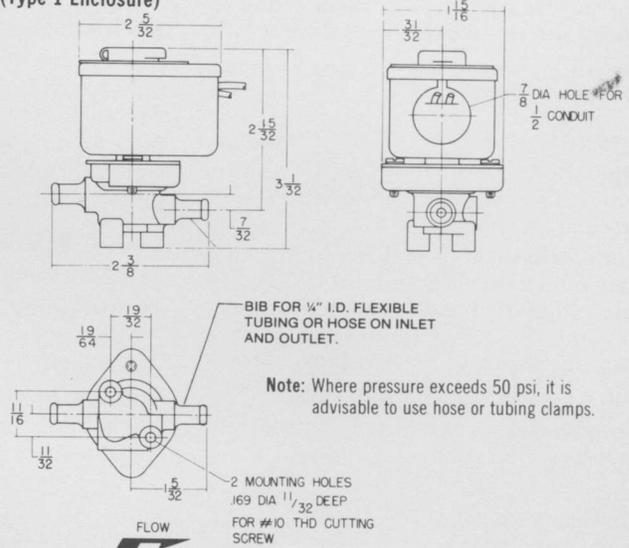
ORDERING INFORMATION
IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. When ordering coils, specify part number and voltage.

DIMENSIONS (in inches)

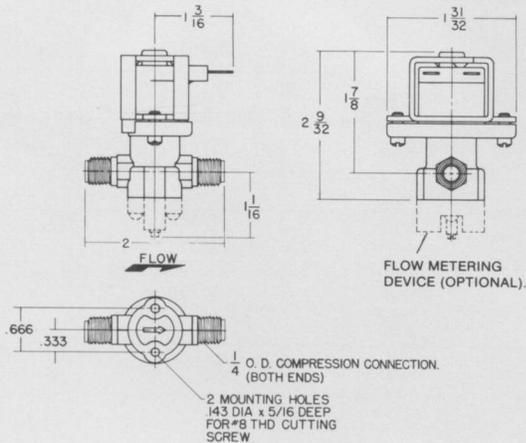
Male Flare and 1/4" O.D. Compression Connections (Type 1 Enclosure)



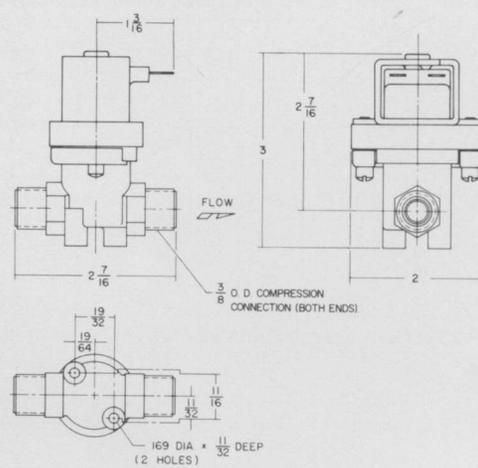
Hose Bib Connection (Type 1 Enclosure)



1/4" O.D. Compression Connections (Open Frame Solenoid)



3/8" O.D. Compression Connections (Open Frame Solenoid)



MINIATURE 2 Way Solenoid Valves

Normally Closed and Normally Open
Brass or Stainless Steel Body • 1/8", 1/4" and 3/8" N.P.T.

ASCO Red-Hat

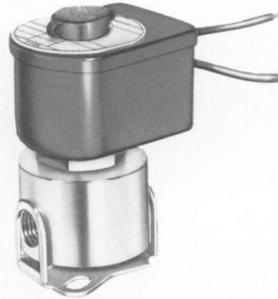
BULLETINS
8261, 8262, 8263



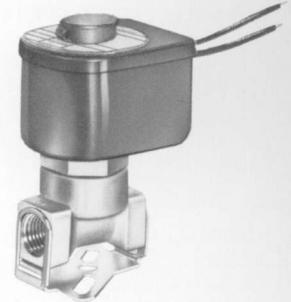
Normally Closed
1/8" — 8262
Brass



Normally Closed
3/8" — 8263
Brass



Normally Closed
1/8" and 1/4" — 8262
Stainless Steel



Normally Closed
1/4" — 8262
Brass

General Description

A wide selection of valves is offered in various pipe and orifice sizes and constructions for all applications.

Applications

For automatic control of air, inert gas, water, oil, freon, steam and other gases and liquids . . . compatible with brass and stainless steel.

Some typical applications are:

- instrumentation
- vending machines
- water treatment
- flame cutting
- welding equipment
- humidifiers
- dental equipment
- laundry and dry cleaning machines

For corrosive and non-contaminating applications, refer to Shielded Core Valves.

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy-duty operation • clickless and quiet (no AC hum) operation. Refer to Long Life Construction.

IMPORTANT: A complete listing of shut-off and vent valves suitable for fuel gas and fuel oil service appears in Combustion Section.

Specifications

Operation: Two types available:

(a) Normally Closed (open when energized, closed when de-energized).

(b) Normally Open (closed when energized, open when de-energized).

Valve Parts in Contact with Fluid:

Body — Brass or 303 s.s., as listed.
Seals and Discs — Buna "N," Teflon*, Ethylene Propylene and Stainless Steel, as listed.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Shading Coil — Copper (brass body); Silver (stainless steel body).

Springs — General Service (302 s.s.); Steam Service (Inconel or 17-7PH s.s.).

All 1/8" N.P.T. normally open valves contain acetal.

All 1/4" N.P.T. normally open valves contain nylon.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G), except as noted. Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages (except where noted):

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

*DuPont Co. trademark.

Coil: Continuous Duty Molded Class A, B, F and H, as listed.

Temperature:

Fluid: To 353°F. Maximum AC and 150°F. Maximum DC, as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions.

Attitude: Valves may be mounted in any position.

Approvals: CSA certified. UL listed as indicated. Refer to Engineering Section for details and coding explanation.

OPTIONAL FEATURES

- Junction Box Solenoid Enclosure
- Strain-Relief Connector
- Manual Operator
- Flow Metering Device (Consult ASCO when required)
- 1/2" Threaded Conduit Hub
- 1/2" Conduit Adapter
- Spade Terminal Coils
- Dual Voltage Molded Coils
- Open Frame Solenoid for Cabinet Installation
- And Others as listed in Optional Features Section.

Added Feature > for AC or DC Conversion

Listed in this Bulletin are valves that may be AC or DC operated by merely substituting the correct coil. Since no other change is required, stocking and in-line conversions are simplified. The catalog numbers specifically designed for this service are identified in the specifications table with a RED Dot.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 300 SSU				Catalog Number	Constr. Ref. No.	UL Listing	Catalog Number	UL Listing		
			AC	DC	AC	DC	AC	DC	AC	DC						AC	DC
NORMALLY CLOSED OPERATION, Sub-Miniature Valves with Brass Body and Buna "N" Disc for General Service																	
1/8	1/16	.09	150	60	150	60	150	60	200	120	82616	1A	○	—	—	6.5/B	6.4/B
	3/32	.18	100	20	100	20	100	20	200	120	82617	1A	○	—	—	6.5/B	6.4/B
	1/8	.26	60	10	60	10	60	10	200	120	82618	1A	○	—	—	6.5/B	6.4/B
1/4	1/16	.09	150	60	150	60	150	60	200	120	82619	1B	○	—	—	6.5/B	6.4/B
	3/32	.18	100	20	100	20	100	20	200	120	826110	1B	○	—	—	6.5/B	6.4/B
	1/8	.26	60	10	60	10	60	10	200	120	826111	1B	○	—	—	6.5/B	6.4/B
NORMALLY CLOSED OPERATION, Brass Body, Buna "N" Disc for General Service																	
1/8	3/64	.06	750	650	750	640	530	550	180	120	8262C1	1	○	8262C40	○	6/A	9.7/A
	3/64	.06	1900	—	1500	—	—	—	140	—	8262C95①	1	●	8262C97①	●	9/F	—
	3/32	.20	275	150	290	140	130	145	180	120	8262C14	1	○	8262C41	○	6/A	9.7/A
	3/32	.20	340	—	415	—	300	—	180	—	8262C11	1	○	8262C42	○	9/F	—
	1/8	.34	155	80	180	80	140	80	180	120	8262C2	1	○	8262C43	○	6/A	9.7/A
	1/8	.34	215	—	200	—	180	—	180	—	8262C16	1	○	8262C44	○	9/F	—
1/4	3/64	.06	750	500	750	500	500	500	180	120	8262D19	16	○	8262D45	○	6/A	9.7/A
	3/64	.06	1500	475	1500	475	1100	450	140	140	8262D200①	17	●	8262C201①	●	10.5/A	11.2/A
	3/32	.17	360	150	340	125	160	125	180	120	8262D20	16	○	8262D46	○	6/A	9.7/A
	3/32	.17	500	—	500	—	280	—	180	—	8262D21	16	○	8262D47	○	9/F	—
	1/8	.35	140	65	165	60	90	60	180	120	8262D22	16	○	8262D48	○	6/A	9.7/A
	1/8	.35	215	—	245	—	160	—	180	—	8262D23	16	○	8262D49	○	9/F	—
	1/8	.35	300	75	300	70	200	70	180	150	8262D232	17	○	8262C233	○	10.5/A	11.2/A
	5/32	.50	180	40	200	40	145	45	180	150	8262C202	4	○	8262B203	○	10.5/A	11.2/A
	7/32	.85	40	17	50	20	40	21	180	120	8262C13	2	○	8262C54	○	6/A	9.7/A
	7/32	.72	90	25	100	25	100	25	180	150	8262C208	4	○	8262B209	○	10.5/A	11.2/A
	9/32	.96	27	15	36	16	28	16	180	120	8262C90	2	○	8262C100	○	6/A	9.7/A
	9/32	.88	60	18	75	15	60	18	180	150	8262C210	4	○	8262B211	○	10.5/A	11.2/A
9/32	.88	90	—	100	—	90	—	200	—	8262B212	6	○	8262B213	○	16.7/F	—	
3/8	1/8	.35	160	65	150	60	90	60	180	120	8263C2	3	○	8263C62	○	6/A	9.7/A
	1/8	.35	215	—	215	—	150	—	180	—	8263C3	3	○	8263C63	○	9/F	—
	1/8	.35	310	—	310	—	260	—	200	—	8263B232	5	○	8263A233	○	16.7/F	—
	5/32	.52	100	35	100	35	100	35	180	150	8263B200	5	○	8263A201	○	10.5/A	11.2/A
	7/32	.72	100	25	100	25	100	25	200	150	8263B206	5	○	8263A207	○	16.7/F	11.2/A
	9/32	.85	28	14	35	14	20	14	180	120	8263C54	3	○	8263C55	○	6/A	9.7/A
9/32	.85	95	—	105	—	75	—	200	—	8263A210	7	○	8263A211	○	20/F	—	
NORMALLY OPEN OPERATION, Brass Body, Buna "N" Disc for General Service																	
1/8	1/16	.09	500	400	300	250	225	150	180	120	8262D91	8	●	8262D66	●	6/A	9.7/A
	3/32	.15	275	190	200	110	150	110	180	120	8262D93	8	●	8262D67	●	6/A	9.7/A
	1/8	.21	125	80	100	60	85	50	180	120	8262D31	8	●	8262D68	●	6/A	9.7/A
1/4	3/64	.06	750	500	700	500	700	500	140	140	8262A260①	9	●	8262A266①	●	10.5/A	11.2/A
	3/32	.17	300	200	250	150	230	125	140	140	8262A261①	9	●	8262A267①	●	10.5/A	11.2/A
	1/8	.35	130	80	110	60	100	60	180	150	8262A262	9	●	8262A268	●	10.5/A	11.2/A
	5/32	.49	85	45	75	30	60	30	180	150	8262A263	4	●	8262A269	●	10.5/A	11.2/A
	7/32	.83	45	25	45	20	40	20	180	150	8262A264	4	●	8262A270	●	10.5/A	11.2/A
	9/32	.96	30	15	25	15	20	15	180	150	8262A265	4	●	8262A271	●	10.5/A	11.2/A

Note: ① Cast urethane disc supplied as standard.

● Red DOT denotes valve suitable for both AC and DC operation by merely substituting the correct coil.



Automatic Switch Co. 50-56 Hanover Road, Florham Park, New Jersey 07932, Tel. (201) 966-2000

SPECIFICATIONS (continued)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)								Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 300 SSU		Maximum Fluid Temp. °F.		Catalog Number	Constr. Ref. No.	UL Listing	Catalog Number	UL Listing	AC	DC
			AC	DC	AC	DC	AC	DC	AC	DC							

NORMALLY CLOSED OPERATION, Stainless Steel Body, Buna "N" Disc for Corrosive Service

1/8	3/64	.06	750	650	750	640	530	550	180	120	8262C12	1	○	8262C56	○	6/A	9.7/A
	3/64	.06	1900	—	1500	—	—	—	140	—	8262C79①	1	●	8262C98①	●	9/F	—
	3/32	.20	275	150	290	140	130	145	180	120	8262C15	1	○	8262C58	○	6/A	9.7/A
	1/8	.35	155	80	180	80	140	80	180	120	8262C6	1	○	8262C60	○	6/A	9.7/A
1/4	3/64	.06	750	500	750	500	500	500	180	120	8262C80	11	○	8262C81	○	6/A	9.7/A
	3/64	.06	2200	475	2000	475	1100	450	140	140	●8262B214①	12	●	●8262B215①	●	10.5/A	11.2/A
	3/32	.17	360	150	340	125	160	125	180	120	8262C86	11	○	8262C87	○	6/A	9.7/A
	1/8	.35	140	65	165	60	90	60	180	120	8262C7	11	○	8262C62	○	6/A	9.7/A
	5/32	.50	180	40	200	40	145	45	180	150	●8262C220	12	○	●8262B221	○	10.5/A	11.2/A
	7/32	.85	40	17	50	20	40	21	180	120	8262C36	11	○	8262C37	○	6/A	9.7/A
	7/32	.72	90	25	100	25	100	25	180	150	●8262C226	12	○	●8262B227	○	10.5/A	11.2/A
	9/32	.96	27	15	36	16	28	16	180	120	8262C38	11	○	8262C39	○	6/A	9.7/A
	9/32	.88	90	—	100	—	90	—	200	—	●8262B230	13	○	●8262B231	○	16.7/F	—

NORMALLY OPEN OPERATION, Stainless Steel Body, Buna "N" Disc for Corrosive Service

1/8	1/16	.09	500	400	300	250	225	150	180	120	8262C92	1	●	8262C72	●	6/A	9.7/A
	3/32	.15	275	190	200	110	150	110	180	120	8262C94	1	●	8262C73	●	6/A	9.7/A
	1/8	.21	125	80	100	60	85	50	180	120	8262C35	1	●	8262C74	●	6/A	9.7/A
1/4	3/64	.06	750	500	700	500	700	500	140	140	8262A130①	14	●	8262A131①	●	10.5/A	11.2/A
	3/32	.17	300	200	250	150	230	125	140	140	8262A134①	14	●	8262A135①	●	10.5/A	11.2/A
	1/8	.35	130	80	110	60	100	60	200	150	8262A138	14	●	8262A139	●	10.5/A	11.2/A
	5/32	.50	85	45	75	30	60	30	200	150	8262A142	14	●	8262A143	●	10.5/A	11.2/A
	7/32	.83	65	—	65	—	60	—	200	—	8262A148	14	●	8262A149	●	16.7/F	—
	9/32	.96	45	—	40	—	35	—	200	—	8262A152	14	●	8262A153	●	16.7/F	—

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Type 1 General Purpose Solenoid Enclosure			Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation			
			Steam		Air-Inert Gas		Water and Light Oil @ 300 SSU		Maximum Fluid Temp. °F.		Catalog Number	Constr. Ref. No.	UL Listing	Catalog Number	UL Listing	AC	DC
			AC	DC	AC	DC	AC	DC	AC	DC							

NORMALLY CLOSED OPERATION, Brass Body, Stainless Steel Seat and Teflon or Ethylene Propylene Disc for Steam Service**

1/8	1/8	.34	50	—	—	—	—	—	298	—	8263B52**	10	—	—	—	6/F	—
	1/8	.34	90②	—	—	—	—	—	331	—	8263B58	10	—	—	—	6/F	—
1/4	1/8	.34	50	—	—	—	—	—	298	—	8263B53**	15	—	—	—	6/F	—
	1/8	.34	90②	—	—	—	—	—	331	—	8263B59	15	—	—	—	6/F	—
	3/32	.52	110	—	—	—	—	—	344	—	8263A300	18	●	8263A309③	—	11/H	—
	7/32	.72	70	—	—	—	—	—	316	—	8263A301	18	●	8263A310③	—	11/H	—
3/8	9/32	.85	60	—	—	—	—	—	307	—	8263A303	18	—	8263A312③	—	16.7/F	—
	1/8	.36	125	—	—	—	—	—	353	—	8263A304	18	●	8263A313③	●	11/H	—
	5/32	.52	110	—	—	—	—	—	344	—	8263A305	18	●	8263A314③	●	11/H	—
	7/32	.72	70	—	—	—	—	—	316	—	8263A306	18	●	8263A315③	●	11/H	—
9/32	.85	60	—	—	—	—	—	307	—	8263A308	18	—	8263A317④	—	16.7/F	—	

NORMALLY CLOSED OPERATION, Stainless Steel Body, Stainless Steel Seat, Teflon Disc for Steam and Corrosive Service

3/8	1/8	.36	125	—	125	—	125	—	353	—	8263A318	18	●	8263A322③	●	11/H	—
	5/32	.52	110	—	110	—	100	—	344	—	8263A319	18	●	8263A323③	●	11/H	—
	7/32	.72	80	—	80	—	75	—	324	—	8263A320	18	●	8263A324③	●	11/H	—
	9/32	.85	60	—	60	—	45	—	307	—	8263A321	18	—	8263A325④	—	16.7/F	—

Notes: ① Cast urethane disc supplied as standard.

② Slight leakage occurs below 30 psi.

③ Suitable for Types 4 and 7 (C and D) and 9 (E and F) only, and have a temperature range code T3A.

④ Suitable for Types 4 and 7 (C and D) and 9 (E and F) only.

● Red DOT denotes valve suitable for both AC and DC operation by merely substituting the correct coil.

ELECTRICAL INFORMATION

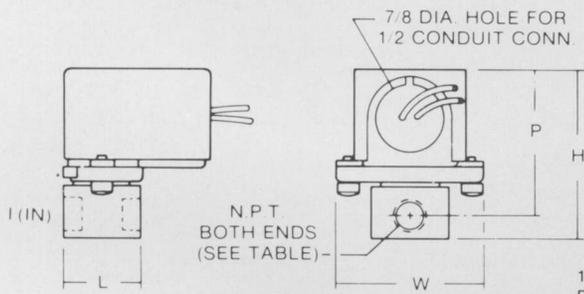
Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	27.5	96-619	103-832
F	—	9	22.5	30	99-216	—
F	—	20	41.2	80	99-257	—
A	11.2	10.5	23	45	27-462	27-463
F	—	16.7	35	56	64-982	—
H	—	11	23	45	27-502	—
F	—	6	15.6	27.5	99-216	—
B	6.4	6.5	9.2	15	204-945	206-605

ORDERING INFORMATION
IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. When ordering coils, specify part number and voltage.

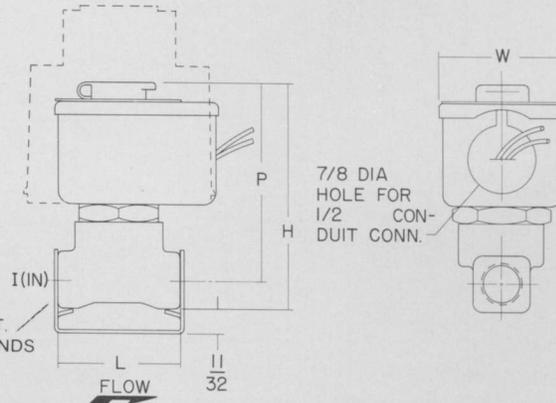
DIMENSIONS (in inches)

Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Detail drawings available on request.

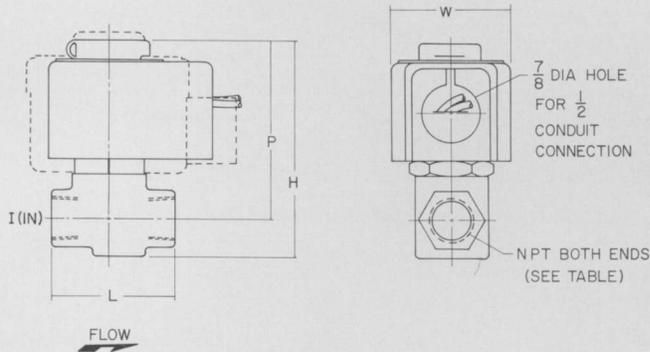
Constr. Refs. 1A and 1B



Constr. Refs. 2, 4 and 6



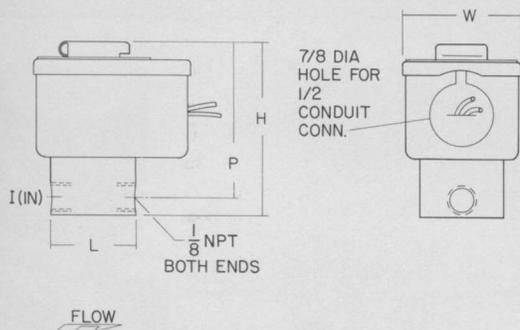
Constr. Refs. 3, 5, 7 and 18



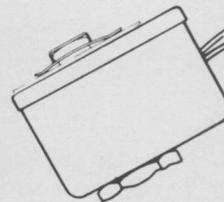
DIMENSIONS (in inches)

Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Detail drawings available on request.

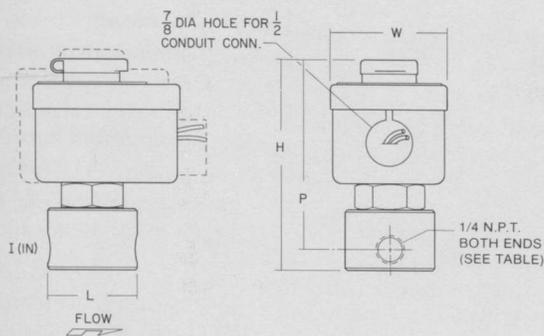
Constr. Refs. 1, 9, 10, 11, 12, 13, 14, 15, 16 and 17



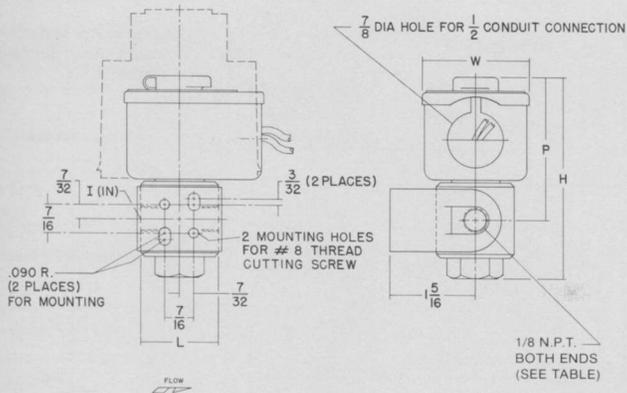
Bulletin 8263 (Steam) Supplied with Metal Clip



Constr. Ref. 14



Constr. Ref. 8



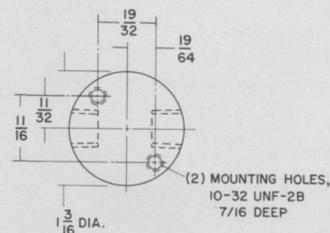
MOUNTING DETAILS

Constr. Ref. 8 (See Dim. View)

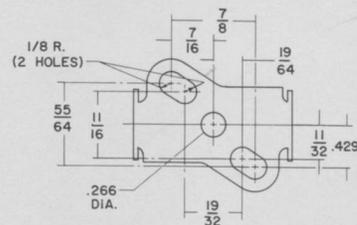
Constr. Refs. 1A, 1B, 9 and 10



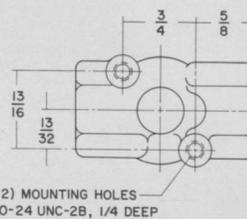
Constr. Ref. Brass: 1



Constr. Refs. Brass: 2, 4, 6, 15, 16 and 17 SS: 1, 11, 12, 13 and 14



Constr. Refs. 3, 5, 7 and 18



Constr. Ref.	Body				Constr. Ref.	Body							
	N.P.T.	Mat'l	L	H		N.P.T.	Mat'l	L	H	W	P		
1	1/8	Brass	1 3/16	2 17/32	1 21/32	2 5/32	9	1/4	Brass	1 1/4	3 1/4	1 13/16	2 25/32
1	1/8	SS	1 3/16	2 17/32	1 21/32	2 5/32	10	1/8	Brass	1 3/16	2 17/32	1 21/32	2 5/32
1A	1/8	Brass	1	2 5/16	1 31/32	2	11	1/4	SS	1 9/16	2 15/16	1 21/32	2 9/16
1B	1/4	Brass	1 1/4	2 15/32	1 31/32	2 1/16	12	1/4	SS	1 9/16	3 3/16	1 13/16	2 13/16
2	1/4	Brass	1 9/16	2 15/16	1 21/32	2 9/16	13	1/4	SS	1 9/16	3 7/16	2 7/32	3 1/16
3	3/8	Brass	1 7/8	3 1/16	1 21/32	2 1/2	14	1/4	SS	1 9/16	3 27/32	2 7/32	3 15/32
4	1/4	Brass	1 9/16	3 3/16	1 13/16	2 13/16	15	1/4	Brass	1 1/4	3	1 21/32	2 17/32
5	3/8	Brass	1 7/8	3 5/16	1 13/16	2 3/4	16	1/4	Brass	1 1/4	3	1 21/32	2 17/32
6	1/4	Brass	1 9/16	3 7/16	2 7/32	3 1/16	17	1/4	Brass	1 1/4	3 1/4	1 13/16	2 25/32
7	3/8	Brass	1 7/8	3 9/16	2 7/32	3	18	1/4 & 3/8	Brass	1 7/8	3 5/16	1 13/16	2 3/4
8	1/8	Brass	1 3/16	3 3/32	1 21/32	2 7/16	18	3/8	SS	1 7/8	3 5/16	1 13/16	2 3/4

STEAM SERVICE STRAIGHT-THRU FLOW DESIGN 2 Way Solenoid Valves

Brass Body • 3/8", 1/2" and 3/4" N.P.T.

General Description

These are direct acting valves with a guillotine type disc that provides straight-thru flow, minimizing pressure drop and turbulence through the valve. This straight-thru flow design provides a flow capacity equal to that of a larger valve.

Important: No minimum operating pressure is required!

Applications

- steam dryers
- steam tables
- steam cookers
- chicken fryers

Used to drain hot cooking oil and steam condensate on cookers.

Specifications

Operation: Two types available:

- (a) Normally Closed (open when energized, closed when de-energized).
- (b) Normally Open (closed when energized, open when de-energized).

Valve Parts in Contact with Fluid:

Body — Brass.
Disc — Stainless Steel.
Seat — Glass filled Teflon* or Polyphenylene Sulfide (3/4" N.P.T. only).

Core Tube — 305 s.s.
Core and Plugnut — 430F s.s.
Springs — Inconel and 17-7PH s.s.
Shading Coil — Copper.
Gaskets — Viton.*

Solenoid Enclosures: Two types available:

- (a) **Type 1** — General Purpose.
- (b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, Hz (or 110, 220 volts, AC, 50 Hz).

Other voltages available when required.

Coil: Continuous Duty Molded Class F and H, as listed.

Temperature:

Fluid: To 320°F., as listed.

Ambient: Nominal Range, 32°F. to 86°F. for valves with Class F coils and 104°F. for valves with Class H coils.

*DuPont Co. trademark.



3/8" and 1/2" sizes shown.
3/4" has one-piece body.

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valve must be mounted with the solenoid vertical and upright.

Approvals: UL listed and CSA certified as indicated below. Refer to Engineering Section for details and coding explanation.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

SPECIFICATIONS • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure			Watt Rating/Class of Coil Insulation
			Steam	AC	Catalog Number	UL and CSA Listings	Catalog Number	Approval Listings		
NORMALLY CLOSED OPERATION										
3/8	1/4	1.5	75	320	8267A1	•	8267A2	—	•	15.4/H
3/8	3/8	5.1	30	280	8267B3	①	8267B4	—	②	15.4/F
1/2	1/4	1.4	75	320	8267A5	•	8267A6	—	•	15.4/H
1/2	3/8	4.5	15	250	8267B7	•	8267B8	—	•	15.4/F
3/4	3/8	5.4	30	280	8267C17	•	8267C18	—	•	15.4/F
3/4	1/2	9.7	15	250	8267C19	•	8267C20	—	•	15.4/F
NORMALLY OPEN OPERATION										
3/8	1/4	1.5	75	320	8267B9	①	8267B10	—	②	15.4/F
3/8	3/8	5.1	30	280	8267B11	①	8267B12	—	②	15.4/F
1/2	1/4	1.4	75	320	8267B13	①	8267B14	—	②	15.4/F
1/2	3/8	4.5	15	250	8267B15	•	8267B16	—	•	15.4/F
3/4	3/8	5.4	25	267	8267C21	•	8267C22	—	•	15.4/F
3/4	1/2	9.7	15	250	8267C23	•	8267C24	—	•	15.4/F

Notes: ① UL and CSA listed with Class H Coil (Catalog Number Prefix "HT") only.

② CSA certified with Class H Coil (Catalog Number Prefix "HT") only.

ELECTRICAL INFORMATION

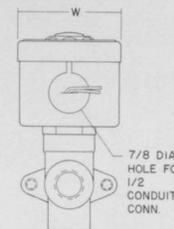
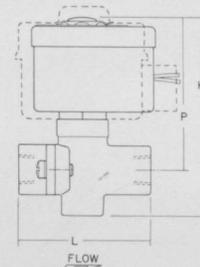
Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil Part No.
	AC			
	Watts	VA Holding	VA Inrush	AC
F	15.4	26	125	99-257
H	15.4	23.6	110	222-345

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Details available on request.)



Pipe Size	L	H	W	P
3/8-1/2	2 7/32	4 5/16	2 7/32	3 5/16
3/4	3 1/32	5 1/32	2 7/32	3 23/32

3 WAY SOLENOID VALVES • INDEX

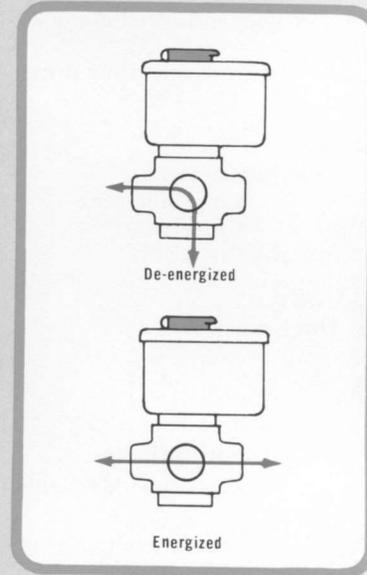
The solenoid valves listed in this section are the fully automatic 3 way type. They have three pipe connections and two orifices; one orifice is open while the other one is closed. Most valves are supplied for normally closed, normally open or universal operation. Valves for universal operation will accept dual inlet or divergent flow characteristics.

Body materials, such as forged brass, stainless steel, steel, zinc and plastic, are available. Valves are normally supplied with a Type 1 General Purpose Solenoid Enclosure having a $\frac{7}{8}$ " diameter hole for $\frac{1}{2}$ " conduit connection. Combination Watertight and Explosion-Proof Solenoid Enclosures conforming to Types 4 and 7 (C and D) standards, which also meet Types 3 and 9 (E, F and G), except where noted, are available.

Many optional features, such as high temperature molded coils, manual operators, metering devices, junction boxes, strain-relief connectors, etc., are available. Refer to the Optional Feature Section for details.

The table below gives, in condensed form, an indication of the pipe sizes, body materials, and general data for valves listed in this 3 way valve section.

Additional 3 way valves are listed in specialized sections of the catalog, i.e., Manual Reset, Air Operated, Special Purpose. Consult the Title Index for the page reference.



INDEX

Pipe Size Range (ins.)	General Valve Description	Body Material	Bulletin Number	Page Number
$\frac{1}{8}$	Sub-Miniature	Brass, Stainless Steel	8325	52
$\frac{1}{8}$ - $\frac{1}{4}$	Miniature Size	Brass, Stainless Steel	8320	45-47
$\frac{1}{8}$ - $\frac{1}{4}$	Air Valve with Built-in Metering	Zinc	8324	49
$\frac{1}{8}$ - $\frac{1}{4}$	Midget Size	Brass	8314	38-39
$\frac{1}{8}$ - $\frac{1}{4}$	Air-Inert Gases-Water	Plastic	8360	50-51
$\frac{1}{8}$ - $\frac{3}{8}$	Gang Mounted Air Valves	Zinc	8318, 8319	43-44
$\frac{1}{8}$ - $\frac{1}{2}$	General Service, Corrosive and Steam Service, Direct Acting	Brass, Steel, Stainless Steel	8300, 8302, 8315	36-37
$\frac{1}{4}$	Midget Quick Exhaust	Brass, Stainless Steel	8317	42
$\frac{1}{4}$ - $\frac{3}{8}$	Quick Exhaust	Brass	8321	48
$\frac{3}{8}$ -1	General Service, High Flow Capacity	Brass	8316	40-41

3 Way Solenoid Valves

Forged Brass, Steel or Stainless Steel Body

1/8", 1/4", 3/8" and 1/2" N.P.T.

General Description

These rugged forged brass, steel and stainless steel body valves are especially suited for heavy duty industrial applications.

Important: No minimum operating pressure required.

Applications

- These valves may be used on:
- air vises
 - compressors
 - large control valves as "pilots"
 - machine tools
 - turbines

Specifications

Operation: Three types available:

- (a) Normally Closed (suffix "F")
- (b) Normally Open (suffix "G")
- (c) Universal (suffix "U")

Valve Parts in Contact with Fluid:

Body — Forged Brass, Steel or 304 Stainless Steel, as listed.

Disc — 303 s.s. (metal seated); Nylon (resilient seated).

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s., 17-7PH or Inconel.

Shading Coil — Copper for forged brass and steel valves; Silver for stainless steel valves.

Seats — Buna "N," or 303 s.s., as listed.

Gaskets — Buna "N" for forged brass and steel valves; Teflon* for stainless steel valves; Ethylene Propylene for steam valves.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

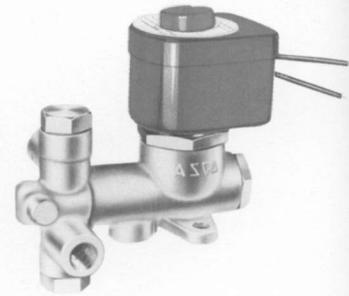
24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Note: 125 volts, DC, and 250 volts, DC, are battery voltages applied in power plants. Special valves in both AC and DC construction are available for power plant applications, to act as pilots for control valves. Consult your local ASCO sales office for details.

*DuPont Co. trademark.



Coils: Continuous Duty Molded Class F or H, as listed.

Temperature:

Fluid: To 405°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves must be mounted with solenoid vertical and upright.

Approvals: CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)								Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation		
			Normally Closed ^① or Normally Open ^②				Universal ^③						Catalog Number	Constr. Ref. No.	Catalog Number	AC			DC
			Air-Inert Gas, Water, Light Oil		Steam		Air-Inert Gas, Water, Light Oil		AC	DC ^④									
			AC	DC ^④	AC	DC	AC	DC ^④			AC	DC	AC	DC					
Forged Brass Body, Metal Seats and Discs for General Service																			
1/8	3/16	.13	550	250	—	—	300	125	200	180	8300D55	1	8302D24	20/F	33/H				
		.35	250	125	—	—	150	60	200	180	8300D3	1	8302D1	20/F	33/H				
1/4	1/4	3/16	.35	250	125	—	—	150	60	200	180	8300D58	1	8302D25	20/F	33/H			
		1/4	.45	190	75	—	—	90	25	200	180	8300A81	1	8302A81	20/F	33/H			
3/8	3/8	1/4	.45	190	75	—	—	120	—	200	—	8300D61	1	8302D26 ^⑥	28/H	—			
		1/4	.45	250	—	—	—	120	—	200	—	8300A82	1	8302A82	20/F	33/H			
		5/16	.75	120	40	—	—	60	20	200	180	8300D9	1	8302D4 ^⑥	28/H	—			
		3/8	1.0	75	30	—	—	35	15	200	180	8300D64	2	8302D27	20/F	33/H			
1/2	3/8	5/16	.75	120	40	—	—	60	20	200	180	8300D72	2	8302D31	20/F	33/H			
		3/8	1.0	75	30	—	—	35	15	200	180	8300D68	2	8302D29	20/F	33/H			
Forged Brass Body, Buna "N" Seats and Nylon Discs for General Service																			
1/4	3/16	.25	250	125	—	—	150	60	180	180	8300D58R	1	8302D25R	20/F	33/H				
		.39	150	75	—	—	75	25	180	180	8300A81R	1	8302A81R	20/F	33/H				
3/8	3/16	.39	150	75	—	—	75	25	180	180	8300A82R	1	8302A82R	20/F	33/H				
		.53	120	40	—	—	60	20	180	180	8300D64R	2	8302D27R	20/F	33/H				
1/2	5/16	.53	120	40	—	—	60	20	180	180	8300D68R	2	8302D29R	20/F	33/H				
Forged Brass Body, Metal Seats and Discs for Steam Service																			
1/4	1/4	.45	—	—	110	—	—	—	344	—	8315D2	1	8315D22	15.4/H	—				
		.45	—	—	225	150	—	—	—	405	360	831532	4	831538 ^⑤	28.2/H	21.4/H			
3/8	1/4	.45	—	—	110	—	—	—	344	—	8315D3	1	8315D23	15.4/H	—				
		.45	—	—	225	150	—	—	—	405	360	831533	4	831539 ^⑤	28.2/H	21.4/H			
		.75	—	—	105	75	—	—	—	341	320	831534	5	831540 ^⑤	28.2/H	21.4/H			
		1.0	—	—	75	45	—	—	—	320	300	831536	5	831542 ^⑤	28.2/H	21.4/H			
1/2	3/8	.75	—	—	105	75	—	—	341	320	831535	5	831541 ^⑤	28.2/H	21.4/H				
		1.0	—	—	75	45	—	—	—	320	300	831537	5	831543 ^⑤	28.2/H	21.4/H			

SPECIFICATIONS (continued)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Normally Closed ^① or Normally Open ^②			Universal ^③					Catalog Number	Constr. Ref. No.	Catalog Number	AC		
			Air-Inert Gas, Water, Light Oil		Steam	Air-Inert Gas, Water, Light Oil		AC	DC ^④	AC				DC		
			AC	DC ^④	AC	DC	AC				DC ^④	AC	DC			
Steel Body, Metal Seats and Discs for Corrosive Service																
3/8	3/16	.35	250	100	—	—	125	50	200	180	8300B32	3	8302B8	20/F	33/H	
	1/4	.45	150	50	—	—	75	25	200	180	8300A83	3	8302A83	20/F	33/H	
	1/4	.45	175	—	—	—	85	—	200	—	8300B41	3	8302B46 ^⑤	28/H	—	
	5/16	.75	120	40	—	—	60	20	200	180	8300B89	3	8302B38	20/F	33/H	
	3/8	1.0	75	30	—	—	35	15	200	180	8300B97	3	8302B42	20/F	33/H	
1/2	5/16	.75	120	40	—	—	60	20	200	180	8300B203	3	8302B203	20/F	33/H	
	3/8	1.0	75	30	—	—	35	15	200	180	8300B204	3	8302B204	20/F	33/H	
Stainless Steel Body, Metal Seats and Discs for Corrosive Service																
1/2	5/16	.75	120	40	—	—	60	20	200	180	8300B403	3	8302B403	20/F	33/H	
	3/8	1.0	75	30	—	—	35	15	200	180	8300B404	3	8302B404	20/F	33/H	

- Notes: ① For normally closed operation, use catalog number suffix "F".
 ② For normally open operation, use catalog number suffix "G".
 ③ For universal operation, use catalog number suffix "U".
 ④ For higher DC rating valves, refer to Bulletin 8321.

- ⑤ Suitable for Types 4 and 7 (C and D) only and has a temperature range code T2B. Refer to Engineering Section for details.
 ⑥ Suitable for Types 4 and 7 (C and D) only and has a temperature range code T2C. Refer to Engineering Section for details.

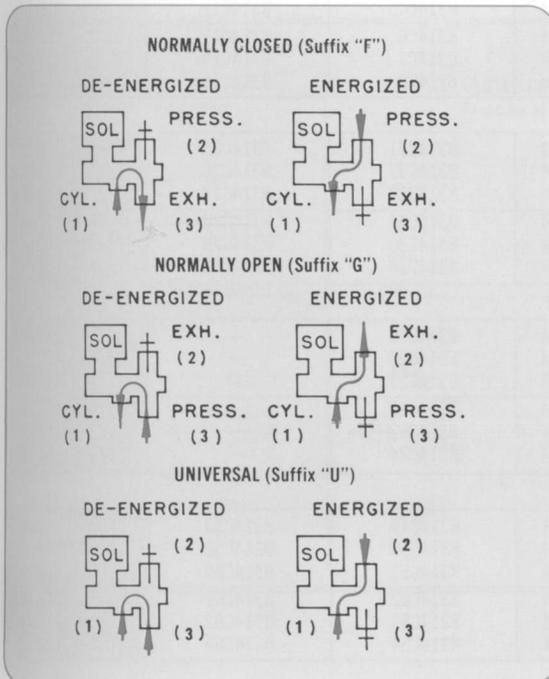
OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
F	—	20	41.5	195	99-257	—
H	33	28.2	59	329	204-806	222-184
H	21.4	28	57	250	222-345	208-492
H	—	15.4	27	145	222-345	—

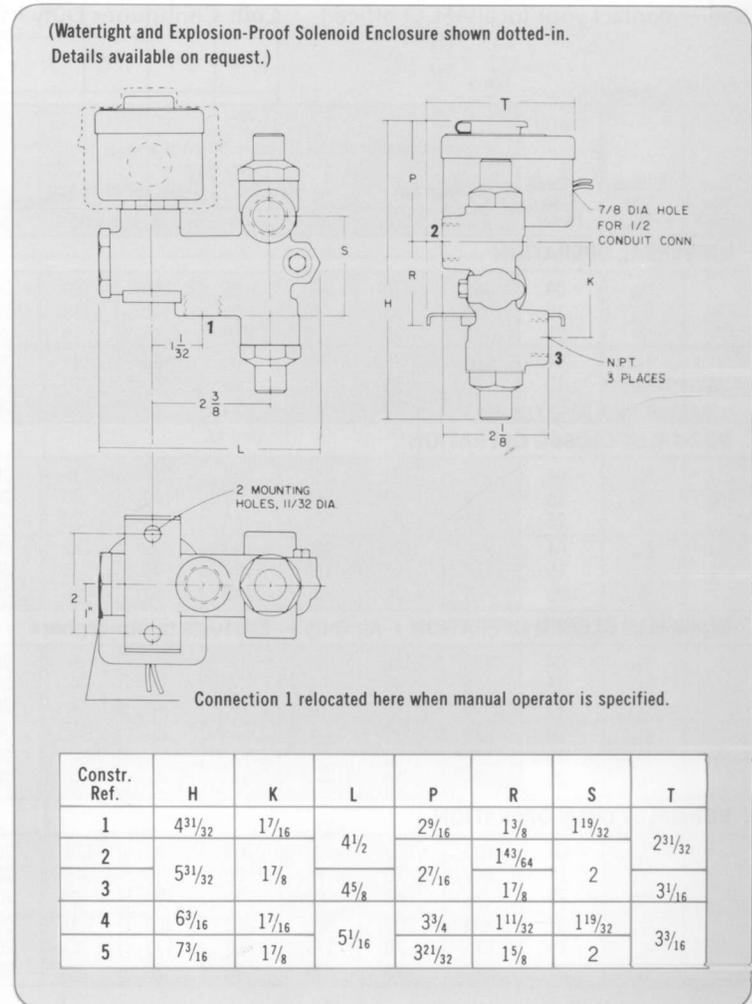
FLOW DIAGRAMS



ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)



MIDGET 3 Way Solenoid Valves

Brass Body • 1/8" and 1/4" N.P.T.

General Description

These midget brass body 3 way solenoid valves are ideally suited for controlling single acting cylinders.

Important: No minimum operating pressure required!

Specifications

Operation: Three types available:

(a) Normally Closed — applies pressure when solenoid is energized; exhausts pressure when solenoid is de-energized.

(b) Normally Open — applies pressure when solenoid is de-energized; exhausts pressure when solenoid is energized.

(c) Universal — for normally closed or normally open operation. Also suitable for selection (pressure applied to Ports 2 and 3) or diversion (pressure applied to Port 1) of pressure.

Valve Parts in Contact with Fluid:

Body — Brass. (Stainless Steel also available — contact your local ASCO office.)

Seals and Discs — Buna "N" and Nylon.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Core Guide — Acetal — all AC valves and 1/8" orifice normally open DC valves.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A.



Temperature:

Fluid: 32°F. to 200°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves may be mounted in any position.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 45 SSU		AC	DC			Catalog Number	Catalog Number
			AC	DC	AC	DC	AC	DC	AC	DC	AC	DC		
UNIVERSAL OPERATION														
1/8	3/64	.04	160	70	160	65	160	65	200	104	8314C41	8314C10	11/A	11.2/A
	3/32	.15	80	35	40	35	40	15	200	104	8314C43	8314C11	11/A	11.2/A
	1/8	.25	45	20	25	15	25	15	200	104	8314C45	8314C12	11/A	11.2/A
1/4	3/64	.04	160	70	160	65	160	65	200	104	8314C6	8314C13	11/A	11.2/A
	3/32	.15	80	35	40	35	40	15	200	104	8314C7	8314C14	11/A	11.2/A
	1/8	.25	45	20	25	15	25	15	200	104	8314C8	8314C15	11/A	11.2/A
NORMALLY CLOSED OPERATION														
1/8	3/64	.04	230	120	230	140	230	135	200	104	8314C31	8314C25	11/A	11.2/A
	3/32	.15	125	60	100	70	100	30	200	104	8314C32	8314C26	11/A	11.2/A
	1/8	.25	75	30	60	40	60	25	200	104	8314C33	8314C27	11/A	11.2/A
1/4	3/64	.04	230	120	230	140	230	135	200	104	8314C34	8314C28	11/A	11.2/A
	3/32	.15	125	60	100	70	100	30	200	104	8314C35	8314C29	11/A	11.2/A
	1/8	.25	75	30	60	40	60	25	200	104	8314C36	8314C30	11/A	11.2/A
NORMALLY CLOSED OPERATION • Air Only — Exhausts to Atmosphere														
1/8	3/64	.04	230	120	—	—	—	—	200	104	8314C19	—	11/A	11.2/A
	3/32	.15	125	60	—	—	—	—	200	104	8314C20	—	11/A	11.2/A
	1/8	.25	75	30	—	—	—	—	200	104	8314C21	—	11/A	11.2/A
1/4	3/64	.04	230	120	—	—	—	—	200	104	8314C22	—	11/A	11.2/A
	3/32	.15	125	60	—	—	—	—	200	104	8314C23	—	11/A	11.2/A
	1/8	.25	75	30	—	—	—	—	200	104	8314C24	—	11/A	11.2/A
NORMALLY OPEN OPERATION														
1/8	3/64	.04	300	200	300	200	300	120	200	104	8314C49	8314C58	11/A	11.2/A
	3/32	.15	175	70	175	90	175	45	200	104	8314C50	8314C59	11/A	11.2/A
	1/8	.25	90	40	90	40	90	25	200	104	8314C51	8314C60	11/A	11.2/A
1/4	3/64	.04	300	200	300	200	300	120	200	104	8314C52	8314C61	11/A	11.2/A
	3/32	.15	175	70	175	90	175	45	200	104	8314C53	8314C62	11/A	11.2/A
	1/8	.25	90	40	90	40	90	25	200	104	8314C54	8314C63	11/A	11.2/A

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	11	21	42	27-462	27-463

OPTIONAL FEATURES

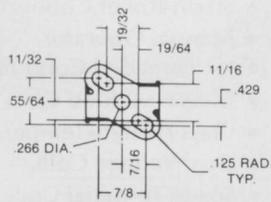
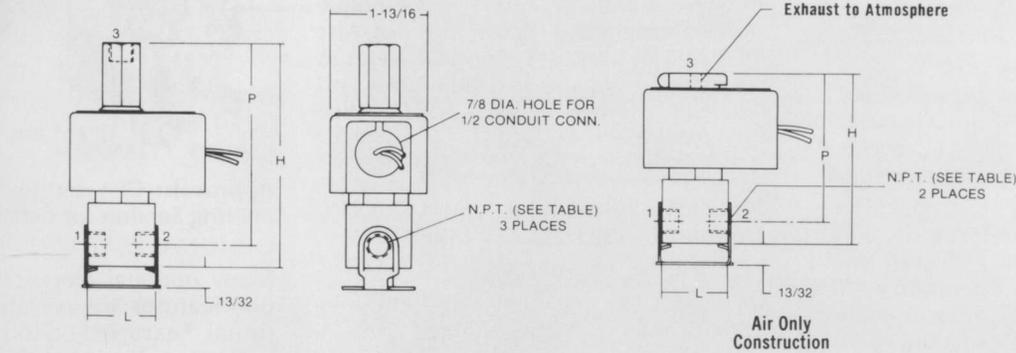
Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)

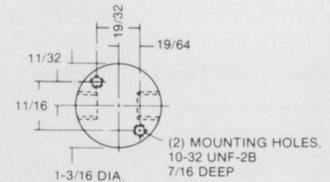
(Watertight and Explosion-Proof Solenoid Dimensions available on request.)



Mounting Bracket Standard
1/4" N.P.T. Size Only

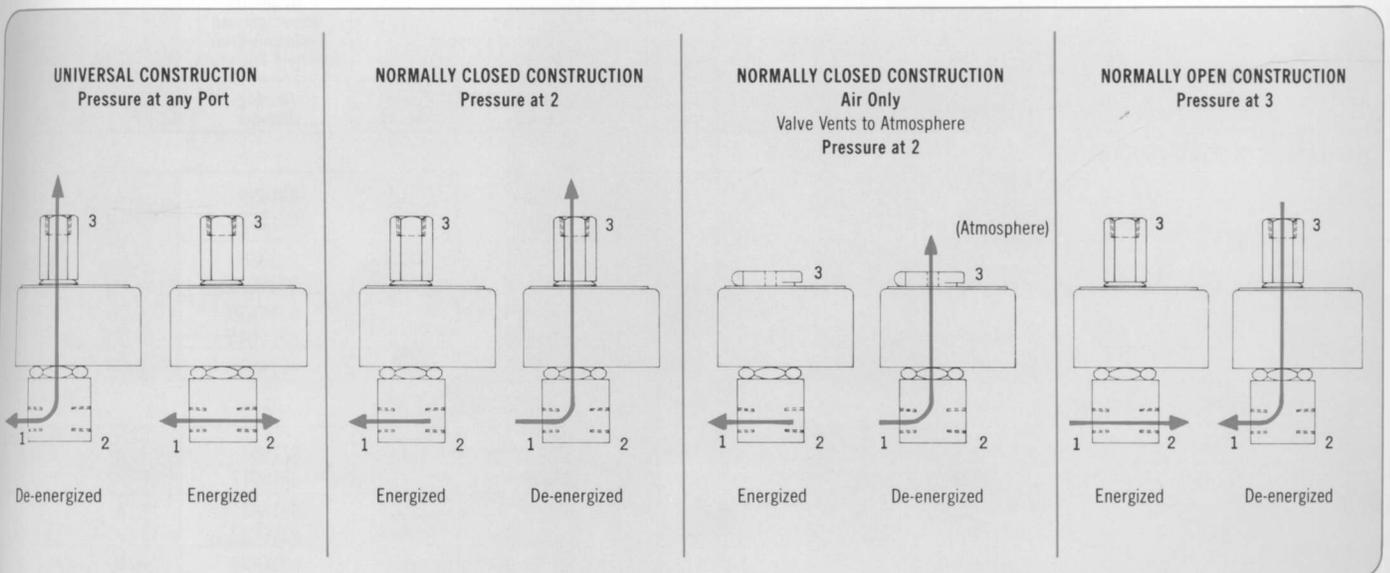
Air Only Construction

Pipe Size	L	H	P
1/8	13/16	329/32	39/16
1/4	1 1/4	4 1/4	327/32
1/8	13/16	3	221/32
1/4	1 1/4	3 3/16	225/32



Mounting Detail
1/8" N.P.T. Size Only

FLOW DIAGRAMS



HIGH FLOW 3 Way Solenoid Valves

Forged Brass Body • 3/8", 1/2", 3/4" and 1" N.P.T.

General Description

These 3 way, internal piloted diaphragm valves have only four operating parts — a stainless steel core, two diaphragms and a disc holder.

Important: 10 psi minimum operating pressure differential required. Valve vents to "zero" psi.

Applications

These valves are used in a variety of applications, such as:

- pilots
- compressor unloaders
- cylinders
- turbines

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy-duty operation • click-less and quiet (no AC hum) operation. Refer to Long Life Construction.

Specifications

Operation: Normally closed and normally open, refer to flow diagrams.

Valve Parts in Contact with Fluid:

Body — Forged Brass.

Seals and Discs — Buna "N."

Diaphragm Assembly — Buna "N" with Brass and Stainless Steel Trim.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Pilot Seat Cartridge — Acetal.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A and F, as listed.

Temperature:

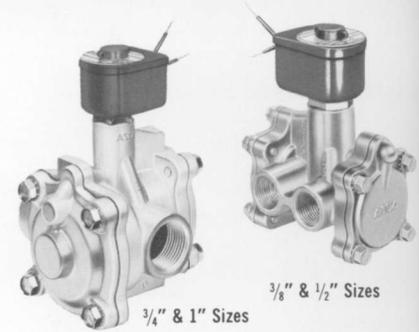
Fluid: 32°F. to 180°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Tables for envelope size and mounting.

Attitude: Valves may be mounted in any position.



3/8" & 1/2" Sizes

Approvals: CSA certified. Refer to Engineering Section for details.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section. Some typical options are listed below:

- Type 1 Junction Box Solenoid Enclosure
- Strain-Relief Connector
- Manual Operator
- 1/2" Threaded Conduit Hub or Adapter
- Class F Molded Coils
- Class H High-Temperature Coils
- Dual Voltage Coils
- Spade Terminal Coils
- Open Frame Solenoid for Cabinet Installation

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)				Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Minimum	Maximum		Catalog Number			Constr. Ref. No.	Catalog Number	AC	DC		
				AC	DC		AC	DC						
NORMALLY CLOSED OPERATION														
3/8	5/8 5/8	3	10	125	125	180	120	831654	1	831655	6/A	9.7/A		
				250	250	180	180						8316C14	2	8316C15	16.7/F	16.8/A
1/2	5/8 5/8	4	10	125	125	180	120	831664	1	831665	6/A	9.7/A		
				250	250	180	180						8316C24	2	8316C25	16.7/F	16.8/A
3/4	11/16 11/16	5.5	10	125	125	180	120	8316A74	3	8316A75	6/A	9.7/A		
				250	250	180	180						8316D44	4	8316D45	16.7/F	16.8/A
1	1	13	10	125	125	180	120	8316E34	5	8316E35	6/A	9.7/A		
NORMALLY OPEN OPERATION														
3/8	5/8 5/8	3	10	125	125	180	120	831656	1	831657	6/A	9.7/A		
				250	250	180	180						8316C16	2	8316C17	16.7/F	16.8/A
1/2	5/8 5/8	4	10	125	125	180	120	831666	1	831667	6/A	9.7/A		
				250	250	180	180						8316C26	2	8316C27	16.7/F	16.8/A
3/4	11/16 11/16	5.5	10	125	125	180	120	8316A76	3	8316A77	6/A	9.7/A		
				250	250	180	180						8316D46	4	8316D47	16.7/F	16.8/A
1	1	13	10	125	125	180	120	8316E36	5	8316E37	6/A	9.7/A		

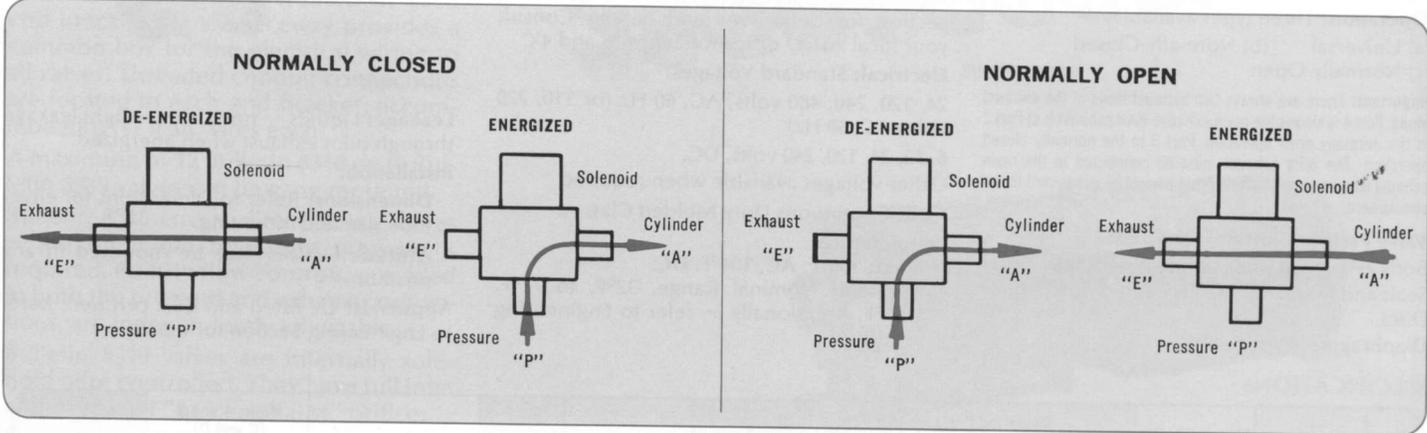
ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832
A	16.8	—	—	—	—	96-671
F	—	16.7	35	56	64-982	—

IMPORTANT
 A minimum operating pressure differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

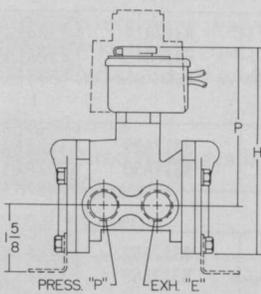
ORDERING INFORMATION
IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

FLOW DIAGRAMS

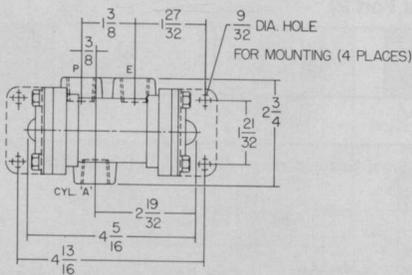


DIMENSIONS (in inches)

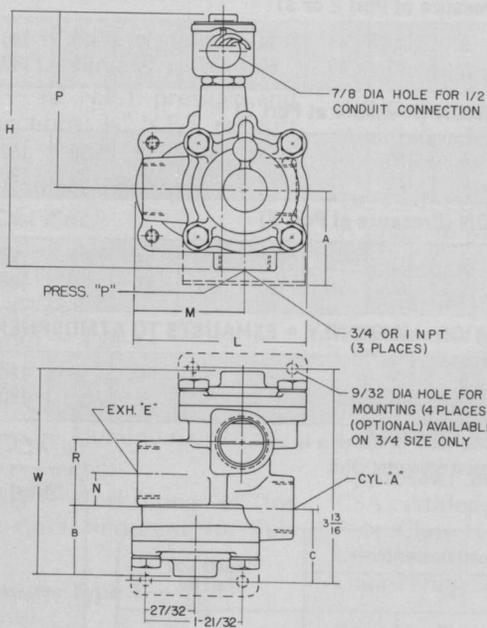
(Watertight and Explosion-Proof Solenoid shown dotted-in. Details available on request.)



Constr. Ref.	1	2
H	5 1/8	5 5/8
P	3 15/16	4 7/16



Constr. Refs. 1 and 2
 3/8" and 1/2" Sizes



Constr. Refs. 3, 4 and 5
 3/4" and 1" Sizes

Constr. Ref.	3	4	5
Pipe Size	3/4	3/4	1
A	1 5/8	1 5/8	—
B	1 13/32	1 13/32	1 25/32
C	1 21/32	1 21/32	—
H	6	6 1/2	6 5/8
L	3 3/8	3 3/8	4 7/16
M	2 5/32	2 5/32	2 13/16
N	1 7/32	1 7/32	7/8
P	4 5/16	4 13/16	4 9/16
R	1/2	1/2	1 3/4
W	3 5/16	3 5/16	5 11/32

Note: Mounting Brackets available for 3/8", 1/2" and 3/4" sizes (2 required per valve). Each bracket has 2 holes, each 9/32" dia.

MIDGET "QUICK EXHAUST" 3 Way Solenoid Valves

Forged Brass or Stainless Steel Body • 1/4" N.P.T.

General Description

These midget solenoid valves have an oversize exhaust orifice that permits a "quick exhaust" of cylinders and diaphragms.

VALVE VENTS TO ZERO PSI.

Applications

• pilots • air vises • cylinders • air motors

Specifications

Operation: Three types available:

- (a) Universal
- (b) Normally Closed
- (c) Normally Open

Important: There are always two exhaust flows in the exhaust mode. Port 4 is always the main exhaust. Pilot exhaust is at Port 2 in the normally open operation, Port 3 in the normally closed operation. The pilot exhaust must be connected to the main exhaust when controlling fluids that cannot be exhausted to the atmosphere.

Valve Parts in Contact with Fluid:

Body — Forged Brass or Stainless Steel.

Seals and Discs — Buna "N" and Nylon (Upper Disc).

Diaphragm — Neoprene.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Spring — 302 s.s.

Shading Coil — Copper for brass body and Silver for stainless steel body.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

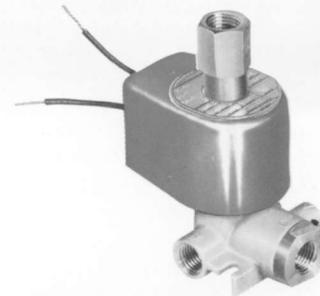
Other voltages available when required.

Coil: Continuous Duty Molded Class A.

Temperature:

Fluid: 180°F. AC, 104°F. DC.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



Leakage: Liquids — none; air — slight leakage through pilot exhaust when energized.

Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)								Maximum Fluid Temp. °F.	Body Material	Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
					Minimum			Maximum				Light Oil @ 45 SSU			AC	DC	Catalog Number	Catalog Number	AC	DC
	Press.	Vent	Press.	Vent	AC	DC	AC	DC	AC	DC										
UNIVERSAL OPERATION (Pressure at Port 2 or 3)																				
1/4	3/32	1/4	.20	.73	5	80	40	50	30	50	15	180	104	Brass	8317A7	8317A14	11/A	11.2/A		
			.20	.73		5	80	40	50	30	50	15	180						104	SS	8317A8	8317A15	11/A	11.2/A
NORMALLY CLOSED OPERATION (Pressure at Port 2)																				
1/4	3/32	1/4	.20	.73	5	125	75	125	55	95	30	180	104	Brass	8317A35	8317A29	11/A	11.2/A		
			.20	.73		5	125	75	125	55	95	30	180						104	SS	8317A36	8317A30	11/A	11.2/A
NORMALLY OPEN OPERATION (Pressure at Port 3)																				
1/4	3/32	1/4	.15	.73	5	160	75	160	45	95	25	180	104	Brass	8317A53	8317A62	11/A	11.2/A		
			.15	.73		5	160	75	160	45	95	25	180						104	SS	8317A54	8317A63	11/A	11.2/A
NORMALLY CLOSED OPERATION • AIR ONLY • EXHAUSTS TO ATMOSPHERE (Pressure at Port 2)																				
1/4	3/32	1/4	.20	.73	5	125	—	—	—	—	—	180	—	Brass	8317B23	②	11/A	—		
			.20	.73		5	125	—	—	—	—	—	180						—	SS	8317B24	②	11/A	—

Notes: ① Minimum Operating Pressure Differential on light oil is 10 psi.
② Use normally closed, piped exhaust equivalent valve.

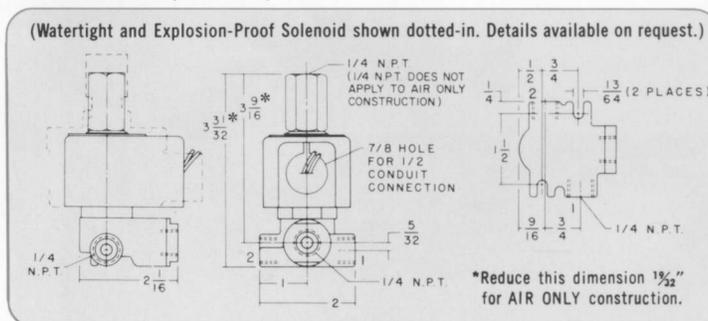
ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	11	21	42	27-462	27-463

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

DIMENSIONS (in inches)



GANG MOUNTING

3 Way Solenoid Valves

Zinc Body • 1/4" and 3/8" N.P.T.

ASCO® Red-Hat®
BULLETINS
8318, 8319

General Description

These 3 way solenoid valves are designed for gang mounting into any desired number of valves. Any combination of normally closed and normally open valves may be grouped together to control single and double acting AIR cylinders.

The valves are designed to simplify wiring and piping. Common pressure and exhaust connections are located in each end bracket. A wire raceway provides a common box for the electrical wiring to all valves. Threaded conduit connections are located in each end bracket, accommodating 12 lead wires each.

A maximum of 12 Bulletin 8318 or 10 Bulletin 8319 valves can be gang mounted.

Bulletin 8318 covers direct acting valves — no minimum operating pressure is required. Built-in flow controls, provided in both the pressure and exhaust connections, are independently adjustable.

Bulletin 8319 valves are internally solenoid pilot controlled. They have full inlet and oversized "quick exhaust" orifices.

Do-It-Yourself or Factory Assembled Units Available:

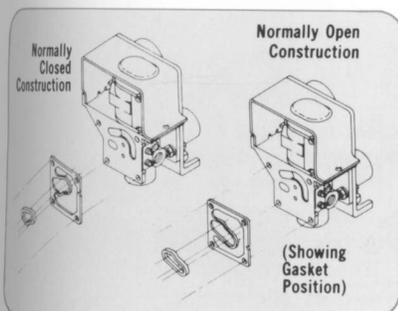
(a) "Do-It-Yourself" Assembly — individual valves and end bracket kits may be purchased permitting on-the-job gang mounting of any combination.

(b) Factory Assembly — valves are gang mounted at the factory to customer requirements, supplied standard with tie-rods.

Specifications

Operation: Three types available:

- (a) Normally Closed
- (b) Normally Open



(c) Universal (Bulletin 8318 only) — interchangeable from normally closed to normally open (or vice versa) merely by inverting the gasket (only with this construction).



BULLETIN 8318



BULLETIN 8319

Pipe Sizes:

Bulletin 8318 — 1/4" N.P.T. pressure and exhaust; 1/8" N.P.T. cylinder.

Bulletin 8319 — 3/8" N.P.T. pressure and cylinder connections; 3/4" N.P.T. exhaust connection.

Valve Parts in Contact with Fluid:

Body — Die-Cast Zinc.

Seals and Discs — Buna "N" and Urethane (Bulletin 8319).

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Metering Screws — Aluminum.

Seat Cartridge — Acetal.

Interface Gasket — Cork/Buna "N" for Bulletin 8318; Cork/Neoprene for Bulletin 8319.

Solenoid Enclosure: Type 1 — General Purpose.

Electrical: Standard Voltages:

24, 120, 240 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

AC Coil: Continuous Duty Molded Class A with Spade Terminals. 18" leads can be supplied, use catalog number prefix "L."

DC Coil: Continuous Duty Molded Class A supplied with leads only.

Temperature:

Fluid: To 104°F., as listed.

Ambient: Nominal Range, 32°F. to 104°F. Refer to Engineering Section.

Installation:

Attitude: Mountable in any position.

Approvals: Bulletins 8318 and 8319 are CSA certified. When supplied with Class F or Class H coils, Bulletin 8318 is UL listed recognized component. Refer to Engineering Section for details.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

SPECIFICATIONS: "Do-It-Yourself" Assembly² • Air Only

This table covers single valve unit consisting of complete valve, one gasket and bolts (see photos).

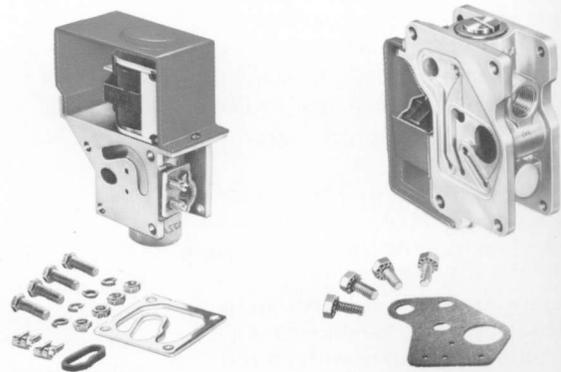
Pipe Size (ins.)		Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure	Watt Rating/ Class of Coil Insulation	
Cylinder	Pressure and Exhaust			Minimum	Maximum	AC	DC	Catalog Number	AC	DC
UNIVERSAL OPERATION										
1/8	1/4	3/64	.044	0	100	104	77	8318D1	6/A	9.7/A
1/8	1/4	3/32	.11	0	40	104	77	8318D3	6/A	9.7/A
NORMALLY CLOSED OPERATION										
1/8	1/4	3/64	.044	0	200	104	77	8318D19	6/A	9.7/A
1/8	1/4	3/32	.11	0	100	104	77	8318D20	6/A	9.7/A
3/8	③	①	①	15	125	104	77	8319C2	6/A	9.7/A
NORMALLY OPEN OPERATION										
1/8	1/4	3/64	.044	0	200	104	77	8318D49	6/A	9.7/A
1/8	1/4	3/32	.11	0	100	104	77	8318D50	6/A	9.7/A
3/8	③	①	①	15	125	104	77	8319C4	6/A	9.7/A

- Notes:**
- ① Pressure orifice is 3/32" having .8 Cv Flow Factor. Exhaust orifice is 1 1/32" having 1.2 Cv Flow Factor.
 - ② Catalog number covers single valve unit consisting of complete valve, one gasket and bolts. End brackets must be ordered separately — refer to Price Schedule.
 - ③ Pressure and cylinder connection 3/8" N.P.T. Exhaust connection 3/4" N.P.T.

ELECTRICAL INFORMATION

Standard Coil* and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	25.5	91-087	103-832

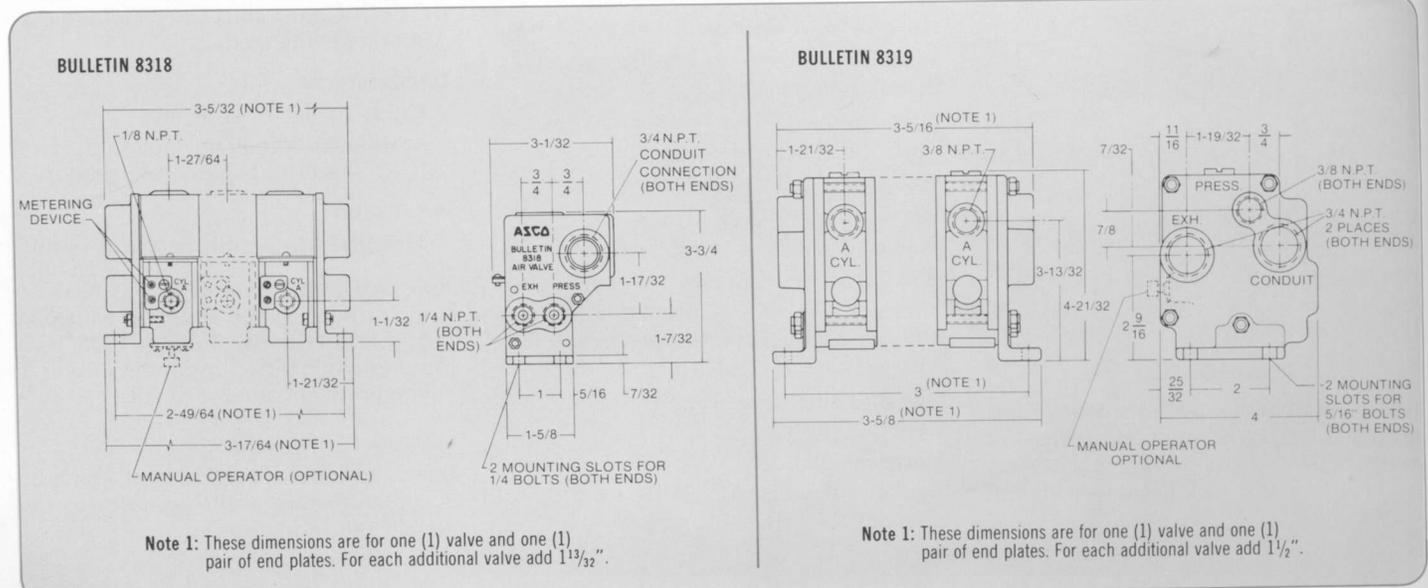
*Standard AC Coil supplied with spade terminals; 18" coil leads are available on request — use catalog number prefix "L."
 Standard DC Coil supplied with coil leads only.
 For 480 volts, 60 Hz can furnish coil with leads only, at no additional charge.



BULLETIN 8318

BULLETIN 8319

DIMENSIONS (in inches)



Note 1: These dimensions are for one (1) valve and one (1) pair of end plates. For each additional valve add 1 13/32".

Note 1: These dimensions are for one (1) valve and one (1) pair of end plates. For each additional valve add 1 1/2".

MINIATURE SIZE 3 Way Solenoid Valves

Brass or Stainless Steel Body • 1/8" and 1/4" N.P.T.

ASCO® Red-Hat®
BULLETIN
8320

General Description

This compact design eliminates the orifice connection in the solenoid — all connections are in the valve body providing in-line piping.

This modern design concept with orifice and pipe connections in the body also permits coil replacement without opening pipe connections — now necessary on other 3 way valves.

Applications

For automatic control of air, inert gas, water, light oil, freon and all other gases and liquids... non-corrosive to brass and stainless steel. Valves are commonly used to apply pressure to and vent pressure from cylinders and diaphragms or for selection and diversion of pressure.

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy duty operation • click-less and quiet (no AC hum) operation. Refer to Long Life Construction.

Some typical applications are:

- automation
- vending
- air and hydraulic cylinders
- pilot operators
- gas sampling
- copying and reproduction equipment
- lubricating devices
- air conditioning
- instrumentation
- air dryers
- laundry equipment
- compressors
- robots

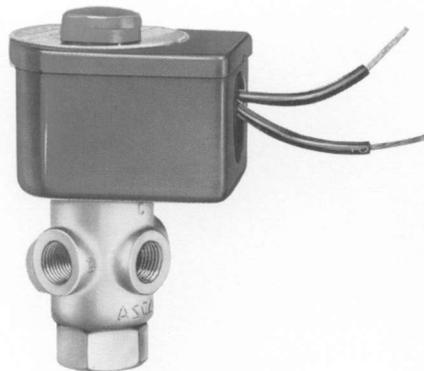
Specifications

Operation: Three types available:

(a) Normally Closed — applies pressure when solenoid is energized; exhausts pressure when solenoid is de-energized.

(b) Normally Open — applies pressure when solenoid is de-energized; exhausts pressure when solenoid is energized.

(c) Universal — for normally closed or normally open operation. Also suitable for selection of two pressures (pressure applied at 2 and 3) and diversion flow (pressure applied at 1).



1/4" Brass



1/8" and 1/4" Stainless Steel
1/8" Brass

Valve Parts in Contact with Fluid:

Body — Brass or 303 s.s., as listed.
Seals and Discs — Buna "N" or Urethane, as listed.
Core Tube — 305 s.s.
Core and Plugnut — 430F s.s.
Core Spring — 302 s.s.
Shading Coil — Copper (brass body); Silver (stainless steel body).
Disc Holder — Acetal.
Core Guide (10.5 and 16.7 watt only) — Acetal.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A or F Coils, as listed.

Temperature:

Fluid: 32°F. to 200°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves may be mounted in any position except as noted in Dimensions Table.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section. Some typical options are listed below:

- Junction Box Solenoid Enclosure
- Strain-Relief Connector
- Manual Operator
- 1/2" Threaded Conduit Hub or Adapter
- Class A or F Molded Coils with Spade Terminals or Leads
- Class A or F Dual Voltage Molded Coils
- Class H High-Temperature Molded Coils
- Open Frame Solenoid for Cabinet Installation

SPECIFICATIONS • Brass Body

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 300 SSU		AC	DC	Catalog Number	Constr. Ref. No.	Catalog Number	AC	DC	
			AC	DC	AC	DC	AC	DC								
<p>UNIVERSAL OPERATION (Pressure at any orifice)</p> <div style="display: flex; justify-content: space-around;">   </div>																
1/8	3/64	.06	175	125	175	125	175	125	140	120	8320B130	1	8320B131	9/F	9.7/A	
	1/16	.09	100	65	100	65	100	65	180	120	8320B1	1	8320B2	9/F	9.7/A	
	3/32	.12	50	50	50	50	50	50	180	120	8320B83	1	8320B84	6/A	9.7/A	
	1/8	.21	30	20	30	20	30	20	180	120	8320B3	1	8320B4	9/F	9.7/A	
1/4	1/16	.09	100	65	100	65	100	65	180	120	8320A5	3	8320A6	9/F	9.7/A	
	3/32	.12	40	40	40	40	40	40	180	120	8320A85	3	8320A86	6/A	9.7/A	
	1/8	.25	30	20	30	20	30	20	180	120	8320A9	3	8320A10	9/F	9.7/A	
1/4	1/32	.02	395	280	410	305	410	305	140	140	8320A170	4	8320A171	16.7/F	11.2/A	
	1/16	.09	125	75	130	75	130	75	200	150	8320A172	4	8320A173	10.5/A	11.2/A	
	3/32	.12	100	60	100	60	100	60	200	150	8320B174	4	8320B175	16.7/F	11.2/A	
	1/8	.25	50	25	50	25	50	25	200	150	8320B176	4	8320B177	16.7/F	11.2/A	
	11/64	.35	20	12	20	12	20	12	200	150	8320A178	4	8320A179	10.5/A	11.2/A	
<p>NORMALLY CLOSED OPERATION (Pressure at 2)</p> <div style="display: flex; justify-content: space-around;">   </div>																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320B132	1	8320B133	6/A	9.7/A	
	3/64	.06	300	250	300	250	300	250	140	120	8320B134	1	8320B135	9/F	9.7/A	
	1/16	.09	125	125	125	125	125	125	180	120	8320B13	1	8320B14	6/A	9.7/A	
	3/32	.12	100	100	100	100	100	100	180	120	8320B15	1	8320B16	6/A	9.7/A	
1/4	1/16	.09	125	125	125	125	125	125	180	120	8320A19	3	8320A20	6/A	9.7/A	
	3/32	.12	110	65	110	65	110	65	180	120	8320A89	3	8320A90	9/F	9.7/A	
	1/8	.25	40	40	40	40	40	40	180	120	8320A23	3	8320A24	6/A	9.7/A	
	11/64	.35	30	20	30	20	30	20	180	120	8320A97	3	8320A98	9/F	9.7/A	
1/4	1/32	.02	750	520	750	550	750	570	140	140	8320A180	4	8320A181	16.7/F	11.2/A	
	1/16	.09	210	160	225	160	225	160	200	150	8320A182	4	8320A183	16.7/F	11.2/A	
	3/32	.12	150	115	150	115	150	115	200	150	8320A184	4	8320A185	10.5/A	11.2/A	
	1/8	.25	85	60	85	60	85	60	200	150	8320A186	4	8320A187	10.5/A	11.2/A	
	11/64	.35	45	25	45	25	45	25	200	150	8320A188	4	8320A189	10.5/A	11.2/A	
<p>NORMALLY OPEN OPERATION (Pressure at 3)</p> <div style="display: flex; justify-content: space-around;">   </div>																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320B136	1	8320B137	6/A	9.7/A	
	3/64	.06	300	250	300	250	300	250	140	120	8320B138	1	8320B139	9/F	9.7/A	
	1/16	.09	125	125	125	125	125	125	180	120	8320B27	1	8320B28	6/A	9.7/A	
	3/32	.12	100	100	100	100	100	100	180	120	8320B29	1	8320B30	6/A	9.7/A	
1/4	1/16	.09	125	125	125	125	125	125	180	120	8320A33	3	8320A34	6/A	9.7/A	
	3/32	.12	110	65	110	65	110	65	180	120	8320A91	3	8320A92	9/F	9.7/A	
	1/8	.25	40	40	40	40	40	40	180	120	8320A37	3	8320A38	6/A	9.7/A	
	11/64	.35	30	20	30	20	30	20	180	120	8320A99	3	8320A100	9/F	9.7/A	
1/4	1/32	.02	790	550	825	600	825	600	140	140	8320A190	4	8320A191	16.7/F	11.2/A	
	1/16	.09	235	160	250	160	250	160	200	150	8320A192	4	8320A193	16.7/F	11.2/A	
	3/32	.12	140	100	140	100	140	100	200	150	8320A194	4	8320A195	10.5/A	11.2/A	
	1/8	.25	70	55	70	55	70	55	200	150	8320A196	4	8320A197	10.5/A	11.2/A	
	11/64	.35	40	30	40	30	40	30	200	150	8320A198	4	8320A199	10.5/A	11.2/A	

Note: ① Supplied with cast urethane discs.

ELECTRICAL INFORMATION

ORDERING INFORMATION
IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	Watts	AC		AC	DC
			VA Holding	VA Inrush		
A	9.7	6	15.6	25.5	96-619	103-832
F	—	9	22.5	36.5	99-216	—
A	11.2	10.5	23	45	27-462	27-463
F	—	16.7	35	56	64-982	—

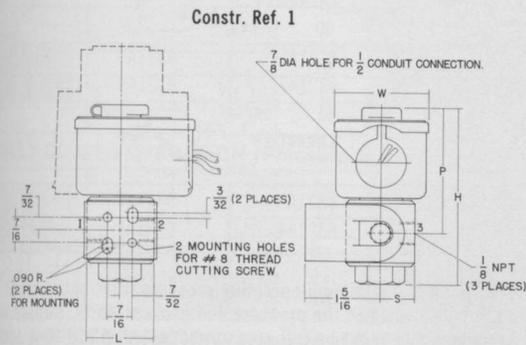
SPECIFICATIONS • Stainless Steel Body

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Water		Light Oil @ 300 SSU				Catalog Number	Constr. Ref. No.	Catalog Number	AC			DC
			AC	DC	AC	DC	AC	DC	AC	DC						
UNIVERSAL OPERATION (Pressure at any orifice)																
1/8	3/64	.06	175	125	175	125	175	125	140	120	8320A140 ^①	1	8320A141 ^①	9/F	9.7/A	
	1/16	.09	100	65	100	65	100	65	180	120	8320A41	1	8320A42	9/F	9.7/A	
	3/32	.12	50	50	50	50	50	50	180	120	8320A87	1	8320A88	6/A	9.7/A	
	1/8	.21	30	20	30	20	30	20	180	120	8320A43	1	8320A44	9/F	9.7/A	
1/4	1/16	.09	100	65	100	65	100	65	180	120	832057	2	832058	9/F	9.7/A	
	3/32	.12	40	40	40	40	40	40	180	120	832059	2	832060	6/A	9.7/A	
	1/8	.31	30	20	30	20	30	20	180	120	832061	2	832062	9/F	9.7/A	
NORMALLY CLOSED OPERATION (Pressure at 2)																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320A142	1	8320A143	6/A	9.7/A	
	3/64	.06	300	250	300	250	300	250	140	120	8320A144 ^①	1	8320A145 ^①	9/F	9.7/A	
	1/16	.09	125	125	125	125	125	125	180	120	8320A45	1	8320A46	6/A	9.7/A	
	3/32	.12	100	100	100	100	100	100	180	120	8320A47	1	8320A48	6/A	9.7/A	
1/4	1/16	.09	125	125	125	125	125	125	180	120	832063	2	832064	6/A	9.7/A	
	3/32	.12	110	65	110	65	110	65	180	120	832093	2	832094	9/F	9.7/A	
	1/8	.31	40	40	40	40	40	40	180	120	832065	2	832066	6/A	9.7/A	
NORMALLY OPEN OPERATION (Pressure at 3)																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320A146	1	8320A147	6/A	9.7/A	
	3/64	.06	300	250	300	250	300	250	140	120	8320A148 ^①	1	8320A149 ^①	9/F	9.7/A	
	1/16	.09	125	125	125	125	125	125	180	120	8320A51	1	8320A52	6/A	9.7/A	
	3/32	.12	100	100	100	100	100	100	180	120	8320A53	1	8320A54	6/A	9.7/A	
1/4	1/16	.09	125	125	125	125	125	125	180	120	832067	2	832068	6/A	9.7/A	
	3/32	.12	110	65	110	65	110	65	180	120	832095	2	832096	9/F	9.7/A	
	1/8	.31	40	40	40	40	40	40	180	120	832069	2	832070	6/A	9.7/A	

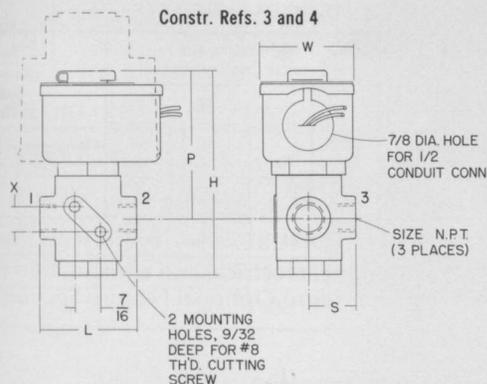
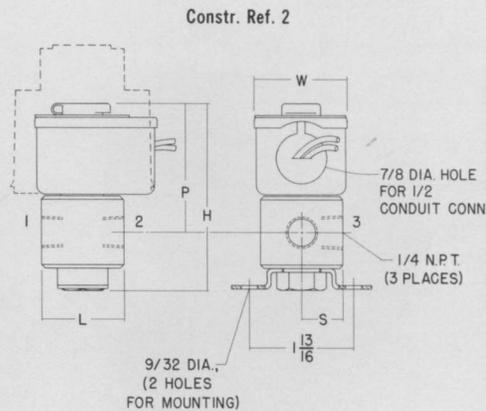
Note: ① Supplied with cast urethane discs.

DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in. Details available on request.)



(Bracket Supplied with Constr. Refs. 1 and 2 Valves.)



Constr. Ref.	Pipe Size	H	L	P	S	W	X
1	1/8	3 ³ / ₁₆	1 ³ / ₁₆	2 ¹ / ₄	1 ⁹ / ₃₂	1 ²¹ / ₃₂	—
2	1/4	3 ¹ / ₄	1 ⁷ / ₁₆	2 ⁷ / ₃₂	2 ³ / ₃₂	1 ²¹ / ₃₂	—
3	1/4	3 ¹⁹ / ₃₂	1 ¹¹ / ₁₆	2 ¹⁹ / ₃₂	1 ³ / ₁₆	1 ²¹ / ₃₂	3/8
4	1/4	3 ¹³ / ₁₆	1 ¹¹ / ₁₆	2 ¹³ / ₁₆	1 ³ / ₁₆	1 ¹³ / ₁₆	3/8

Note: Mounting Brackets available for Brass Body Constr. Refs. 3 and 4 Valves, refer to Price Schedule.

INTEGRAL ADJUSTABLE FLOW CONTROL

3 Way Solenoid Valves

Zinc Body • 1/8" and 1/4" N.P.T.

ASCO® Red-Hat®
BULLETIN
8324

General Description

This direct acting 3 way valve has adjustable flow controls integral with the body.

The flow through the pressure and exhaust connections of the valve may be independently controlled to regulate the rate of speed of cylinder pistons in either direction.

Important: No minimum operating pressure required.

Applications

They are used in various applications, such as:

- cylinders (for controlling speed)
- air vises
- air motors

Specifications

Operation: Three types available:

(a) Normally Closed (c) Universal

(b) Normally Open

Valve Parts in Contact with Fluid:

Body — Die-Cast Zinc.

Seals and Discs — Buna "N."

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Seat Insert and Disc Holder — Acetal.

Metering Stems — Aluminum.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A or F, as listed.

Temperature:

Fluid: 32°F. to 104°F., as listed.

Ambient: Nominal Range, 32°F. to 104°F., AC; to 77°F., DC. (Refer to Engineering Section.)

Installation:

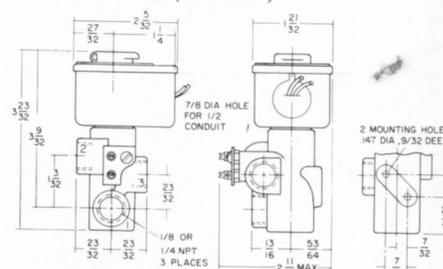
Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.



Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

DIMENSIONS (in inches)



(Watertight and Explosion-Proof Solenoid Dimensions available on request.)

SPECIFICATIONS

	Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure Catalog Number	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure Catalog Number	Watt Rating/Class of Coil Insulation	
				Air-Inert Gas					AC	DC
				AC	DC					
UNIVERSAL OPERATION (Pressure at any orifice)										
	1/8	1/16	.08	100	65	104	83241	83242	9/F	9.7/A
	1/4	3/32	.13	50	50	104	832419	832420	9/F	9.7/A
		1/8	.18	30	20	104	832421	832422	6/A	9.7/A
							832423	832424	9/F	9.7/A
NORMALLY CLOSED OPERATION (Pressure at 2, Exhaust at 3)										
	1/8	1/16	.08	125	125	104	83247	83248	6/A	9.7/A
		3/32	.13	100	100	104	83249	832410	6/A	9.7/A
	1/4	1/16	.08	125	125	104	832425	832426	6/A	9.7/A
		3/32	.13	100	100	104	832427	832428	6/A	9.7/A
		1/8	.18	40	40	104	832429	832430	6/A	9.7/A
NORMALLY OPEN OPERATION (Pressure at 3, Exhaust at 2)										
	1/8	1/16	.08	125	125	104	832413	832414	6/A	9.7/A
	1/4	1/16	.08	125	125	104	832431	832432	6/A	9.7/A
		3/32	.13	100	100	104	832433	832434	6/A	9.7/A

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832
F	—	9	22.5	36.5	99-216	—

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

Special Valves Available For:

- dry air
- continuous cycling
- exceptionally long life
- clickless and quiet operation

Refer to Long Life Construction.

PLASTIC BODY

3 Way Solenoid Valves

with 1/8" and 1/4" Hose Bib and 1/4" Compression Connections

General Description

These are direct acting solenoid valves that feature compact acetal plastic bodies with various end connections to accommodate plastic, rubber or metal tubing.

Important: No minimum operating pressure is required!

Applications

Bulletin 8360 solenoid valves are ideally suited for industrial-commercial processes.

Specifications

Operation: Three types available:

- (a) Universal
- (b) Normally Closed
- (c) Normally Open

Valve Parts in Contact with Fluid:

Body — Acetal.
Disc — Buna "N."

- Disc Holder — Acetal.
- Disc Retainer (6.5 watt only) — Brass.
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Springs — 302 s.s. or 17-7PH s.s.
- Shading Coil — Copper.

Solenoid Enclosure: Type 1 —
General Purpose.

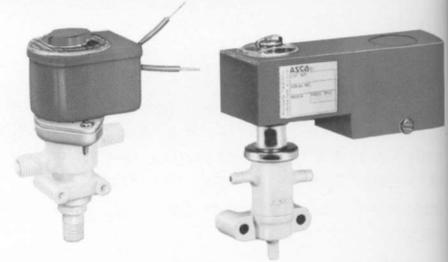
Electrical: Standard Voltages:
24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).
6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A, B or F, as listed.

Temperature:

Fluid: 130°F. Maximum AC, 120°F. Maximum DC.



Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — see Engineering Section.)

Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

Approvals: CSA certified. UL listed as indicated. Refer to Engineering Section for details and coding explanation.

SPECIFICATIONS

Pipe Size	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure			Watt Rating/Class of Coil Insulation	
			Air-Inert Gases-Water		AC	DC	Catalog Number	Constr. Ref. No.	UL Listing	AC	DC
			AC	DC							
UNIVERSAL OPERATION (Pressure at any orifice)											
			DE-ENERGIZED				ENERGIZED				
1/4" O.D. Compression ①	1/16 3/32 1/8	.07 .11 .16	100 50 30	65 50 20	130 130 130	120 120 120	8360A71 8360A73 8360A74	1 1 1	• • •	9/F 6/A 9/F	9.7/A 9.7/A 9.7/A
NORMALLY CLOSED OPERATION (Pressure at 2)											
			DE-ENERGIZED				ENERGIZED				
1/4" O.D. Compression ①	1/16 1/16 3/32 3/32 1/8 1/8	.07 .07 .11 .15 .16 .21	125 125 100 50 40 25	125 — 100 — 40 —	130 130 130 130 130 130	120 — 120 — 120 —	8360A75 836080 8360A77 836081 8360A78 836082	1 2 1 2 1 2	• • • • • •	6/A 6.5/B 6/A 6.5/B 6/A 6.5/B	9.7/A — 9.7/A — 9.7/A —
Bib for 1/4" I.D. Tube	1/16 3/32 1/8	.07 .15 .21	125 50 25	— — —	130 130 130	— — —	836083 836084 836085	3 3 3	• • •	6.5/B 6.5/B 6.5/B	— — —
NORMALLY OPEN OPERATION (Pressure at 3)											
			DE-ENERGIZED				ENERGIZED				
1/4" O.D. Compression ①	1/16 1/16 3/32 3/32 1/8 1/8	.07 .07 .11 .15 .16 .21	125 125 100 50 40 25	125 — 100 — 40 —	130 130 130 130 130 130	120 — 120 — 120 —	8360A67 836086 8360A69 836087 8360A70 836088	1 2 1 2 1 2	• • • • • •	6/A 6.5/B 6/A 6.5/B 6/A 6.5/B	9.7/A — 9.7/A — 9.7/A —
Bib for 1/4" I.D. Tube	1/16 3/32 1/8	.07 .15 .21	125 50 25	— — —	130 130 130	— — —	836089 836090 836091	3 3 3	• • •	6.5/B 6.5/B 6.5/B	— — —

SPECIFICATIONS

SUB-MINIATURE VALVES featuring Permanently Assembled Body and Core Tube Assembly

Pipe Size	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure			Watt Rating/Class of Coil Insulation	
			Air-Inert Gases-Water		AC	DC	Catalog Number	Constr. Ref. No.	UL Listing	AC	DC
			AC	DC							
UNIVERSAL OPERATION (Pressure at any orifice)											
Bib for 1/8" I.D. Tube	1/16	.06	30	15	130	120	836094②	4	—	6.5/B	9.2/F
NORMALLY CLOSED OPERATION (Pressure at 2)											
Bib for 1/8" I.D. Tube	1/16	.06	125	30	130	120	836092②	4	•	6.5/B	9.2/F
NORMALLY OPEN OPERATION (Pressure at 3)											
Bib for 1/8" I.D. Tube	1/16	.06	125	30	130	120	836093②	4	•	6.5/B	9.2/F

Notes: ① Fittings not supplied with valve. To order, refer to List Price Schedule. ② Supplied standard with Type 1 Junction Box Solenoid Enclosure having a ground screw.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832
F	9.2	9	19.5	40	99-216	206-912
B	—	6.5	9.2	17.3	204-945	206-605

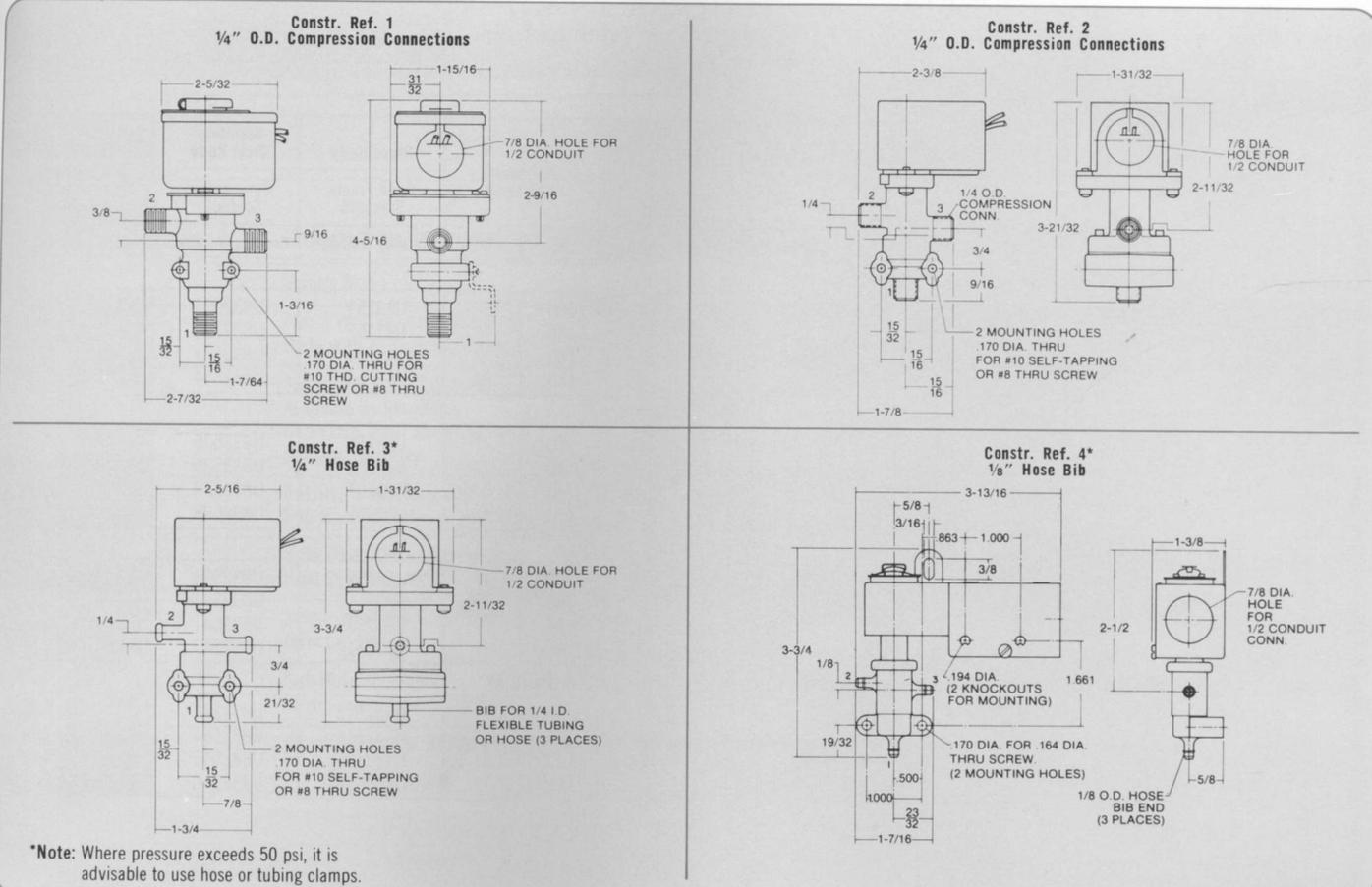
OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

DIMENSIONS (in inches)



SUB-MINIATURE 3 Way Solenoid Valves

Brass or Stainless Steel Body • 1/8" N.P.T.

General Description

These direct acting 3 way valves provide a low cost, compact design for 3 way valving applications.

Important: No minimum operating pressure required.

Applications

Ideally suited for the control of air, inert gas, water, light oil . . . and other fluids compatible with brass or stainless steel. Three way valves are commonly used as pilot valves to actuate larger diaphragm valves, pistons and cylinders.

Some typical applications are:

- automation
 - robots
 - gas sampling
 - instrumentation
 - packaging equipment
 - laundry equipment
 - pilot operators
 - copying equipment
- Manifold construction available. Refer to Bulletin 8380.

Specifications

Operation: Three types available:

- (a) Normally Closed — applies pressure when solenoid is energized; exhausts pressure when solenoid is de-energized.
- (b) Normally Open — applies pressure when solenoid is de-energized; exhausts pressure when solenoid is energized.

(c) Universal — for normally closed or normally open operation. Suitable for selection of two pressures (pressures applied at 2 and 3) and diversion flow (pressure applied at 1).

Valve Parts in Contact with Fluid:

- Body — Brass or 303 s.s., as listed.
- Seals and Discs — Buna "N."
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Core Spring — 302 s.s.
- Shading Coil — Copper.

Solenoid: Open Frame Solenoid.

Electrical: Standard Voltages:

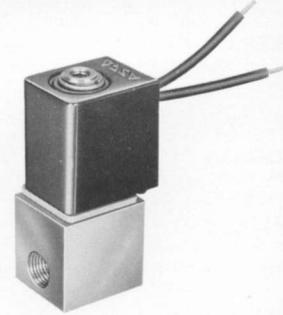
- 24, 120, 240 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).
 - 6, 12, 24, 120, 240 volts, DC.
- Other voltages available when required.

Coil: Continuous Duty Molded Class A.

Temperature:

Fluid: To 180°F. Maximum.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



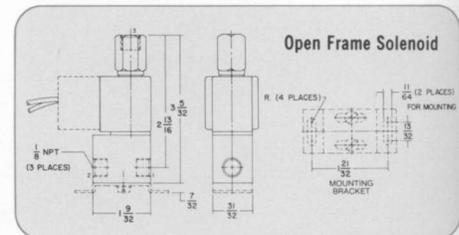
Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

DIMENSIONS (in inches)

(Type 1 Enclosure shown dotted-in.)



SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor		Maximum Operating ^① Pressure Differential (psi)						Maximum Fluid Temp. °F.		Brass Body	Stainless Steel Body	Watt Rating/Class of Coil Insulation	
		At Port "2"	At Port "3"	Air-Inert Gas		Water		Light Oil @ 45 SSU		AC	DC	Open Frame Solenoid	Open Frame Solenoid	AC	DC
				AC	DC	AC	DC	AC	DC						
UNIVERSAL OPERATION (Pressure at Ports 1, 2 and 3)															
1/8	3/64	.05	.07	100	65	90	50	90	40	180	77	U83251	U832531	6.2/A	7/A
	1/16	.09	.07	55	45	55	30	55	25	180	77	U83252	U832532	6.2/A	7/A
	3/32	.17	.07	30	15	30	15	20	15	180	77	U83253	U832533	6.2/A	7/A
	1/8	.23	.07	15	12	15	12	15	12	180	77	U83254	U832534	6.2/A	7/A
NORMALLY CLOSED OPERATION (Pressure at Port 1)															
1/8	3/64	.05	.07	150	150	150	150	120	120	180	77	U83255	U832535	6.2/A	7/A
	1/16	.09	.07	110	110	110	110	75	75	180	77	U83256	U832536	6.2/A	7/A
	3/32	.17	.07	60	60	60	60	40	40	180	77	U83257	U832537	6.2/A	7/A
	1/8	.23	.07	40	40	35	35	30	30	180	77	U83258	U832538	6.2/A	7/A
NORMALLY OPEN OPERATION (Pressure at Port 3)															
1/8	3/64	.05	.07	110	110	110	70	110	50	180	77	U83259	U832539	6.2/A	7/A
	1/16	.09	.07	110	55	110	35	110	30	180	77	U832510	U832540	6.2/A	7/A
	3/32	.17	.07	110	25	110	20	90	20	180	77	U832511	U832541	6.2/A	7/A
	1/8	.23	.07	75	15	75	15	65	15	180	77	U832512	U832542	6.2/A	7/A
NORMALLY CLOSED OPERATION • Air Only • Exhaust to Atmosphere (Pressure at Port 1)															
1/8	3/64	.05	.07	150	150	—	—	—	—	180	77	U832513	U832543	6.2/A	7/A
	1/16	.09	.07	110	110	—	—	—	—	180	77	U832514	U832544	6.2/A	7/A
	3/32	.17	.07	60	60	—	—	—	—	180	77	U832515	U832545	6.2/A	7/A
	1/8	.23	.07	40	40	—	—	—	—	180	77	U832516	U832546	6.2/A	7/A

Note: ① Ratings given are for valves controlling cylinders and diaphragms having dead-end flow conditions. When using common pressure to divert flow, valves may be provided to control higher pressures — consult ASCO for details.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC			AC	DC
		Watts	VA Holding	VA Inrush		
A	7	6.2	8.6	13.6	224-604	224-605

4 WAY SOLENOID VALVES • INDEX

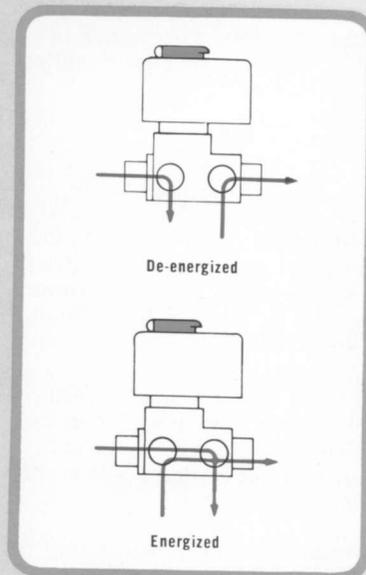
The valves listed in this section are of the 4 way type, having four pipe connections, but in the case of Bulletins 8340, 8345 and 8346, five pipe connections exist — as there are two exhaust orifices. Four way valves are generally used to control double acting pneumatic and hydraulic cylinders.

Body materials of forged brass, zinc, and die-cast aluminum are available. Valves are normally supplied with a Type 1 General Purpose Solenoid Enclosure, having a $\frac{7}{8}$ " diameter hole for $\frac{1}{2}$ " conduit connection. Combination Watertight and Explosion-Proof Solenoid Enclosures conforming to Types 4 and 7 (C and D) standards, which also meet Types 3 and 9 (E, F and G), except where noted, are available.

Many optional features, such as high temperature molded coils, manual operators, metering devices, junction boxes, strain-relief connectors, etc., are available. Refer to the Optional Feature Section for details.

The table below gives, in condensed form, an indication of the pipe sizes, body materials, and general data for valves listed in this 4 way valve section.

Additional 4 way valves are listed in specialized sections of the catalog, i.e., Manual Reset, Air Operated, Special Purpose. Consult the Title Index for the page reference.



INDEX

Pipe Size Range (ins.)	General Valve Description	Body Material	Bulletin Number	Page Number
$\frac{1}{4}$	Midget Size	Brass	8345	60
$\frac{1}{4}$	Two 3 Way Valves in One Body with Built-in Metering	Zinc	8349	64
$\frac{1}{4}$	Single and Dual Solenoids, Available as Standard, Sub Plate (Pad) Mounted, or as Gang Mounted	Aluminum	8340	54-56
$\frac{1}{4}$ - $\frac{3}{8}$	In-Line, Group Mounted and Sub-Base Mounted, Spool Type	Aluminum	8400	65-66
$\frac{1}{4}$ - $\frac{3}{8}$	3 Position, Closed Center Dual Solenoids	Brass	8347	63
$\frac{1}{4}$ - $\frac{3}{8}$	Single and Dual Solenoids, Direct Acting	Brass	8342	57
$\frac{1}{4}$ - $\frac{3}{4}$	Sub-Base Mounted, Single and Dual Solenoids	Aluminum	8346	61-62
$\frac{1}{4}$ -1	General Purpose, Single and Dual Solenoids	Brass	8344	58-59

4 Way Valves

2 Position — Single and Dual Solenoids
Aluminum Body • 1/4" N.P.T.

General Description

This bulletin offers a wide variety of direct acting 4 way valves including individual valves, group mounted valves and sub-base mounted valves, available with either single or dual solenoids.

Important: No minimum operating pressure required.

Two constructions are available:

Sub-Base Mounted — This construction can be supplied individually or group mounted by inserting tie-rods through holes supplied in the sub-base. Single and dual solenoid constructions in any combination can be grouped up to 8 units. Sub-bases have common pressure and exhaust connections at each end and separate cylinder connections.

"Do-It-Yourself" assemblies can be made in the field.

Group Mounted — This construction is held together with a strong "snap-on clamp" which can be easily installed in the field with a "Do-It-Yourself" assembly kit supplied with each valve. Can be grouped up to 8 units. Valves have common pressure connection at each end and separate cylinder and exhaust connections in each valve. Can also be supplied as factory assembled unit.

Specifications

Operation:

Single Solenoid: Valve operates when energized and returns when de-energized.

Dual Solenoid: Valve operates when one solenoid is energized and returns when the other solenoid is energized. Solenoid may be energized momentarily (1/2 second) or energized continuously. **Caution:** Do not energize both solenoids simultaneously.

Valve Parts in Contact with Fluid:

Body — Hard Anodized Aluminum.

Disc — Polyethylene.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Spring — 302 s.s.

Shading Coil — Copper.

Seals — Buna "N."

Miscellaneous — Nylon, Acetal.

Leakage rate of 2 scfh on break-in reduces to a very slight amount as the valve wears in.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Coil: Continuous Duty Molded Class A and F, as listed.

Temperature:

Fluid and Ambient: 32°F. to 130°F., as listed.

Installation:

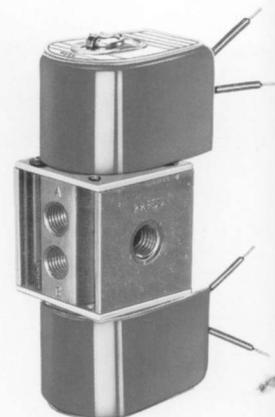
Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

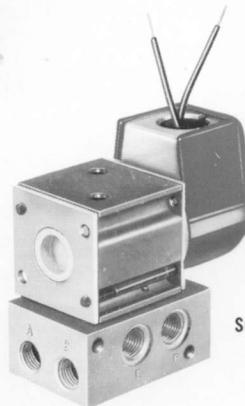
Approvals: CSA certified. UL listed as indicated. Refer to Engineering Section for details and coding information.



Single Valve



Dual Solenoid Valve



Sub-Base Mounted



Group Mounted

BULLETIN
SPECIFIC
Pipe Size (ins.)
SINGL
1/4
SINGL
1/4
GROU
1/4
GROU
1/4
SUB-
1/4
SUB-
1/4
Notes: (1)
(2)
ELECT
Stan
Coil
Clas
Insul
FLOW

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid and Ambient Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation	
			Air		AC	DC	Catalog Number	UL Listing		Catalog Number	AC	DC
			AC	DC							
SINGLE VALVE CONSTRUCTION • Single Solenoid											
1/4	5/64	0.1	150	100	130	95	8340A1	②	8340A6	16.7/F	19.7/F
SINGLE VALVE CONSTRUCTION • Dual Solenoids											
1/4	5/64	0.1	150	150	104	95	8340A2	②	8340A7	10.5/A	19.7/F
GROUP MOUNTED CONSTRUCTION • Single Solenoid											
1/4	5/64	0.1	150	100	104	95	8340A3	②	—	16.7/F	19.7/F
GROUP MOUNTED CONSTRUCTION • Dual Solenoids											
1/4	5/64	0.1	150	150	104①	95①	8340A8	②	—	10.5/A	19.7/F
SUB-BASE MOUNTED CONSTRUCTION • Single Solenoid											
1/4	5/64	0.08	150	100	104	95	8340A4	②	—	16.7/F	19.7/F
SUB-BASE MOUNTED CONSTRUCTION • Dual Solenoids											
1/4	5/64	0.08	150	150	104①	95①	8340A5	②	—	10.5/A	19.7/F

Notes: ① Rating shown for individual mounted valves; when group mounted, maximum UL allowable Fluid and Ambient Temperature is 86°F.
 ② UL listed as General Purpose Valve — AC only.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	—	10.5	23.5	65	27-462	—
F	19.7	16.7	35.6	86	64-982	66-611

ORDERING INFORMATION

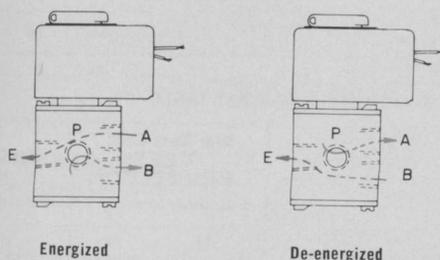
Refer to List Price Schedule for complete details on ordering factory assembled or do-it-yourself valves and assembly kits.

OPTIONAL FEATURES

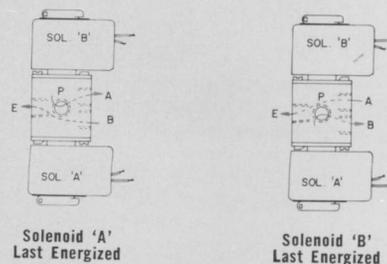
Many optional electrical and construction features are available, refer to Optional Feature Section.

FLOW DIAGRAMS

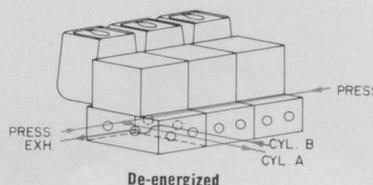
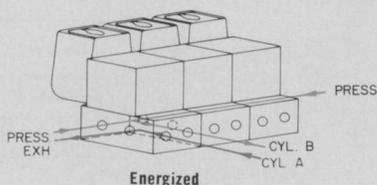
Single Valve — Single Solenoid



Single Valve — Dual Solenoid



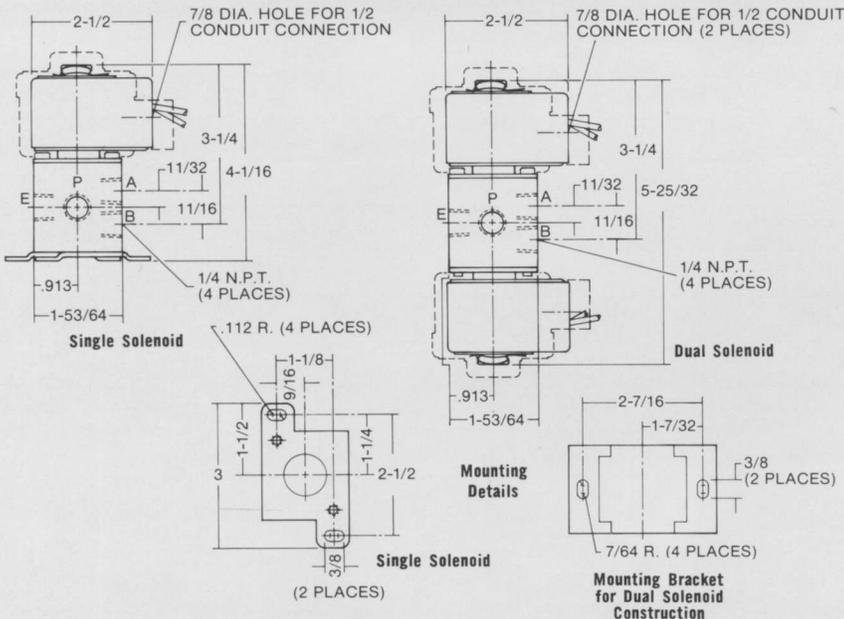
Sub-Base Mounted — Single Solenoid — Group Mounted



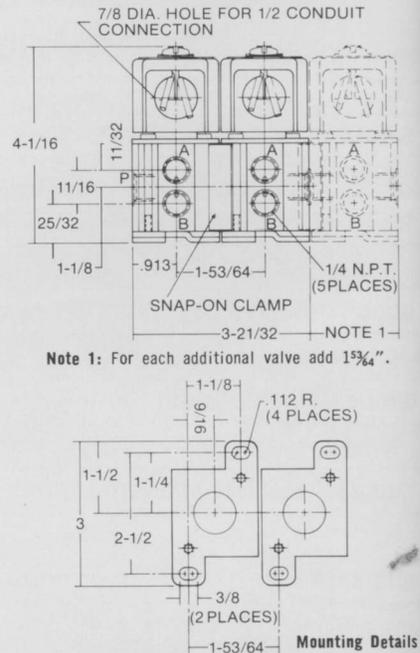
DIMENSIONS (in inches)

SINGLE VALVE CONSTRUCTION — SINGLE AND DUAL SOLENOIDS

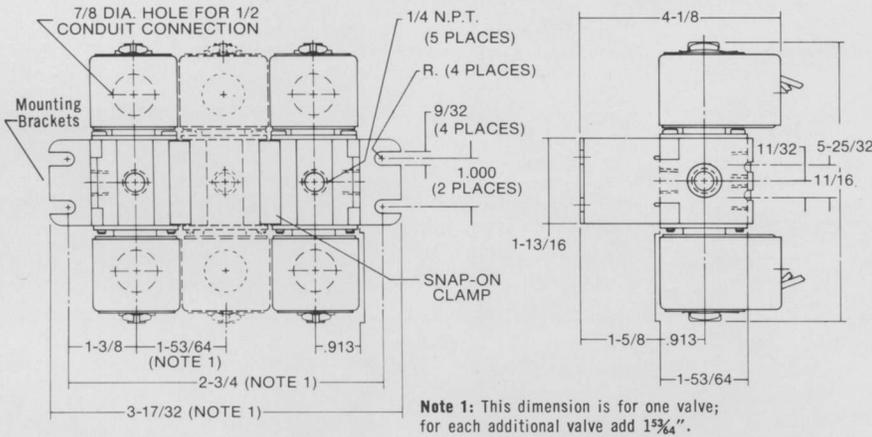
(Combination Types 4 and 7 [C and D] Solenoid Enclosure shown dotted-in, details available on request.)



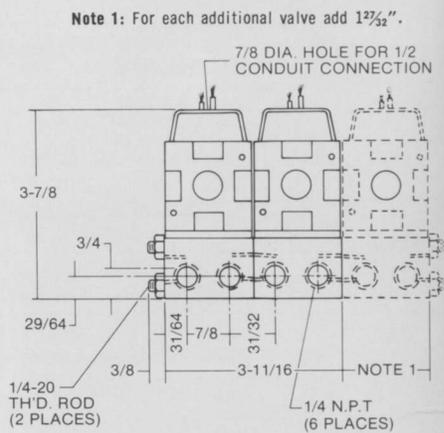
GROUP MOUNTED CONSTRUCTION SINGLE SOLENOID



GROUP MOUNTED CONSTRUCTION — DUAL SOLENOIDS

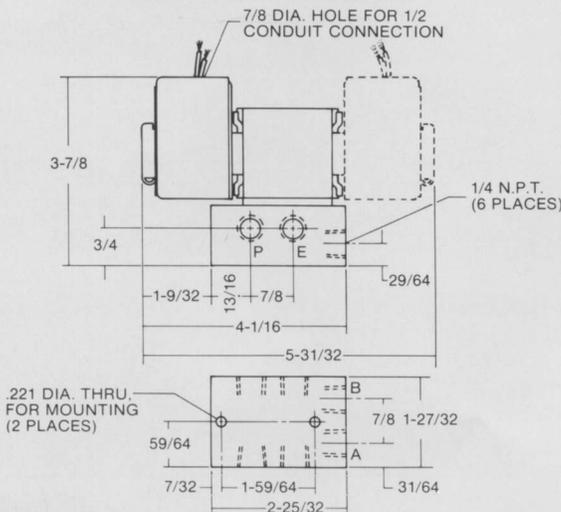


SUB-BASE MOUNTED CONSTRUCTION (Shown as Group Mounted)



SUB-BASE MOUNTED SINGLE AND DUAL SOLENOID CONSTRUCTION

Note: Dual solenoid shown dotted-in.



MOUNTING BRACKET TABLE

Catalog Number	With Type 1 General Purpose Solenoid Enclosure	With Types 4 and 7 (C and D) Solenoid Enclosure	When Manual Operator Is Used
8340A1	Mounting Holes on Body	—	Order Kit No. 206-737
8340A2	Standard	—	NA
8340A3	Mounting Holes on Body	—	Order Kit No. 206-554
8340A4	Mounting Holes on Body	—	NA
8340A5	Mounting Holes on Body	—	NA
8340A6	—	Standard	Standard
8340A7	—	Standard	NA
8340A8	Standard when factory assembled but must order Kit No. 206-554 for individual valves	—	NA

NA — Not Available.

Gener
This direc
ient sea
Important
required
Specifi
Operati
(a) Single
gized an
(b) Dual
solenoid
other so
energize
gized co
Caution
taneous
Valve Pa
Body —
Seals an
Core Tu
Core an
Springs
Shading

*DuPont
SPECI
Pipe
Size
(ins.)
SIN
1/4
3/8
DU
1/4
3/8

Note: C
ELEC
Star
Coil
Clas
Insu
FLO

HIGH FLOW 4 Way Solenoid Valves

2 Position Single and Dual Solenoids
Forged Brass Body • 1/4" to 1" N.P.T.

General Description

These heavy duty two position 4 way valves have rugged forged brass bodies and poppet type seats and discs to provide tight seating.

The main valve discs are power driven in both directions by line pressure — no return springs.

Applications

- double acting cylinders
- forging equipment
- machine tools
- molding equipment

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy duty operation • click-less and quiet (no AC hum) operation. Refer to Long Life Construction.

Specifications

Operation: Two types available:

(a) **Single Solenoid:** The valve changes position when the solenoid is energized; the valve returns to its original position when de-energized.

(b) **Dual Solenoids:** The valve changes position when one solenoid is energized. Valve will not return to its original position until opposite solenoid is energized.

Solenoids may be energized momentarily or continuously.

Minimum on time of coil for dual solenoid valves is 0.3 second on air service and 1.0 second on liquids.

Caution: Do not energize both solenoids simultaneously.

Valve Parts in Contact with Fluid:

Body — Forged Brass.

Seals and Discs — Buna "N."

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Pilot Seat Cartridge — Acetal.

Shaft Gasket — Lead/Copper.

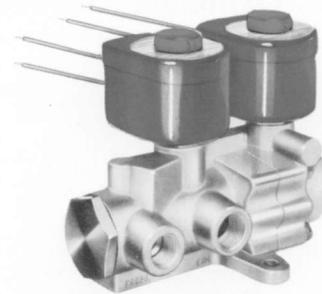
Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).



6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A and F, as listed.

Temperature:

Fluid: To 180°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimension Table for envelope size and mounting.

Attitude: Valves may be mounted in any position.

Approvals: CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)									Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
			Minimum ①	Maximum				Maximum Fluid Temp. °F.		Catalog Number	Constr. Ref. No.	Catalog Number	AC	DC			
				Air-Inert Gas		Water		Light Oil @ 300 SSU									
			AC	DC	AC	DC	AC	DC	AC	DC							
SINGLE SOLENOID																	
1/4	1/4	0.8	10	125	125	125	125	125	125	180	150	8344A70	1	8344A71	10.5/A	11.2/A	
		0.8	10	250	250	250	250	250	250	180	180	8344B0②	1	8344B4②	16.7/F	16.8/A	
3/8	3/8	0.8	10	250	250	250	250	250	250	180	180	8344B1②	1	8344B5②	16.7/F	16.8/A	
		2.2	10	125	125	125	125	125	125	180	150	8344A72	2	8344A73	10.5/A	11.2/A	
		2.2	10	250	250	250	250	250	250	180	180	8344C25②	2	8344C37②	16.7/F	16.8/A	
1/2	3/8	2.2	10	125	125	125	125	125	125	180	150	8344A74	2	8344A75	10.5/A	11.2/A	
		2.2	10	250	250	250	250	250	250	180	180	8344C27②	2	8344C39②	16.7/F	16.8/A	
3/4	3/4	5.6	10	125	125	125	125	125	125	180	150	8344A76	3	8344A77	10.5/A	11.2/A	
		5.6	10	250	250	250	250	250	250	180	180	8344B29②	3	8344B41②	16.7/F	16.8/A	
1	3/4	5.6	10	125	125	125	125	125	125	180	150	8344A78	3	8344A79	10.5/A	11.2/A	
		5.6	10	250	250	250	250	250	250	180	180	8344B31②	3	8344B43②	16.7/F	16.8/A	
DUAL SOLENOID																	
1/4	1/4	0.8	10	250	125	200	125	125	100	180	120	834444	4	834445	6/A	9.7/A	
		0.8	10	350	—	350	—	300	—	180	—	8344B46	5	8344B58	10.5/A	—	
3/8	3/8	0.8	10	350	125	350	125	300	100	180	120	8344B48	5	8344B60	10.5/A	9.7/A	
		2.2	10	250	125	200	125	125	100	180	120	834480	6	834481	6/A	9.7/A	
		2.2	10	300	—	300	—	200	—	180	—	8344B50	7	8344B62	10.5/A	—	
1/2	3/8	2.2	10	250	125	200	125	125	100	180	120	834482	6	834483	6/A	9.7/A	
		2.2	10	300	—	300	—	200	—	180	—	8344B52	7	8344B64	10.5/A	—	
3/4	3/4	5.6	10	300	125	300	125	200	100	180	120	8344B54	8	8344B66	10.5/A	9.7/A	
		5.6	10	300	125	300	125	200	100	180	120	8344B56	8	8344B68	10.5/A	9.7/A	

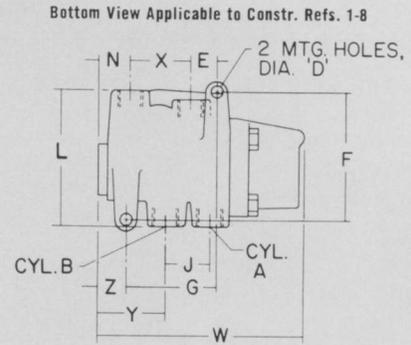
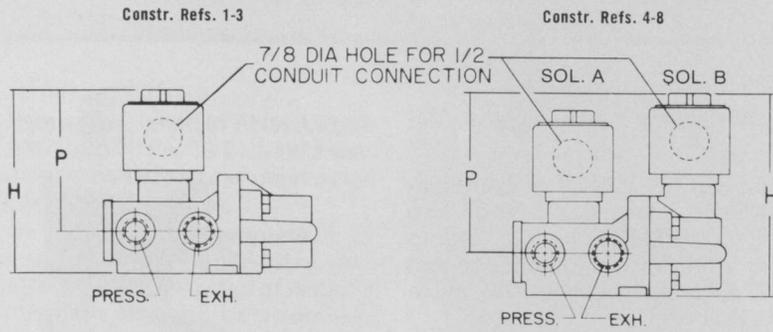
Notes: ① 25 psi minimum on light oil.

② For best results, do not use valve rated 250 psi on main line pressures of less than 125 psi.

DIMENSIONS • AC Only† (in inches)

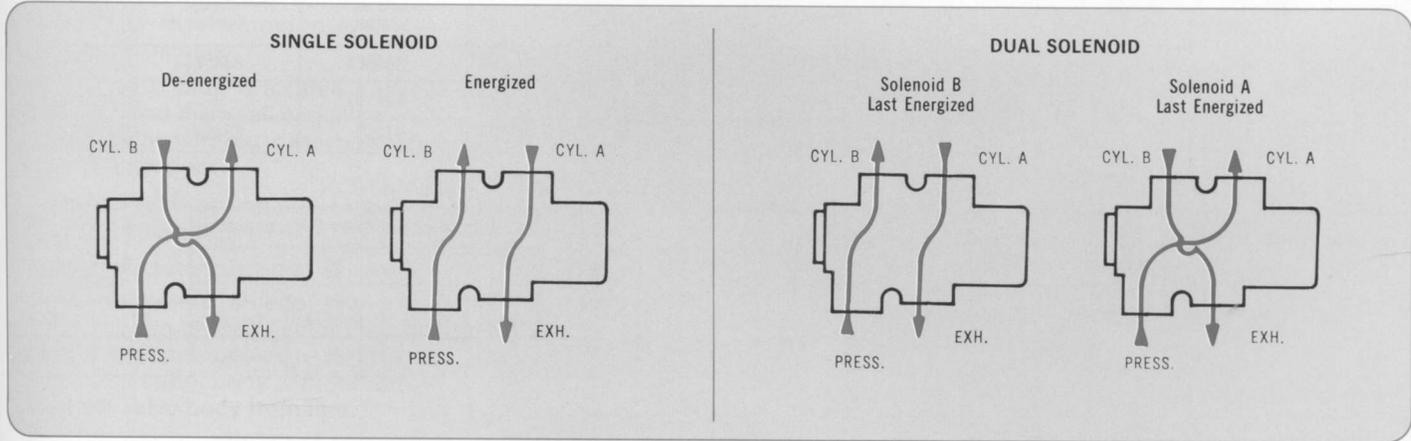
(Watertight and Explosion-Proof Solenoid Enclosure available. Details available on request.)

†DC dimensions available on request.



Constr. Ref.	Pipe Size	H	J	L	N	P	W	X	Y	Z	E	Dia. D	F	G	Exhaust Pipe Size (ins.)
1	1/4 or 3/8	4 ⁵ / ₃₂	1 ¹ / ₃₂	3 ¹ / ₈	2 ³ / ₃₂	3 ³ / ₁₆	4 ³ / ₄	1 ¹³ / ₃₂	1 ⁹ / ₁₆	1 ³ / ₁₆	9 ¹ / ₁₆	9 ¹ / ₃₂	2 ¹³ / ₃₂	1 ⁷ / ₈	3 ¹ / ₈
2	3/8 or 1/2	4 ¹ / ₈	1 ¹ / ₂	3 ³ / ₁₆	2 ⁷ / ₃₂	3	6 ¹ / ₁₆	1 ⁷ / ₈	1 ²⁹ / ₃₂	2 ⁷ / ₃₂	3 ¹ / ₄	1 ¹ / ₃₂	3 ¹ / ₈	2 ⁵ / ₈	1 ¹ / ₂
3	3/4 or 1"	4 ¹⁵ / ₁₆	2 ³ / ₃₂	4 ⁹ / ₁₆	1 ⁹ / ₁₆	3 ³ / ₈	8 ¹ / ₄	2 ¹ / ₈	2 ⁵ / ₈	1 ⁵ / ₃₂	1 ¹¹ / ₃₂	1 ¹ / ₃₂	3 ¹³ / ₁₆	3 ⁷ / ₈	1
4	1/4	4 ¹¹ / ₃₂	1 ¹ / ₃₂	3 ¹ / ₈	2 ³ / ₃₂	3 ³ / ₈	4 ¹³ / ₁₆	1 ¹³ / ₃₂	1 ⁹ / ₁₆	1 ³ / ₁₆	9 ¹ / ₁₆	9 ¹ / ₃₂	2 ¹³ / ₃₂	1 ⁷ / ₈	3 ¹ / ₈
5	1/4 or 3/8	4 ¹⁹ / ₃₂				3 ⁵ / ₈	4 ²⁹ / ₃₂								
6	3/8 or 1/2	4 ¹ / ₂	1 ¹ / ₂	3 ³ / ₁₆	2 ⁷ / ₃₂	3 ³ / ₈	6	1 ⁷ / ₈	1 ²⁹ / ₃₂	2 ⁷ / ₃₂	3 ¹ / ₄	1 ¹ / ₃₂	3 ¹ / ₈	2 ⁵ / ₈	1 ¹ / ₂
7		4 ³ / ₄				3 ⁵ / ₈									
8	3/4 or 1"	5 ⁵ / ₈	2 ³ / ₃₂	4 ⁹ / ₁₆	1 ⁹ / ₁₆	4 ¹ / ₁₆	8 ¹ / ₄	2 ¹ / ₈	2 ⁵ / ₈	1 ⁵ / ₃₂	1 ¹¹ / ₃₂	1 ¹ / ₃₂	3 ¹³ / ₁₆	3 ⁷ / ₈	1

FLOW DIAGRAMS



ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832
A	16.8	—	—	—	—	96-671
A	11.2	10.5	21	40	27-462	27-463
F	—	16.7	35	56	64-982	—

IMPORTANT: A minimum operating pressure differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

2 Position – 4 Way Solenoid Valves

Brass Body • 1/4" N.P.T.

General Description

These 4 way valves control small double acting cylinders not larger than 4" in diameter.

Applications

- pilots
- air motors
- air vises
- dampers

Special valves available for: • dry air-gas • continuous cycling • exceptionally long life • heavy-duty operation • clickless and quiet (no AC hum) operation. Refer to Long Life Construction.

Specifications

Valve Parts in Contact with Fluid:

- Body — Brass.
- Seals and Discs — Buna "N" and Nylon.
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Core Spring — 302 s.s.
- Shading Coil — Copper.

Piston — Nylon.

Solenoid Enclosures: Two types available:

- (a) **Type 1** — General Purpose.
- (b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

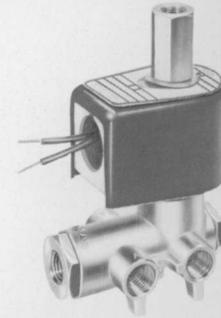
- 24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).
- 6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A.

Temperature:

- Fluid:** To 180°F., as listed.
- Ambient:** Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



Leakage: Liquids — none; air — slight leakage through exhaust when energized.

Installation:

Dimensions: Refer to Dimensions.

Attitude: Valves may be mounted in any position.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS

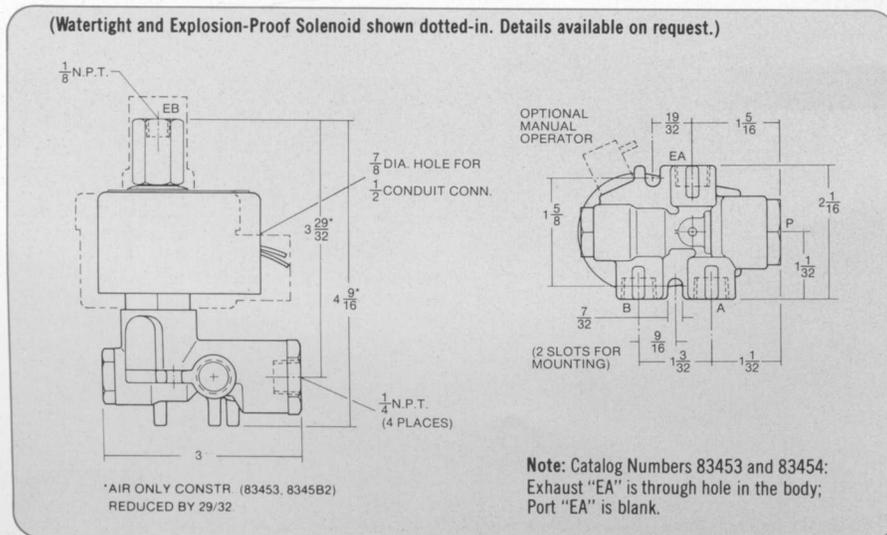
Pipe Size (ins.)	Orifice Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)								Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation		
					Minimum	Maximum				AC	DC	AC							DC
						AC	DC	AC	DC										
1/4	1/16	3/32	.09	.09	10	150	100	150	100	150	100	180	104	8345E1	8345E11	11/A	11.2/A		
1/4	1/16	3/32	.09	.09	10	150	100	—	—	—	—	180	104	8345B2	—	11/A	11.2/A		
1/4	1/16	3/32	.09	.09	10	150	100	—	—	—	—	180	104	83453	83454	11/A	11.2/A		

IMPORTANT: A minimum operating pressure differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	11.2	11	21	42	27-462	27-463

DIMENSIONS (in inches)



OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.

SUB-BASE MOUNTED 4 Way Solenoid Valves

2 and 3 Position — Single and Dual Solenoids — 5 Ported
Aluminum Body • 1/4" to 3/4" N.P.T.

ASCO® Red-Hat®
BULLETIN
8346

General Description

These valves are designed to ANSI B.93.33-1974 (R1981) and NFPA/T3.21.1-1973 sub-base interface standards and meet original J.I.C. recommendations.

Valve can be furnished complete or as separate sub-base and upper valve. This provides the distinct advantage of stocking only a few parts that can be assembled into many combinations of valves as they are needed.

Features

- Diaphragm-poppet design eliminates closely fitted parts.
- No minimum operating pressure differential is required; a line pressure of merely 10 psig is all that is required in the main valve to fully open poppet discs against a spring closing force.
- Fast response time and high flow capacity.
- Handles non-lubricated air for many millions of service-free operations because design has no metal-to-metal sliding surfaces.
- An electrical quick disconnect is provided inside the solenoid cover to allow quick coil change.
- An electrical plug is located between sub-base and main valve to allow valve replacement without disturbing electrical connections.
- Indicator lights optional — to indicate solenoid energization.
- Manual operator provided as standard.
- All 3 position dual solenoid valve flow operation can be changed by changing the flow gasket between main valve bonnet and pilot body without removing main valve body from line.

Figure A. Illustrates the ease with which flow gasket can change flow operation to closed or open center or pressure center.

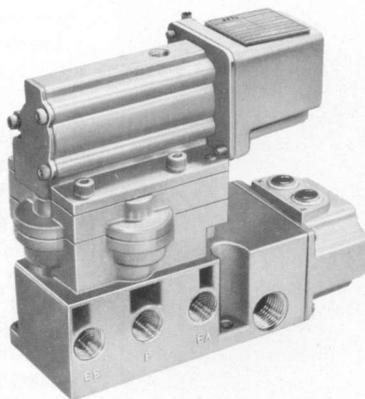
Applications

- air vises
- machine tools
- cylinders
- positioning controls

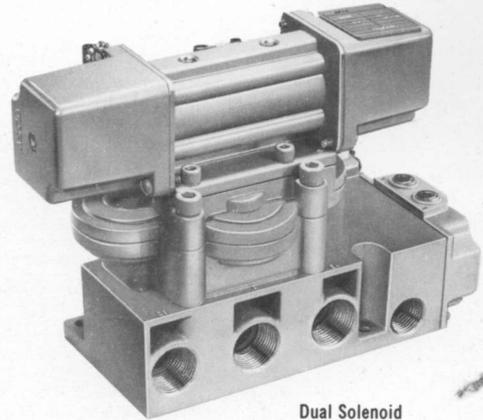
Specifications

Valve Parts in Contact with Fluid:

Body and Sub-Base — Die-Cast Aluminum.



Single Solenoid



Dual Solenoid

Seals — Buna "N" and Composition Buna "N."

Discs — Buna "N" and High Density Polyethylene.

Diaphragms — Polypropylene.

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper.

Disc Holders — Glass-Filled Nylon.

Solenoid Enclosure: J.I.C.

Electrical: Standard Voltages:

120, 240 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz). For other voltages and DC, consult your local ASCO sales office.

Coil: Continuous Duty Molded Class F.

Temperature:

Fluid: 32°F. to 150°F. Maximum, as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Table for envelope size and mounting.

Attitude: Valves may be mounted in any position.

OPTIONAL FEATURES

- Indicator Light
- Gaskets to change valve flow operation of 3 position dual solenoid valves
- Class H High-Temperature Molded Coils (Refer to List Price Schedule for ordering information.)

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil	
	AC			Voltage and Hertz	Part No.
	Watts	VA Holding	VA Inrush		
F	16.7	49.1	90	120/60	84-432-90
				240/60	84-432-91

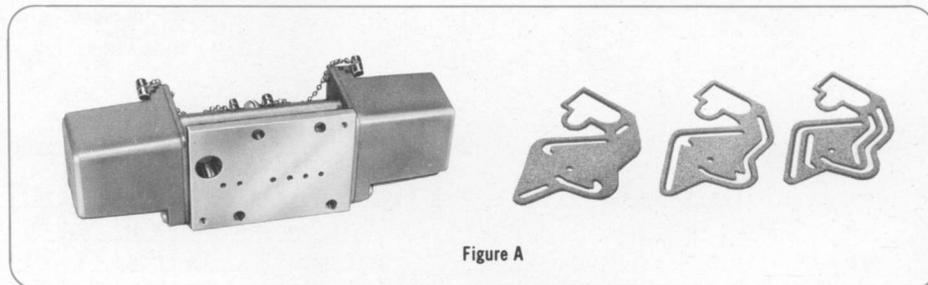


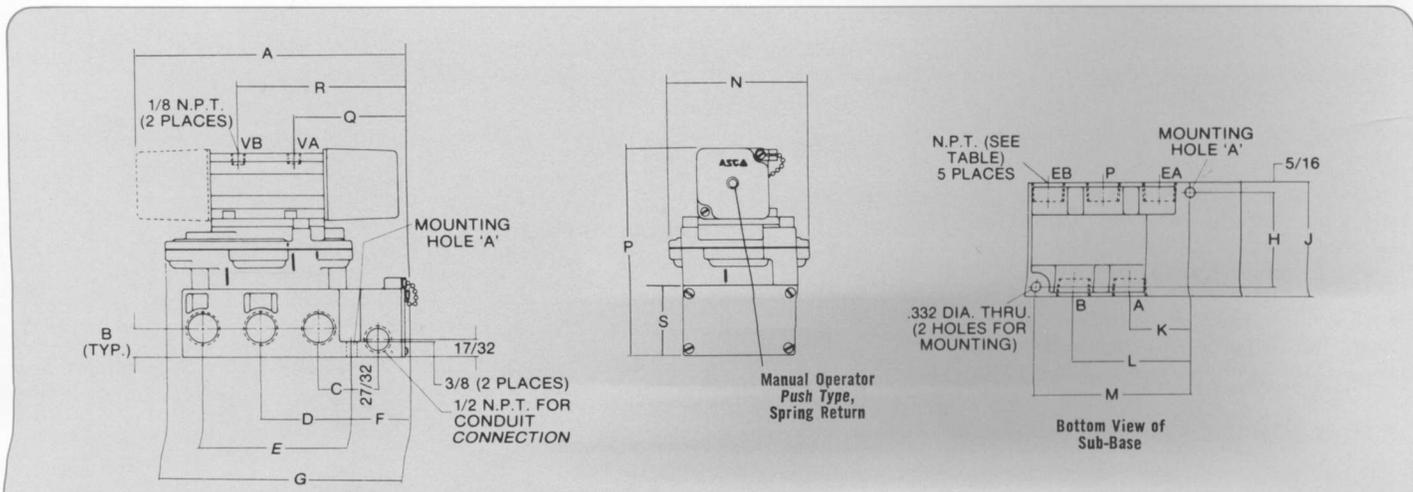
Figure A

SPECIFICATIONS • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	NFPA Type	Pressure Rating (psig)		Maximum Fluid Temp. °F.	Complete Valve (with Sub-Base)	Upper Valve Only (without Sub-Base)	Sub-Base Only	Watt Rating/ Class of Coil Insulation
				Air Only						
				Minimum	Maximum		Catalog Number	Catalog Number	Catalog Number	AC
TWO POSITION SINGLE SOLENOID										
1/4	1/4	1.3	2	10	150	150	8346A9	N8346A9	204-297-1	16.7/F
3/8	1/4	1.4	2	10	150	150	8346A10	N8346A10	204-297-2	16.7/F
1/2	1/2	3.6	8	10	150	150	8346A11	N8346A11	204-298-1	16.7/F
3/4	1/2	3.8	8	10	150	150	8346A12	N8346A12	204-298-2	16.7/F
TWO POSITION DUAL SOLENOIDS										
1/4	1/4	1.3	2	10	150	150	8346A13	N8346A13	204-297-1	16.7/F
3/8	1/4	1.4	2	10	150	150	8346A14	N8346A14	204-297-2	16.7/F
1/2	1/2	3.6	8	10	150	150	8346A15	N8346A15	204-298-1	16.7/F
3/4	1/2	3.8	8	10	150	150	8346A16	N8346A16	204-298-2	16.7/F
THREE POSITION DUAL SOLENOIDS • Closed Center										
1/4	1/4	1.3	2	20	150	150	8346A17	N8346A17	204-297-1	16.7/F
3/8	1/4	1.4	2	20	150	150	8346A18	N8346A18	204-297-2	16.7/F
1/2	1/2	3.6	8	20	150	150	8346A19	N8346A19	204-298-1	16.7/F
3/4	1/2	3.8	8	20	150	150	8346A20	N8346A20	204-298-2	16.7/F
THREE POSITION DUAL SOLENOIDS • Open (Float) Center										
1/4	1/4	1.3	2	10	150	150	8346A21	N8346A21	204-297-1	16.7/F
3/8	1/4	1.4	2	10	150	150	8346A22	N8346A22	204-297-2	16.7/F
1/2	1/2	3.6	8	10	150	150	8346A23	N8346A23	204-298-1	16.7/F
3/4	1/2	3.8	8	10	150	150	8346A24	N8346A24	204-298-2	16.7/F
THREE POSITION DUAL SOLENOIDS • Pressure Center										
1/4	1/4	1.3	2	10	150	150	8346A25	N8346A25	204-297-1	16.7/F
3/8	1/4	1.4	2	10	150	150	8346A26	N8346A26	204-297-2	16.7/F
1/2	1/2	3.6	8	10	150	150	8346A27	N8346A27	204-298-1	16.7/F
3/4	1/2	3.8	8	10	150	150	8346A28	N8346A28	204-298-2	16.7/F

IMPORTANT ORDERING INFORMATION: Valves can be ordered 2 ways: (1) as a complete valve, or (2) as separate upper valve and sub-base. Specify appropriate catalog numbers.

DIMENSIONS (in inches)



Pipe Size (ins.) ^①	Catalog No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
1/4 & 3/8	8346A9, 10	—	1 1/8	47/64	163/64	315/64	25/32	527/32	2 1/8	2 3/4	1 23/64	2 39/64	3 11/32	3 5/32	6 1/32	2 3/4	4 15/32	2 1/16
1/2 & 3/4	8346A11, 12	—	7/8	15/16	211/16	47/16	17/8	7 23/32	2 7/8	3 1/2	1 13/16	3 9/16	4 3/4	4 1/4	6 9/32	3 21/64	5 1/32	2 1/8
1/4 & 3/8	8346A13, 14, 17, 18, 21, 22, 25, 26	7 9/16	1 1/8	47/64	163/64	315/64	25/32	527/32	2 1/8	2 3/4	1 23/64	2 39/64	3 11/32	3 5/32	6 1/32	2 3/4	4 15/32	2 1/16
1/2 & 3/4	8346A15, 16, 19, 20, 23, 24, 27, 28	8 3/32	7/8	15/16	211/16	47/16	17/8	7 23/32	2 7/8	3 1/2	1 13/16	3 9/16	4 3/4	4 1/4	6 9/32	3 21/64	5 1/32	2 1/8

Note: ① When indicator lights are supplied (prefix "I") overall length will increase on 1/4" and 3/8" valves by 1 1/4" and on 1/2" and 3/4" valves by 7/8"

INTEGRAL ADJUSTABLE FLOW CONTROLS

4 Way Solenoid Valves

Zinc Body • 1/4" N.P.T.

General Description

These 4 way valves are actually two 3 way valves in a common body, able to operate simultaneously or independently of each other.

The flow through the pressure and exhaust connections can be independently controlled to regulate the speed of the piston in either direction. The adjustable flow controls also permit pressure and exhaust connections to be shut off while servicing the valve in line, if necessary.

Important: No minimum operating pressure required.

Specifications

Operation: Three types available:

(a) Three Position, 4 Ported Dual Solenoid 4 Way Valve with open (float) center position. Cylinder being controlled can be positioned manually because no pressure is applied to either side of the cylinder when coils are de-energized.

(b) Three Position, 4 Ported Dual Solenoid 4 Way Valve with pressure center position. Cylinder can shift quickly because energizing a coil will exhaust one side of the cylinder while the other side is still pressurized.

(c) Two Position, 4 Ported Dual Solenoid 4 Way Valve.

Valve Parts in Contact with Fluid:

- Body — Die-Cast Zinc.
- Seals and Discs — Buna "N."
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Springs — 17-7PH s.s. and 302 s.s.
- Shading Coil — Copper.
- Seat Insert and Disc Holder — Acetal.

Solenoid Enclosure: Type 1 — General Purpose.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A.

Temperature:

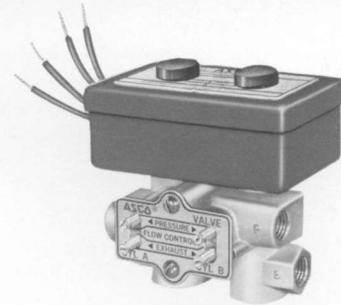
Fluid: 104°F.

Ambient: Nominal Range, 32°F. to 104°F. Refer to Engineering Section.

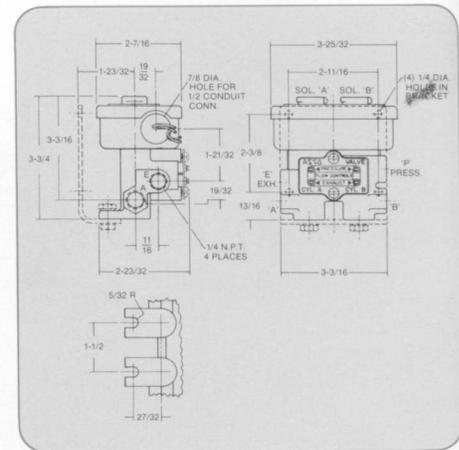
Installation:

Attitude: Mountable in any position without affecting operation.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.



DIMENSIONS (in inches)



SPECIFICATIONS

	Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure	Watt Rating/Class of Coil Insulation		
				Air-Inert Gas		AC	DC		Catalog Number	AC	DC
				AC	DC	AC	DC				
THREE POSITION, 4 PORTED DUAL SOLENOIDS • Open (Float) Center											
	1/4	3/64	.042	200	200	104	104	83491	6/A	9.7/A	
				125	125	104	104		83492	6/A	9.7/A
				100	100	104	104		83493	6/A	9.7/A
				40	40	104	104		83494	6/A	9.7/A
THREE POSITION, 4 PORTED DUAL SOLENOIDS • Pressure Center											
	1/4	3/64	.042	200	200	104	104	83495	6/A	9.7/A	
				125	125	104	104		83496	6/A	9.7/A
				100	100	104	104		83497	6/A	9.7/A
				40	40	104	104		83498	6/A	9.7/A
TWO POSITION, 4 PORTED DUAL SOLENOIDS											
	1/4	3/64	.042	200	200	104	104	83499	6/A	9.7/A	
				125	125	104	104		834910	6/A	9.7/A
				100	100	104	104		834911	6/A	9.7/A
				40	40	104	104		834912	6/A	9.7/A

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	24.6	96-619	103-832

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

IN-LINE, GROUP MOUNTED AND SUB-BASE MOUNTED - SPOOL VALVE

4 Way Solenoid Valves

2 Position — Single and Dual Solenoids — 5 Ported • Air Only
Aluminum Body • 1/4" and 3/8" N.P.T.

ASCO® Red-Hat®
BULLETIN
8400

General Description

These are 2 position 4 way valves with a unique piloting arrangement that insures positive shifting of the spool shuttle by utilizing the supply line pressure to drive the spool. This unique design creates a fast maximum force in the shifting direction which completely eliminates any possibility of spool "hang-up" in mid-position between ports.

No minimum operating pressure differential is required; however, the supply pressure should be a minimum of 20 psig.

The lightweight spool is Teflon*-impregnated, hard-anodized aluminum that seats against Buna "N" control ports with a cushioned effect. The spool rides on stationary Buna "N" seals. This construction will give many millions of trouble-free operations.

Three constructions are available:

In-Line — The solenoid, all working parts and the pressure, cylinder and exhaust connections are in the valve body.

Sub-Base Mounted or Group Mounted (Sub-Base) — These constructions can be supplied either as complete valves (with sub-base) or as separate upper valve and sub-base which can easily be assembled with 4 screws. This permits inventory to be minimized by stocking common upper valve bodies and sub-bases to be assembled as needed. The upper valve bodies for both the sub-base mounted and the group mounted are the same.

A maximum of 6 valves can be manifolded at the factory or as required at the job site. One upper valve and one sub-base are required for each valve to be manifolded.

The upper valve body contains the solenoid

*DuPont Co. trademark.

and all working parts. Removal of the upper valve allows servicing without disturbing the piping connections.

Valve is supplied standard with a manual operator.

Applications

- air vices • machine tools
- double acting cylinders

Specifications

Operation:

(a) **Single Solenoid:** Valve shifts when energized, returns to original position when de-energized.

(b) **Dual Solenoid:** Valve shifts when one solenoid is energized and returns to original position when the other solenoid is energized. Solenoid may be energized momentarily (1/10 second) or energized continuously.

Caution: Do not energize both solenoids simultaneously.

Valve Parts in Contact with Fluid:

Body — Extruded Aluminum.

Sub-Base — Die-Cast Aluminum.

Seals — Buna "N."

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s. and 17-7PH s.s.

Shading Coil — Copper.

Pilot Valve Body — Glass-Filled Nylon.

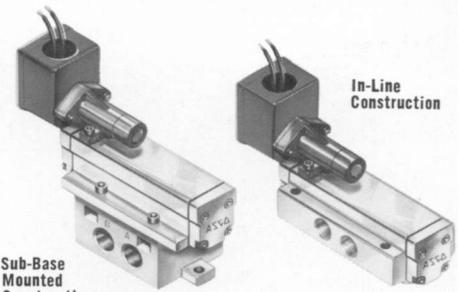
Pistons/Spool Cages — Glass-Filled Nylon.

Interface Gasket — Composition Buna "N."

Spool — Aluminum (Teflon*-impregnated, hard-anodized).

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.



Sub-Base Mounted Construction

In-Line Construction

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Coil: Continuous Duty Molded Class A and F, as listed.

Temperature:

Fluid: 104°F. Maximum.

Ambient: Nominal Range, 32°F. to 104°F. (Refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions Tables for envelope size and mounting.

Attitude: Valves may be mounted in any position except as noted in Dimensions Tables.

Approvals: CSA certified. Refer to Engineering Section for details.

SPECIFICATIONS • Air Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Supply Pressure (psig)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Sub-Base Only	Watt-Rating/Class of Coil Insulation		
			AC	DC		Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	AC		DC		
														Minimum	Maximum	AC and DC
IN-LINE CONSTRUCTION															
SINGLE SOLENOID															
1/4	5/16	0.8	20	150	104	84001	84002	—	—	—	—	9/F	9.7/A		
3/8	5/16	0.8	20	150	104	84003	84004	—	—	—	—	9/F	9.7/A		
DUAL SOLENOID															
1/4	5/16	0.8	20	150	104	84005	84006	—	—	—	—	6/A	9.7/A		
3/8	5/16	0.8	20	150	104	84007	84008	—	—	—	—	6/A	9.7/A		
SUB-BASE MOUNTED CONSTRUCTION — Can be ordered two ways: (1) As a complete valve, or (2) as a separate upper valve and a sub-base. Specify each catalog number.															
SINGLE SOLENOID															
						Complete Valve (with Sub-Base)		Upper Valve Only (without Sub-Base)		Sub-Base Only					
1/4	5/16	1.3	20	150	104	84009	840010	840021	840022	206-725-1	9/F	9.7/A			
3/8	5/16	1.3	20	150	104	840011	840012	840021	840022	206-725-2	9/F	9.7/A			
DUAL SOLENOID															
1/4	5/16	1.3	20	150	104	840013	840014	840023	840024	206-725-1	6/A	9.7/A			
3/8	5/16	1.3	20	150	104	840015	840016	840023	840024	206-725-2	6/A	9.7/A			

SPECIFICATIONS • Air Only

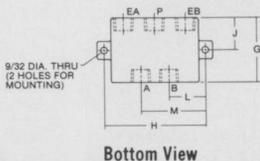
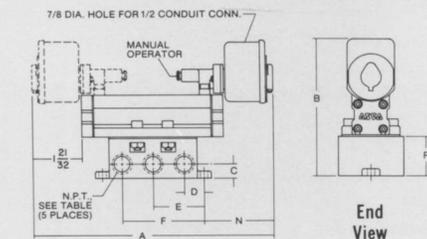
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Supply Pressure (psig)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Sub-Base Only	Watt-Rating/ Class of Coil Insulation	
			AC and DC	AC and DC		AC and DC	AC and DC	AC and DC	AC		DC	
			Minimum	Maximum	AC and DC	AC and DC	AC and DC	AC	DC			
GROUP MOUNTED (SUB-BASE) CONSTRUCTION ② — Can be ordered two ways: (1) As a complete valve suitable for manifolding, or (2) as separate upper valves and sub-bases. One upper valve and one sub-base are required for each valve to be manifolded. Specify each catalog number.												
SINGLE SOLENOID						Complete Valve (with Sub-Base)	Upper Valve Only (without Sub-Base)	Sub-Base Only				
1/4	5/16	1.16	20	150	104	840030	—	840021	—	212-307-1	9/F	9.7/A
3/8	5/16	1.16	20	150	104	840031	—	840021	—	212-307-2	9/F	9.7/A
DUAL SOLENOID						840032	—	840023	—	212-307-1	6/A	9.7/A
1/4	5/16	1.16	20	150	104	840033	—	840023	—	212-307-2	6/A	9.7/A

Notes: ① When valves are manifolded and two or more valves are passing flow simultaneously, the Cv is reduced. When the maximum number of valves (6) are manifolded the Cv is 0.76.
 ② Assembly kit available for group mounted construction — refer to price schedule.

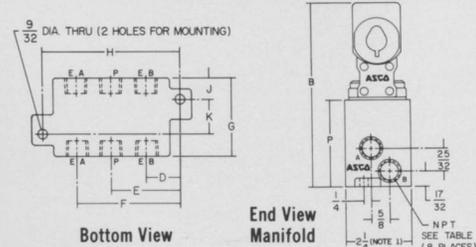
DIMENSIONS (in inches)

(For details on Watertight and Explosion-Proof Solenoid Enclosure, consult ASCO.)

SUB-BASE MOUNTED CONSTRUCTION
Single and Dual Solenoids



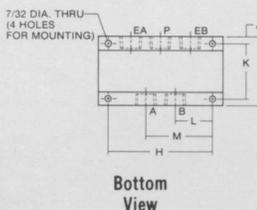
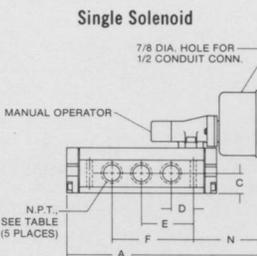
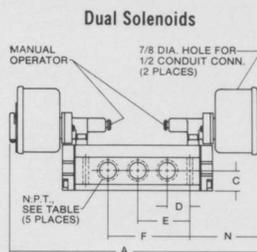
GROUP MOUNTED — SUB-BASE CONSTRUCTION Single and Dual Solenoids



Solenoid	Single	Dual	Manifold
Pipe Size	1/4, 3/8	1/4, 3/8	1/4, 3/8
A	6 19/32	8 1/4	8 13/16
B	4 13/16	4 13/16	6 13/32
C	17/32	17/32	1 31/32
D	25/32	25/32	1
E	125/32	125/32	2
F	225/32	225/32	3
G	2 1/4	2 1/4	2 1/4
H	3 3/8	3 3/8	4
J	1 1/8	1 1/8	5/8
K	—	—	1
L	1 9/32	1 9/32	—
M	2 9/32	2 9/32	—
N	2 11/32	2 11/32	2 13/32
P	1 7/16	1 7/16	3

Note:
1. This dimension is for one valve, for each additional valve add 2 1/4".

IN-LINE CONSTRUCTION



Solenoid	Single	Dual
Pipe Size	1/4, 3/8	1/4, 3/8
A	6 19/32	8 1/4
B	3 3/32	3 3/32
C	5/8	5/8
D	3/4	3/4
E	1 11/16	1 11/16
F	2 5/8	2 5/8
G	2 1/4	2 1/4
H	3 3/8	3 3/8
J	7/32	7/32
K	1 13/16	1 13/16
L	17/32	17/32
M	2 5/32	2 5/32
N	2 7/16	2 7/16

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
F	—	9	22.5	36.5	99-216	—
A	9.7	6	15.6	25.5	96-619	103-832

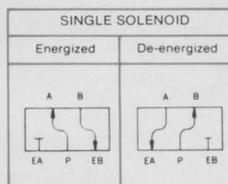
OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

FLOW DIAGRAMS

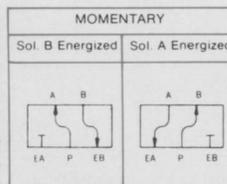
Single Solenoid

The main valve shifts when the solenoid is energized. When the solenoid is de-energized, the valve returns to its original position. This type of operation is used where automatic return of valve on electrical power failure is required.



Dual Solenoids

The main valve shifts when one solenoid is energized and remains in this position when power to the solenoid is disconnected. Valve will not return to original position until opposite solenoid is energized. Solenoids may be energized momentarily or continuously, depending upon the application. Dual solenoid valves are used where equipment must not change position when electrical power fails.

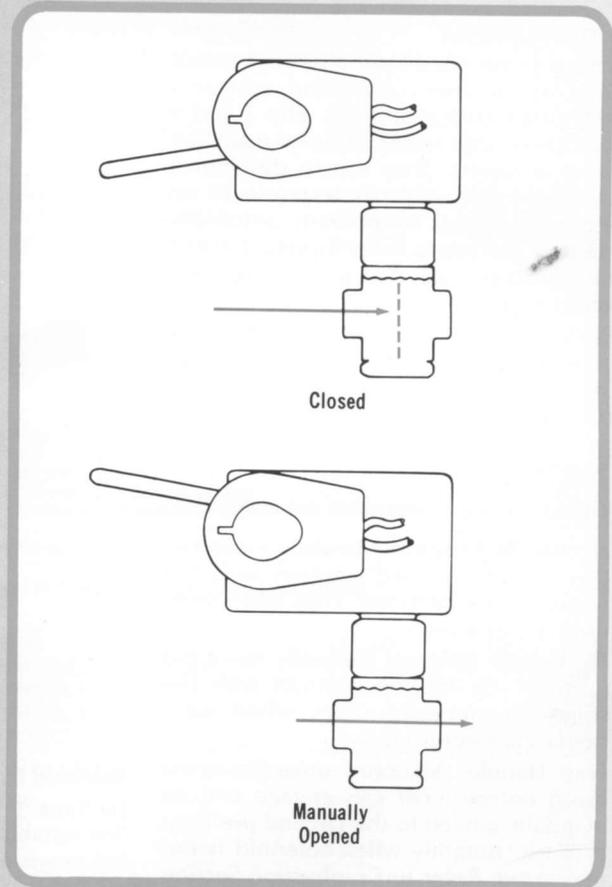


MANUAL RESET VALVES • INDEX

ASCO solenoid valves listed in this section are available with several different operating characteristics, depending upon service requirements.

Manual reset valves are used wherever 2, 3 or 4 way valves are required to return to their original position when the solenoid is energized or de-energized (depending upon construction). Once the valves are tripped, they have to be manually reset, thus preventing inadvertent startup.

These valves are offered with forged brass, stainless steel, steel or aluminum bodies. Type 1 General Purpose Junction Box Solenoid Enclosures and Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Solenoid Enclosures are available.



INDEX

Pipe Size Range (ins.)	Fluids (For other fluids refer to Valve Material Selection Guide)						Valve Type			Operation			Bulletin Number	Page Number	
	Air-Inert Gas	Fuel Gas	Water	Light Oil	Steam	Corrosive Fluids	2 Way	3 Way	4 Way	Electrically Tripped	No Voltage Release	Free Handle			
1/2-2 1/2	•		•	•	•	•	•				•	•		8015, 8025	69
1/4-1	•		•	•		•			•		•	•		8308, 8309, 8310, 8311	69
1/4-1	•		•	•						•	•	•		8408, 8409, 8410, 8411	69
3/4-3	•	•					•						•	8044	70
1/4, 3/8	•		•	•					•				•	8037	70
1/4, 3/8	•									•			•	8047	70

2, 3 and 4 Way Valves

Electrically Tripped, No Voltage Release or Free Handle

General Description

The manual reset movement is a heavy-duty sealed unit with a highly visible position indicator showing valve position. Movement can be rotated to best locate the sturdy reset handle and visual indicator.

Applications

Primarily intended for the petrochemical industry on large combustion, ammonia and other critical systems. The 3 and 4 way valves are used as pilots for main line valve actuators. They trip to shut down the main line valve in response to an electrical signal to prevent automatic startup. The valves, once tripped, have to be manually reset, thus preventing inadvertent startup.

Both the steel and stainless steel body constructions have operators suitable for an environment requiring "copper-free" valves.

Specifications

The following movements are available:

Electrically Tripped: Manually move the lever to the latched position with the solenoid de-energized. Trips when solenoid is energized.

No Voltage Release: Manually move the lever to the latched position with the solenoid energized. Trips when solenoid is de-energized.

Free Handle: Solenoid must be energized before lever can engage and be manually moved to the latched position. Will trip instantly when solenoid is de-energized. Refer to Combustion Section for additional listings.

Pipe Sizes: 1/4" to 3" N.P.T.

Valve Body: Forged Brass, Stainless Steel, Steel and Aluminum, as listed.

Valve Parts in Contact with Fluid:

See valve listing for body, disc, diaphragm, seat and seal materials.

Parts Common to All Manual Reset Valves are:

Stem — 303 s.s.

Springs — 302 s.s.

Pilot Seat Cartridge — Acetal, when listed.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose Junction Box suitable for splicing and with grounding provision.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Note: 125 volts, DC, and 250 volts, DC,

are battery voltages applied in power plants. Special valves are available for power plant applications, to act as pilots for control valves. Consult your local ASCO sales office for listing.

Coil: Continuous Duty Molded Class F or H, as listed.

Temperature:

Fluid: To 353°F., as listed.

Ambient: Nominal Range, -20°F. to +104°F. Refer to Engineering Section for details.

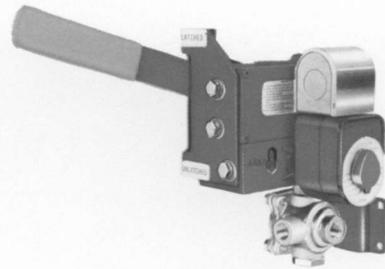
Installation:

Dimensions: Consult your local ASCO sales office for details.

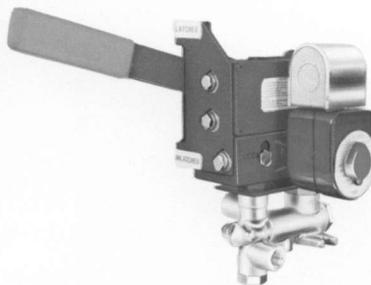
Approvals: CSA certification applied for. Refer to Engineering Section for details.



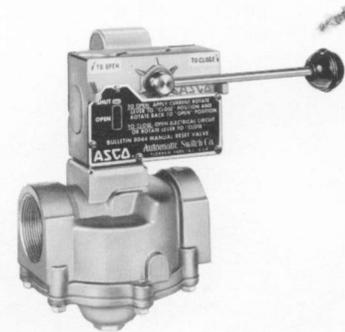
2 WAY



4 WAY



3 WAY



FREE HANDLE
(2 Way)

SPECIFICATIONS • 2 Way — No Voltage Release or Electrically Tripped Operation

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Junction Box Solenoid Enclosure ③					
							Latched Open		Latched Closed		Watt Rating/ Class of Coil Insulation	
			AC and DC		No Voltage Release (Closes When Coil is De-energized)	Electrically Tripped (Closes When Coil is Energized)	No Voltage Release (Opens When Coil is De-energized)	Electrically Tripped (Opens When Coil is Energized)				
			Minimum	Maximum	AC	DC	Catalog Number	Catalog Number	Catalog Number	Catalog Number	AC	DC
2 Way Forged Brass Body, with Buna "N" Diaphragm for Air, Inert Gas, Water and Light Oil												
3/4	3/4	6.5	5	250	180	180	8025A201	8015A201	8025A214	8015A214	20/F	33/H
1	1	13	5	125	180	180	8025A202	8015A202	8025A215	8015A215	20/F	33/H
1 1/4	1 1/8	15	5	125	180	180	8025A203	8015A203	8025A216	8015A216	20/F	33/H
1 1/2	1 1/4	22.5	5	125	180	180	8025A204	8015A204	8025A217	8015A217	20/F	33/H
2	1 3/4	43	5	125	180	180	8025A205	8015A205	8025A218	8015A218	20/F	33/H
2 1/2	1 3/4	45	5	125	180	180	8025A206	8015A206	8025A219	8015A219	20/F	33/H
2 Way Forged Brass Body, with Teflon* Disc (Ethylene Propylene, Viton* and Teflon Seals) for Steam Service												
3/4	3/4	7.8	5	125	353	353	8025A207	8015A207	8025A220	8015A220	20/F	33/H
1	1	13.5	5	125	353	353	8025A208	8015A208	8025A221	8015A221	20/F	33/H
1 1/4	1 1/8	15	5	125	353	353	8025A209	8015A209	8025A222	8015A222	20/F	33/H
1 1/2	1 1/4	22.5	5	125	353	353	8025A210	8015A210	8025A223	8015A223	20/F	33/H
2 Way Stainless Steel Body, with Teflon Disc (Viton Seals) for Corrosive Service												
1/2	3/8	3.2	5	250	350	350	8025A211	8015A211	8025A224	8015A224	20/F	33/H
3/4	3/4	7.8	5	250	350	350	8025A212	8015A212	8025A225	8015A225	20/F	33/H
1	1	11.2	5	125	350	350	8025A213	8015A213	8025A226	8015A226	20/F	33/H

*DuPont Co. trademark.

SPECIFICATIONS • 3 and 4 Way — No Voltage Release or Electrically Tripped Operation

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		No Voltage Release		Electrically Tripped		Watt Rating/ Class of Coil Insulation	
							Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		
			AC and DC		Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure				
			Minimum	Maximum	AC	DC	Catalog Number	Catalog Number	Catalog Number	Catalog Number	AC	DC
3 Way, Universal Operation (Except as Noted^①), Forged Brass Body, with Buna "N" Disc/Diaphragm (Acetal Pilot Cartridge^②) for Air, Inert Gas and Water												
1/4	11/64	.38	0	125	180	180	8308A40	8309A40	8310A40	8311A40	20/F	33/H
3/8	5/8	3	10	250	180	180	8308A41 ^{①②}	8309A41 ^{①②}	8310A41 ^{①②}	8311A41 ^{①②}	20/F	33/H
1/2	5/8	4	10	250	180	180	8308A42 ^{①②}	8309A42 ^{①②}	8310A42 ^{①②}	8311A42 ^{①②}	20/F	33/H
3/4	11/16	5.5	10	250	180	180	8308A43 ^{①②}	8309A43 ^{①②}	8310A43 ^{①②}	8311A43 ^{①②}	20/F	33/H
1	1	13	10	125	180	180	830850 ^{①②}	830950 ^{①②}	831050 ^{①②}	831150 ^{①②}	20/F	33/H
3 Way, Universal Operation, Forged Brass Body, with Stainless Steel Seats and Discs for Air, Inert Gas, Water and Light Oil												
1/4	1/4	.45	0	125	200	200	830844	830944	831044	831144	20/F	33/H
3/8	1/4	.45	0	125	200	200	830845	830945	831045	831145	20/F	33/H
1/2	5/16	.75	0	125	200	200	830846	830946	831046	831146	20/F	33/H
3 Way, Universal Operation, Forged Brass Body, with Buna "N" Seats and Nylon Discs for Air, Inert Gas, Water and Light Oil												
1/4	1/4	.39	0	125	180	180	830844R	830944R	831044R	831144R	20/F	33/H
3/8	1/4	.39	0	125	180	180	830845R	830945R	831045R	831145R	20/F	33/H
1/2	5/16	.53	0	125	180	180	830846R	830946R	831046R	831146R	20/F	33/H
3 Way, Universal Operation, Stainless Steel Body, with Stainless Steel Seats and Discs for Corrosive Service												
1/2	5/16	.75	0	125	200	200	830847	830947	831047	831147	20/F	33/H
3 Way, Universal Operation, Steel Body, with Stainless Steel Seats and Discs for Corrosive Service												
3/8	5/16	.75	0	125	200	200	830848	830948	831048	831148	20/F	33/H
1/2	5/16	.75	0	125	200	200	830849	830949	831049	831149	20/F	33/H
4 Way^① Forged Brass Body, with Plastic Seats and Discs for Air and Inert Gas												
1/4	3/16	.7	0	250	160	160	8408B6	8409B6	8410B6	8411B6	20/F	33/H
3/8	3/16	.7	0	250	160	160	8408B7	8409B7	8410B7	8411B7	20/F	33/H
4 Way Forged Brass Body, with Buna "N" Seats and Discs (Acetal Pilot Cartridge) for Air, Inert Gas, Water and Light Oil												
1/2	3/8	2.2	10	250	200	200	84088	84098	84108	84118	20/F	33/H
3/4	3/4	5.6	10	250	200	200	84089	84099	84109	84119	20/F	33/H
1	3/4	5.6	10	250	200	200	840810	840910	841010	841110	20/F	33/H

Notes: ① When ordering, specify suffix "F" for normally closed construction; suffix "G" for normally open construction.

② Supplied with acetal pilot cartridge.

③ Available with Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Enclosure. Consult your local ASCO sales office.

④ Can be modified to provide 3 way operation; consult your local ASCO sales office.

SPECIFICATIONS • 2, 3 and 4 Way — Free Handle Operation

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Free Handle Operation		Watt Rating/Class of Coil Insulation	
			AC and DC		AC	DC	Type 1 General Purpose Junction Box Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	AC	DC
			Minimum	Maximum			Catalog Number	Catalog Number		
2 Way, Normally Closed Operation, Aluminum Body, with Buna "N" Disc for Air and Fuel Gas Service										
3/4	1 3/32	13	0	25	125	125	8044A1	8044A8	20/F	33/H
1	1 5/8	22	0	25	125	125	8044A2	8044A9	20/F	33/H
1 1/4	1 5/8	30	0	25	125	125	8044A3	8044A10	20/F	33/H
1 1/2	1 5/8	33	0	25	125	125	8044A4	8044A11	20/F	33/H
2	2 3/32	55	0	20	125	125	8044A5	8044A12	20/F	33/H
2 1/2	3	108	0	10	125	125	8044A6	8044A13	20/F	33/H
3	3	135	0	10	125	125	8044A7	8044A14	20/F	33/H
3 Way Forged Brass Body, with Plastic Seats and Discs for Air, Inert Gas, Water and Light Oil										
1/4	3/16	.7	0	125	160	160	8037A8 ^①	8037A9 ^①	20/F	33/H
3/8	3/16	.7	0	125	160	160	8037A10 ^①	8037A11 ^①	20/F	33/H
4 Way Forged Brass Body, with Plastic Seats and Discs for Air										
1/4	3/16	.7	0	125	160	160	8047A1	8047A3	20/F	33/H
3/8	3/16	.7	0	125	160	160	8047A2	8047A4	20/F	33/H

Note: ① When ordering, specify suffix "F" for normally closed construction; suffix "G" for normally open construction.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC			AC	DC
		Watts	VA Holding	VA Inrush		
F	—	20	45	96	99-257	—
H	33	—	—	—	—	222-345

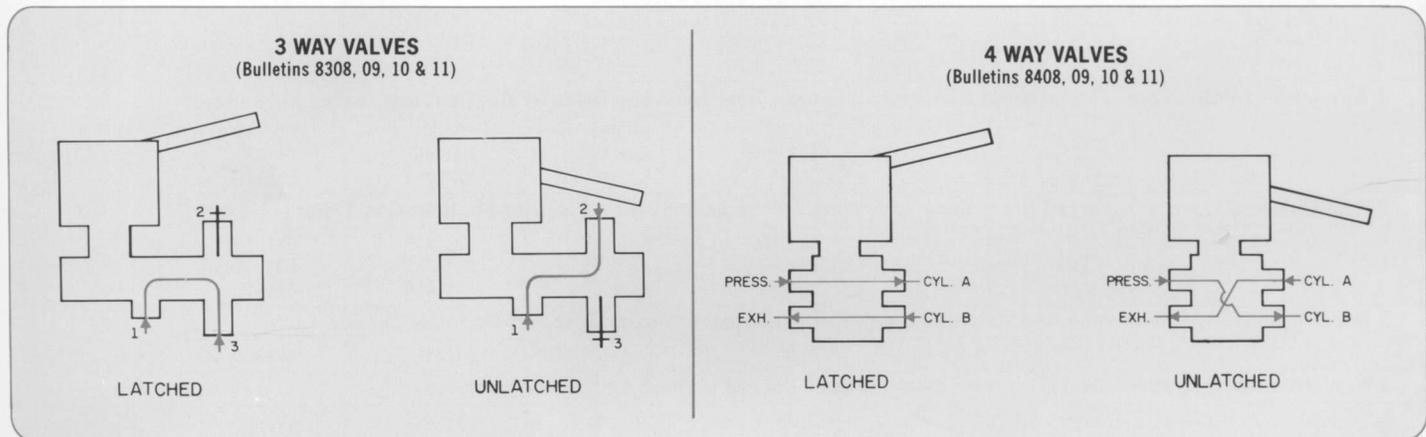
OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled.

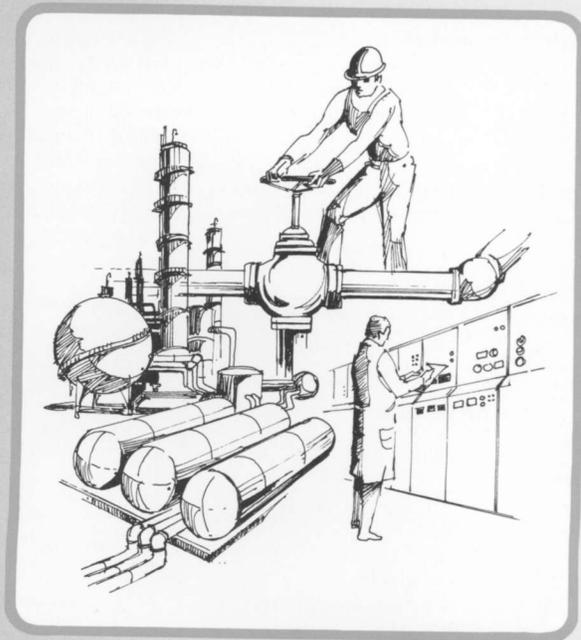
FLOW DIAGRAMS



Consult your local ASCO sales office for dimensions.

SPECIAL PURPOSE VALVES • INDEX

ASCO valves listed in this section have been designed for specific applications. In addition to the special purpose valves illustrated, ASCO engineering and research personnel have developed countless other designs. If you cannot locate a valve in this catalog to suit your needs — consult your local ASCO sales office with your requirements.



INDEX

	Page No.
Bulletin 8264 — Liquid CO ₂ Valves	77
Bulletins 8280, 8380 — 2 and 3 Way Gang Mounted Sub-Miniature Valves	85
Bulletin 8292 — Gasoline Dispensing Valves	79
Bulletin 8323 — Redundant Control Valves	75
Bulletin 8350 — Dual Solenoid Laundry Fill Valve	77
Bulletin 8352 — Coolant Valves	75
Bulletin 8353 — Dust Collector Valves	78
Cryogenic Valves	73
Intrinsically Safe Valves	80-83
Long Life — Quiet Operating — Rapid Cycling Valves	74
Shielded Core Valves	76
Solenoid Operators	84
Vacuum Valves	72

VACUUM SERVICE FOR LOW • MEDIUM • HIGH RANGE

2 Way Solenoid Valves

Normally Closed and Normally Open • 1/4" to 2" N.P.T.

General Description

ASCO medium and high vacuum valves are mass spectrometer tested. Special resilient materials and handling procedures are used in the high vacuum valves to avoid molecular contamination.

Applications

Vacuum valves may be used throughout the vacuum system. For example:

- electrical check
- foreline
- vacuum breaker
- cooling water
- roughing
- suction line
- lubricating oil

Vacuums may be classified into two categories — Low and High Vacuums. Within these classifications we find various conditions and pressure ranges, as follows:

LOW VACUUM	
Conditions:	Pressure Range:
Low (and Rough)	760 to 25 Torr
Medium (and Fine)	25 to 10 ⁻³ Torr
HIGH VACUUM	
High	10 ⁻³ to 10 ⁻⁶ Torr
Very High	10 ⁻⁶ to 10 ⁻⁹ Torr
Ultra High	10 ⁻⁹ Torr and Below

Specifications

Operation: Two types available:

- (a) Normally Closed — open when energized, closed when de-energized.
- (b) Normally Open — open when de-energized, closed when energized.

Valve Parts in Contact with Fluid:

Body — Brass or Aluminum, as listed.

Seals and Discs — Low and medium vacuum (Buna "N"); high vacuum (Viton* or degassed Buna "N").

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper.

Normally Open Valves — Nylon disc holder (stainless steel holder available — consult your local ASCO office).

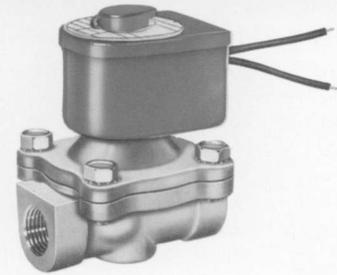
Solenoid Enclosure: Type 1 — General Purpose. [Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Enclosure is available. Consult your local ASCO office.]

Electrical: Standard Voltages (AC only):

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

DC available — consult your local ASCO sales office.

*DuPont Co. trademark.



Coil: Continuous Duty Molded Class A or F, as listed.

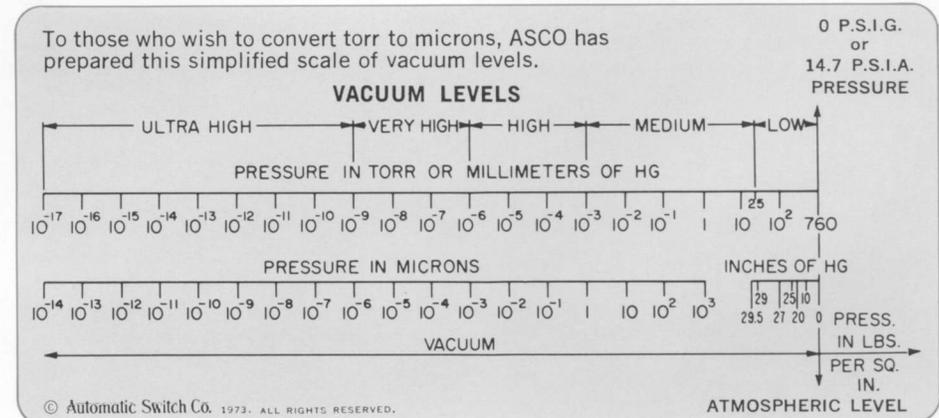
Temperature:

Fluid: To 180°F.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation: Mountable in any position.

Approvals: CSA certified. Refer to Engineering Section for details.



SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Factor	Maximum Operating Pressure Differential (psi)	Application Guide					Low Vacuum Range to 29" Hg	Medium Vacuum Range to 10 ⁻³ Torr	High Vacuum Range to 10 ⁻⁶ Torr	Watt Rating/Class of Coil Insulation	
				Body Material	Electrical Check	Breaker	Roughing	Foreline or Hi Vacuum					Suction or Release	AC
NORMALLY CLOSED CONSTRUCTION													
1/4	9/32	.96	15	Brass	•	•	•	•	•	8262C90	8262C90VM	8262C90VH	6/A
3/8	3/8	1.8	15	Brass	•	•	•	•	•	8030B13	8030B13VM	8030B13VH	10.5/A
1/2	7/16	2.8	15	Brass	•	•	•	•	•	8030A17	8030A17VM	8030A17VH	15.4/A
3/4	3/4	5	4	Brass	•	•	•	•	•	8030B43	8030B43VM	8030B43VH	16.7/F
3/4	3/4	5	15	Brass	•	•	•	•	•	8210D95	8210D95VM	8210D95VH	11/A
1	1 1/8	20.5	15	Alum.	•	•	•	•	•	8215B50	8215B50VM	8215B50VH	15.4/A
1 1/4	1 1/8	31.7	15	Alum.	•	•	•	•	•	8215B60	8215B60VM	8215B60VH	15.4/A
1 1/2	1 5/8	32.7	15	Alum.	•	•	•	•	•	8215B70	8215B70VM	8215B70VH	15.4/A
2	2 3/32	55	15	Alum.	•	•	•	•	•	8215B80	8215B80VM	8215B80VH	15.4/A
NORMALLY OPEN CONSTRUCTION													
3/8	5/8	3	15	Brass	•	•	•	•	•	8210C33	8210C33VM	8210C33VH	10.5/A
1/2	5/8	4	15	Brass	•	•	•	•	•	8210C34	8210C34VM	8210C34VH	10.5/A
3/4	3/4	5.5	15	Brass	•	•	•	•	•	8210C35	8210C35VM	8210C35VH	10.5/A
1	1 1/8	20.5	15	Alum.	•	•	•	•	•	8215C53	8215C53VM	8215C53VH	15.4/A
1 1/4	1 5/8	31.7	15	Alum.	•	•	•	•	•	8215C63	8215C63VM	8215C63VH	15.4/A
1 1/2	1 5/8	32.7	15	Alum.	•	•	•	•	•	8215C73	8215C73VM	8215C73VH	15.4/A
2	2 3/32	55	15	Alum.	•	•	•	•	•	8215C83	8215C83VM	8215C83VH	15.4/A

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil Part No.
	AC			
	Watts	VA Holding	VA Inrush	AC
A	6	15.6	24.6	96-619
A	10.5 & 11	23	55	27-462
A	15.4	26	130	96-817
F	16.7	33	67	64-982

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

CRYOGENIC SERVICE

2 Way Solenoid Valves

Normally Closed • 1/8" to 1 1/2" N.P.T.



General Description

These solenoid valves will withstand the severe service encountered in controlling cryogenic fluids, such as liquid oxygen (-297°F.), liquid argon (-303°F.) and liquid nitrogen (-320°F.).

All valves are degreased, cleaned and tested to keep them free of moisture. In addition, liquid oxygen (LOX) valves are "black light" tested for hydrocarbons.

Applications

The ultra-cold of cryogenics has been put to work in a wide variety of applications ranging from missile fuels to freezing food to exotic new electronic innovations.

When selecting valves, be sure to size for the flow conditions of your application. Many times smaller valves may be used more efficiently and more economically.

Specifications

Operation: Normally closed operation (closed when solenoid is de-energized, open when solenoid is energized).

Valve Parts in Contact with Fluid:

- Body — Brass.
- Seals — Teflon* and/or Lead-Clad Copper.
- Disc — Teflon/Rulon**.
- Core Tube — 305 s.s.

*DuPont Co. trademark.

**Dixon Industries Co. trademark.

Core and Plugnut — 430F s.s. or 49FM Alloy.

Core Spring — 302 s.s.

Shading Coil — Copper.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

DC available, consult your local ASCO sales office.

Coil: Continuous Duty Molded Class A or F, as listed.

Temperature:

Fluid: -150°F. to -320°F.

Ambient: To 77°F. Maximum. (104°F. occasionally — refer to Engineering Section.)

Approvals: CSA certified. Refer to Engineering Section for details.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

SPECIFICATIONS

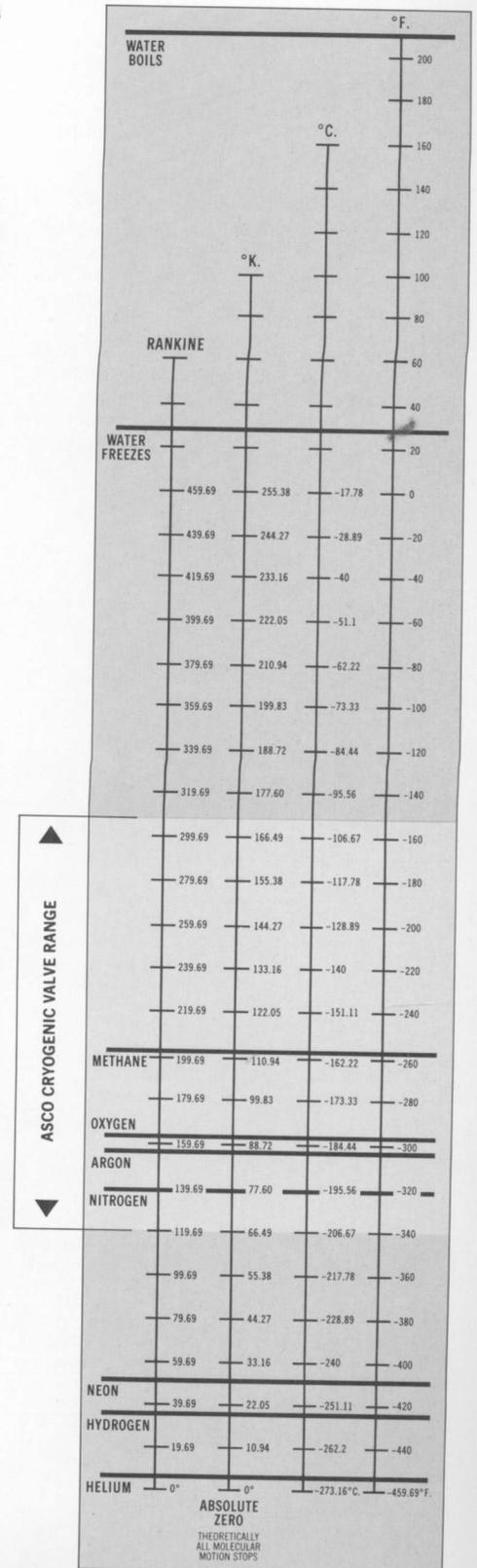
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Minimum Fluid Temp. °F.	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/ Class of Coil Insulation
			Minimum	Maximum		AC	AC	
1/8	1/8	.35	0	130	-320	8263A240LT	8263A241LT	11.8/A
1/4	7/32	.56	0	100	-320	8263205LT	8263208LT	16.7/F
1/4	9/32	.70	0	40	-320	8263209LT	8263212LT	11.8/A
3/8	7/32	.56	0	100	-320	8263B206LT	8263B207LT	16.7/F
3/8	9/32	.70	0	40	-320	8263A210LT	8263A211LT	11.8/A
1/2	5/8	3.8	0	125	-320	8222D2LT	8222D22LT	16.7/F
3/4	3/4	6	0	125	-320	8222E3LT	8222E23LT	16.7/F
1	1	13.5	5	200	-320	8210C78LT	8211C78LT	16.7/F
1 1/4	1 1/8	15	5	200	-320	8210C80LT	8211C80LT	16.7/F
1 1/2	1 1/4	22.5	5	200	-320	8210C82LT	8211C82LT	16.7/F

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil Part No.
	AC			
	Watts	VA Holding	VA Inrush	AC
A	11.8	21	40	27-462
F	16.7	33	60	64-982

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ, operating pressure and fluid handled. Use strainers with solenoid valves.



2, 3 and 4 Way Solenoid Valves

General Description

These are standard Red-Hat® solenoid valves modified to extend the cycling life when handling dry air and gas by eliminating internal AC hum and metal-to-metal contact. In addition, the metal click when the solenoid is energized has been virtually eliminated.

Applications

Used wherever millions of trouble-free operations are needed; where non-lubricated air or dry gases are handled; where quiet operation is essential; and where rapid cycling is encountered.

All 2 way valves listed are suitable for both rapid cycling and continuous energization. The 3 and 4 way valves listed are suitable for rapid cycling to a 50% intermittency, with up to one hour on-time. Three and 4 way valves can be provided for continuous energization, consult your local ASCO office.

Some typical applications include:

- office copiers
- packaging applications
- high speed production equipment

SPECIFICATIONS

AC Only • 5 Million Cycle Capability

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Body Material	Type 1 General Purpose Solenoid Enclosure	Watt Rating/ Class of Coil Insulation
			Mini- mum	Maxi- mum		Catalog Number	
2 WAY NORMALLY CLOSED OPERATION							
3/8	5/8	3	5	125	Brass	8210D1Q	13.4/A
1/2	5/8	4	5	125	Brass	8210D2Q	13.4/A
3/4	3/4	4.5	5	125	Brass	8210D9Q	13.4/A
1	1 5/8	13	1	20	Aluminum	821595Q	13.4/A
1 1/4	1 5/8	15	1	20	Aluminum	821596Q	13.4/A
1 1/2	1 5/8	20	1	20	Aluminum	821597Q	13.4/A
2	2 3/32	34	1	20	Aluminum	821598Q	13.4/A
2 WAY NORMALLY OPEN OPERATION							
3/8	5/8	3	5	125	Brass	8210C11Q	13.4/A
1/2	5/8	4	5	125	Brass	8210C12Q	13.4/A
3/4	3/4	4.5	5	125	Brass	8210C13Q	13.4/A
1	1 5/8	13	1	20	Aluminum	821599Q	13.4/A
1 1/4	1 5/8	15	1	20	Aluminum	8215100Q	13.4/A
1 1/2	1 5/8	20	1	20	Aluminum	8215101Q	13.4/A
2	2 3/32	34	1	20	Aluminum	8215102Q	13.4/A
3 WAY NORMALLY CLOSED OPERATION							
3/8	5/8	3	5	125	Brass	8316C14Q	13.4/A
1/2	5/8	4	5	125	Brass	8316C24Q	13.4/A
3 WAY NORMALLY OPEN OPERATION							
3/8	5/8	3	5	125	Brass	8316C16Q	13.4/A
1/2	5/8	4	5	125	Brass	8316C26Q	13.4/A
4 WAY, SINGLE SOLENOID							
1/4	1/4	.53	10	125	Brass	8344A70Q	13.4/A
3/8	1/4	.53	10	125	Brass	8344B1Q	13.4/A
1/2	3/8	1.3	10	125	Brass	8344A74Q	13.4/A

Specifications

Operation: Three types available:

- 2 Way — Normally Closed and Normally Open.
- 3 Way — Normally Closed, Normally Open and Universal.
- 4 Way — Single Solenoid.

Solenoid Enclosure: Type 1 — General Purpose. [Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Enclosure is available. Consult your local ASCO office.]

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz.

DC available at lower cost, consult your local ASCO office.

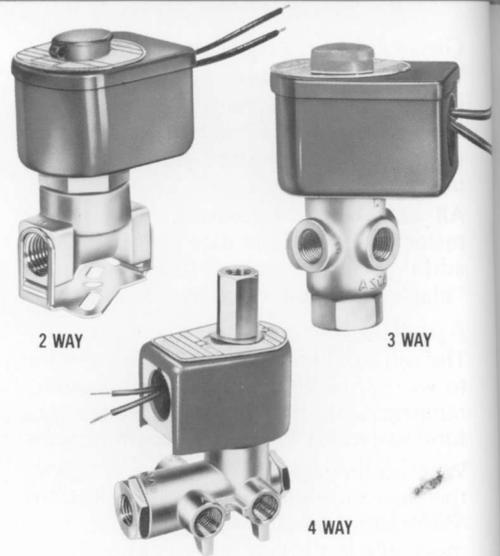
AC Watt Rating: 13.4.

Coil: Molded Class A.

Temperature:

Fluid: 140°F. Maximum.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)



Installation:

Dimensions: Consult your local ASCO office.

Attitude: For optimum life, the solenoid should be mounted vertically and upright.

AC Only • 20 Million Cycle Capability

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Body Material	Type 1 General Purpose Solenoid Enclosure	Watt Rating/ Class of Coil Insulation
			Mini- mum	Maxi- mum		Catalog Number	
2 WAY NORMALLY CLOSED OPERATION							
1/8	1/8	.35	0	125	Brass	826277Q	13.4/A
1/4	1/8	.35	0	125	Brass	8262C232Q	13.4/A
1/4	7/32	.85	0	50	Brass	8262B208Q	13.4/A
2 WAY NORMALLY OPEN OPERATION							
1/8	1/16	.09	0	125	Brass	8262C91Q	13.4/A
1/4	1/16	.09	0	125	Brass	8262C32Q	13.4/A
3 WAY UNIVERSAL OPERATION							
1/8	1/16	.09	0	70	Brass	8320B1Q	13.4/A
1/4	1/16	.09	0	70	Brass	8320A172Q	13.4/A
1/4	3/32	.15	0	40	Brass	8320A174Q	13.4/A
3 WAY NORMALLY CLOSED OPERATION							
1/8	1/16	.09	0	125	Brass	8320B13Q	13.4/A
1/4	1/16	.09	0	125	Brass	8320A182Q	13.4/A
1/4	1/8	.31	0	35	Brass	8320A186Q	13.4/A
3 WAY NORMALLY OPEN OPERATION							
1/8	1/16	.09	0	125	Brass	8320B27Q	13.4/A
1/4	1/16	.09	0	125	Brass	8320A192Q	13.4/A
1/4	1/8	.31	0	35	Brass	8320A196Q	13.4/A
4 WAY, SINGLE SOLENOID							
1/4	1/16	Ⓢ	10	100	Brass	8345A2Q	13.4/A

Note: Ⓢ Inlet Cv is .036; Exhaust Cv is .092.

NORMALLY CLOSED 2 Way Coolant Valves

ASCO® Red-Hat®
BULLETIN
8352

General Description

These are cylinder operated valves with auxiliary pressure to open and spring return (fail closed). Available with either integral 3 way pilot or suitable for remote piloting.

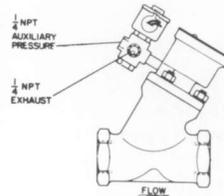
Important: No minimum operating pressure required — valves operate at zero pressure.

Applications

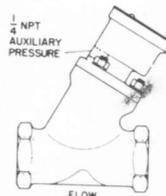
Control the flow of slurries and coolants containing suspended solids from grinding or cutting operations.

SPECIFICATIONS • Cast Iron Body, Viton® Disc • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure		Watt Rating/ Class of Coil Insulation	
			AC	AC	AC	DC	AC-AC Solenoids	AC-DC Solenoids	Solenoid A	Solenoid B	Solenoid B	AC
INTEGRAL PILOT CONSTRUCTION Auxiliary Pressure Required: 50 psi minimum — 125 psi maximum												
3/4	1	10	70	180	835212	835222	6/A					
1	1	13.5	70	180	835213	835223	6/A					
1 1/4	1 1/2	28	40	180	835214	835224	6/A					
1 1/2	1 1/2	35	40	180	835215	835225	6/A					
REMOTE PILOT CONSTRUCTION Auxiliary Pressure Required: 50 psi minimum — 300 psi maximum												
3/4	1	10	70	180	835217	—	—					
1	1	13.5	70	180	835218	—	—					
1 1/4	1 1/2	28	40	180	835219	—	—					
1 1/2	1 1/2	35	40	180	835220	—	—					



INTEGRAL PILOT



REMOTE PILOT

*DuPont Co. trademark.

REDUNDANT CONTROL 3 Way Solenoid Valves

BULLETIN
8323

General Description

Has two independent solenoids; energizing either or both operates the valve. Both solenoids must be de-energized to return valve to original position.

Important: Requires no minimum operating pressure differential.

Applications

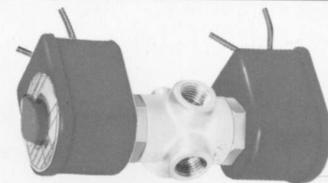
To maintain uninterrupted control as long as either of two power sources is applied to valve. Can also be used as 2 way (normally closed or normally open) merely by plugging one pipe connection.

Approvals: CSA certified. Refer to Engineering Section for details.

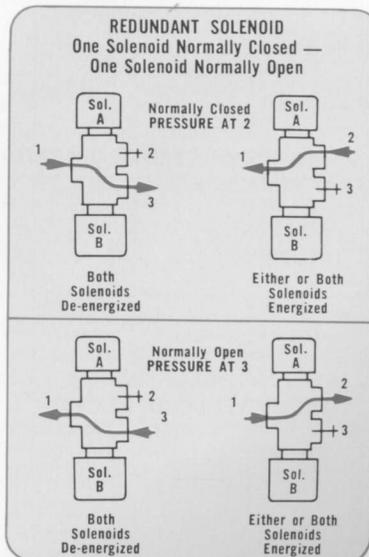
SPECIFICATIONS • Forged Brass Body, Buna "N" Disc for Air, Inert Gas, Water and Light Oil (300 SSU)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure				Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure				Watt Rating/ Class of Coil Insulation		
			AC	DC	AC-AC Solenoids		AC-DC Solenoids		Solenoid A	Solenoid B	Solenoid B	AC	AC	DC			
					AC	DC	AC-AC Solenoids	AC-DC Solenoids									
NORMALLY CLOSED OPERATION (Pressure at 2)																	
1/4	1/16	.09	125	180	120	8323A19	8323A35	8323A20	8323A36	6/A	10.5/A	11.2/A	6/A	10.5/A	11.2/A		
	1/8	.25	40	180	120	8323A23	8323A39	8323A24	8323A40	6/A	10.5/A	11.2/A	6/A	10.5/A	11.2/A		
NORMALLY OPEN OPERATION (Pressure at 3)																	
1/4	1/16	.09	125	180	120	8323A27	8323A43	8323A28	8323A44	6/A	10.5/A	11.2/A	6/A	10.5/A	11.2/A		
	1/8	.25	40	180	120	8323A31	8323A47	8323A32	8323A48	6/A	10.5/A	11.2/A	6/A	10.5/A	11.2/A		

Note: Solenoid B can be connected to a battery source so that valve can be operated even if normal AC power fails. Can also be used as a 2 way normally closed valve by plugging pipe connection 3, or as a 2 way normally open valve by plugging pipe connection 2. See Flow Diagram at right.



FLOW DIAGRAM



SHIELDED CORE FOR CORROSIVE FLUIDS 2 and 3 Way Solenoid Valves

General Description

These direct-acting solenoid valves are designed to isolate the fluid controlled from the internal solenoid parts. The only parts in contact with the fluid controlled are the isolating member, seals and the body. (In addition, the 3 way valves include a 302 stainless steel spring.)

Important: No minimum operating pressure required.

Applications

- for corrosive fluids
- for fluids with suspended solids
- when fluid purity is important
- for fluids that may affect the movement of the solenoid core in a conventional valve

Specifications

Operation: Three types available:

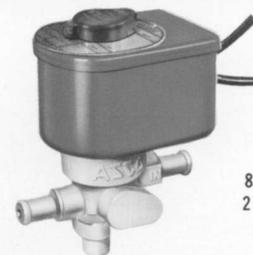
- 2 Way Normally Closed
- 2 Way Normally Open
- 3 Way Universal Flow Construction

Valve Parts in Contact with Fluid:

Body — Refer to specification table.
Seals, Discs, Diaphragm — Refer to specification table. 3 way valves only have a 302 s.s. spring.

Solenoid Enclosure: Type 1 — General Purpose. [Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Solenoid Enclosure is available on some valves. Consult your local ASCO sales office.]

Electrical: Standard Voltages: 24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz). 6, 12, 24, 240 volts, DC.



8260
2 Way

Coil: Continuous Duty Molded Class A or F, as listed.

Temperature:

Fluid: To 250°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. on all D8260 and D8360 valves; to 120°F. on D8030 valves.

Approvals: UL listed as indicated, CSA certified. Refer to Engineering Section for details and coding explanation.

SPECIFICATIONS

Body Material	Diaphragm/Disc	Seals	Typical Applications	Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure (psi)		Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Watt Rating/Class of Coil Insulation	
							AC	DC	AC	DC	Catalog Number	UL Listing	AC	DC
2 WAY NORMALLY CLOSED OPERATION														
Celcon†	Ethylene Propylene	—	Demineralized and Distilled Water, Sea Water	Bib for 1/4" I.D. Flexible Tubing or Hose	9/64	.35	6	6	130	120	D8260A54E	—	6/A	9.7/A
				1/4" O.D. Compression①	9/64	.35	6	6	130	120	D8260A71E	—	6/A	9.7/A
Polypropylene	Ethylene Propylene	—	Photo Solution, 20% Max. Concentration Hydrochloric Acid	Bib for 1/4" I.D. Flexible Tubing or Hose	9/64	.35	6	6	130	120	D8260A53E	—	6/A	9.7/A
					3/16	.53	6	6	130	120	D8260A56E	②	6/A	9.7/A
Polypropylene	Viton*	—	95% Max. Concentration Phosphoric Acid	Bib for 1/4" I.D. Flexible Tubing or Hose	9/64	.35	6	6	130	120	D8260A53V	—	6/A	9.7/A
			60% Max. Concentration Sulphuric Acid		3/16	.53	6	6	130	120	D8260A56V	—	6/A	9.7/A
Brass (with S.S. Seat)	Rulon**	Viton	Hot Water, Steam Boiler Blowdown, Steam Cookers, Hot Cooking Oil, Deep Fat Cookers	3/8	3/8	1.8	15③	—	250	—	D803084	•	20/H	—
				1/2	3/8	2.2	15③	—	250	—	D803085	•	20/H	—
				3/4	3/8	2.2	15③	—	250	—	D803086	•	20/H	—
18-8 S.S.	Rulon	Viton	Hot Water, Steam Boiler Blowdown, Steam Cookers, Hot Cooking Oil, Deep Fat Cookers	3/8	3/8	1.8	15③	—	250	—	D803094	•	20/H	—
				1/2	3/8	2.2	15③	—	250	—	D803095	•	20/H	—
2 WAY NORMALLY OPEN OPERATION														
Brass (with S.S. Seat)	Rulon	Viton	Hot Water, Steam Boiler Blowdown, Steam Cookers, Hot Cooking Oil, Deep Fat Cookers	3/8	3/8	2.4	15③	—	250	—	D803044	•	15.4/F	—
				1/2	3/8	2.8	15③	—	250	—	D803045	•	15.4/F	—
				3/4	3/8	2.9	15③	—	250	—	D803046	•	15.4/F	—
18-8 S.S.	Rulon	Viton	Hot Water, Steam Boiler Blowdown, Steam Cookers, Hot Cooking Oil, Deep Fat Cookers	3/8	3/8	2.4	15③	—	250	—	D803090	•	15.4/F	—
				1/2	3/8	2.8	15③	—	250	—	D803091	•	15.4/F	—
3 WAY UNIVERSAL OPERATION														
Celcon	Ethylene Propylene	Ethylene Propylene	Demineralized and Distilled Water, Sea Water	Bib for 1/4" I.D. Flexible Tubing or Hose	1/8	.16	6	6	130	120	D8360A54E	—	6/A	9.7/A
				1/4" O.D. Compression①	1/8	.16	6	6	130	120	D8360A79E	—	6/A	9.7/A

Notes: ① Fittings not supplied with valve; to order, refer to List Price Schedule. ② UL recognized component listed, AC only.

③ Valves are suitable for closing at zero pressure differential.

*DuPont Co. trademark.

**Dixon Industries Co. trademark.

†Celanese Plastics Co. trademark.

DUAL SOLENOID Laundry Fill Valve

ASCO® Red-Hat®
BULLETIN
8350

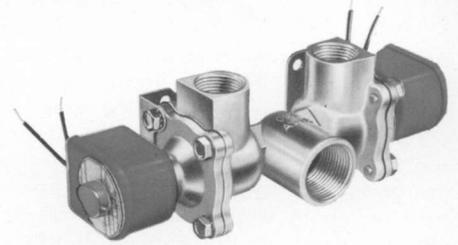
General Description

Forged brass body has two inlets (usually one for hot water and one for cold water) and one outlet. Outlet will accept either 1" N.P.T. pipe or 1½" I.D. rubber hose.

Applications

Control hot and cold water input to laundry equipment.

Approvals: CSA certified and UL recognized component valve. Refer to Engineering Section for details.

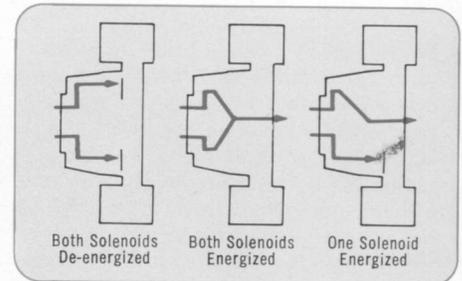


SPECIFICATIONS • Normally Closed • AC Only

Pipe Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure	Watt Rating/Class of Coil Insulation
		One Solenoid Energized	Both Solenoids Energized					
Inlet	Outlet			Minimum	Maximum	AC	Catalog Number	AC
¾	1	5.8	10.7	5	125	170	8350C3	6/A

Note: The flowing inlet valve pressure should never exceed the closed inlet valve (inert) pressure by more than 50%. Maintaining a maximum differential pressure of 50% or less prevents the opening of the closed valve which would permit backflow.

FLOW DIAGRAM



LIQUID CO₂ 2 Way Solenoid Valves

BULLETIN
8264

General Description

These direct-acting, normally closed valves have nickel plated brass, angle type bar stock bodies, stainless steel seats, and resilient discs for tight shut-off. The valves are suitable for either "Direct Mounting" or "Remote Mounting" installations.

Important: No minimum operating pressure required — valves operate at "zero" pressure.

Applications

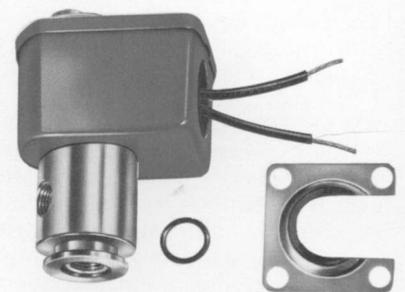
For automatic control of liquid CO₂ to low temperature tumbling barrels, environmental test chambers, and other cooling applications where constant temperature control is essential.

Installation and Mounting:

These valves are provided with ⅛" N.P.T. pipe connections. When required for "Direct Mounting," the valve body is bolted directly to the compartment to be refrigerated by using the four hole mounting bracket provided as standard.

Important: Install tubing with an inside diameter no larger than the valve orifice in the outlet port (1) to locate the refrigeration point downstream of the valve and (2) to prevent freezing of the expanding CO₂ inside the valve body.

Approvals: CSA certified. Refer to Engineering Section for details.



Used for Direct Mounting Installation.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi)		Minimum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation	
			AC and DC			Catalog Number	Catalog Number	AC	DC
⅛	¾ ₆₄	.06	1000	(—) 75	8264D9	8264D5	13.8/F	15.3/F	
⅛	¾ ₃₂	.20	300	(—) 75	8264D10	8264D6	13.8/F	15.3/F	

DUST COLLECTOR Valves and Controls

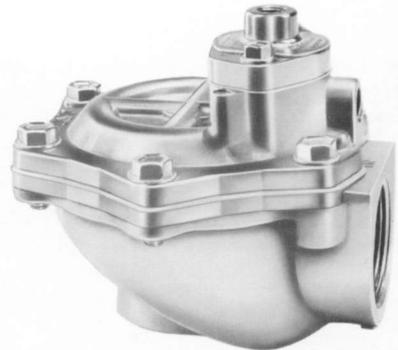
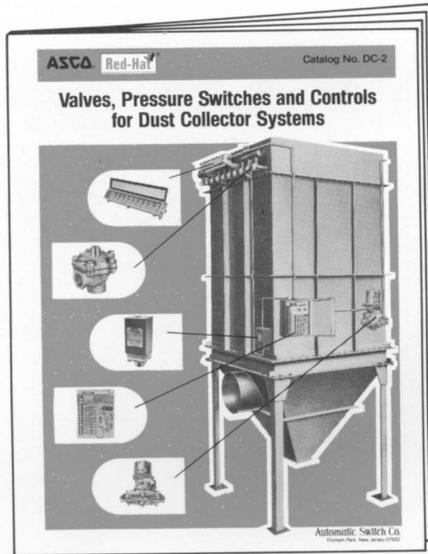
General Description

ASCO has pioneered in the design and development of high flow-fast opening valves, pressure switches and sequential controllers for dust collector systems. ASCO can offer a complete control package containing total interfacing of pressure switch to sequential controller to pilot valve to main pulse valve, all precision tuned to function as the heart of the dust collector system.

- **Bulletin 8353** — ASCO die-cast aluminum valves are high flow, diaphragm operated angle body valves specially designed for reverse jet type dust collectors. Most designs have a unique springless construction with only one moving part. High flow, long life and fast opening combine to offer a superior design for the dust collector system. Available for remote pilot valve operation or with integral pilot valve. In addition, a variety of resilient materials is offered.
- **Solenoid Pilot Valves** — These are the same proven ASCO Red-Hat® designs widely used for industrial applications, specially selected for the harsh cyclic duty needed for dust collector applications. A wide variety of solenoid options includes open frame or panel mount, Type 4 JIC Explosion-Proof or Type 1 enclosures. Resilient materials for specific fluids or temperatures can be supplied.
- **ASCO® TRI-POINT® Pressure Switches** — ASCO pressure switches are used to conserve energy. A differential pressure switch determines if there is sufficient dust buildup before allowing the cleaning cycle to start, thus preventing unnecessary cycling of the unit. A second pressure switch monitors the air pressure to assure that sufficient air pressure exists to accomplish efficient cleaning of the unit.
- **ASCO® Sequential Controller** — The ASCO controller has been designed to operate up to 10 pilot valves in any adjustable sequence. Controls are provided to adjust the length of the time between the pilot valve's being energized and the length of time each pilot valve is energized.

ASCO Catalog DC-2

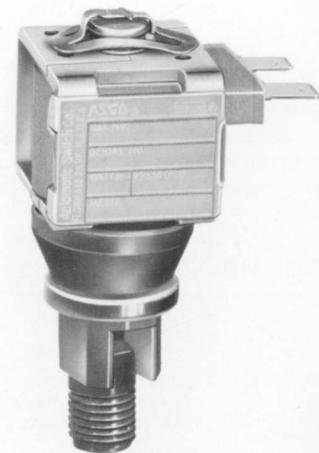
The NEW ASCO Catalog DC-2 contains complete specifications and ordering information on ASCO valves, pressure switches and sequential controllers for dust collector systems. Request your copy from your local ASCO sales office.



Catalog No. 8353E38



Catalog No. 8353E39



Catalog No. US8260100

DISPENSING VALVE

2 Way 3 Position Single Solenoid Valve

Forged Brass Body • 3/4" N.P.T.

ASCO® Red-Hat®
BULLETIN
8292

General Description

This unique design combines the function of two 2 way normally closed valves into one. A single solenoid directs the valve to three different flow positions: No Flow, Low Flow and High Flow.

Applications

These valves are specifically intended for liquid dispensing systems where filling time and accuracy are of critical importance, such as:

- batch filling
- self-service gasoline pumps

Specifications

Operation: Refer to Flow description and Wiring Schematic.

Valve Parts in Contact with Fluid:

- Body and Bonnet — Forged Brass.
- O-Rings and Diaphragm — Buna "N."
- Core Disc — Viton.*
- Core Tube — 305 s.s.
- Core and Plugnut — 430F s.s.
- Springs — 302 s.s.

*DuPont Co. trademark.

Solenoid Enclosures: Two types available:

- (a) **Type 1** — General Purpose.
- (b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 120, 220, 240 volts, AC, 50 Hz).

Coil: Continuous Duty Molded Class A.

Temperature:

Fluid: To 150°F. Maximum.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions.

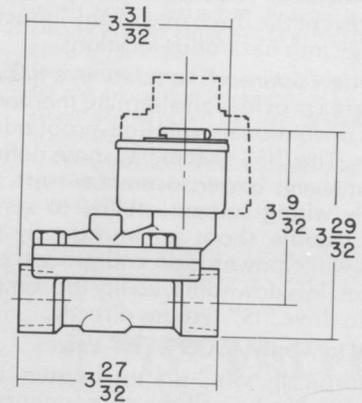
Attitude: Valves may be mounted in any position.

Approvals: UL listed and CSA certified. Refer to Engineering Section for details.

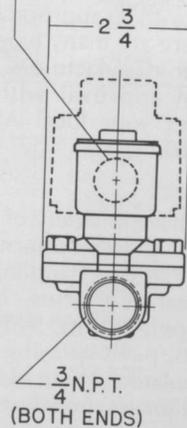


DIMENSIONS (in inches)

(Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in, details on request.)



7/8 DIA. HOLE FOR 1/2 CONDUIT CONNECTION



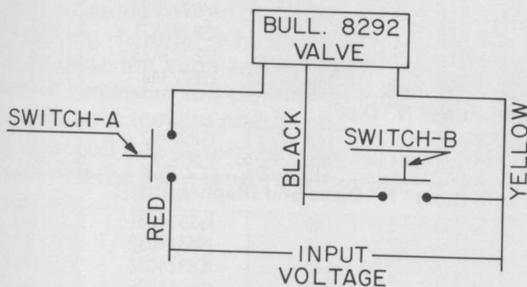
SPECIFICATIONS • AC Only

Pipe Size (ins.)	Orifice Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure	Watt Rating/Class of Coil Insulation
	Full Flow	Low Flow	Full Flow	Low Flow	Minimum	Maximum		Catalog Number	Catalog Number	
3/4	3/4	5/32	6.5	.13	5	50	150	82921	82922	AC
										9.95/A

Note: ① Cv Flow Factor will vary with the viscosity of oil, consult ASCO for details.

WIRING SCHEMATIC

All wiring to valve to be furnished by customer.



VALVE OPERATION

- Switch A Open, Switch B Open — Valve Closed
- Switch A Open, Switch B Closed — Valve Closed
- Switch A Closed, Switch B Open — Low Flow
- Switch A Closed, Switch B Closed — Full Flow

Valve coil supplied with 3 color-coded leads 18" long. Other lengths available.

2, 3 and 4 Way Solenoid Valves

Brass or Stainless Steel Body • 1/8" to 1" N.P.T.

General Description

This bulletin offers valves designed for use in an inherently safe system which will not ignite an explosive atmosphere. This is accomplished by a unique, highly efficient solenoid operator capable of operating at very low power levels, so low that any spark or thermal effect produced is insufficient to cause ignition of the gas, vapor or dust present within a hazardous location. This concept is commonly referred to as "intrinsically safe."

The power consumption of the ASCO "IS" solenoid is 0.35 watts (350 milliwatts) at nominal 24 volts, DC input. The input voltage must be applied to the valve through a current and voltage limiting device, known as a "SAFETY BARRIER." This safety barrier consists of solid-state devices that limit the current and voltage to the hazardous area where the "IS" solenoid valve is located. The valve coil also includes redundant parallel diodes to prevent the discharge of any inductive energy into hazardous locations.

This new approach to safety in a hazardous area provides an alternate method to the conventional explosion-proof enclosures. The "IS" system has some definite advantages: Lower insurance costs, less costly wiring systems, ability to service and trouble shoot an intrinsically safe area while power is on and process continues, less downtime, ability for computers to drive "IS" systems directly.

How to Apply ASCO's "IS" Valves

"Intrinsically safe" is a total system concept; only when all the components are correctly selected and properly wired together does it become intrinsically safe.

The intrinsically safe solenoid valves in this section have FM approval for Class I, II, and III, Division 1, Groups A through G, when used with an appropriate SAFETY BARRIER. There are many types of barriers and barrier manufacturers. ASCO has obtained FM approval with several; please contact your local ASCO sales office for details.

Applications

These valves have a variety of uses, such as: Chemical plants, pharmaceutical houses, research labs handling volatiles, petrochemical refineries, distillation plants, ammonia plants, synthetic fuel gasifier plants, paint spraying industries, distillers of volatiles, grain elevators and handling equipment, powdered metal industries, coal and coal dust handling equipment, mining industries, and

wherever there is a process valve located in a hazardous area where there is or might be an explosive atmosphere which could be ignited by surface temperature or an ignition spark. The use of the "IS" valve will eliminate this hazard.

Specifications

Operation: Various constructions are available:

- (a) 2 Way Normally Open
- (b) 2 Way Normally Closed
- (c) 3 Way Normally Open
- (d) 3 Way Normally Closed
- (e) 4 Way (Single Solenoid — 2 Position)
- (f) 4 Way (Dual Solenoids — 2 Position)
- (g) Manual Reset 3 and 4 Way Valves, No Voltage Release

Valve Parts in Contact with Fluid:

Body — Brass, Stainless Steel or Steel, as listed.

Seals and Discs — Buna "N" (Neoprene also used in Bulletin IS8317).

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Springs — 300 Series Stainless Steel.

Pilot Seat Cartridge (Bulletins IS8316 and IS8344 Only) — Acetal.

Solenoid Enclosure: Type 1 — General Purpose. [Type 4 Watertight Splice Box Enclosure is available, specify prefix "WP".]



3 Way Valve

Electrical: Standard Voltages: 24 volts, DC only available.

Coil — Continuous Duty Molded Class A Screw Terminal.

Watts — 0.35 watts, DC.

Temperature:

Fluid and Ambient: -4°F. to +200°F., as listed.

Installation:

Dimensions: Refer to Dimensions Tables.

Attitude: Valve must be mounted with solenoid vertical and upright.

Approvals: FM approved in accordance with NFPA 493. CSA certified in accordance with CSA C22.2 No. 157. For PTB apparatus approval (Germany) and BASEEFA apparatus approval (United Kingdom), consult your local ASCO sales office.

SPECIFICATIONS

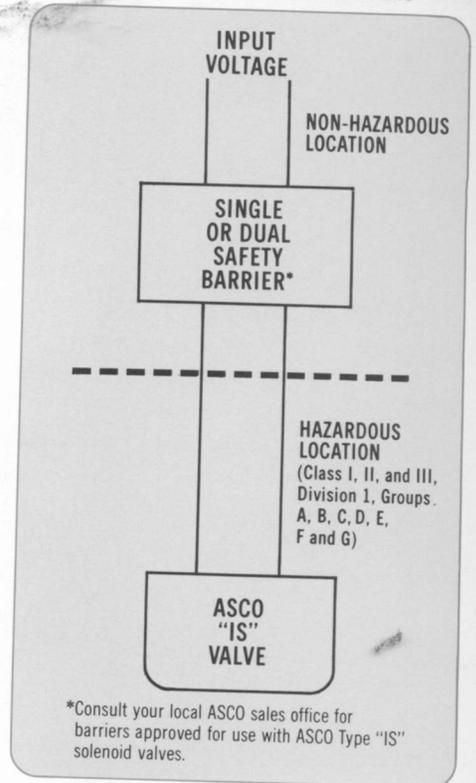
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid and Ambient Temp. °F.	Type 1 General Purpose Solenoid Enclosure	
			Air-Inert Gas			Catalog Number	Constr. Ref. No.
			Minimum	Maximum			
2 Way Normally Closed, Brass Body with Buna "N" Disc							
1/8	3/64	.05	0	150	140	IS8262C1	1
1/8	3/32	.09	0	100	140	IS8262C14	1
1/4	3/64	.05	0	150	140	IS8262D19	1
1/4	3/32	.09	0	100	140	IS8262D20	1
1/4	5/16	1.5	10	100	140	IS8223A21	2
3/8	5/16	1.5	10	100	140	IS8223A23	2
1/2	3/8	3.2	25	100	140	IS8223A3	2
2 Way Normally Open, Brass Body with Buna "N" Disc							
1/4	3/64	.05	0	150	140	IS826282	3
1/4	3/32	.09	0	100	140	IS826283	3
3 Way Normally Closed, Brass Body with Buna "N" Discs and Diaphragms^①							
1/8	3/64	.05	0	150	140	IS8314C31	3
1/8	3/32	.09	0	100	140	IS8314C32	3
1/4	3/64	.05	0	150	140	IS8314C34	3
1/4	3/32	.09	0	100	140	IS8314C35	3
3/8	5/8	3	10	100	140	IS831654 ^{①③}	6
1/2	5/8	4	10	100	140	IS831664 ^{①③}	6
3/4	11/16	5.5	10	100	140	IS8316A74 ^{①③}	7
1	1	13	10	100	140	IS8316E34 ^{①③}	7

"IS" VALVES (continued)

SPECIFICATIONS (continued)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid and Ambient Temp. °F.	Type 1 General Purpose Solenoid Enclosure		
			Air-Inert Gas			Catalog Number	Constr. Ref. No.	
			Minimum	Maximum				
3 Way Normally Closed, Stainless Steel Body with Buna "N" Disc								
1/8	3/64	.05	0	150	140	IS8314C37	3	
1/8	3/32	.09	0	100	140	IS8314C38	3	
1/4	3/64	.05	0	150	140	IS8314C120	3	
1/4	3/32	.09	0	100	140	IS8314C121	3	
3 Way Normally Closed "Quick Exhaust," Brass Body with Neoprene Diaphragm and Buna "N" Disc								
1/4	②	②	5	100	140	IS8317A35③	4	
3 Way Normally Open, Brass Body with Buna "N" Disc								
1/8	3/64	.05	0	150	140	IS8314C49	3	
1/8	3/32	.09	0	100	140	IS8314C50	3	
1/4	3/64	.05	0	150	140	IS8314C52	3	
1/4	3/32	.09	0	100	140	IS8314C53	3	
3 Way Normally Open, Stainless Steel Body with Buna "N" Disc								
1/8	3/64	.05	0	150	140	IS8314C55	3	
1/8	3/32	.09	0	100	140	IS8314C56	3	
1/4	3/64	.05	0	150	140	IS8314C122	3	
1/4	3/32	.09	0	100	140	IS8314C123	3	
3 Way Normally Open "Quick Exhaust," Brass Body with Neoprene Diaphragm and Buna "N" Disc								
1/4	②	②	5	100	140	IS8317A53③	4	
		Press. to Cyl.	Cyl. to Exh.					
4 Way, Brass Body, Single Solenoid with Buna "N" Disc								
1/4	1/16	.09	.09	10	100	140	IS8345E1③	5
1/4	1/4	0.8	1.0	④	100	140	IS8344A70③	8
3/8	3/8	1.4	2.2	④	100	140	IS8344A72③	8
1/2	3/8	1.4	2.2	④	100	140	IS8344A74③	8
3/4	3/4	5.2	5.6	④	100	140	IS8344A76③	8
1	3/4	5.2	5.6	④	100	140	IS8344A78③	8
4 Way, Brass Body, Dual Solenoid with Buna "N" Disc								
1/4	1/4	0.8	1.0	10	100	140	IS834444	9
3/8	3/8	1.4	2.2	10	100	140	IS834480	9
1/2	3/8	1.4	2.2	10	100	140	IS834482	9
3/4	3/4	5.2	5.6	10	100	140	IS8344B54	9
1	3/4	5.2	5.6	10	100	140	IS8344B56	9

INTRINSICALLY SAFE SYSTEM



*Consult your local ASCO sales office for barriers approved for use with ASCO Type "IS" solenoid valves.

- Notes: ① Buna "N" Diaphragm.
 ② "Quick Exhaust" valve has a larger exhaust to quickly exhaust the cylinder or piston to zero pressure. Pressure Port is 1/16", Cv = .09; Exhaust Port is 1/4", Cv = .73.
 ③ There are two exhaust flows in the exhaust mode. The pilot exhaust must be connected to the main exhaust when air or inert gas cannot be exhausted to atmosphere.
 ④ No minimum operating pressure differential required; however, the main inlet pressure should be a minimum of 10 psi.

INTRINSICALLY SAFE MANUAL RESET 3 and 4 Way Solenoid Valves

No Voltage Release • 1/4" to 3/4" N.P.T.

"IS" VALVES

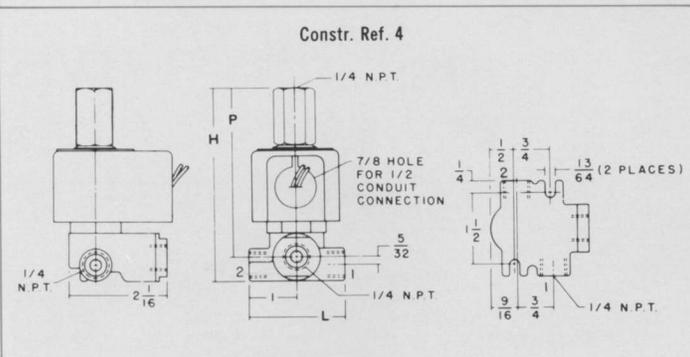
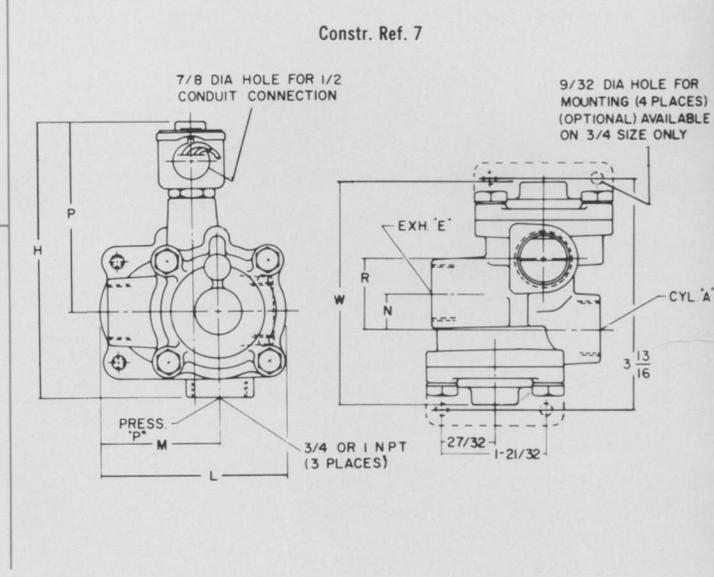
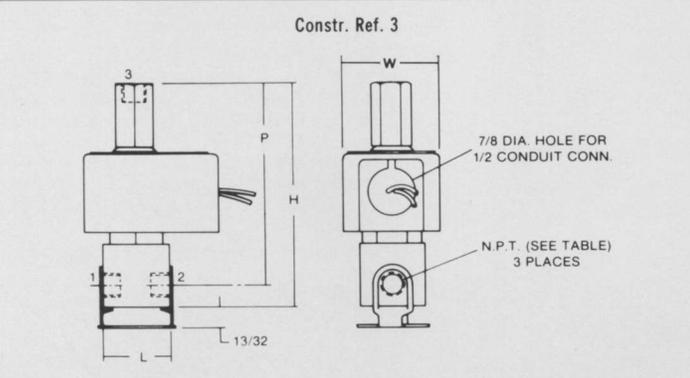
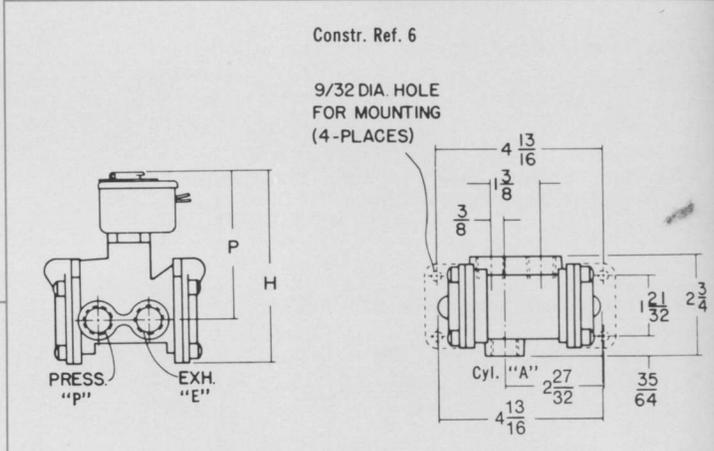
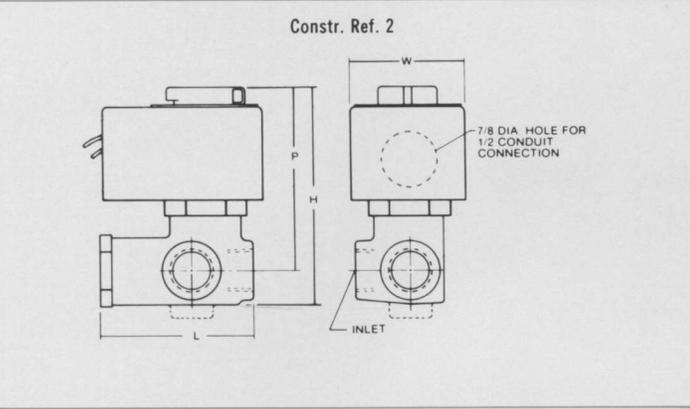
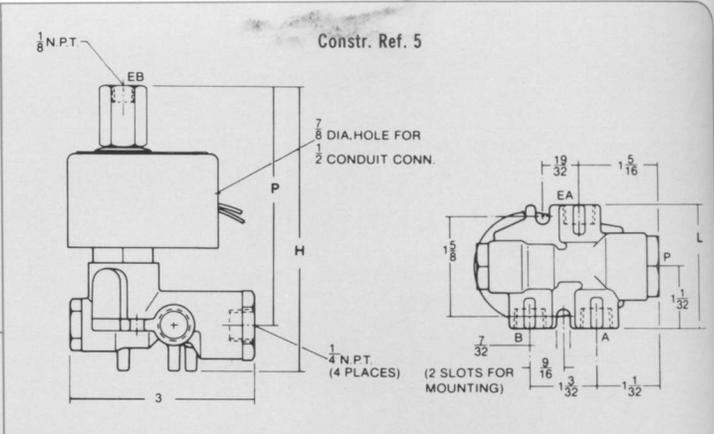
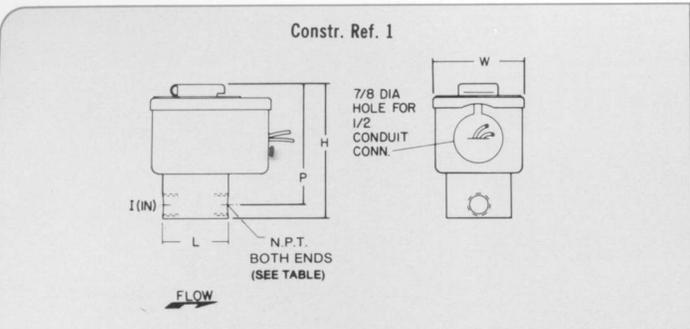
Operation of the "IS" manual reset valve is accomplished by (1) energizing the coil and (2) pushing in the yellow knob. (3) While continuing to hold this knob in, lift the latching handle, which shifts the valve. Release the knob and handle. The valve will remain in this position as long as the solenoid remains energized. When the coil is de-energized, the latch releases and the valve returns to its original position.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Fluid and Ambient Temp. °F.	Type 1 General Purpose Solenoid Enclosure	
			Air-Inert Gas			Catalog Number	Constr. Ref. No.
			Minimum	Maximum			
3 Way Universal Operation (or Normally Closed① and Normally Open), Brass Body with Buna "N" Disc							
1/4	11/64	.38	0	125	180	IS830840	10
1/4	1/4	.45	0	125	180	IS830844②	11
3/8	1/4	.45	0	125	180	IS830845②	11
3/8	5/8	3.0	10	250	180	IS830841①	12
1/2	5/16	.75	0	125	180	IS830846②	11
1/2	5/8	4.0	10	250	180	IS830842①	12
3/4	11/16	5.5	10	250	180	IS830843①	13
3 Way Universal Operation, Steel Body with Stainless Steel Seats and Discs							
3/8	5/16	.75	0	125	200	IS830848	11
1/2	5/16	.75	0	125	200	IS830849	11
3 Way Universal Operation, Stainless Steel Body with Stainless Steel Seats and Discs							
1/2	5/16	.75	0	125	200	IS830847	11
4 Way, Forged Brass Body with Plastic Discs							
1/4	3/16	0.8	0	250	160	IS8408A6	14
3/8	3/16	0.8	0	250	160	IS8408A7	14

- Notes: ① Only available as normally closed (add suffix "F") or normally open (add suffix "G").
 ② Supplied with stainless steel seats and discs.

DIMENSIONS (in inches)



Constr. Ref.	Catalog Number	N.P.T.	L	H	P	W	Constr. Ref.	Catalog Number	N.P.T.	L	H	P	W	Constr. Ref.	Catalog Number	N.P.T.	L	H	P	W	M	N	R
1	IS8262C1, IS8262C14	1/8	1 3/16	3 5/8	3 1/4	2 7/32	3	IS8314C49, IS8314C50	1/8	1 3/16	4 9/16	4 7/32	2 7/32	3	IS8314C35, IS826283	1/4	1 1/4	4 29/32	4 1/2	2 7/32	—	—	—
1	IS8262D19, IS8262D20	1/4	1 1/4	3 13/16	3 13/32	2 7/32	3	IS8314C52, IS8314C53	1/4	1 1/4	4 29/32	4 1/2	2 7/32	6	IS831654	3/8	2 3/4	5 29/32	4 23/32	4 5/16	—	—	—
2	IS8223A21	1/4	2 7/16	3 31/32	3 15/32	2 7/32	3	IS8314C55, IS8314C56	1/8	1 3/16	4 9/16	4 7/32	2 7/32	6	IS831664	1/2	2 3/4	5 29/32	4 23/32	4 5/16	—	—	—
2	IS8223A23	3/8	2 7/16	3 31/32	3 15/32	2 7/32	3	IS8314C122, IS8314C123	1/4	1 5/8	4 27/32	4 15/32	2 7/32	7	IS8316A74	3/4	3 3/8	6 29/32	5 3/32	3 5/16	2 5/32	1 7/32	1/2
2	IS8223A3	1/2	3 1/32	4 29/32	3 33/32	2 7/32	3	IS8314C37, IS8314C38	1/8	1 3/16	4 9/16	4 3/16	2 7/32	7	IS8316E34	1	4	7 13/32	5 11/32	4 7/16	2 13/16	7/8	1 3/4
3	IS8314C31	1/8	1 3/16	4 9/16	4 3/16	2 7/32	3	IS8314C120, IS8314C121	1/4	1 5/8	4 27/32	4 7/16	2 7/32	3	IS8314C37, IS8314C38	1/8	1 3/16	4 9/16	4 3/16	2 7/32	—	—	—
3	IS8314C32	1/8	1 3/16	4 9/16	4 7/32	2 7/32	4	IS8317A53	1/4	2	4 23/32	4 7/32	—	3	IS8314C120, IS8314C121	1/4	1 5/8	4 27/32	4 7/16	2 7/32	—	—	—
3	IS8314C34, IS826282	1/4	1 1/4	4 29/32	4 1/2	2 7/32	5	IS8345E1	1/4	2 1/16	5 3/8	4 23/32	—	4	IS8317A35	1/4	2	4 23/32	4 7/32	—	—	—	—



Automatic Switch Co. 50-56 Hanover Road, Florham Park, New Jersey 07932, Tel. (201) 966-2000

SOLENOID OPERATORS

2 Way and 3 Way

for Air, Inert Gas, Water and Light Oil

General Description

These are the same reliable solenoid operators supplied on ASCO Red-Hat® solenoid valves. The solenoid operators can be mounted directly on larger valves as pilots or used as 2 way valves when mounted on manifolds, etc. Inserted seats are available for the solenoid operators to simplify main body and manifold machining (refer to specification table for details).

Special operators available for:

- dry air-gas
- continuous cycling
- exceptionally long life
- heavy-duty operation
- clickless and quiet (no AC hum) operation.

Push type 2 way solenoid operators are also available. Consult your local ASCO sales office for details.

Specifications

Parts in Contact with Fluid:

Seals and Disc — Buna "N" (on 3 way operators only the upper disc is nylon).

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Springs — 302 s.s.

Shading Coil — Copper.

Adapter — Brass (82002 only).

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

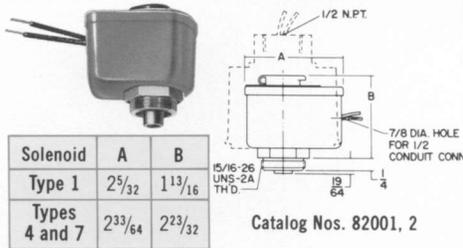
(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages (except where noted):

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

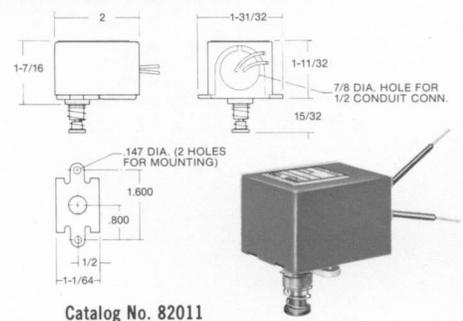
DIMENSIONS (in inches) (Watertight and Explosion-Proof Solenoid Enclosure shown dotted-in, details on request.)

2 WAY



Solenoid	A	B
Type 1	2 ⁵ / ₃₂	1 ¹³ / ₁₆
Types 4 and 7	2 ³³ / ₆₄	2 ²³ / ₃₂

Catalog Nos. 82001, 2



Catalog No. 82011

6, 12, 24, 120, 240 volts, DC.*

*Except 6.4 watt coil limited to 6, 12, 24 volts, DC.

Other voltages available when required.

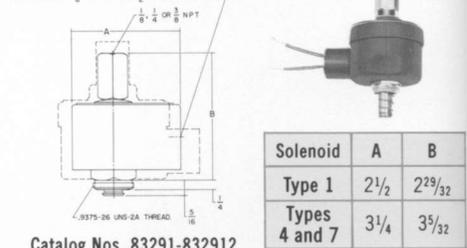
Coil: Continuous Duty Molded Class A or B, as listed.

Temperature:

Fluid: To 200°F., as listed.

Ambient: Nominal Range, 32°F. to 77°F. (Refer to Engineering Section.)

3 WAY



Solenoid	A	B
Type 1	2 ¹ / ₂	2 ²⁹ / ₃₂
Types 4 and 7	3 ¹ / ₄	3 ⁵ / ₃₂

Catalog Nos. 83291-832912

Installation:

Dimensions: Refer to Dimensions Tables.

Attitude: Mountable in any position without affecting operation.

Approvals: CSA certified. Refer to Engineering Section for details.

ELECTRICAL INFORMATION

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC				
		Watts	VA Holding	VA Inrush	AC	DC
A	9.7	6	15.6	27.7	96-619	103-832
B	6.4	6.5	9.2	15	204-945	206-605
A	11.2	11	21	42	27-462	27-463

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

SPECIFICATIONS

Orifice Size (ins.)	Cv Flow Factor ①	Maximum Operating Pressure Differential (psi)						Maximum Fluid Temp. °F.		Type 1 General Purpose Solenoid Enclosure Catalog Number	Types 4 and 7 (C and D) Watertight and Explosion-Proof Solenoid Enclosure Catalog Number	Watt Rating/Class of Coil Insulation		Optional Inserted Seat Part Number
		Air-Inert Gas		Water		Light Oil @ 300 SSU ⑤						AC	DC	
		AC	DC	AC	DC	AC	DC	AC	DC					
2 Way Solenoid Operators, ① Normally Closed														
3/64	.06	750	325	600	225	400	300	180	120	82001	82002	6/A	9.7/A	096-429-4② 180-222-5D③ 180-222-1D③
3/32	.17	275	110	200	100	130	100							
1/8	.35	135	50	115	50	90	50							
2 Way Sub-Miniature Solenoid Operators, Normally Closed														
1/16	.09	150	60	150	60	150	60	180	77	82011	—	6.5/B	6.4/B	096-429-5② 096-429-17②
3/32	.18	100	20	100	20	100	20							
3 Way Solenoid Operators, ① Normally Closed														
3/64	.04	230	120	230	140	230	125	200	150	83291	83294	11/A	11.2/A	096-429-4②
3/32	.15	125	60	100	70	100	30	200	150	83292	83295	11/A	11.2/A	096-429-3②
1/8	.25	75	30	60	40	60	25	200	150	83293	83296	11/A	11.2/A	180-222-1D③
3 Way Solenoid Operators, ① Normally Open														
3/64	.04	300	200	300	300	300	120	200	150	83297	832910	11/A	11.2/A	096-429-4②
3/32	.15	175	70	175	90	175	45	200	150	83298	832911	11/A	11.2/A	096-429-3②
1/8	.25	90	40	90	40	90	25	200	150	83299	832912	11/A	11.2/A	180-222-1D③

Notes: ① Larger operators, orifice sizes and higher pressure ratings are available, consult your local ASCO sales office.

② Inserted seat has 1/8-32 thread for threading into cavity.

③ Inserted seat has 3/8-32 thread for threading into cavity.

④ Cv will depend upon size and location of connecting passages.

⑤ Maximum viscosity for 3 way solenoid operators is 45 SSU.

GROUP MOUNTING

2&3 Way "Sub-Miniature" Valves

Aluminum Body • 1/8" N.P.T.

ASCO® Red-Hat®
BULLETINS
8280, 8380

General Description

These low-cost, compact, direct-acting 2 and 3 way valves may be gang mounted in any combination up to 10 valves per manifold. The 3 way valves exhaust to atmosphere.

Applications

Valves are designed for simplified piping. Common pressure connections may be made at either end of the manifold. These valves are particularly suitable for use on: machine tools, packaging equipment, etc., wherever cost and space are important. In-line valves in brass or stainless steel available. Refer to (2 Way) Bulletin 8225 and (3 Way) Bulletin 8325.

Specifications

Both the 2 and 3 way designs are available in two constructions:

(a) A solenoid operator only, suitable for mounting directly to customer's manifold body.

(b) Sub-base mounted valves, suitable to be used individually or group mounted by means of tie-rods through holes supplied in the sub-base.

Operation:

(a) **2 Way Valves:** Normally Closed — valve closed when solenoid is de-energized, open when energized.

(b) **3 Way Valves:** Normally Closed — applies pressure when solenoid is energized; exhausts pressure when de-energized. Valve exhausts to atmosphere.

Valve Parts in Contact with Fluid:

Body — Aluminum.

Seals and Discs — Buna "N."

Core Tube — 305 s.s.

Core and Plugnut — 430F s.s.

Core Spring — 302 s.s.

Shading Coil — Copper.

Core Retaining Ring — Acetal.

Washer and Retainer (3 Way) — Brass.

Solenoid: Open Frame Solenoid.

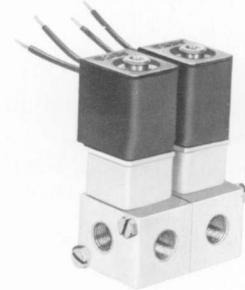
Electrical: Standard Voltages:

24, 120, 240 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz).

6, 12, 24, 120, 240 volts, DC.

Other voltages available when required.

Coil: Continuous Duty Molded Class A.



Temperature:

Fluid: To 180°F. Maximum, as listed.

Ambient: Nominal Range, 32°F. to 77°F. (104°F. occasionally — refer to Engineering Section.)

Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position.

OPTIONAL FEATURES

- Spade Terminal Coil with Ground Terminal (in accordance with DIN 43650)
- Mounting Bracket

SPECIFICATIONS ① • Air Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Maximum Operating Pressure Differential (psi) ③				Maximum Fluid Temp. °F.	Open Frame Solenoid		Watt Rating/Class of Coil Insulation	
			Air-Inert Gas		Operator Only	Sub-Base Construction		AC	DC		
			AC	DC						AC	DC
2 WAY NORMALLY CLOSED OPERATION											
1/8	3/64	.05	150	150	180	77	U82801	U82802	6.2/A	7/A	
3 WAY NORMALLY CLOSED OPERATION • Exhaust to Atmosphere • Pressure at Port 1											
1/8	3/64	②	150	150	180	77	U83801	U83802	6.2/A	7/A	

Notes: ① For factory assembled group mounted constructions refer to price list.

② Cv at Port 2 is .05 and .07 at Port 3.

③ 3 way ratings are for valves controlling cylinders and diaphragms having dead-end flow conditions. When using common pressure to divert flow, valves may be provided to control higher pressures — consult ASCO for details.

ELECTRICAL INFORMATION

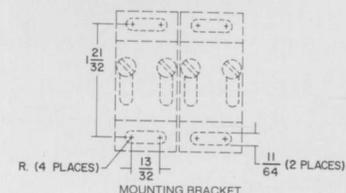
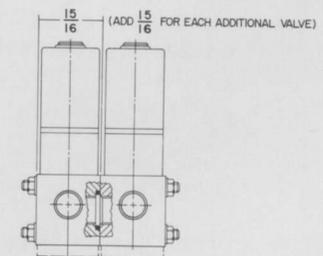
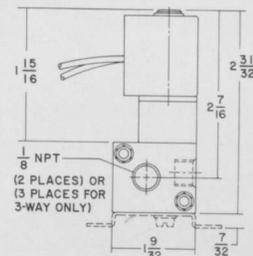
Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.	
	DC Watts	AC			AC	DC
		Watts	VA Holding	VA Inrush		
A	7	6.2	8.6	13.6	224-604	224-605

ORDERING INFORMATION

IMPORTANT: We must have PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ and OPERATING PRESSURE.

DIMENSIONS (in inches)

Open Frame Solenoid

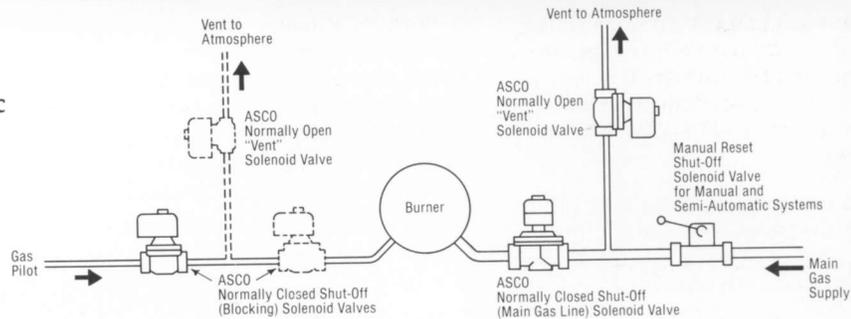


COMBUSTION VALVES INDEX

GAS-FIRED SINGLE BURNER SYSTEM

Typical of F.I.A. semi-automatic or manual systems.

Additional valves (shown dotted-in) for combination of two shut-off (blocking) and vent valves arrangement as recommended by F.I.A. for gas ratings of 120,000 BTU/hr. and above.



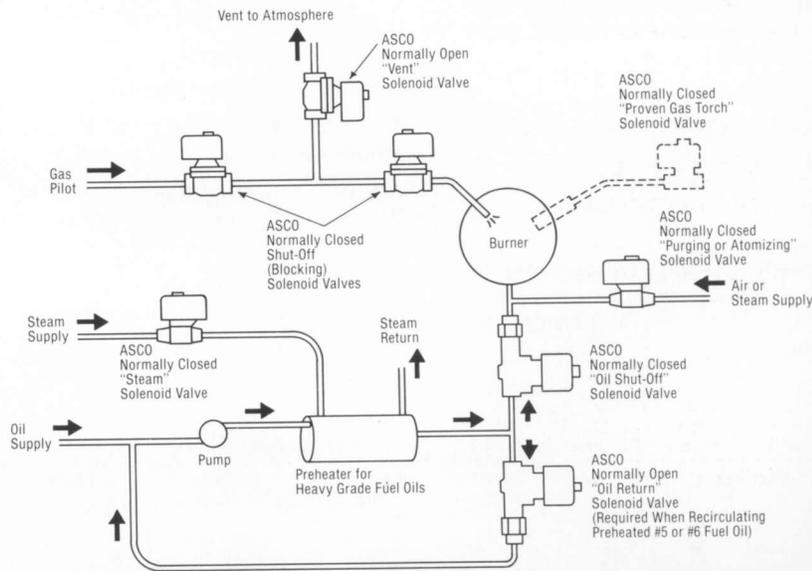
OIL-FIRED SINGLE BURNER SYSTEM

Typical of F.I.A. semi-automatic or automatic systems.

Combination of two shut-off (blocking) and vent valves arrangement as recommended by F.I.A. for gas pilot ratings above 120,000 BTU/hr.

IMPORTANT:

These diagrams are merely intended as guides in the application of solenoid valves. The selection of valves depends upon the equipment manufacturers' requirements, and the general practice recommendations of the appropriate approval agencies.



INDEX

Fuel Gas Service

Blocking (Shut-Off) Valves for:

• Industrial and Commercial Burners	1/8" to 3"	87
• F.I.A. Systems (5 lb. Closing Spring)	3/4" to 3"	88
• FM Systems (Proof of Closure)	3/4" to 3"	89
• LP Gas Systems	1/4" to 2"	89

Vent Valves for:

• F.I.A. Systems	3/8" to 2 1/2"	88
------------------------	----------------	----

"Free Handle" Manual Reset Shut-Off Valves for:

• Industrial and Commercial Burners	3/4" to 3"	90
---	------------	----

Dimensions — Valves for Fuel Gas Service		91
--	--	----

Fuel Oil Service

Light Fuel Oil Shut-Off Valves	1/8" to 3/8"	92
--------------------------------------	--------------	----

Heavy Fuel Oil Valves

• Shut-Off • Bypass • Normally Open	3/8" to 3/4"	93
---	--------------	----

3 Way Diversion Valves	3/8" and 1/2"	94
------------------------------	---------------	----

Dimensions — Valves for Fuel Oil Service		95
--	--	----



2 Way Solenoid Valves

Normally Closed and Normally Open Operation • 1/8" to 3" N.P.T.

General Description

ASCO offers a complete line of 2 way normally closed and normally open solenoid valves for fuel gas service to meet the requirements of combustion systems which are UL listed, FM approved and CSA certified.

Specifications

Body — Aluminum and Brass, as listed.
Seat — Buna "N."
Disc — Buna "N," for Low Pressure.
Solenoid Enclosures:
Standard: Type 1 — General Purpose.

Optional:

(a) **Type 3R** — Rainproof for outdoor rooftop installations.
(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof Enclosure.
Consult your local ASCO office.

Electrical: Standard Voltages: 24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz), unless otherwise noted.

Other voltages and DC available, consult your local ASCO office.

Coil: Continuous Duty Molded Class A, B, F and H, as listed.

Installation:

Dimensions: Refer to Dimensions for envelope size and mounting.

Attitude: Valves may be mounted in any position, except where noted.

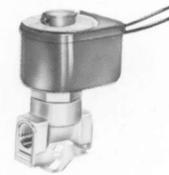
Approvals: UL, FM and CSA, as listed. Refer to Engineering Section for details and coding explanation.

OPTIONAL FEATURES

Many optional electrical and construction features are available, refer to Optional Feature Section.

BLOCKING (SHUT-OFF) VALVES For Industrial and Commercial Burners

Used as shut-off valves on the main gas line or gas pilot line.



SPECIFICATIONS

2 Way Normally Closed Operation • AC Only

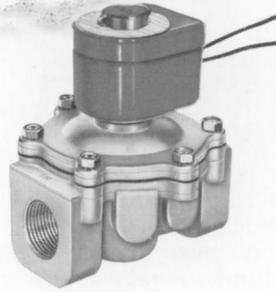
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure 1000 Btu/Cu. Ft. or More 0.64 Sp. Gr. Gas Btu/Hr.	Approval Listings			Watt Rating/ Class of Coil Insulation AC
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.		UL	FM	CSA	
Brass Body with Buna "N" Seating													
1/8	1/8	.35	0	190	104	104	826277	2	15,000	○	○	○	11.8/A
1/4	3/32	.96	0	40	104	104	826278	2	51,700	○	○	○	11.8/A
3/8	3/8	1.8	0	15	104	104	803068	41	97,000	○	○	○	11.8/A
3/8	5/8	2.8	0	50	104	104	8210C74	4	150,000	○	○	○	11.8/A
1/2	7/16	2.8	0	8	104	104	803069	42	151,000	○	○	○	11.8/A
1/2	5/8	3.6	0	50	104	104	8210C75	5	193,000	○	○	○	11.8/A
3/4	3/4	5.0	0	2	104	104	803079	3	269,000	○	○	○	11.8/A
3/4	3/4	5.5	0	50	104	104	8210C76	6	295,000	○	○	○	11.8/A
Aluminum Body with Buna "N" Disc for Low Pressure													
1/8	3/8	1.0	0	4	125	125	8040A17	7	53,700	○	○	○	6.5/B
1/4	3/8	1.1	0	4	125	125	8040A18	7	59,000	○	○	○	6.5/B
3/8	3/8	1.2	0	4	125	125	8040A19	7	64,400	○	○	○	6.5/B
3/8	3/4	3.9	0	2	104	104	8040A21	43	210,000	○	○	○	11.8/A
1/2	3/4	5.4	0	2	104	104	8040A22	43	291,000	○	○	○	11.8/A
3/4	3/4	9.5	0	2	104	104	8040A23	44	512,000	○	○	○	11.8/A
1	1 5/8	16.8	0	0.5	104	104	8040C4	12	900,000	○	—	○	15.4/A
1 1/4	1 5/8	19.6	0	0.5	104	104	8040C5	12	1,100,000	○	—	○	15.4/A
Aluminum Body with Buna "N" Seating													
3/8	3/4	3.4	0	50	104	104	8215C10	8	183,000	○	○	○	11.8/A
1/2	3/4	4.4	0	50	104	104	8215C20	9	238,500	○	○	○	11.8/A
3/4	3/4	5.1	0	50	104	104	8215C30	10	247,500	○	○	○	11.8/A
3/4	1 3/32	8.4	0	50	104	104	821535	11	453,000	○	○	○	11.8/A
1	1 5/8	21	0	25	104	104	8215B50*	12	1,119,000	○	—	○	15.4/A
1 1/4	1 5/8	32	0	25	104	104	8215B60*	12	1,730,000	○	—	○	15.4/A
1 1/2	1 5/8	35	0	25	104	104	8215B70*	12	1,900,000	○	—	○	15.4/A
2	2 3/32	60	0	25	104	104	8215B80*	13	3,251,250	○	—	○	15.4/A
2 1/2	3	108	0	5	104	104	8215A90*	14	5,821,200	○	—	○	28.2/A
3	3	138	0	5	104	104	8215A40*	14	7,430,000	○	—	○	28.2/A

*Valve must be mounted with the solenoid vertical and upright for maximum life.

SHUT-OFF VALVES For F.I.A. Systems

These valves include a 5 lb. closing spring to meet F.I.A. requirements, as the downstream shut-off valve in the "block and vent" system.

Note: For gas pilot valves, under 120,000 BTU's, refer to listing under "Blocking Valves."



SPECIFICATIONS*

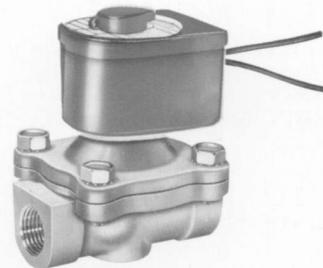
**2 Way Normally Closed Operation, Aluminum Body with Buna "N" Diaphragm
120 and 240 Volts, 60 Hz • AC Only**

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure		Approval Listings			Watt Rating/ Class of Coil Insulation
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.	1000 Btu/Cu. Ft. or More 0.64 Sp. Gr. Gas		UL	FM	CSA	AC
									Btu/Hr.					
3/4	1 3/32	12	0	20	104	104	8042C35	28	640,000	○	—	—	59.5/H	
1	1 5/8	24	0	20	104	104	8042C45	29	1,290,000	○	—	—	59.5/H	
1 1/4	1 5/8	35	0	20	104	104	8042C55	29	1,900,000	○	—	—	59.5/H	
1 1/2	1 5/8	40	0	20	104	104	8042C65	29	2,145,000	○	—	—	59.5/H	
2	2 3/32	60	0	20	104	104	8042C75	30	3,241,000	○	—	—	59.5/H	
2 1/2	3	120	0	5	104	104	8042C85	31	6,467,500	○	—	—	66/H	
3	3	130	0	5	104	104	8042C95	31	7,002,500	○	—	—	66/H	

*All Bulletin 8042 valves must be mounted with solenoid vertical and upright for maximum life.

VENT VALVES For F.I.A. Systems

Generally used as the vent valve located between the two blocking valves in the "block and vent" systems. They are used in both the pilot and main lines in gas-fired systems.



SPECIFICATIONS

2 Way Normally Open Operation • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure		Approval Listings			Watt Rating/ Class of Coil Insulation
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.	1000 Btu/Cu. Ft. or More 0.64 Sp. Gr. Gas		UL	FM	CSA	AC
									Btu/Hr.					
Brass Body with Buna "N" Seating														
3/8	3/8	1.6	0	15	200	77	8030A70	17	86,000	•	—	•	15.4/A	
3/8	5/8	2.8	0	125	200	77	8210C33	20	150,000	•	—	•	10.5/A	
1/2	3/4	5.0	0	2	77	77	8030B82	18	269,000	•	—	•	10.5/A	
1/2	5/8	3.5	0	125	200	77	8210C34	20	188,000	•	—	•	10.5/A	
3/4	3/4	5.5	0	2	77	77	8030B83	19	295,000	•	—	•	10.5/A	
3/4	3/4	5.5	0	125	200	77	8210C35	21	295,000	•	—	•	10.5/A	
Aluminum Body with Buna "N" Diaphragm														
3/8	3/4	3.2	0	125	104	104	8215A13	22	172,500	•	—	•	10.5/A	
1/2	3/4	4.0	0	125	104	104	8215A23	22	206,250	•	—	•	10.5/A	
3/4	3/4	4.6	0	125	104	104	8215A33	23	247,500	•	—	•	10.5/A	
3/4	1 3/32	8.7	0	25	104	104	8215A37	32	469,500	•	—	•	15.4/A	
1	1 5/8	22	0	25	104	104	8215C53*	33	1,191,750	•	—	•	15.4/A	
1 1/4	1 5/8	33	0	25	104	104	8215C63*	33	1,793,250	•	—	•	15.4/A	
1 1/2	1 5/8	37	0	25	104	104	8215C73*	33	1,988,250	•	—	•	15.4/A	
2	2 3/32	58	0	25	104	104	8215C83*	34	3,100,000	•	—	•	15.4/A	
2 1/2	3	117	0	5	104	104	8215B93*	35	6,290,000	•	—	•	28.2/A	

*Valves must be mounted with the solenoid vertical and upright or horizontal only.

VENT PIPE SIZES

Recommended by F.I.A.

Fuel Line ^① Diameter (ins.)	up to 1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7 1/2
Vent Line ^② Diameter (ins.)	3/4	1	1 1/4	1 1/4	1 1/2	2	2	2	2 1/2	3

Notes: ① If the main line is less than 3/4", then the vent line shall be equal to the cross sectional area of the main line.

② The vent valve port (orifice) shall have a cross sectional area equal to the specified vent line.

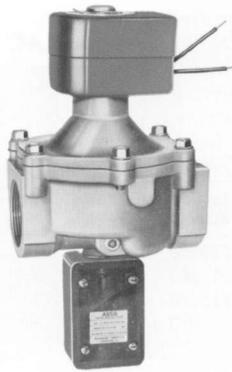
ORDERING INFORMATION

IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.

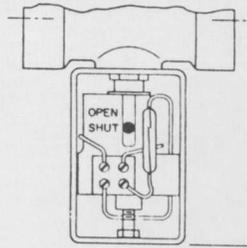
For FM "Proof of Closure" Requirements

FM "Proof of Closure" design incorporates a double disc arrangement. While the first disc shuts off the flow, the valve stem continues to "overtravel," allowing the second disc to close against the seat, thus insuring complete shut-off. A 5 lb. closing spring is included.

A position indicator providing visual and electrical indication of the valves' open and shut positions is standard.



VISUAL AND ELECTRICAL POSITION INDICATOR



The indicator is of a packless design (no stuffing box or sliding gland) encased in a moisture and dust tight enclosure.

The indicator is furnished standard with one reed switch having a single contact to close when the valve is in open (energized) position. The switch rating is 15 watts maximum resistive load, current not to exceed one ampere and the voltage not to exceed 120 volts, AC or DC.

This is a combination visual and electrical position indicator that assures positive indication of the valves' open and shut positions. It is arranged to show the position of the main valve disc.

Reed switches with contacts to show both the open and shut positions of the valve can be provided when required. Consult your local ASCO sales office.

SPECIFICATIONS*

2 Way Normally Closed Operation, Aluminum Body with Buna "N" Diaphragm, 120 and 240 Volts, 60 Hz • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure 1000 Btu/Cu. Ft. or More 0.64 Sp. Gr. Gas	Approval Listings			Watt Rating/ Class of Coil Insulation
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.		UL	FM	CSA		AC
			3/4	1 3/32	11	0	20	104	104	804337	46	580,000	○	○	—	59.5/H
1	1 5/8	22	0	20	104	104	804347	47	1,170,000	○	○	—	59.5/H
1 1/4	1 5/8	31	0	20	104	104	804357	47	1,657,000	○	○	—	59.5/H
1 1/2	1 5/8	35	0	20	104	104	804367	47	1,867,500	○	○	—	59.5/H
2	2 3/32	60	0	20	104	104	804377	48	3,247,500	○	○	—	59.5/H
2 1/2	3	105	0	5	104	104	804387	49	5,659,500	○	○	—	66/H
3	3	125	0	5	104	104	804397	49	6,737,500	○	○	—	66/H

*All Bulletin 8043 valves must be mounted with solenoid vertical and upright for maximum life.

For LP Gas Systems

Internal solenoid parts have been modified in order to handle liquefied petroleum gases (propane) in both the liquid and gaseous states in applications such as grain dryers, incinerators and some space heaters.



ORDERING INFORMATION

IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.

SPECIFICATIONS*

2 Way Normally Closed Operation, Brass^① or Aluminum^② Body with Buna "N" Seating • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure 2300 Btu/Cu. Ft. or More 1.6 Sp. Gr. Gas	Approval Listings			Watt Rating/ Class of Coil Insulation
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.		UL	FM	CSA		AC
			1/4	1/8	.35	0	250	180	77	8262C232B ^①	2	27,250	—
1/4	3/32	.96	0	45	180	77	8262B210B ^①	2	74,700	—	—	○	10.5/A
3/8	3/4	2.9	0	50	104	104	8215C10B ^②	8	225,750	—	—	○	10.5/A
3/8	5/8	2.8	5	250	180	77	8210105B ^①	16	217,950	—	—	○	10.5/A
1/2	3/4	4.8	0	50	104	104	8215C20B ^②	9	373,650	—	—	○	10.5/A
1/2	5/8	3.6	5	250	180	77	8210106B ^①	16	280,250	—	—	○	10.5/A
3/4	3/4	5.1	0	50	104	104	8215C30B ^②	10	397,000	—	—	○	10.5/A
3/4	3/4	6.5	5	250	180	77	8210D3B ^①	15	506,000	—	—	○	10.5/A

*Valves must be mounted with solenoid vertical and upright for maximum life.

(continued)

SPECIFICATIONS*

**For Applications Where Propane in the Gaseous State Only is Handled
2 Way Normally Closed Operation, Aluminum Body with Buna "N" Diaphragm • AC Only**

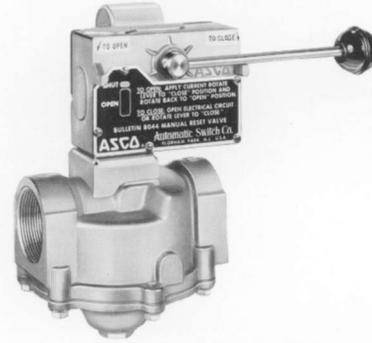
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure		Approval Listings			Watt Rating/ Class of Coil Insulation
									2300 Btu/Cu. Ft. or More 1.6 Sp. Gr. Gas					
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.	Btu/Hr.	UL	FM	CSA	AC	
1	1 ⁵ / ₈	21	0	25	104	104	8215B50	12	759,000	○	—	○	15.4/A	
1 ¹ / ₄	1 ⁵ / ₈	32	0	25	104	104	8215B60	12	1,193,000	○	—	○	15.4/A	
1 ¹ / ₂	1 ⁵ / ₈	35	0	25	104	104	8215B70	12	1,242,000	○	—	○	15.4/A	
2	2 ³ / ₃₂	60	0	25	104	104	8215B80	13	2,042,000	○	—	○	15.4/A	

*Valves must be mounted with solenoid vertical and upright for maximum life.

**“FREE HANDLE”
MANUAL RESET SHUT-OFF VALVES**

Used in gas supply lines of burners for industrial and commercial boilers, furnaces/ovens to shut off the fuel gas instantly upon de-energization of electric power. The free handle will not open the valve until the solenoid is energized which will allow the lever to engage. Only then can the lever be manually raised to the latched position, opening the valve. The valve will trip closed instantly when the solenoid is de-energized.

The manual reset movement is a heavy-duty sealed unit with a highly visible position indicator showing valve position. Top movement can be rotated to any of 4 positions (90° apart) to best locate the sturdy handle and visual indicator.



SPECIFICATIONS†

2 Way Normally Closed Operation, Aluminum Body with Buna "N" Disc • AC Only

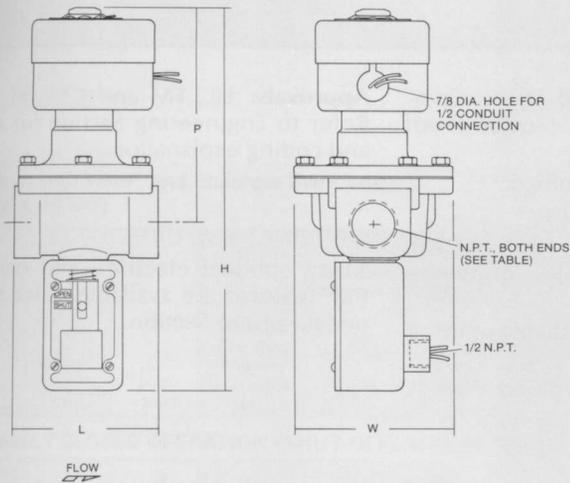
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)		Maximum Temp. °F.		Type 1 General Purpose Solenoid Enclosure		Gas Capacity 1" W.C. Drop @ 2" W.C. Inlet Pressure		Approval Listings			Watt Rating/ Class of Coil Insulation
									1000 Btu/Cu. Ft. or More 0.64 Sp. Gr. Gas					
			Minimum	Maximum	Fluid	Ambient	Catalog Number	Constr. Ref. No.	Btu/Hr.	UL	FM	CSA	AC	
3/4	1 ³ / ₃₂	13	0	25	125	125	8044A1	24	717,000	○	○	○	16.7/F	
1	1 ⁵ / ₈	22	0	25	125	125	8044A2	25	1,170,000	○	○	○	16.7/F	
1 ¹ / ₄	1 ⁵ / ₈	30	0	25	125	125	8044A3	25	1,580,000	○	○	○	16.7/F	
1 ¹ / ₂	1 ⁵ / ₈	33	0	25	125	125	8044A4	25	1,760,000	○	○	○	16.7/F	
2	2 ³ / ₃₂	55	0	20	125	125	8044A5	26	2,960,000	○	○	○	16.7/F	
2 ¹ / ₂	3	108	0	10	125	125	8044A6	27	5,810,000	○	○	○	16.7/F	
3	3	135	0	10	125	125	8044A7	27	7,260,000	○	○	○	16.7/F	

†Available with electrical position indicator switches — one indicates closed position of valve and the other indicates open position of valve. To order, add suffix "SW" to catalog number.

ORDERING INFORMATION
IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.

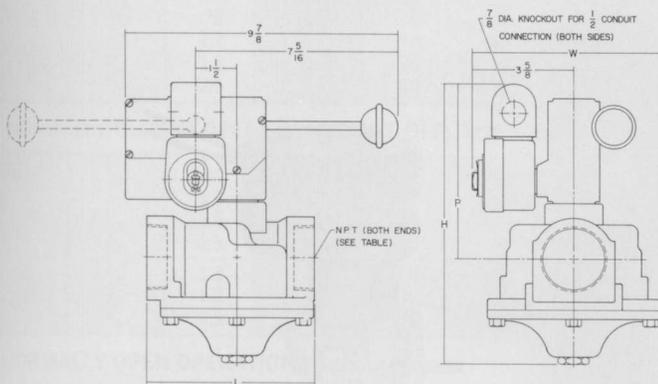
DIMENSIONS (in inches) For valves listed on pages 87 to 90.

Constr. Refs. 46-49



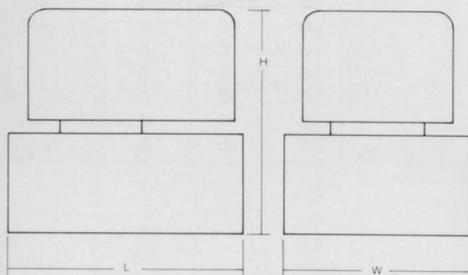
Constr. Ref.	Pipe Size	H	L	P	W
46	3/4	10 1/2	4 1/2	5 27/32	4 9/16
47	1	11 13/32	5	6 11/32	5 3/8
47	1 1/4	11 13/32	5	6 11/32	5 3/8
47	1 1/2	11 13/32	5	6 13/32	5 3/8
48	2	12 1/8	6 3/32	6 7/8	6 5/16
49	2 1/2	14	7 13/16	7 29/32	7 15/16
49	3	14	7 13/16	7 29/32	7 15/16

Constr. Refs. 24-27



Constr. Ref.	Pipe Size	H	L	P	W
24	3/4	8 15/16	4 1/2	5 3/4	5 29/32
25	1	9 5/8	5	6 3/16	6 5/16
25	1 1/4	9 5/8	5	6 3/16	6 5/16
25	1 1/2	9 5/8	5	6 1/8	6 5/16
26	2	10 1/4	6 3/32	6 3/8	6 25/32
27	2 1/2	12 7/16	7 13/16	7 7/32	7 3/4
27	3	12 7/16	7 25/32	7 7/32	7 3/4

Constr. Refs. 1-23, 28-35, 37-44



Constr. Ref.	L	H	W	Constr. Ref.	L	H	W	Constr. Ref.	L	H	W
1	1 3/16	2 17/32	1 21/32	14	7 51/64	10 1/4	7 15/16	31	7 13/16	10 1/4	7 15/16
2	1 9/16	3 3/16	1 13/16	15	3 25/32	4 5/32	2 3/4	32	4 1/2	5 13/32	4 9/16
3	3 5/16	4 3/8	2 5/16	16	2 3/4	3 13/32	2 5/16	33	5	7 1/16	5 3/8
4	2 25/32	4 1/32	2 5/16	17	1 29/32	4 3/16	2 7/32	34	6 3/32	7 11/16	6 5/16
5	2 25/32	4 1/32	2 5/16	18	2 13/16	3 31/32	2 5/16	35	7 51/64	10 3/8	7 13/16
6	2 13/16	4 1/4	2 5/16	19	2 13/16	3 31/32	2 5/16	37	1 9/16	2 15/16	1 21/32
7	1 29/32	2 11/16	1 15/16	20	2 3/4	4 5/8	2 9/32	38	1 9/16	3 3/16	1 13/16
8	2 3/4	4 3/32	1 15/16	21	2 13/16	4 27/32	2 9/32	39	1 7/8	3 1/16	1 21/32
9	2 3/4	4 3/32	1 15/16	22	2 3/4	4 11/16	2 3/8	40	1 7/8	3 5/16	1 13/16
10	3 5/16	4 17/32	1 15/16	23	3 5/16	5 1/8	2 11/32	41	1 29/32	3 15/16	1 13/16
11	4 1/2	4 27/32	4 9/16	28	4 1/2	6 3/4	4 9/16	42	2 9/32	4 3/16	1 13/16
12	5	6 27/32	5 3/8	29	5	7 21/32	5 3/8	43	2 3/4	4 3/32	2 3/8
13	6 3/32	7 1/16	6 5/16	30	6 3/32	8 3/8	6 5/16	44	3 5/16	4 1/2	2 1/32

2 Way Solenoid Valves

Normally Closed and Normally Open Operation • 1/8" to 3/4" N.P.T.

General Description

These valves are used to control light (Nos. 2 and 4) and heavy fuel oils No. 5 and heated No. 6 in oil-fired industrial burner systems. A valve with a time delay on opening also is available for on-off control on oil burner equipment. Consult ASCO for details.

Specifications

Body — Brass.
Disc — Viton* and Buna "N," as listed.
Seat — Viton* and Stainless Steel, as listed.

Solenoid Enclosures:

Standard: Type 1 — General Purpose.

Optional:

(a) Type 3R — Rainproof for outdoor rooftop installations.

*DuPont Co. trademark.

(b) Types 4 and 7 (C and D) — Combination Watertight and Explosion-Proof Enclosure.

Consult your local ASCO office.

Electrical: Standard Voltages:

24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220 volts, AC, 50 Hz), unless otherwise noted.

Other voltages and DC available, consult your local ASCO office.

Coil: Continuous Duty Molded Class A and Class F, as listed.

Installation:

Attitude: Bulletin 8266 valves must be mounted with the solenoid vertical and upright. All other valves may be mounted in any position without affecting operation.

Approvals: UL, FM and CSA, as listed. Refer to Engineering Section for details and coding explanation.

OPTIONAL FEATURES

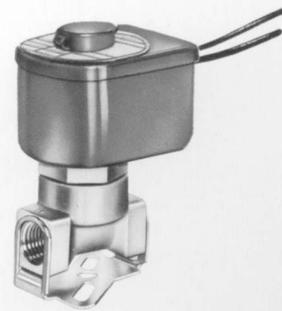
Many optional electrical and construction features are available, refer to Optional Feature Section.

ORDERING INFORMATION

IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.

LIGHT FUEL OIL SHUT-OFF VALVES

For on-off control of the flow of Nos. 2 and 4 fuel oil to burners.



SPECIFICATIONS

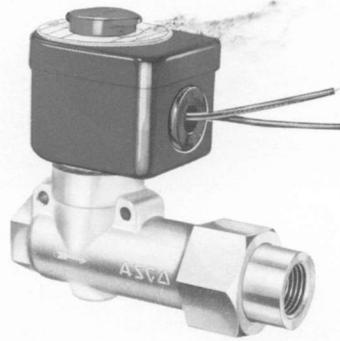
2 Way Normally Closed Operation, Brass Body with Viton* Disc • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Minimum Operating Pressure Differential (psi)	Maximum Operating Pressure Differential (psi)		Maximum Fluid Temp. °F.	Type 1 General Purpose Solenoid Enclosure		Approval Listings			Watt Rating/Class of Coil Insulation
				#2 Fuel Oil	#4 Fuel Oil		Catalog Number	Constr. Ref. No.	UL	FM	CSA		AC
1/8	3/64	.06	0	750	530	180	8262C1V	1	○	○	○	6/A
1/8	3/32	.20	0	360	300	180	8262C11V	1	○	○	○	9/F
1/8	1/8	.34	0	190	140	180	8262C2V	1	○	○	○	6/A
1/4	3/32	.17	0	450	280	180	8262D21V	37	○	○	○	9/F
1/4	1/8	.35	0	205	160	180	8262D23V	37	○	○	○	9/F
1/4	7/32	.85	0	100	100	200	8262B208V	38	○	○	○	16.7/F
3/8	1/8	.35	0	200	150	180	8263C3V	39	○	○	○	9/F
3/8	7/32	.72	0	100	100	200	8263B206V	40	○	○	○	16.7/F

*DuPont Co. trademark.

HEAVY FUEL OIL VALVES

For controlling the flow of all grades of fuel oil; particularly suited to control heavy No. 5 and heated No. 6 oil because of its lever design.



SPECIFICATIONS

Brass Body with Viton* and Stainless Steel Seats, as Listed • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Minimum Operating Pressure Differential (psi)	Maximum Operating Pressure Differential (psi)		Maximum Fluid and Ambient Temp. °F.	Type 1 General Purpose Solenoid Enclosure			Approval Listings			Watt Rating/Class of Coil Insulation AC	
				#2 and #4 Oil	#5 or Heated #6 Oil		Viton* Seating	Stainless Steel Disc	Constr. Ref. No.	UL	FM	CSA		
							Catalog Number	Catalog Number						
NORMALLY CLOSED OPERATION (SHUT-OFF), Without Bypass														
3/8	1/8	.34	0	400	350	See Table Below	8266D1V	8266D1L	36	○	○	○	15.4/A	
	3/16	.68	0	200	175		8266D7V	8266D7L	36	○	○	○	15.4/A	
	3/16	.68	0	300	250		8266D11V	8266D11L	36	○	○	○	20/F	
	1/4	1.2	0	110	100		8266D23V	8266D23L	36	○	○	○	15.4/A	
1/2	1/8	.34	0	400	350		8266D47V	8266D47L	36	○	○	○	15.4/A	
	3/16	.68	0	200	175		8266D53V	8266D53L	36	○	○	○	15.4/A	
	3/16	.68	0	300	250		8266D57V	8266D57L	36	○	○	○	20/F	
	13/64	.78	0	170	140		8266D61V	8266D61L	36	○	○	○	15.4/A	
	1/4	1.2	0	110	100		8266D69V	8266D69L	36	○	○	○	15.4/A	
	5/16	1.8	0	70	70		8266D77V	8266D77L	36	○	○	○	15.4/A	
	3/8	2.5	0	40	35		8266D85V	8266D85L	36	○	○	○	15.4/A	
	NORMALLY CLOSED OPERATION (SHUT-OFF), With 1/2" N.P.T. Bypass													
1/2	1/8	.34	0	650	600	See Table Below	8266C203V	8266C203L	36	○	○	○	20/F	
	1/4	1.2	0	180	160		8266C215V	8266C215L	36	○	○	○	20/F	
	5/16	1.8	0	110	100		8266C219V	8266C219L	36	○	○	○	20/F	
	3/8	2.5	0	75	70		8266C223V	8266C223L	36	○	○	○	20/F	
3/4	1/4	1.2	0	180	160		8266C239V	8266C239L	36	○	○	○	20/F	
	5/16	1.8	0	110	100		8266C243V	8266C243L	36	○	○	○	20/F	
	3/8	2.5	0	75	70		8266C247V	8266C247L	36	○	○	○	20/F	
	NORMALLY OPEN OPERATION, Without Bypass													
3/8	1/8	.34	0	425	400		See Table Below	8266D101V	8266D101L	36	○	—	○	15.4/A
	3/16	.68	0	160	150			8266D107V	8266D107L	36	○	—	○	15.4/A
	1/4	1.2	0	90	75			8266D123V	8266D123L	36	○	—	○	15.4/A
1/2	3/16	.68	0	160	150			8266D153V	8266D153L	36	○	—	○	15.4/A
	13/64	.78	0	130	125	8266D161V		8266D161L	36	○	—	○	15.4/A	
	1/4	1.2	0	90	75	8266D169V		8266D169L	36	○	—	○	15.4/A	

*DuPont Co. trademark.

AC FLUID AND AMBIENT TEMPERATURE TABLE

Coil	Watt Rating	Class of Coil Insulation	Fluid Temp. °F.	Ambient Temp. °F.	Cat. No. Prefix
STANDARD	15.4	A	190	77	NONE REQUIRED
	20	F	225	77	
			200	95	
			180	104	
For Higher Fluid and/or Ambient Temp. use:	15.4	F	250	95	FT
	15.4	F	225	104	FT
	15.4	H	250	122	HT
	20	H	250	122	HB

ORDERING INFORMATION
IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.



3 Way Diversion Solenoid Valve

Bypass Operation • Forged Brass Body • 3/8" and 1/2" N.P.T.

General Description

The new direct acting Bulletin 8377 pack-less 3 way diversion solenoid valve is supplied with a rugged forged brass body, designed for fuel oil service. It has a built-in strainer and three inlet pressure positions. Refer to pressure Diagram "A."

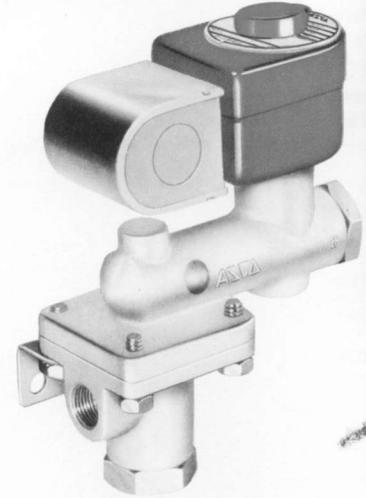
Important: No minimum operating pressure is required!

Applications

This multipurpose fuel oil valve is designed to handle fuel oil up to 1500 SSU in industrial burners. The valve allows diversion of flow from the burner to the recirculating system.

ORDERING INFORMATION

IMPORTANT: Please specify PIPE SIZE, CATALOG NUMBER, VOLTAGE and HERTZ.



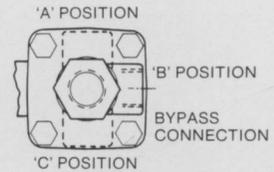
SPECIFICATIONS^② • AC Only

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi) ^③		Maximum Temp. °F.		Inlet Position ^①	Type 1 General Purpose Solenoid Enclosure ^④		Approval Listings			Watt Rating/Class of Coil Insulation
			Fuel Oil		Fluid	Ambient		Catalog Number	Constr. Ref. No.	UL	FM	CSA	
			Minimum	Maximum										AC
3/8	1/4	1.0	0	100	265	115	A	83771	45	○	○	○	15.4/F
3/8	1/4	1.0	0	100	265	115	B	83773	45	○	○	○	15.4/F
3/8	1/4	1.0	0	100	265	115	C	83775	45	○	○	○	15.4/F
1/2	1/4	1.0	0	100	265	115	A	83777	45	○	○	○	15.4/F
1/2	1/4	1.0	0	100	265	115	B	83779	45	○	○	○	15.4/F
1/2	1/4	1.0	0	100	265	115	C	837711	45	○	○	○	15.4/F

- Notes:**
- ① Before ordering, refer to Diagram "A" for description of inlet positions.
 - ② This valve construction is only capable of 3 way operation. DO NOT PLUG or RESTRICT BYPASS PORT.
 - ③ Valve intended for burner control with low pressure drop when energized. For other applications, be sure pressure drop, when energized, does not exceed 65 psi.
 - ④ Type 1 Junction Box Solenoid Enclosure supplied standard.

DIAGRAM "A"

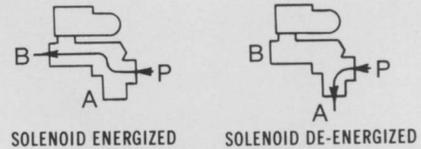
Bottom View Showing Inlet Positions



ELECTRICAL INFORMATION for All Valves in the Combustion Section.

Standard Coil and Class of Insulation	Watt Rating and Power Consumption			Spare Coil Part No.
	AC			
	Watts	VA Holding	VA Inrush	AC
A	6	15.6	34	96-619
F	9	22.5	30	99-216
B	6.5	9.2	17	204-945
A	10.5 and 11.8	23	55	27-462
F	16.7	35	78	64-982
A	15.4	26	130	96-817
F	20	43	240	99-257
A	28.2	51	384	206-408
H	59.5	122	600	204-806
H	66	128	936	204-806
F	15.4	26	130	99-257

FLOW DIAGRAM

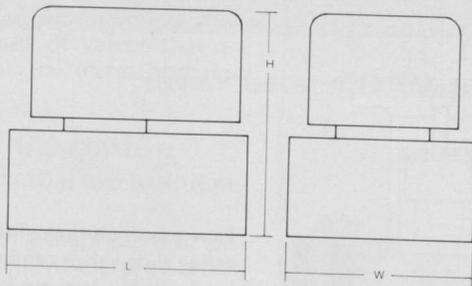


MOUNTING BRACKET STANDARD



DIMENSIONS (in inches) For valves listed on pages 92 to 94.

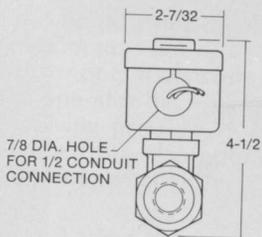
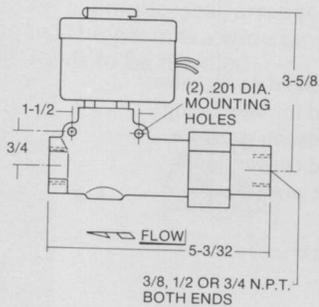
Constr. Refs. 1, 37, 38, 39 and 40



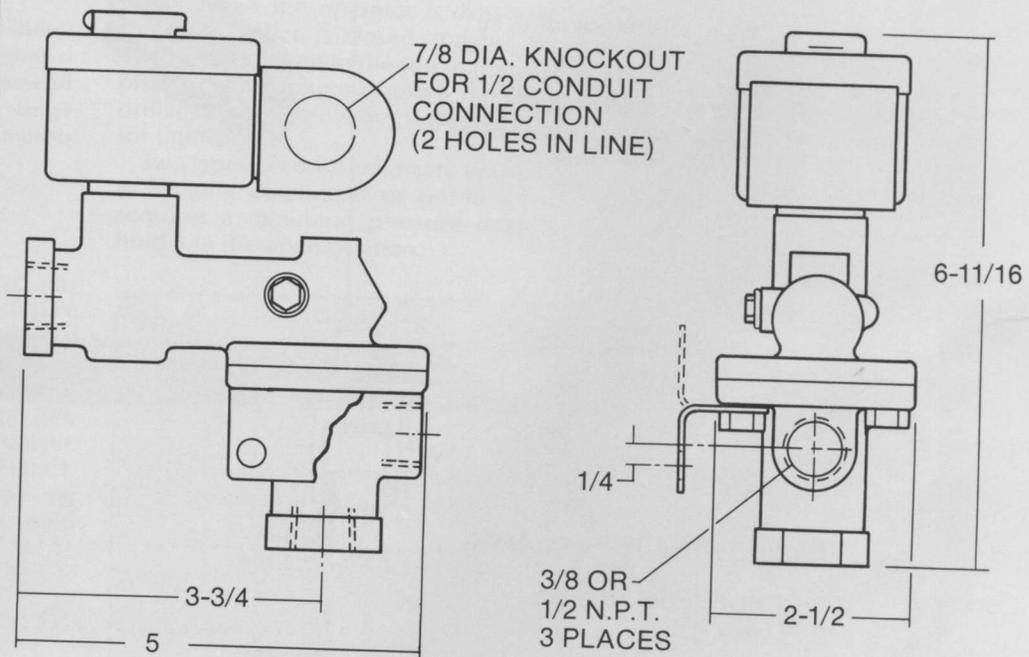
Constr. Ref.	L	H	W
1	1 ⁹ / ₁₆	2 ¹⁷ / ₃₂	1 ²¹ / ₃₂
37	1 ⁹ / ₁₆	2 ¹⁵ / ₁₆	1 ²¹ / ₃₂
38	1 ⁹ / ₁₆	3 ³ / ₁₆	1 ¹³ / ₁₆
39	1 ⁷ / ₈	3 ¹ / ₁₆	1 ²¹ / ₃₂
40	1 ⁷ / ₈	3 ⁵ / ₁₆	1 ¹³ / ₁₆

DIMENSIONS (in inches) (Type 1 Junction Box Solenoid Enclosure shown for Constr. Ref. 45 only.)

Constr. Ref. 36



Constr. Ref. 45



AIR OPERATED VALVES INDEX

Some Typical Applications for Air Operated Valves:



Two way valves for controlling air or liquids, in process control, filling, draining, or other fluid conveying systems.



Four way, high-flow, direct acting slide valves can be used without concern for minimum pressure differential when controlling double acting cylinders, actuators, or other similar devices.



Three way valves for controlling air or other fluids used to operate cylinders, air motors, clutches, and pilots for other valves.



Constant bleed 3 way valve is designed for interfacing between low air pressure signals and conventional pneumatic pressures.

INDEX

	Page No.
Engineering Information	97
General Description	
2, 3 and 4 Way Valves	98
2 Way Valve Specifications	98-100
3 Way Valve Specifications	101-102
4 Way Valve Specifications	103
3 Way Constant Bleed Interface Valve	104

AIR OPERATED VALVES

Engineering Information

ASCO®

This Engineering Section provides a complete description of air operated valve operation, the types of valves that are available, a glossary of terms and flow rating data.

I. Principle of Operation

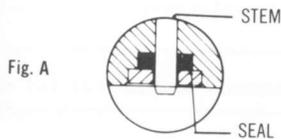
An air operated valve has two basic functional units:

- An operator with a diaphragm or piston assembly which when pressurized develops a force to operate.
- A valve containing an orifice in which a disc or plug is positioned to stop or allow flow.

Operators

Three operators are offered in this catalog, each having a pressure range to suit various industrial requirements: low pressure range 1.5 to 5 psi; instrument air range 3 to 30 psi; and pneumatic range 30 to 125 psi.

The operator control air is completely isolated from the main line fluid through use of a unique seal arrangement (see Fig. A). This permits a wide range of main line fluids to be handled.

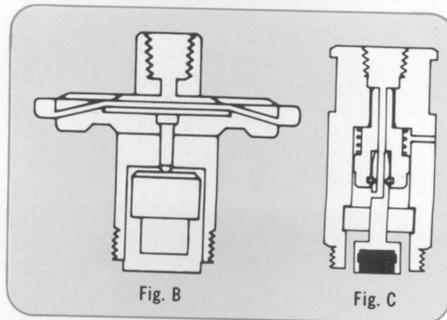


When a particular valve is selected, any pressure within the operator pressure range will operate the valve regardless of variations in the main line pressure.

The low and instrument air pressure range operators utilize a diaphragm (see Fig. B) for operation while the pneumatic range operator has a piston (see Fig. C). By applying pressure to and exhausting pressure from the operator the main valve will open or close.

Direct Acting Valve (Fig. 1)

In a direct acting valve, the operator stem is moved by the diaphragm or piston and directly opens or closes the orifice, depending upon whether the operator is pressurized or exhausted. The valve will operate from zero psi to its maximum rated pressure.



Internal Pilot Operated Valve (Fig. 2)

This valve is equipped with a pilot and bleed orifice, and utilizes the line pressure for operation. When the operator is pressurized, it opens the pilot orifice and releases pressure from the top of the valve piston or diaphragm to the outlet side of the valve. This results in an unbalanced pressure which causes the line pressure to lift the piston or diaphragm off the main orifice, thereby opening the valve. When the operator is exhausted, the pilot orifice is closed and full line pressure is applied to the top of the valve piston or diaphragm through the bleed orifice, thereby providing a seating force for tight closure.

Two types of construction are available:

- Floating diaphragm or piston which requires a minimum pressure drop to hold it in the open position.

- Hung type diaphragm or piston which is mechanically held open and operates from zero to the maximum pressure rating.

II. Types of Air Operated Valves

2 Way Valves: Normally closed and normally open operation.

3 Way Valves: Normally closed, normally open and universal operation.

4 Way Valves

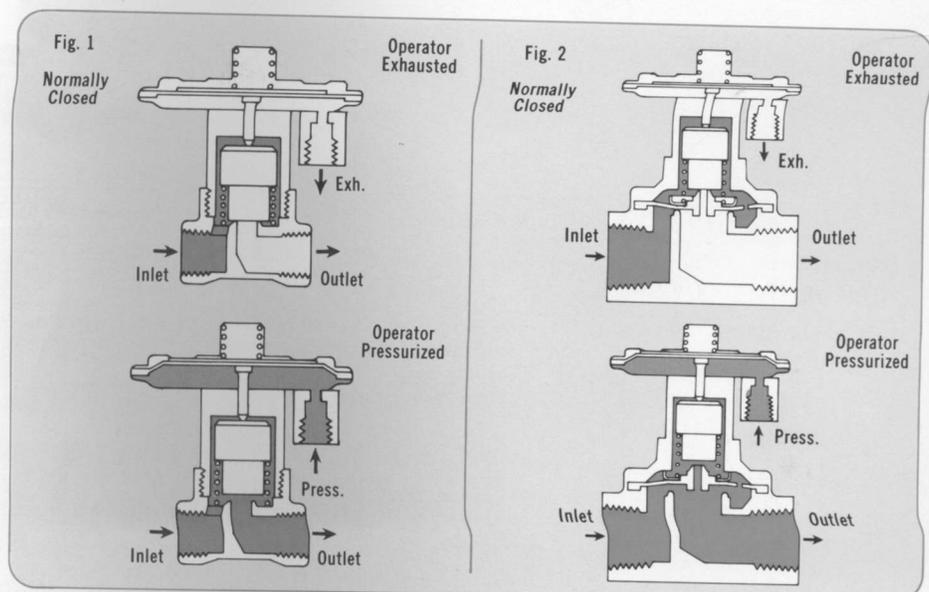
III. Maximum Operating Pressure

The maximum operating pressure is the maximum pressure at the inlet side of the valve against which the operator can safely operate the valve. This pressure may be much less than the maximum safety rating of the valve body.

IV. Minimum Operating Pressure Differential

The minimum operating pressure differential is that which is required to open the valve and to keep it open. Two way valves with floating piston or diaphragm will start to close below the minimum differential pressure. Three and four way pilot valves must maintain the minimum operating pressure throughout the operating cycle to insure complete transfer from one position to the other.

Note: Direct acting valves do not require a minimum pressure.



AIR OPERATED 2, 3 and 4 Way Valves

Forged Brass or Stainless Steel Body • 1/4" to 2" N.P.T.

General Description

These general service valves are available in a wide range of sizes and materials to handle a variety of fluids. Poppet-type constructions provide tight shut-off.

The ASCO® design provides a unique sealing member which isolates the pilot air pressure from the main line fluid.

Other unique features: Variations in pilot air pressure or main line pressure do not affect the operation of the valves; no constant pilot pressure required; standard valves will handle dry or lubricated air and provide long life.

Two, three and four way valves with low pressure air operators (1.5-5 psi) accept low pressure signals from fluidic or logic systems and interface with industrial systems to control fluids at higher pressures.

Quick exhaust constructions are listed in the 3 way valve specification table. For remote Quick Exhaust Valves refer to Bulletin V043.

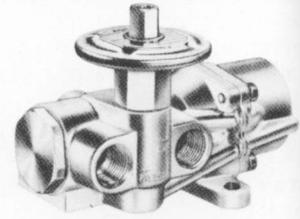
To control the speed of cylinders, etc., use Flow Control Valves listed in Bulletin V022.



2 Way



3 Way



4 Way

Specifications

Operator: 1/8" N.P.T. (Barbed tubing adapter available on request for instrument and low pressure air operator only.)

Body — Forged Brass or Stainless Steel, as listed.

Seat — Buna "N" (Teflon* for Steam Service).

Temperature:

Fluid: To 353°F. Maximum, as listed.

Ambient: 125°F. Maximum.

Mounting: Refer to Dimensions views on pages 100 and 102.

Installation:

Attitude: Mountable in any position without affecting operation.

Flow: See flow charts and sizing information in the Engineering Section.

Air Operator Specifications:

Displacement Volume (actuated): 1.5-5 psi and 3-30 psi Operator, .6 cu. ins.; 30-125 psi Operator, .025 cu. ins.

Fluid: Air. Operators for vacuum, and other fluids can be supplied. Consult your local ASCO office.

Manual Operator: Combination push and hold or turn and lock offered as an optional feature on 2 way normally open valves, 3 and 4 way valves. Not available on 2 way normally closed valves and Catalog Numbers P442B1 and P442B3. Order Kit FV180-990. See details on page 100.

ORDERING INFORMATION

IMPORTANT: When ordering, please specify PIPE SIZE and CATALOG NUMBER.

*DuPont Co. trademark.

SPECIFICATIONS 2 Way Air Operated Valves



Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Instrument Air Operator ^① 3-30 psi Range		Pneumatic Operator ^① 30-125 psi Range	
			Minimum	Maximum		Catalog Number	Constr. Ref. No.	Catalog Number	Constr. Ref. No.
NORMALLY CLOSED OPERATION, Forged Brass Body, Buna "N" Seating for Air, Inert Gas, Water and Light Oil									
1/4	5/32	.50	0	125	200	F262B202K	1	P262B202	1
1/4	9/32	.96	0	40	200	F262C90K	1	P262C90 ^②	1
3/8	5/8	2.8	0	125	180	F210C93K	6	P210C93	6
3/8	3/8	1.5	1 ^③	125	200	F210C73K	3	P210C73	3
1/2	7/16	2.2	1 ^③	125	200	F210A15K	4	P210A15	4
1/2	5/8	3.6	0	125	180	F210C94K	6	P210C94	6
3/4	3/4	5.5	0	125	180	F210D95K	7	P210D95	7
3/4	3/4	5.5	5	125	180	F210D9K	8	P210D9	8
1	1	13.0	5	125	180	F210D4K	10	P210D4	10
1 1/4	1 1/8	15.0	5	125	180	F210D8K	12	P210D8	12
1 1/2	1 1/4	22.5	5	125	180	F210D22K	14	P210D22	14
2	1 3/4	43.0	5	125	180	F210100K	15	P210100	15

SPECIFICATIONS
2 Way Air Operated Valves (continued)



Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Instrument Air Operator ^① 3-30 psi Range		Pneumatic Operator ^① 30-125 psi Range	
			Minimum	Maximum		Catalog Number	Constr. Ref. No.	Catalog Number	Constr. Ref. No.
NORMALLY OPEN OPERATION, Forged Brass Body, Buna "N" Seating for Air, Inert Gas, Water and Light Oil									
1/4	5/32	.50	0	125	200	F262B106K	2	P262B106	2
3/8	5/8	2.8	0	125	180	F210C33K	16	P210C33	16
1/2	5/8	3.5	0	125	180	F210C34K	16	P210C34	16
3/4	3/4	5.5	0	125	180	F210C35K	17	P210C35	17
1	1	13.0	5	125	180	F210D14K	18	P210D14	18
1 1/4	1 1/8	15.0	5	125	180	F210D18K	19	P210D18	19
1 1/2	1 1/4	22.5	5	125	180	F210D32K	20	P210D32	20
2	1 3/4	43.0	5	125	180	F210103K	21	P210103	21
NORMALLY CLOSED OPERATION, Stainless Steel Body, Buna "N" Seating for Air, Inert Gas, Water and Light Oil									
1/4	5/32	.50	0	125	200	F262B220K	22	—	—
3/8	3/8	1.5	1 ^③	125	200	F210A36K	3	—	—
1/2	7/16	2.2	1 ^③	125	200	F210A37K	4	—	—
1/2	5/8	4.5	0	125	180	F210C87K	6	—	—
3/4	5/8	4.5	0	125	180	F210C88K	7	—	—
NORMALLY CLOSED OPERATION, Forged Brass Body, Teflon* Seating for Steam Service									
1/4	3/8	1.2	1	125	353	F222A70K	4	P222A70	4
3/8	3/8	2.5	1	125	353	F222A74K	4	P222A74	4
1/2	3/8	2.5	1	125	353	F222A76K	4	P222A76	4
3/4	3/4	6.0	5	125	353	F222C3K	5	P222C3	5
1	1	13.5	5	125	353	F222B4K	9	P222B4	9
1 1/4	1 1/8	15.0	5	125	353	F222B8K	11	P222B8	11
1 1/2	1 1/4	22.5	5	125	353	F222B82K	13	P222B82	13

*DuPont Co. trademark.

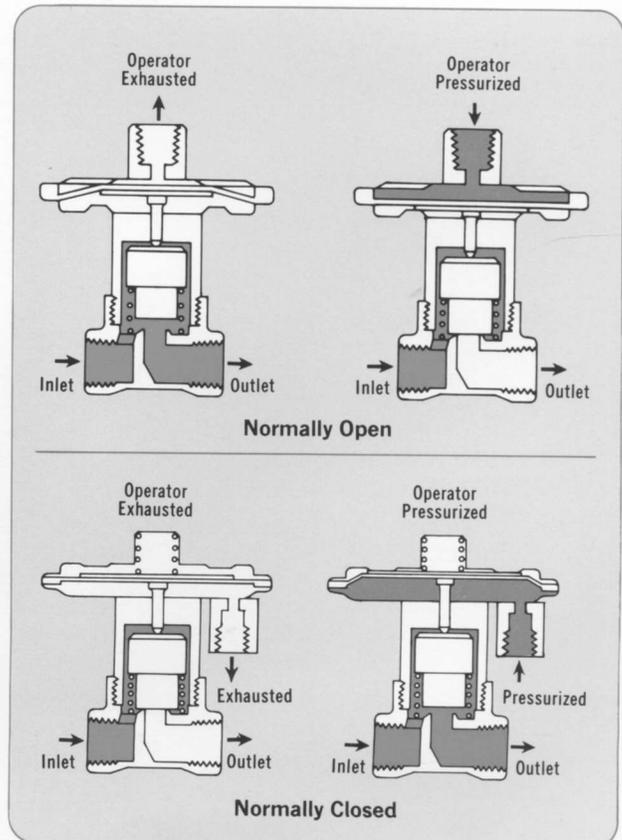
SPECIFICATIONS
2 Way Valves with Low Pressure Air Operators



Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Low Pressure Air Operator 1.5-5 psi Range	
			Minimum	Maximum		Catalog Number	Constr. Ref. No.
NORMALLY CLOSED OPERATION, Buna "N" Seating for Air, Inert Gas, Water and Light Oil							
1/4	3/32	.17	0	125	150	F262D20KK	1
3/8	3/8	1.5	1 ^③	125	150	F210C73KK	3
3/8	5/8	2.8	0	125	150	F210C93KK	6
1/2	7/16	2.2	1 ^③	125	150	F210A15KK	4
1/2	5/8	3.6	0	125	150	F210C94KK	6
3/4	3/4	5.5	0	125	150	F210D95KK	7
NORMALLY OPEN OPERATION, Buna "N" Seating for Air, Inert Gas, Water and Light Oil							
1/4	3/32	.17	0	125	150	F262D33KK	2
3/8	5/8	2.8	0	125	150	F210C33KK	16
1/2	5/8	3.6	0	125	150	F210C34KK	16
3/4	3/4	5.5	0	125	150	F210C35KK	17

Notes: ① 3-40 psi and 50-125 psi range for steam valves only.
 ② Refers to Operator Minimum Pressure: Catalog Number P262C90 requires 50 psi Minimum Pressure.
 ③ 5 psi required for air service.

FLOW DIAGRAMS



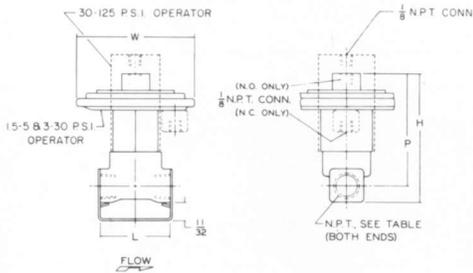
2 WAY VALVES (continued)

DIMENSIONS (in inches)

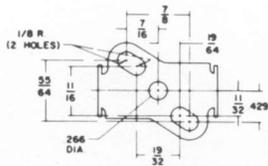
Constr. Ref.	N.P.T. (ins.)	2 Way Valves with 1.5-5 or 3-30 psi Operator				2 Way Valves with 30-125 psi Operator				Constr. Ref.	N.P.T. (ins.)	2 Way Valves with 1.5-5 or 3-30 psi Operator				2 Way Valves with 30-125 psi Operator			
		H	P	L	W*	H	P	L	W*			H	P	L	W*	H	P	L	W*
1	1/4	27/8	2 1/2	1 9/16	2 21/32	3 5/16	2 15/16	1 9/16	1 5/32	12	1 1/4	5 9/16	3 15/16	3 21/32	3 11/32	6	4 3/8	3 21/32	3 11/32
2	1/4	3 1/16	2 11/16	1 9/16	2 21/32	3 5/16	2 15/16	1 9/16	1 5/32	13	1 1/2	6 1/16	4 3/32	4 3/8	5 5/8	6 15/32	4 17/32	4 3/8	5 5/8
3	3/8	3 1/2	2 31/32	1 29/32	2 21/32	3 25/32	3 9/32	1 29/32	1 5/32	14	1 1/2	6 1/16	4 3/32	4 3/8	3 23/32	6 15/32	4 17/32	4 3/8	3 23/32
4	1/4, 3/8, 1/2	3 1/2	2 31/32	2 9/32	2 21/32	4	3 15/32	2 9/32	1 5/32	15	2	7 9/32	4 17/32	5 1/16	5 11/16	7 11/16	4 15/32	5 1/16	5 1/2
5	3/4	4 25/32	3 11/32	3 19/32	2 21/32	5 7/32	3 13/16	3 19/32	2	16	3/8, 1/2	3 13/16	3 1/4	2 3/4	2 21/32	4 1/32	3 15/32	2 3/4	2 5/16
6	3/8, 1/2	3 21/32	3 3/32	2 3/4	2 21/32	4 1/32	3 15/32	2 3/4	2 5/16	17	3/4	4 1/16	3 7/16	2 13/16	2 21/32	4 7/32	3 5/8	2 13/16	2 9/32
7	3/4	3 7/8	3 1/4	2 13/16	2 21/32	4 7/32	3 19/32	2 13/16	2 5/16	18	1	5 3/4	4 1/8	3 3/4	2 29/32	6	4 3/8	3 3/4	2 29/32
8	3/4	3 25/32	3 5/32	2 13/16	2 21/32	4 1/4	3 5/8	2 13/16	2 5/16	19	1 1/4	5 3/4	4 1/8	3 21/32	3 11/32	6	4 3/8	3 21/32	3 11/32
9	1	5 9/16	3 15/16	3 3/4	4 5/16	6	4 3/8	3 3/4	4 5/16	20	1 1/2	6 1/4	4 9/32	4 3/8	3 23/32	6 1/2	4 17/32	4 3/8	3 23/32
10	1	5 9/16	3 15/16	3 3/4	2 29/32	6	4 3/8	3 3/4	2 29/32	21	2	7 15/32	4 23/32	5 1/16	5 1/2	7 23/32	4 31/32	5 1/16	5 1/2
11	1 1/4	5 9/16	3 15/16	3 21/32	4 3/4	6	4 3/8	3 21/32	4 3/4	22	1/4	2 27/32	2 15/32	1 5/8	2 21/32	—	—	—	—

Note: ① When barbed tubing adapter is used, add 1 3/16" to "H" and/or "P" (or overall) dimensions.
* Represents overall width of valve.

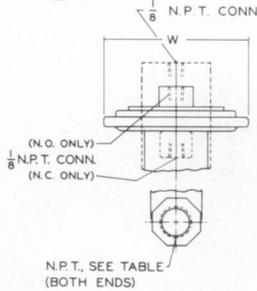
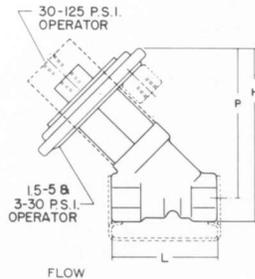
Constr. Refs. 1 & 2



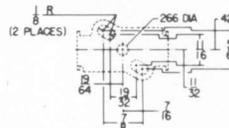
Mounting Bracket Standard
Constr. Refs. 1 & 2



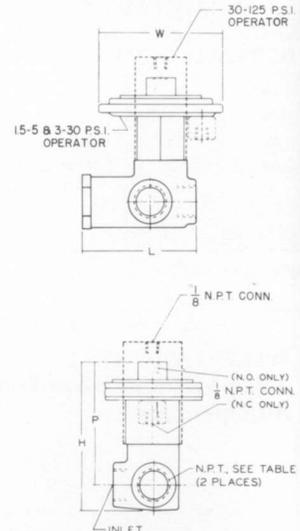
Constr. Refs. 3 & 4



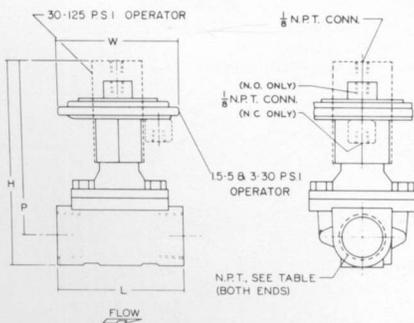
Mounting Bracket
Optional
Constr. Refs. 3 & 4



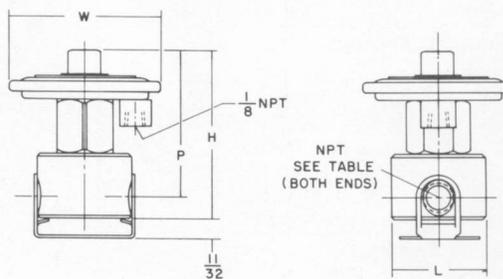
Constr. Ref. 5



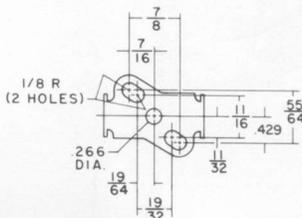
Constr. Refs. 6-21



Constr. Ref. 22

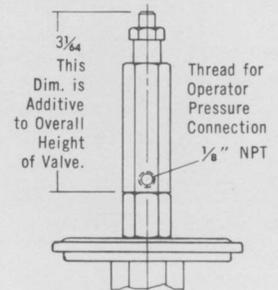


Mounting Bracket
Standard



MANUAL OPERATOR
(SCREW TYPE)

Manual Operator is available on 2 Way Normally Open Valves and 3 and 4 Way Valves. Supplied as Kit (FV180-990) for Customer Installation.



SPECIFICATIONS
3 Way Air Operated Valves



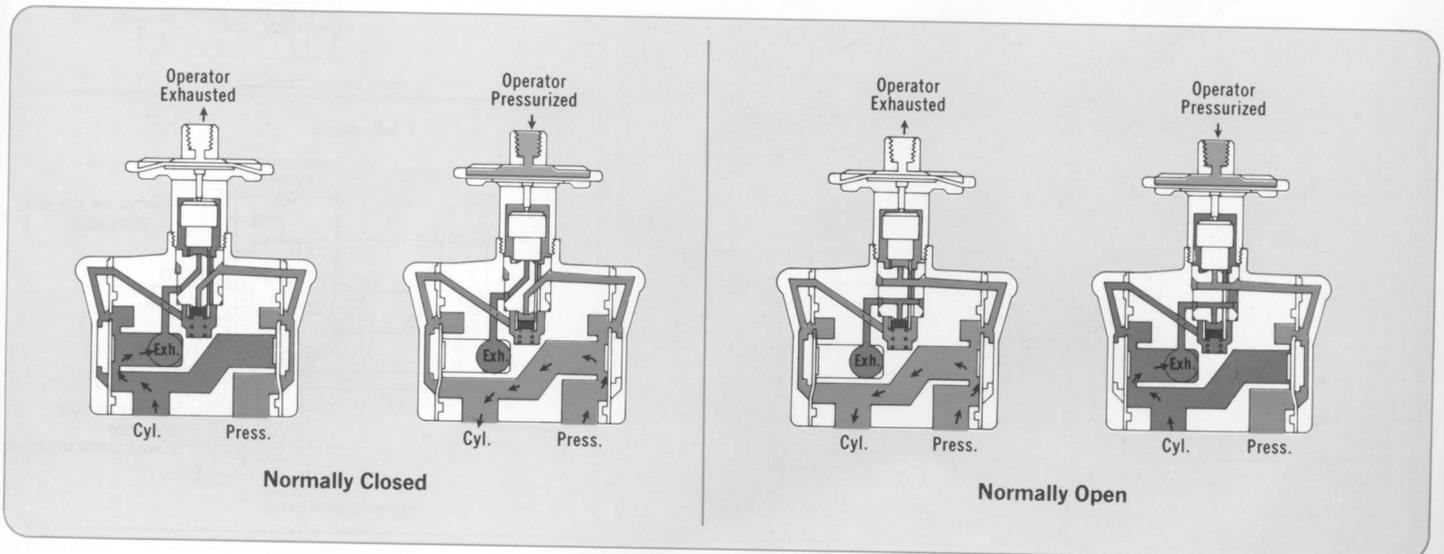
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Instrument Air Operator 3-30 psi Range		Pneumatic Operator 30-125 psi Range	
			Minimum	Maximum		Catalog Number	Constr. Ref. No.	Catalog Number	Constr. Ref. No.
NORMALLY CLOSED OPERATION, for Air, Inert Gas, Water and Light Oil ^⑥									
1/4	9/32	④	10	125	200	F321A1K	5	P321A1③	5
3/8	9/32	④	10	125	200	F321A2K	5	P321A2③	5
3/8	5/8	3.0	10	125	200	F316C14K	2	P316C14	2
1/2	5/8	4.0	10	125	200	F316C24K	2	P316C24	2
3/4	11/16	5.5	10	125	200	F316D44K	3	P316D44	3
1	1	13.0	10	125	200	F316E34K	4	P316E34	4
NORMALLY OPEN OPERATION, for Air, Inert Gas, Water and Light Oil ^⑥									
1/4	9/32	④	10	125	200	F321A3K	5	P321A3③	5
3/8	9/32	④	10	125	200	F321A4K	5	P321A4③	5
3/8	5/8	3.0	10	125	200	F316C16K	2	P316C16	2
1/2	5/8	4.0	10	125	200	F316C26K	2	P316C26	2
3/4	11/16	5.5	10	125	200	F316D46K	3	P316D46	3
1	1	13.0	10	125	200	F316E36K	4	P316E36	4
UNIVERSAL OPERATION, for Air, Inert Gas, Water and Light Oil									
1/4	1/8	.31	0	125	200	F320A9⑤	1	P320A9③⑤	1

SPECIFICATIONS
3 Way Pilot Relay Valves with Low Pressure Air Operators

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Low Pressure Air Operator 1.5-5 psi Range	
			Minimum	Maximum		Catalog Number	Constr. Ref. No.
3 WAY PILOT VALVE, Forged Brass Body, for Air, Inert Gas, Water and Light Oil							
1/4	3/32	.15	0	125	150	F320A89KK①	1
1/4	3/32	.15	0	125	150	F320A91KK②	1
1/4	3/32	.15	0	75	150	F320A85KK⑤	1

- Notes: ① Normally closed construction. ② Normally open construction.
 ③ For higher flow capacity and "0" Minimum Main Line Operating Pressure use 1/4" Catalog No. P442B1 or 3/8" Catalog No. P442B3 and plug cylinder connection. See Page 103.
 ④ Pressure Orifice = .8; Exhaust Orifice = 1.2. Oversized Exhaust Orifice provides quick exhaust feature.
 ⑤ Universal flow, pressure at any port. ⑥ F316 and P316 valves not suitable for light oil.

FLOW DIAGRAMS for F316 Series Valves



SPECIFICATIONS

2 Position, 4 Way Air Operated Valves



Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor		Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Instrument Air Operator 3-30 psi Range		Pneumatic Operator 30-125 psi Range	
		Press. to Cyl.	Cyl. to Exh.	Mini-mum	Maxi-mum		Catalog Number	Constr. Ref. No.	Catalog Number	Constr. Ref. No.
Forged Brass Body, Soft Seating^① for Air, Inert Gas, Water and Light Oil										
1/4	3/16	0.8	0.8	0	125	160	—	—	P442B1	1
1/4	1/4	0.8	1.0	10 ^②	125	200	F444B0K	2	P444B0	2
3/8	3/16	0.8	0.8	0	125	160	—	—	P442B3	1
3/8	3/8	1.4	2.2	10 ^②	125	200	F444C25K	3	P444C25	3
1/2	3/8	1.4	2.2	10 ^②	125	200	F444C27K	3	P444C27	3
3/4	3/4	5.2	5.6	10 ^②	125	200	F444B29K	4	P444B29	4
1	3/4	5.2	5.6	10 ^②	125	200	F444B31K	4	P444B31	4

SPECIFICATIONS

2 Position, 4 Way Valves with Low Pressure Air Operators

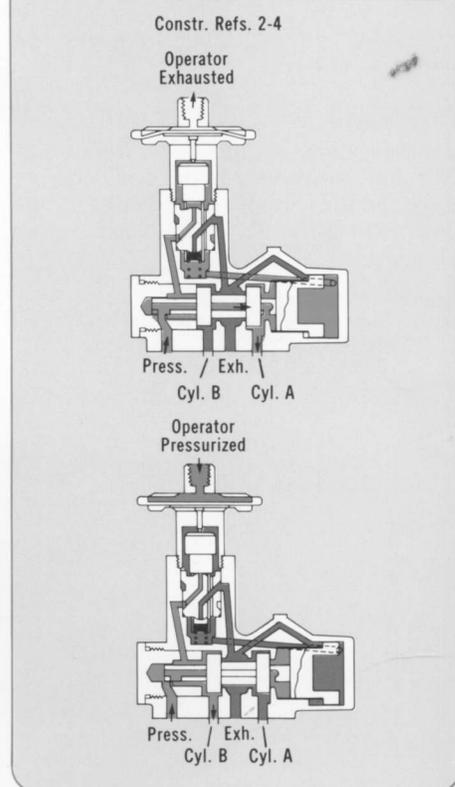
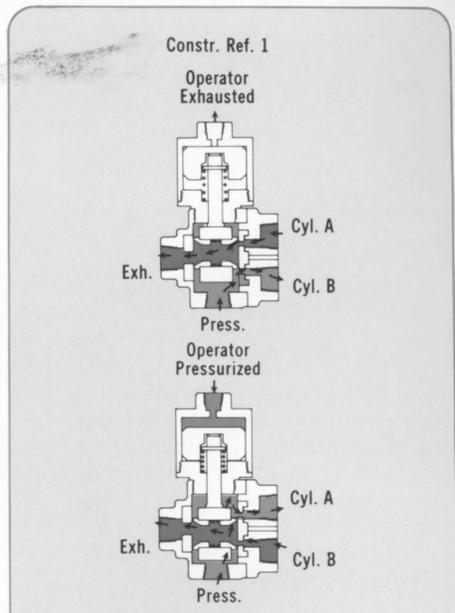
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor		Main Line Operating Pressure (psi)		Maximum Fluid Temp. °F.	Low Pressure Air Operator 1.5-5 psi Range	
		Press. to Cyl.	Cyl. to Exh.	Mini-mum	Maxi-mum		Catalog Number	Constr. Ref. No.
Forged Brass Body, Soft Seating for Air, Inert Gas, Water and Light Oil								
1/4	1/4	0.8	1.0	10 ^②	125	200	F444B0KK	2
3/8	3/8	1.4	2.2	10 ^②	125	200	F444C25KK	3
1/2	3/8	1.4	2.2	10 ^②	125	200	F444C27KK	3
3/4	3/4	5.2	5.6	10 ^②	125	200	F444B29KK	4
1	3/4	5.2	5.6	10 ^②	125	200	F444B31KK	4

Notes: ① Constr. Ref. 1 has soft seating; Constr. Refs. 2, 3 and 4 have soft to metal seating.
 ② 25 psi required for light or hydraulic oil.

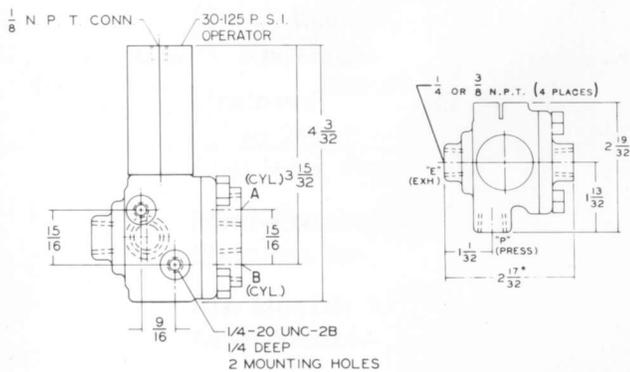
DIMENSIONS^① (in inches)

Constr. Ref.	N.P.T. (ins.)	4 Way Valves with 1.5-5 or 3-30 psi Operator		4 Way Valves with 30-125 psi Operator		L	W ^②	J	N	X	Y	Z	E	Dia. D
		H	P	H	P									
2	1/4	4 1/32	3 1/16	4 9/32	3 5/16	3 1/8	4 3/4	1 1/32	2 3/32	1 13/32	1 9/16	1 13/16	9/16	9/32
3	3/8, 1/2	4	2 7/8	4 1/4	3 1/8	3 1/16	6 1/16	1 1/2	2 7/32	1 7/8	1 29/32	2 7/32	3/4	1 11/32
4	3/4, 1	4 13/16	3 1/4	5 1/16	3 1/2	4 9/16	8 1/4	2 3/32	1 9/16	2 1/8	2 5/8	1 13/32	1 11/32	1 11/32

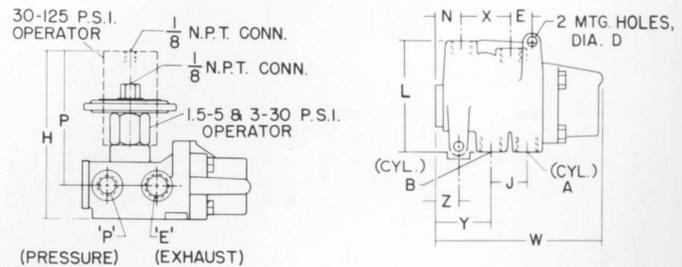
Notes: ① When barbed tubing adapter is used add 1 1/16" to "H" and/or "P" (or overall) dimensions.
 ② Represents overall width of valve.



Constr. Ref. 1



Constr. Refs. 2, 3 & 4



CONSTANT BLEED INTERFACE 3 Way Valves

General Description

The 6080541 valve is a miniature, double poppet, normally closed, constant bleed 3 way valve designed for use as an interface between low air pressure signals and conventional pneumatic pressures. The valve possesses a fast response time due to a short stroke and small internal volume, and is capable of a maximum cycle rate of 50 cycles per second. Since the diaphragm is the only moving part, there is no frictional wear and the valve can be operated for millions of cycles.

Features

Miniature size, extremely long life, fast response, low cost.

Applications

Interface between low pressure air signals and conventional pneumatic pressures, control small single acting cylinders, pilot for larger air operated valves or devices.

Specifications

Fluid: Air or Inert Gas only.

Filtration: 40 Microns absolute.

Control Pressure: 4" to 7" H₂O (10 to 17 mbars) (depending on Supply Pressure).

Maximum Control Pressure: 10 psig (0.69 bars).

Supply Pressure Range: 15 to 125 psig (1 to 8 bars).

Cv: 0.3 P to A; 0.27 A to E.

Connection:

Supply Port: 1/8" Female N.P.T.

Cylinder and Exhaust Ports: 1/16" Female N.P.T.

Control Port: 10-32 UNF Female.

Temperature Range: 0°F. to 180°F. (-18°C. to +82°C.).

Bleed Flow: 0.05 scfm @ 100 psig (0.025 dm³/sec @ 7 bars) (varies with Supply Pressure).

Operating Speed: 50 cycles per second maximum.



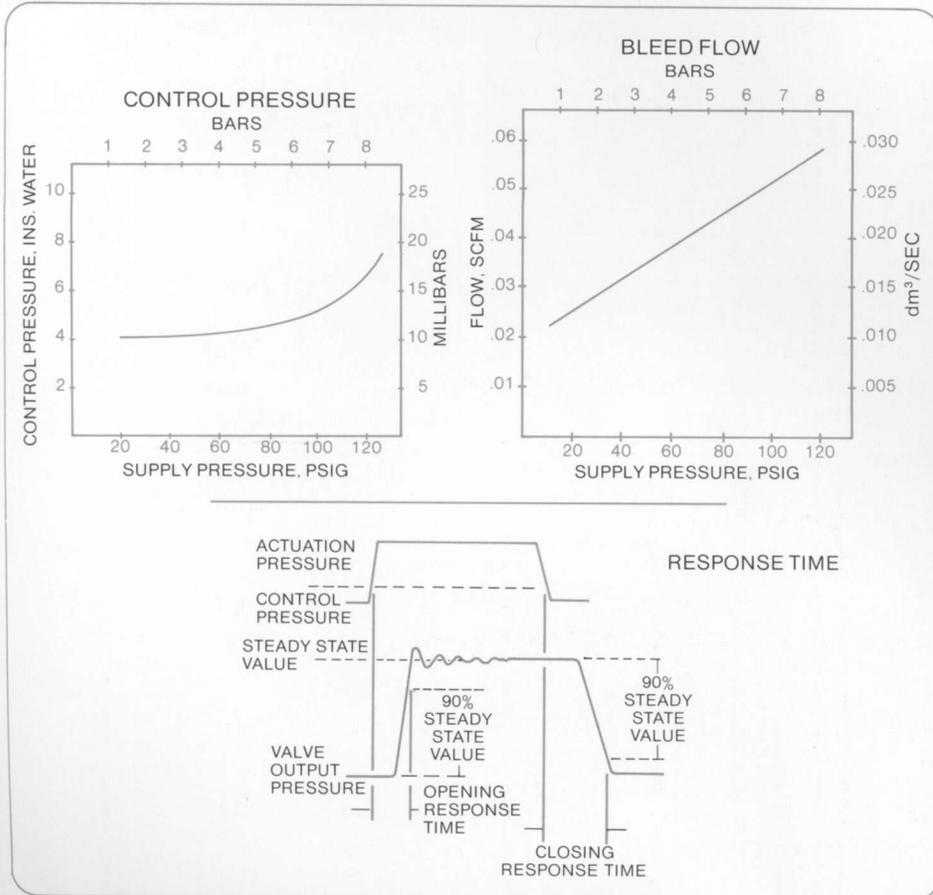
Response Time: Approximately 12 milliseconds to open (measured from the time the control pressure reaches actuation pressure until the valve is 90% open). Response time will vary depending upon control device used.

Approximately 20 milliseconds to close (measured from the time the control decays to below actuation pressure until the valve is 90% closed).

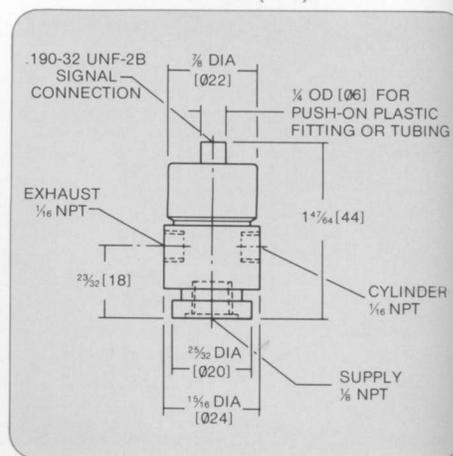
Materials of Construction: Aluminum, Buna "N," Celcon* and Stainless Steel.

*Celanese Plastics Co. trademark.

PERFORMANCE CHARACTERISTICS (For General Reference Only)



DIMENSIONS in inches (mm)

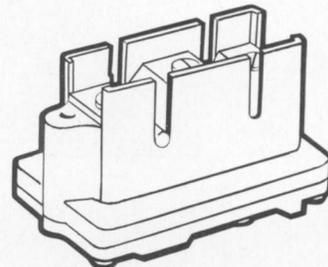
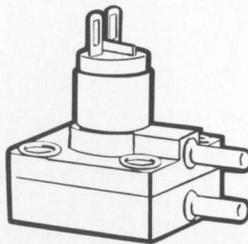
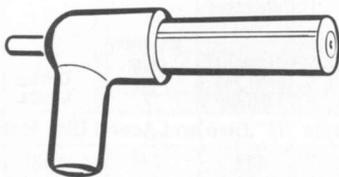
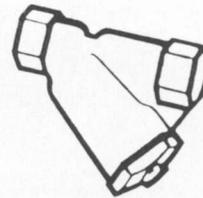
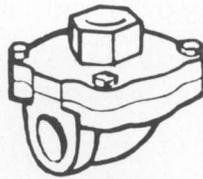


ORDERING INFORMATION

CATALOG NUMBER	DESCRIPTION
6080541	3 way constant bleed interface valve

ACCESSORIES • INDEX

These accessory items are designed for use with both solenoid operated and air operated valves. They have the capacity for rugged, heavy-duty applications.



INDEX

Page No.

Check Valves	106
1/4" to 3/4" N.P.T. • Forged Brass, Stainless Steel, Plastic	
Flow Control Valves	107
1/4" to 3/4" N.P.T. • Brass	
Quick Exhaust/Shuttle/Shut-Off Valves	108
1/8" to 3/4" N.P.T. • Die-Cast Zinc	
Strainers	109
1/8" to 2 1/2" N.P.T. • Forged Brass, Bronze, Stainless Steel, Cast Iron, Plastic	
Mini-Proximity Sensor	110
Stainless Steel, Brass	
Air/Electric Switches	111
Mini-Switch and Heavy-Duty	

Check Valves

Forged Brass, Stainless Steel and Plastic Bodies
1/4" to 3/4" N.P.T.

General Description

These compact, in-line mounted, high-flow capacity single check valves provide quiet operation, shut off instantaneously against reverse flow and open at low cracking pressures in the forward direction.

The disc seats before reverse flow is established, thus avoiding fluid shock on reversal of pressure differential.

Specifications

Pipe Sizes: 1/4", 3/8", 1/2", 3/4" N.P.T. (metal body); 1/4" O.D. Compression and Bib Connections for 1/4" and 5/16" I.D. flexible tubing or hose (acetal body).

Valve Body: Forged Brass, Stainless Steel (300 Series), Acetal.

Valve Seat:

(a) Buna "N" and Ethylene Propylene seat at zero pressure. Drip tight on liquids; bubble tight on air above 3 psi.

(b) Metal Seated — Leakage on air up to 65 scfh.

Temperature:

Fluid: To 388°F. Maximum, as listed.

Ambient: 125°F. Maximum.

Installation:

Dimensions: Refer to Dimensions.

Attitude: Mountable in any position without affecting operation.

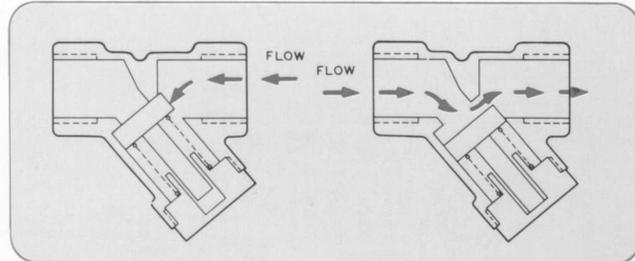


Metal Body



Plastic Body

FLOW DIAGRAM



DIMENSIONS (in inches)

Constr. Ref.	Pipe Size	L	P	H	E	W
2A	1/4	1 ²⁹ / ₃₂	1 ⁹ / ₁₆	2 ¹ / ₃₂	1 ⁵ / ₃₂	7/8
2B	3/8	1 ²⁹ / ₃₂	1 ²¹ / ₃₂	2 ¹ / ₁₆	1 ⁵ / ₃₂	7/8
2C	1/2	2 ⁹ / ₃₂	1 ²⁷ / ₃₂	2 ³ / ₈	1 ⁵ / ₃₂	1 ³ / ₃₂
2D	3/4	2 ³ / ₄	1 ²⁷ / ₃₂	2 ⁵ / ₈	1 ⁵ / ₁₆	1 ⁵ / ₁₆ *
2E	1/4 and 3/8	2 ⁹ / ₃₂	1 ²⁷ / ₃₂	2 ³ / ₈	1 ⁵ / ₁₆	1 ³ / ₁₆
2F	1/2 and 3/4	2 ³ / ₄	2 ⁵ / ₃₂	2 ¹⁵ / ₁₆	1 ³ / ₈	1 ⁵ / ₁₆ *

*Body extends 1/16".

ORDERING INFORMATION: We must have PIPE SIZE and CATALOG NUMBER.

SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Opening Pressure (psi)	Maximum Operating Pressure Differential (psi)	Maximum Fluid Temp. °F.	Catalog Number	Constr. Ref. No.
				Air-Inert Gas, Water and Light Oil			
FORGED BRASS BODY, with Buna "N" Disc and Acetal Disc Holder							
1/4	9/32	0.7	1	150	200	V0121	1
3/8	3/8	1.8	1	150	200	V0122	2B
1/2	7/16	2.5	1	150	200	V0123	2C
3/4	1/2	3.6	1	150	200	V0124	2D
STAINLESS STEEL BODY, with Buna "N" Disc and Acetal Disc Holder							
1/4	9/32	0.7	1	150	200	V0125	3
3/8	3/8	1.8	1	150	200	V0126	2B
1/2	7/16	2.5	1	150	200	V0127	2C
ACETAL BODY, with Buna "N" Disc							
①	3/16	.46	1	50	130	V01221	4
①	3/16	.46	1	150 ^③	130	V0128	4
②	3/16	.46	1	50	130	V01222	5
②	3/16	.46	1	150 ^③	130	V0129	5
④	3/16	.46	1	50	130	V01220	5
④	3/16	.46	1	150 ^③	130	V01223	5
FORGED BRASS BODY, with Ethylene Propylene Disc for Low Pressure Steam							
1/4	3/8	1.7	1	50	300	V01210	2A
3/8	3/8	1.8	1	50	300	V01211	2B
1/2	7/16	2.5	1	50	300	V01212	2C
3/4	1/2	3.6	1	50	300	V01213	2D
FORGED BRASS BODY, with Metal Seating for High Pressure Steam							
1/4	3/8	0.7	8	200	388	V01214	2E
3/8	3/8	0.7	8	200	388	V01215	2E
1/2	1/2	3.4	4	200	388	V01216	2F
3/4	1/2	5.1	4	200	388	V01217	2F

Notes: ① 1/4" O.D. compression connection. Fittings are not supplied. To order, refer to List Price Schedule.

② Bib for 1/4" I.D. flexible tubing or hose.

③ Where pressure exceeds 50 psi, it is advisable to use hose or tubing clamps.

④ Bib for 5/16" I.D. flexible tubing or hose.

ADJUSTABLE Flow Control Valves

Brass Body • 1/4" to 3/4" N.P.T.

ASCO[®]
ACCESSORIES

General Description

ASCO's patented adjustable flow control valve design has greater flow capacity than most conventional constructions where a separate adjustment speed control and ball check for free flow are utilized.

A spring loaded disc allows free flow in one direction and an adjustable or controlled flow in the opposite direction. Flow adjustment is performed by a tapered brass stem that controls the flow through the cross hole in the disc.

The adjustable knob contains a unique locking device that consists of a plastic metering knob and thumb latch pawl. The valve bonnet is scribed with graduations to serve as a position indicator for the stem.

Specifications

Operation: When the pawl is in the up position, it creates a friction lock on the knurled bonnet and the knob cannot rotate. When the pawl is at 90° to the knob, the knob is free to rotate.

Valve Parts in Contact with Fluid:

Body and Stem — Brass.

Seals — Buna "N."

Disc — Acetal.

Spring — 302 s.s.

Retainer — 17-7PH s.s.

Temperature:

Fluid: 180°F. Maximum.

Ambient: 125°F. Maximum.

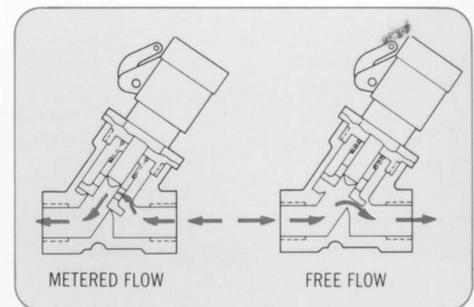
Installation:

Dimensions: Refer to Dimensions.

Attitude: Mountable in any position without affecting operation.



FLOW DIAGRAM

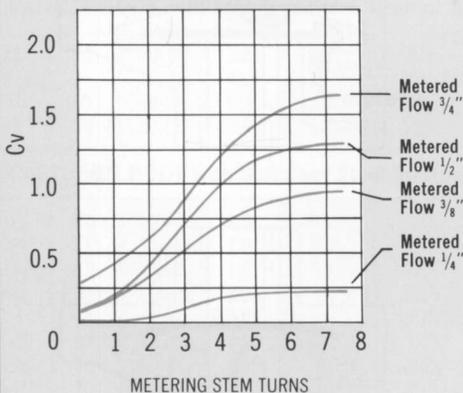


SPECIFICATIONS

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor ①		Opening Pressure (psi)	Maximum Operating Pressure Differential (psi)	Maximum Fluid Temp. °F.	Catalog Number
		Meter	FREE				
1/4	3/8	.22	1.2	1	300	180	V022A1
3/8	3/8	.90	1.4	1	300	180	V0222
1/2	7/16	1.2	2.6	1	300	180	V0223
3/4	17/32	1.6	4.0	2.5	300	180	V0224

Note: ① Refer to Chart A for Cv vs. Metering Stem Turns.

CHART A
Flow Characteristics
for ASCO Flow Control Valves



FREE FLOW DATA

Pipe Size	Cv
1/4	1.2
3/8	1.4
1/2	2.6
3/4	4.0

Example I: A 1/2" N.P.T. flow control valve is required to pass 3 GPM of water at a Δp of 16 psi. Determine the position of the metering stem.

$$Cv = \frac{GPM}{\sqrt{\Delta p}} \quad Cv = \frac{3}{\sqrt{16}} = .75$$

From the graph for the 1/2" N.P.T. flow control valve with a Cv of .75 the stem should be positioned three turns out from fully closed.

Example II: To determine the flow using the same data of 16 psi, Δp and METERED Cv of .75, the solution will be:

$$GPM = Cv \sqrt{\Delta p} = .75 \sqrt{16} = 3$$

Example III: The flow through this valve in the FREE FLOW position is:

$$GPM = Cv \sqrt{\Delta p} = 2.6 \sqrt{16} = 10.4$$

*Cv is obtained from free flow data table.

P₁ — Inlet Pressure (PSIA)

P₂ — Outlet Pressure (PSIA)

Δp — Pressure Drop (P₁ — P₂) psi

G — Specific Gravity of Gas @ 14.7 PSIA & 60°F.

T — Absolute Temp. of Flowing Medium (°F. + 460)

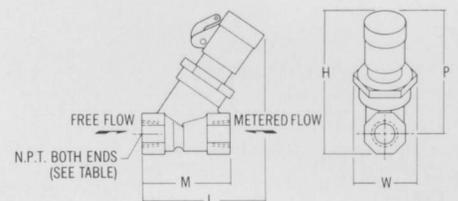
SIZING EQUATIONS

$$\text{WATER} \quad Cv = \frac{GPM}{\sqrt{\Delta p}} \quad GPM = Cv \sqrt{\Delta p}$$

$$\text{AIR} \quad Cv = \frac{SCFH}{960 \sqrt{\frac{\Delta p (P_1 + P_2)}{GT}}}$$

$$SCFH = Cv \quad 960 \sqrt{\frac{\Delta p (P_1 + P_2)}{GT}}$$

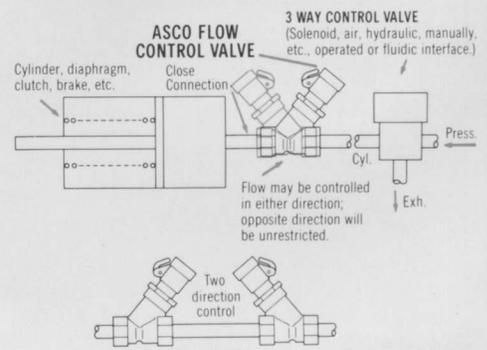
DIMENSIONS (in inches)



Cat. No.	Pipe Size	Orifice Size	H	L	M	P	W
V022A1	1/4	3/8	3/8	2 11/16	1 29/32	2 5/8	1 5/16
V0222	3/8	3/8	3/8	2 11/16	1 29/32	2 11/16	1 5/16
V0223	1/2	7/16	3 11/32	3 7/32	2 9/32	2 13/16	1 5/16
V0224	3/4	17/32	3 3/4	3 11/16	2 3/4	3 3/32	1 15/32

Flow control for single acting cylinders

For best results, a close connection between the flow control valve and cylinder is recommended. Flow may be unrestricted or controlled in either direction. Two flow control valves in line, back-to-back, will provide forward and return control.



LIGHTWEIGHT, HIGH FLOW • AIR ONLY

Quick Exhaust/ Shuttle/Shut-Off Valves

Air Only • Die-Cast Zinc Body • 1/8" to 3/4" N.P.T.

General Description

These compact, 3 ported valves are designed with an oversized exhaust orifice that permits quick exhaust of cylinders, diaphragms, brakes, clutches, etc.

An advantage of these valves is that they allow use of smaller pipe lines and control components where an application requires quick venting. Another feature of the ASCO quick exhaust valve is its versatility as a shuttle valve. A shut-off construction also is available.

Specifications

Body and Bonnet — Die-Cast Zinc.

Seat — Buna "N" Diaphragm.

Temperature:

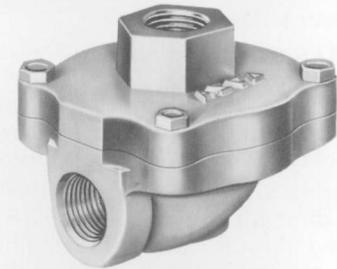
Fluid: 125°F. Maximum.

Ambient: 125°F. Maximum.

Installation:

Dimensions: Refer to Dimensions.

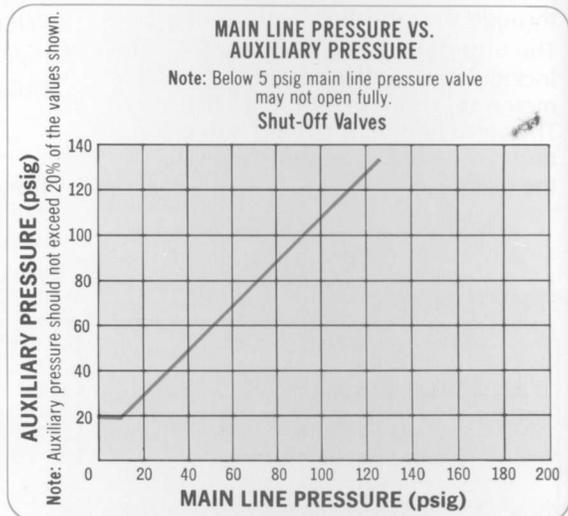
Attitude: Mountable in any position without affecting operation.



SPECIFICATIONS • Air Only

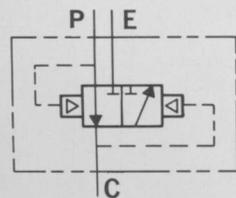
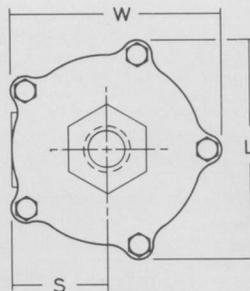
Pipe Size (ins.)	Cv Flow Factor ①		Opening Pressure (psi)	Maximum Operating Pressure Differential (psi)	Maximum Air Temp. °F.	Quick Exhaust/ Shuttle Valve Catalog Number	Shut-Off Valve Catalog Number
	Pressure to Cylinder	Cylinder to Exhaust					
1/8	0.7	0.8	5	125	125	V0435	—
1/4	0.8	1.0	5	125	125	V0436	—
1/4	2.0	2.0	5	125	125	V0431	V04311
3/8	3.5	4.5	5	125	125	V0432	V04321
1/2	6.5	7.5	5	125	125	V0433	V04331
3/4	8.0	11.5	5	125	125	V0434	V04341

Note: ① Shut-off valve Cv's for listed pipe sizes are: 1/4" — Cv 2.5, 3/8" — Cv 4, 1/2" — Cv 7.5, 3/4" — Cv 10.5.

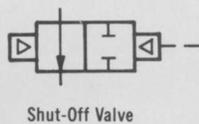


DIMENSIONS (in inches)

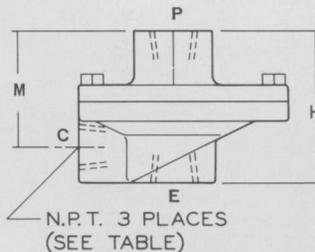
Pipe Size	H	L	M	S	W	Number of Bolts
1/8	1 19/32	1 9/16	1 1/16	1 5/16	1 13/16	3
1/4	1 19/32	1 9/16	1 1/16	1 5/16	1 13/16	3
1/4	2 1/16	2 3/4	1 9/16	1 3/8	2 3/4	4
3/8	2 1/16	2 3/4	1 9/16	1 3/8	2 3/4	4
1/2	2 29/32	4 3/16	2 25/32	1 13/16	4	5
3/4	2 29/32	4 3/16	2 25/32	1 13/16	4	5



Quick Exhaust/Shuttle Valve

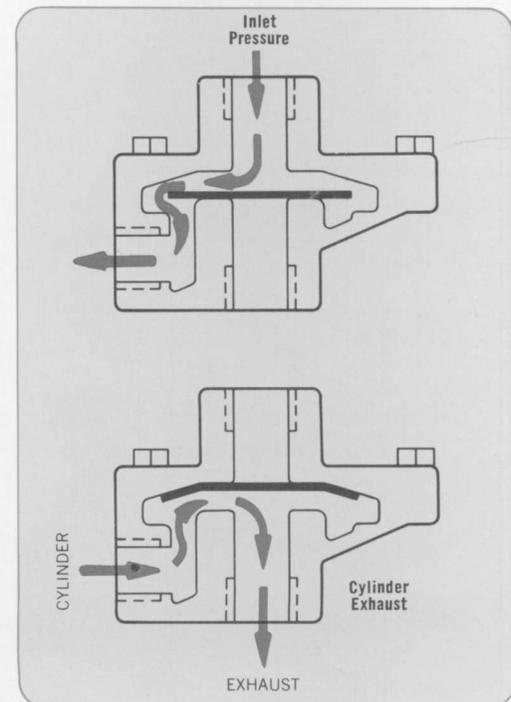


Shut-Off Valve



1/2" & 3/4" Construction Shown

FLOW DIAGRAM Quick Exhaust/Shuttle Valve



2 Way Strainers

Forged Brass, Bronze, Cast Iron, Stainless Steel and Plastic Bodies
1/8" to 2 1/2" N.P.T.

ASCO[®]
ACCESSORIES

General Description

Forged Brass, Bronze, Cast Iron and Stainless Steel Bodies. ASCO rugged self-cleaning "Y" type body strainers have an easily removable strainer element of perforated stainless steel sheet or wire mesh in cylindrical form. The total free hole area as specified in the table is the total area of all perforations or openings through the straining elements. They are suitable for air, water, oil and steam.

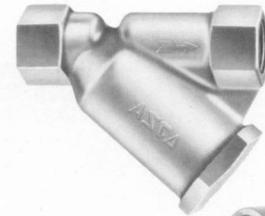
Plastic Body. These ASCO strainers have a straight through flow design with a large area orifice. The strainer can be easily removed from the line and cleaned by back flushing. They are suitable for air and water.

Applications

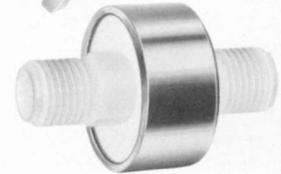
Strainers should be used wherever it is essential that the fluid flowing through pipe lines be maintained free of foreign solid matter. This is necessary to assure proper flow and to prevent damage to controls and other equipment.

Installation

The strainers may be mounted in any position. When installed with solenoid valves, the strainer should be connected in the upstream (inlet) side of the valve — as close to the valve as possible.



Brass and Stainless Body



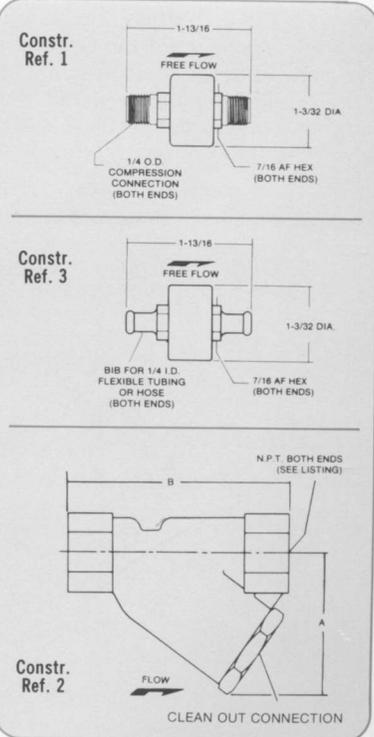
Plastic Body

ORDERING INFORMATION
IMPORTANT:
We must have PIPE SIZE and CATALOG NUMBER.

SPECIFICATIONS

Pipe Size (ins.)	Cv Flow Factor	Screen Mesh Size ③	Total Free Hole Area (in. ²)	Particle Retention Size ③		Blow-Off Pipe Size (ins.)	Maximum Fluid Temp. °F. ⑥	Safe Working Pressure (psi) ⑥	Catalog Number	Constr. Ref. No.	Dimensions (ins.)	
				Microns	Inches						A	B
ACETAL BODY with Stainless Steel Strainer Element and Buna "N" Seals												
①	0.5	80x80	.116	178	.007	—	130	50	86044	1	②	②
①③	0.5	80x80	.116	178	.007	—	130	175	86042	1	②	②
④	0.5	80x80	.116	178	.007	—	130	50	86045	3	②	②
④⑤	0.5	80x80	.116	178	.007	—	130	175	86043	3	②	②
FORGED BRASS BODY with Stainless Steel Strainer Element and Teflon* or Viton* ⑧ Seals												
1/8	1.0	60x60	.325	155	.0061	—	400	750	8600A1⑦⑧	2	1 11/32	2
1/4	1.7	60x60	.325	155	.0061	—	400	750	8600A2⑦⑧	2	1 11/32	2
3/8	1.9	100x100	.35	155	.0061	—	400	750	8600A13⑦	2	1 5/8	1 29/32
1/2	2.6	100x100	.50	155	.0061	—	400	750	8600A14⑦	2	1 13/16	2 2/32
3/4	4.7	100x100	.75	155	.0061	—	400	750	8600A15⑦	2	2 3/32	2 3/4
BRONZE BODY with Stainless Steel Strainer Element												
1	20	40x40	3.83	510	.015	3/4	150	500	8600B6	2	3 1/2	4 7/8
1 1/4	27	40x40	4.98	510	.015	3/4	150	500	8600B7	2	4 3/16	5 5/8
1 1/2	40	40x40	6.95	510	.015	3/4	150	500	8600B8	2	4 3/4	6 3/8
2	70	40x40	7.05	510	.015	1	150	500	8600B9	2	5 11/16	7 1/2
CAST IRON BODY with Stainless Steel Strainer Element												
1/4	2.0	40x40	1.01	510	.015	1/4	150	300	8602B12	2	2 3/16	2 7/8
3/8	3.5	40x40	1.01	510	.015	1/4	150	300	8602B13	2	2 3/16	2 7/8
1/2	6.5	40x40	1.62	510	.015	3/8	150	300	8602B14	2	2 11/16	3 7/16
3/4	12	40x40	2.94	510	.015	1/2	150	300	8602B15	2	3 3/8	4 3/8
1	20	40x40	3.83	510	.015	3/4	150	300	8602B16	2	3 1/2	4 7/8
1 1/4	27	40x40	4.98	510	.015	1	150	300	8602B17	2	4 3/16	5 3/8
1 1/2	40	40x40	6.95	510	.015	1 1/4	150	300	8602B18	2	4 1/2	6 3/8
2	70	40x40	7.05	510	.015	1 1/2	150	300	8602B19	2	5 7/16	7 1/2
2 1/2	90	40x40	10.88	510	.015	1 3/4	150	300	8602B20	2	6 3/4	8 5/8
STAINLESS STEEL BODY with Stainless Steel Strainer Element and Teflon* Seals												
3/8	2.1	60x60	.23	250	.0098	1/4	450	1500	86014	2	1 27/32	1 29/32
1/2	3.0	60x60	.35	250	.0098	1/4	450	1500	86015	2	2	2 29/32

DIMENSIONS (in inches)



Notes:

- 1/4" O.D. compression connection. Fittings are not supplied. To order, refer to List Price Schedule.
- See Dimensions.
- Other mesh sizes may be available; consult ASCO.
- Bibs for 1/4" I.D. flexible tubing or hose.
- Where pressure exceeds 50 psi, it is advisable to use hose or tubing clamps.
- Metal body strainers are rated for steam at 250 psi maximum pressure and 406°F. maximum temperature.
- UL recognized component.
- Valve supplied with Viton seal.

*DuPont Co. trademark.

Mini-Proximity Sensor

General Description

The mini-proximity sensor is a non-contact, no-moving-part air sensor, capable of detecting the presence of an object at ranges up to 1/8" (3.2 mm). In the absence of an object, air flows freely from the sensor resulting in a near zero output signal. The presence of an object within the sensing range deflects the normal air flow and results in an output signal.

At the lower supply pressure, flow from the sensor exerts only minute force on the object being sensed and is consequently appropriate for use where the object is lightweight, or easily marred by mechanical sensors. Since there are no moving mechanical parts in the mini-proximity sensor, there are no inherent wear mechanisms or life limitations. In this regard, the sensor is not cycle dependent and is particularly appropriate for applications requiring large numbers of cycles. Also, the mini-proximity sensor is inherently explosion-proof and self-purging. Therefore, it is suitable for many adverse environments.

Applications

- **High Speed Part Sensing:** Up to 200 per Second
- **Manufactured Parts:** Counting, Gaging, Position, Presence
- **Containers and Packages:** Counting, Motion, Presence
- **Die Protection:** Part or Stock Presence and Position
- **Machine Control:** Cam Position, Part Position, Stock Position
- **Paper, Film, Textile Sensing:** Splice, Edge, Double Thickness Detection

Specifications

Supply Pressure: Up to 10 psig (70 to 690 mbars).

Supply Flow: Up to 2.5 scfm (0.24 to 1.18 dm³/sec).

Output Signal Pressure: See Output Pressure vs. Range Curves.

Response Time: 1 millisecond (measured at sensor output).

Sensing Range: See Output Pressure vs. Range Curves.

Materials of Construction: Stainless Steel, Brass.



Power Supply: Dry air filtered to 1 micron absolute.

Minimum Target Size:

Stationary Objects	Minimum Size
Cylinder	1/8" dia. (3.2 mm)
Slot	0.090" w. (2.3 mm)
Circular Hole	0.130" dia. (3.3 mm)
Circular Disc	0.130" dia. (3.3 mm)

Moving Targets

$$\text{Pulse Duration (sec) Approx.} = \frac{\text{Object Size in (mm)}}{\text{Object Velocity in/sec (mm/sec)}}$$

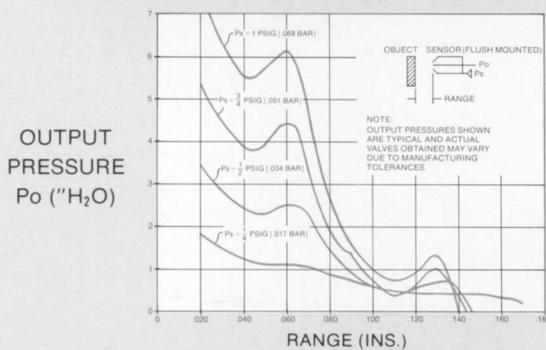
Mounting: Optional mounting bracket available.

ORDERING INFORMATION

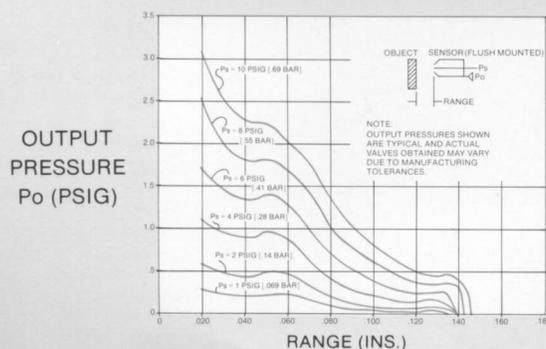
CATALOG NUMBER	DESCRIPTION
6080517	Sensor with elbow fitting and non-threaded mounting.

PERFORMANCE CHARACTERISTICS (For General Reference Only)

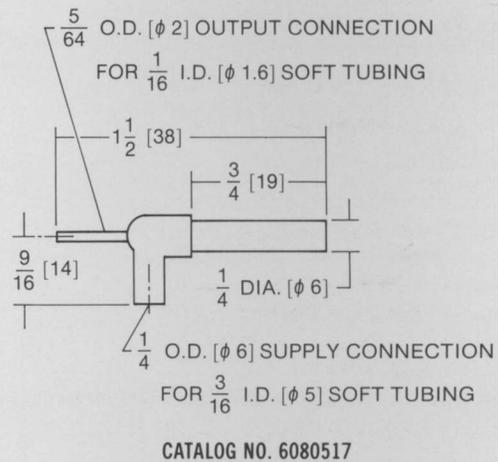
OUTPUT SIGNAL PRESSURE VS. RANGE
SUPPLY PRESSURE 1/4 THRU 1 PSI [.017 THRU .069 BAR]



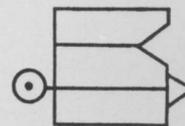
OUTPUT SIGNAL PRESSURE VS. RANGE
SUPPLY PRESSURE 1 THRU 10 PSI [.069 THRU .69 BAR]



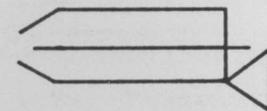
DIMENSIONS in inches (mm)



SYMBOL



European



USA

Air/Electric Switches

ASCO®
ACCESSORIES

General Description

The ASCO air/electric switches provide an ideal means of interfacing fluidic systems or devices with low power electronic or electrical circuits, as well as electric motors, heavy-duty relays or other high current requirements. Their principle of operation is based upon an air pressure signal acting against a diaphragm which moves a conductor disc into contact with the switch's terminals.

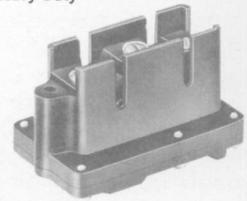
Specifications

Two designs are available:

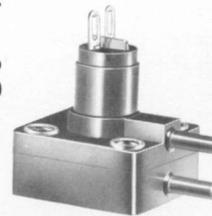
(a) Mini-switch for controlling up to 60 milliamperes resistive load at 120 volts, AC.

(b) Heavy-duty switch for controlling up to 10 amperes resistive load at 125 or 250 volts, AC.

Heavy-Duty



Mini-Switch



AIR/ELECTRIC MINI-SWITCH

The mini-switches are available in normally open or normally closed modes of operation. The normally open switch operates when pressure is applied to the lower control port, while the normally closed switch uses the upper port. The mini-switches can also be used to sense a pressure differential of positive and/or negative pressure sources.

Applications

Control of neon lamps, nixie tubes, incandescent lights or other low power electrical or electronic circuits.

Specifications

Control Pressure: 1.2" H₂O to 4 psi (3 to 276 mbars).

Hysteresis: 0.05" H₂O (0.14 mbars).

Safe Body Working Pressure: 50 psig (3.45 bars).

Maximum Current: 60 milliamps resistive load at 120 volts, AC; 40 milliamps resistive load at 120 volts, DC.

Temperature:

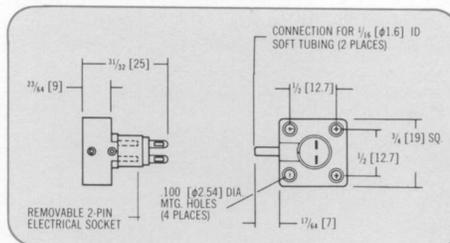
Fluid: 32°F. to 150°F. (0°C. to 65°C.).

Ambient: 32°F. to 150°F. (0°C. to 65°C.).

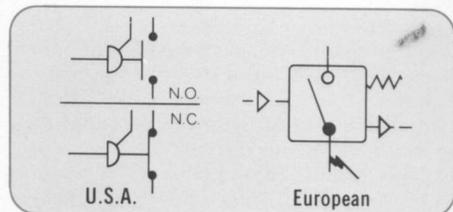
Response Time: 4 milliseconds.

Input Connections: 1/16" I.D. tubing.

DIMENSIONS in inches (mm)



SYMBOL



ORDERING INFORMATION

CATALOG NUMBER ① ②	DESCRIPTION
6080157	Normally Open Mini-Switch
6080503	Normally Closed Mini-Switch

Notes:

- ① A separate electrical connector is provided for soldering to the electrical wire terminals. Soldering must be done with the electrical connectors removed from the switch to prevent damage to the switch contacts by soldering heat.
- ② When controlling inductive loads, such as small relays, it is good practice to use RC suppression or diodes, as required to prevent arcing.

AIR/ELECTRIC HEAVY-DUTY SWITCH

The air/electric switch has a single-pole, double-throw terminal arrangement and is capable of a 25 millisecond response for a single pulse operation.

Applications

Control of motor starters, relays, solenoids, small motors, electrical alarms, pilot lamps, electric counters.

Specifications

Control Pressure: 4.5" H₂O to 5 psig (11 to 345 mbars).

Hysteresis: 0.5" H₂O (1.25 mbars).

Safe Body Working Pressure: 10 psig (690 mbars).

Maximum Current: 10 amperes resistive load at 125 or 250 volts, AC.

Temperature:

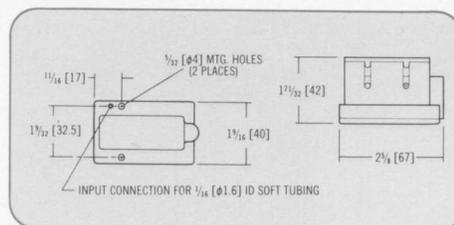
Fluid: 40°F. to 120°F. (4°C. to 49°C.).

Ambient: 40°F. to 120°F. (4°C. to 49°C.).

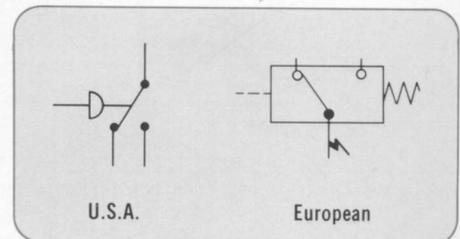
Response Time: 25 milliseconds.

Input Connection: 1/16" I.D. tubing.

DIMENSIONS in inches (mm)



SYMBOL



ORDERING INFORMATION

CATALOG NUMBER	DESCRIPTION
6080158	Heavy-Duty Air/Electric Switch

PULL-TYPE 2 Way Solenoids

General Purpose, Watertight and Explosion-Proof Enclosures and Open Frame Construction • AC Only

General Description

These 2 way pull-type, packless solenoids are identical to the heavy-duty solenoids used on ASCO valves, except the core end is threaded.

Applications

Solenoids operate levers, latches, locks, bell-cranks, i.e., wherever straight line mechanical motion is required.

Special solenoids available for: • exceptionally long life • heavy-duty operation • clickless and quiet (no AC hum) operation. Push-type solenoids and DC solenoids are also available. Consult your local ASCO sales office.

Specifications

Bonnet: Forged Brass (except no bonnet on US80011).

Solenoid Construction: Internal parts are made of 300 and 400 Series Stainless Steel and a copper shading coil. The core end is tapped — refer to drawings.

Solenoid Enclosures: Two types available:

(a) **Type 1** — General Purpose.

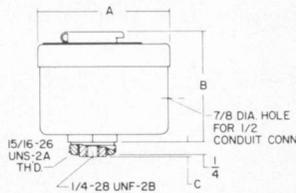
(b) **Types 4 and 7 (C and D)** — Combination Watertight and Explosion-Proof. Also meets Types 3 and 9 (E, F, and G). Refer to Engineering Section for definitions and details. Consult your local ASCO office for Types 3S and 4X.

Electrical: Standard Voltages (except where noted):

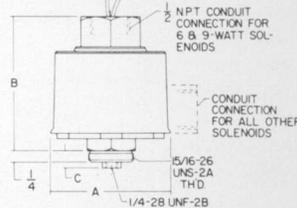
24, 120, 240, 480 volts, AC, 60 Hz (or 110, 220

DIMENSIONS (in inches)

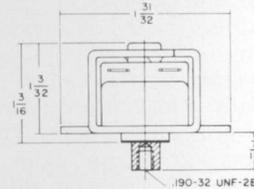
General Purpose Solenoid Enclosure



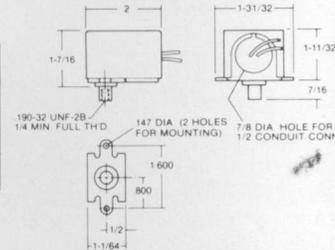
Watertight and Explosion-Proof Solenoid Enclosure



Open Frame Solenoid Construction Ref. IV



General Purpose Solenoid Enclosure Ref. V



Ref. Fig. No.	A	B	C
IA & IB	2 ⁵ / ₃₂	1 ¹³ / ₁₆	1 ⁹ / ₆₄
IIA & IIB	2 ¹ / ₂	2 ¹ / ₁₆	1 ¹ / ₈
IIIA & IIIB	2 ¹¹ / ₁₆	2 ⁵ / ₁₆	1 ¹ / ₈

Ref. Fig. No.	A	B	C
IA & IB	2 ³³ / ₆₄	2 ²³ / ₃₂	1 ⁹ / ₆₄
IIA & IIB	2 ¹⁷ / ₃₂	2 ⁵ / ₃₂	1 ¹ / ₈
IIIA & IIIB	2 ³ / ₄	2 ⁷ / ₁₆	1 ¹ / ₈

Note: Dimension "C" indicates energized position of core.

volts, AC, 50 Hz). (For DC requirements, consult your local ASCO office.)

Coil: Continuous Duty Molded Class A, B and F, as listed.

Temperature:

Ambient: Nominal Range, 32°F. to 77°F. Maximum. (For continuous energization above 77°F. — consult your local ASCO office for recommendations.)

Installation:

Dimensions: Refer to Dimensions and Dimensions Tables.

Attitude: Mountable in any position.

Approvals: UL listed and CSA certified as indicated below. Refer to Engineering Section for details.

PULL CURVES • AC Only

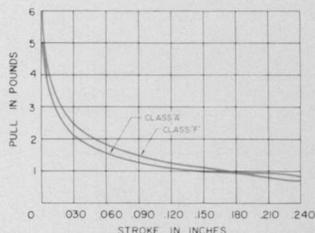


Fig. I (A & B)

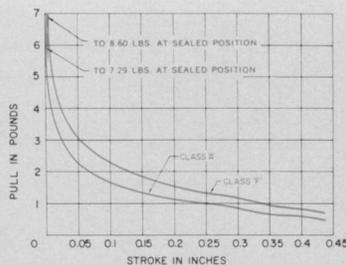


Fig. II (A & B)

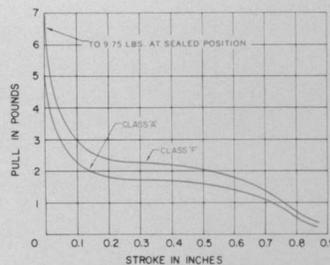
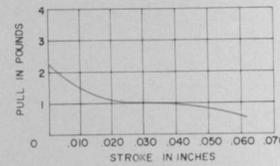


Fig. III (A & B)



Figs. IV, V

SPECIFICATIONS

	Open Frame Construction	Type 1 General Purpose Solenoid Enclosure								Types 4 and 7 (C and D) Combination Watertight and Explosion-Proof Solenoid Enclosure					
Catalog Number	US80011④	80011	80161	80162	80031	80032	80171	80172	80163	80164	80033	80034	80173	80174	
Ref. Figure Number	IV	V	IA	IB	IIA	IIB	IIIA	IIIB	IA	IB	IIA	IIB	IIIA	IIIB	
Watt Rating/Class of Coil Insulation	6.5/B	6.5/B	6/A	9/F	10.5/A	16.7/F	15.4/A	20/F	6/A	9/F	10.5/A	16.7/F	15.4/A	20/F	
VA Holding	9.2	9.2	15.6	22.5	23	35	27	41	15.6	22.5	23	35	27	41	
VA Inrush①	15③	15③	27.7	38.5	45	66	58	78	27.7	38.5	45	66	58	78	
Minimum Return Spring Force or Load Value②	6 oz.	6 oz.	11 oz.	11 oz.	1.5 lb.	1.5 lb.	1.12 lb.	1.12 lb.	11 oz.	11 oz.	1.5 lb.	1.5 lb.	1.12 lb.	1.12 lb.	
UL Listed	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	
CSA Certified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

Notes: ① Core Stroke 1/16".

② Customer to supply return spring, required in solenoid sealed position for proper operation, in accordance with value given.

③ Core Stroke .040".

④ 24, 120 volts, AC, 60 Hz. Spade Terminal Coils supplied as standard. Optional Coil Leads available — refer to Price Schedule.

OPTIONAL FEATURES

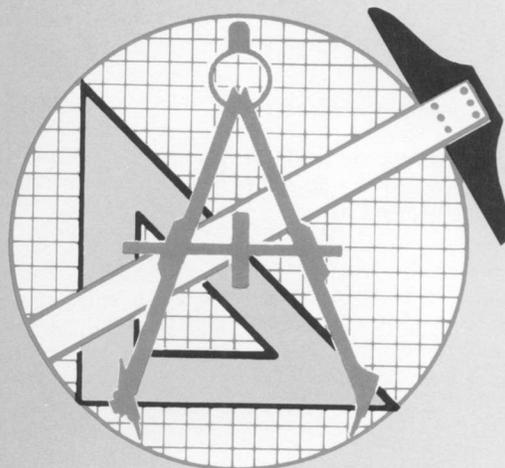
Many optional electrical and construction features are available, refer to Optional Feature Section.

ENGINEERING INFORMATION

for

ASCO®  Red-Hat

Solenoid Valves



This section provides information necessary to determine the exact solenoid valve for your requirements: Flow calculations and graphs for determining orifice size and flow rates, coil data to help select the correct type of coil insulation, a Coil Replacement Guide, and information on solenoid enclosures and approvals available with ASCO solenoid valves.

INDEX

Page

Solenoid Valve Constructions

- | | |
|---|----------------|
| (i) A general description of the construction and operation of ASCO solenoid valves | 114-115 |
| (ii) Description of solenoid enclosures and agency approvals | 116-118 |
| (iii) Solenoid coil data | 118-119 |
| (iv) Coil Replacement and Substitution Guide | 125-127 |

Flow Data

- | | |
|---|------------|
| (i) Estimating Cv or orifice size | 121 |
| (ii) Liquid flow graph | 122 |
| (iii) Air and Gas flow graphs | 123 |
| (iv) Steam flow graphs | 124 |

Approvals **117-118**

Worldwide Agency Approvals **120**

SOLENOID VALVES

Engineering Information

I. Principle of Operation

A solenoid valve is a combination of two basic functional units:

- A solenoid (electro-magnet) with its core.
- A valve body containing one or more orifices.

Flow through an orifice is stopped or allowed by the action of the core when the solenoid is energized or de-energized.

ASCO Red-Hat® solenoid valves have a solenoid mounted directly on the valve body. The core is enclosed and free to move in a sealed tube called a core tube, thus providing a compact, packless assembly.

Direct Acting Valve (Figs. 1A and 1B)

In direct acting valves, the solenoid core directly opens or closes the orifice, depending upon whether the solenoid is

energized or de-energized. The valve will operate from zero psi to its maximum rated pressure.

The force needed to open the valve is proportional to the orifice size and pressure. As the orifice size increases, the force required increases. To keep the solenoid size small and to open large orifices, internal pilot operated valves are used as described below.

Internal Pilot Operated Valve (Figs. 2A, 2B and 3)

This valve has a pilot and bleed orifice, and utilizes the line pressure for operation. When the solenoid is energized, the core opens the pilot orifice and relieves pressure from the top of the valve piston or diaphragm to the outlet side of the valve. This results in an unbalanced pressure which causes the line pressure to lift the piston or diaphragm off the main orifice, thereby opening the valve. When the solenoid is de-energized, the

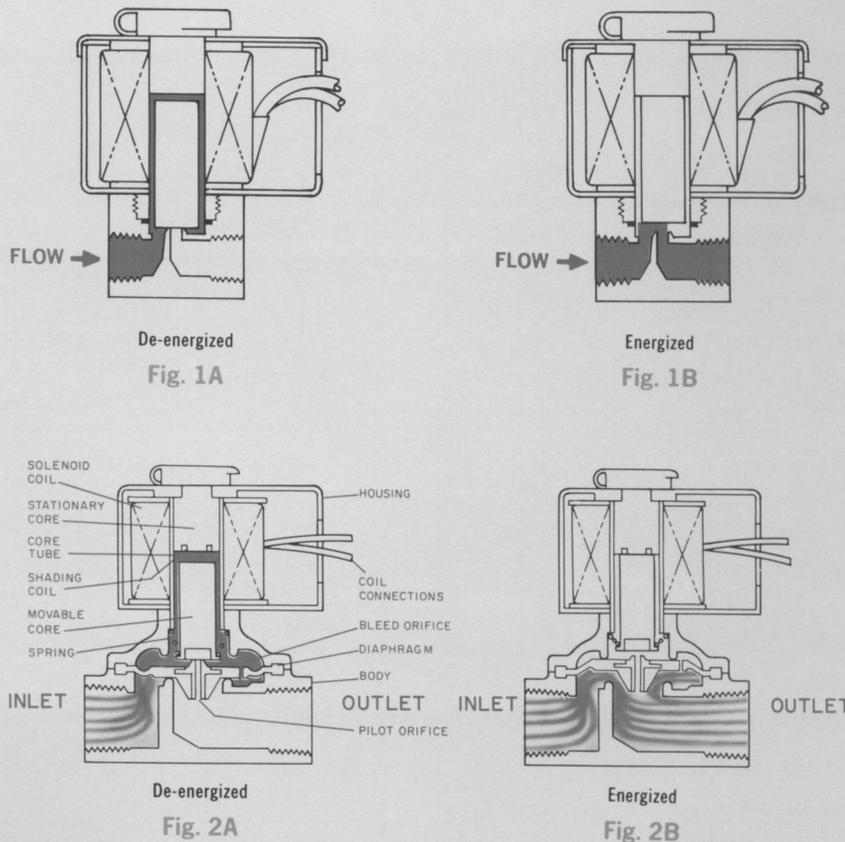
pilot orifice is closed and full line pressure is applied to the top of the piston or diaphragm through the bleed orifice, thereby providing a seating force for tight closure.

Two types of construction are available:

- Floating diaphragm or piston which requires a minimum pressure drop across the valve to hold it in the open position.
- Hung type diaphragm or piston which is mechanically held open by the solenoid core. This allows the diaphragm or piston to open and remain open with a zero pressure drop across the valve (see Fig. 3).

Manual Reset Valves (Figs. 4A and 4B)

The manual reset valve must be manually positioned (latched). It will return to its original position when the solenoid is energized or de-energized, depending upon construction.



II. Types of Solenoid Valves

2 Way Valves (Figs. 2A and 2B)

Two way valves have one inlet and one outlet pipe connection. Valves are available in either:

Normally Closed Construction — Valve is closed when de-energized and open when energized.

Normally Open Construction — Valve is closed when energized and open when de-energized.

3 Way Valves (Figs. 5A and 5B)

Three way solenoid valves have three pipe connections and two orifices (one orifice is always open and one is always closed). These valves are commonly used to alternately apply pressure to and

exhaust pressure from a diaphragm valve or single acting cylinder.

Three modes of operation are available:

Normally Closed Construction — With the valve de-energized, the pressure port is closed and the exhaust port is connected to the cylinder port. With the valve energized, the pressure port is connected to the cylinder port and the exhaust port is closed.

Normally Open Construction — With the valve de-energized, the pressure port is connected to the cylinder port and the exhaust port is closed. With the valve energized, the pressure port is closed and the cylinder port is connected to the exhaust port.

Universal Construction — Allows the valve to be connected in either the normally closed or normally open mode. In addition, the valve may be connected to select one of two fluids (selection) or to divert flow from one port to another (diversion).

4 Way Valves (Figs. 6A and 6B)

Four way solenoid valves are generally used to operate double acting cylinders. These valves have four or five pipe connections — one pressure, two cylinder and one or two exhausts. In one valve position, pressure is connected to one cylinder port; the other is connected to exhaust. In the other valve position, pressure and exhaust are reversed at the cylinder connections.

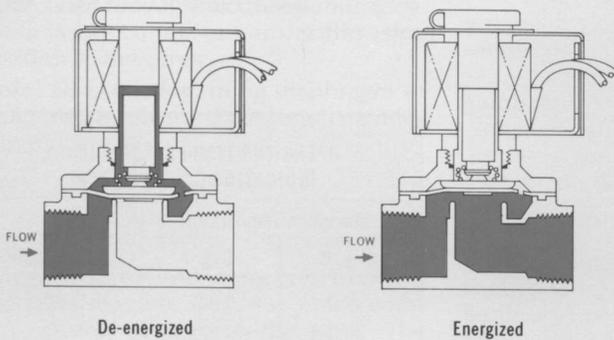


Fig. 3

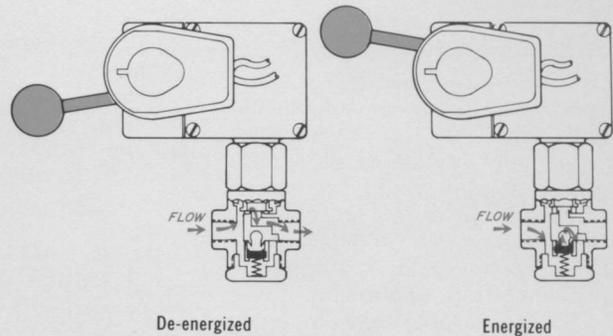


Fig. 4A

Fig. 4B

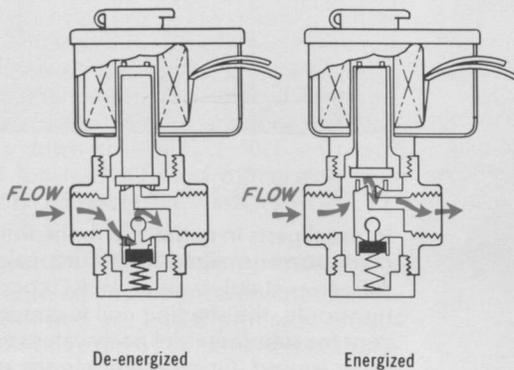


Fig. 5A

Fig. 5B

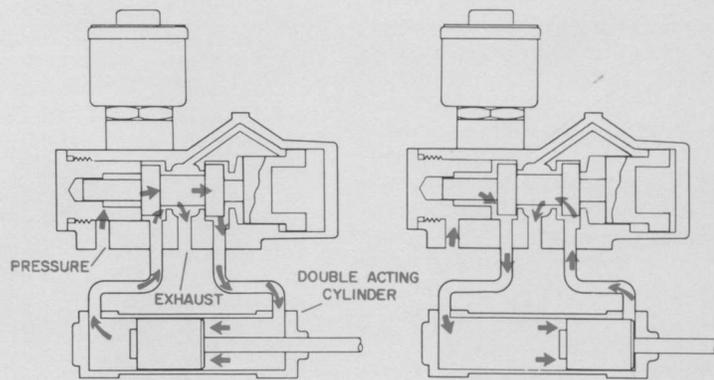


Fig. 6A

Fig. 6B

III. Solenoid Enclosures

Most valves are supplied standard with a Type 1 — General Purpose or Types 4 and 7 (C and D) — Combination Watertight and Explosion-Proof solenoid enclosure as listed in the respective bulletins. The Combination Watertight and Explosion-Proof solenoid enclosure also meets Types 3 and 9 (E, F and G) requirements. Type 3R (Rainproof), Type 6 (Submersible), Type 7B (Explosion-Proof for hydrogen atmospheres), Junction Box and Splice Box solenoid enclosures are also available (see Optional Feature Section). All of the enclosures are designed to meet ICS-6 ANSI/NEMA Standard and UL Standards 429, 508 and 1002. These standards define the protection level an enclosure gives and the tests it must pass to meet a particular type designation.

The solenoid enclosures actually form a path for the magnetic circuit on most enclosures; therefore, do not remove as this will affect valve operation.

Type 1 — General Purpose Solenoid Enclosure

Type 1 enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do not exist. Standard Type 1 enclosures are epoxy-painted, zinc-coated steel, and have a 7/8" diameter hole to accept standard conduit hubs or connectors. A Junction Box construction is also available (see Optional Feature Section).

Types 4 and 7 (C and D) — Combination Watertight and Explosion-Proof Solenoid Enclosure

These enclosures are either epoxy-painted steel or die-cast aluminum and are equipped with a 1/2" threaded conduit hub. They meet the following enclosure types:

a. Type 3: Dusttight, Raintight and Sleet-(Ice-) Resistant — Outdoor: These enclosures are intended for use outdoors to protect the enclosed equipment against windblown dust and water. For applications requiring Type 3S (Dusttight, Raintight and Sleet- (Ice-) Proof — Outdoor) enclosure, consult your local ASCO sales office.

b. Type 4: Watertight and Dusttight — Indoor and Outdoor: These enclosures are intended for use indoors or outdoors to protect the enclosed equipment against splashing water, seepage of water, falling or hose directed water, and severe external condensation. They are sleet-resistant. For applications requiring Type 4X (Watertight, Dusttight and Corrosion-

Resistant — Indoor and Outdoor) enclosure, consult your local ASCO sales office.

c. Type 7 (C and D): Explosion-Proof Class I, Division 1, Groups C and D hazardous locations: These enclosures are designed to contain an internal explosion without causing an external hazard when installed in the indicated atmospheres and locations. Class I, Division 1 locations are those in which hazardous atmospheres are, or may be, present under normal operating conditions. These enclosures are also suitable for Class I, Division 2 locations which are those where the hazardous atmospheres are present only in case of accidental rupture or breakdown of equipment or abnormal operation. Type 1 (General Purpose) solenoid enclosures may be permitted in a Class I, Division 2 location subject to the approval authority (Ref: National Electrical Code 501-3, b3). Group designations C and D are described in the National Electrical Code as:

Group C — Atmospheres containing ethyl-ether vapors, ethylene or cyclopropane.

Group D — Atmospheres containing gasoline, hexane, naphtha, benzene, butane, propane, alcohol, acetone, benzol, lacquer, solvent vapors or natural gas.

d. Type 9 (E, F and G): Dust-Ignition Proof Class II, Groups E, F and G hazardous locations: These enclosures are designed to prevent the entrance of dust and the enclosed devices do not produce sufficient heat to cause external surface temperatures capable of igniting dust on the enclosure or in the surrounding atmosphere. Class II, Division 1 locations are those in which combustible dust is, or may be, present under normal operating conditions. These enclosures are also suitable for Class II, Division 2 locations which are those where the hazardous dust is present only under abnormal conditions. The group designations E, F and G are described in the National Electrical Code as:

Group E — Atmospheres containing metal dust, including aluminum, magnesium, and their commercial alloys and other metals of similarly hazardous characteristics.

Group F — Atmospheres containing carbon black, coal or coke dust.

Group G — Atmospheres containing flour, starch or grain dust.

Hazardous Location Solenoid Temperature Range Codes

Enclosures for hazardous locations will be marked to indicate the maximum exposed surface temperature or temperature indicating code. This temperature is

based on the maximum temperature obtained in the temperature or burnout (blocked core) test, whichever is higher at 40°C. (104°F. ambient).

To prevent ignition of hazardous atmospheres, do not install in areas where vapors or gases having ignition temperatures less than the marked temperatures are present. The operating temperatures corresponding to the various temperature indicating codes are listed in the table below. All standard combination Types 4 and 7 solenoids are marked with a temperature code of T3C except those rated for 6, 9 and 9.7 watts which are marked T4A, or where otherwise noted in specific bulletins.

When used on valves having fluid temperature ratings exceeding 120°C. (240°F.), consult ASCO for applicable enclosure class, groups, and temperature range code.

For temperature range codes of valves and solenoids with optional coils and features, or if a better temperature range code is desired, consult your local ASCO sales office.

OPERATING TEMPERATURE RANGE INDICATING CODE NUMBERS		
Maximum Temperature		Code Number
Deg. C.	Deg. F.	
450	842	T1
300	572	T2
280	536	T2A
260	500	T2B
230	446	T2C
215	419	T2D
200	392	T3
180	356	T3A
165	329	T3B
160	320	T3C
135	275	T4
120	248	T4A
100	212	T5
85	185	T6

IV. Solenoid Construction

Internal parts in contact with the fluid are made of non-magnetic 300 and magnetic 400 series stainless steel. In AC constructions only, the shading coil is copper except for stainless steel body valves where silver is used. Other materials are available when required. No shading coil is used in DC valves.

The core tube in ASCO valves is of 300 series stainless steel and formed by deep drawing, eliminating silver brazed or welded joints otherwise necessary.

V. Maximum Operating Pressure Differential (M.O.P.D.)

The maximum operating pressure differential is the maximum differential pressure between the inlet and the outlet sides of the valve against which the solenoid can safely operate the valve. If the pressure at the valve outlet is not known, the conservative approach is to regard the M.O.P.D. as the supply pressure.

VI. Minimum Operating Pressure Differential

The minimum operating pressure differential is that which is required to open the valve and keep it open. For 2 way valves with floating piston or diaphragm, the valve will start to close below the minimum differential pressure. For 3 and 4 way pilot valves, the minimum operating pressure is measured between the pressure and exhaust ports and must be maintained throughout the operating cycle to insure complete transfer from one position to the other.

Note: Direct acting, hung diaphragm or hung piston valves do not require a minimum pressure.

VII. Safe Working Pressure

Line or system working pressure to which the valve may be safely subjected without causing damage to the valve. The proof pressure for any valve is five times the safe working pressure.

VIII. Ambient Temperature Limitations

Minimum Ambient Temperature

The nominal limitation of 0°C. (32°F.) is advisable for any valve that might contain moisture (water vapor). Where freezing water is not a factor, minimum ambients as low as -18°C. (0°F.) can be tolerated. In addition, special constructions are available for ambient temperatures down to -40°C. (-40°F.). Consult your local ASCO sales office with your specific needs.

Maximum Ambient Temperature

The nominal maximum ambient temperatures listed are based primarily on test conditions used by Underwriters Laboratories, Inc. in determining safe limits for coil insulation. They are determined under continuously energized conditions and with maximum fluid temperatures existing in the valve. In many applications, the specific conditions existing will

permit use at considerably higher ambient temperatures. In addition, modifications to standard constructions are also available which can extend the maximum ambient temperature limitation to 82°C. (180°F.) or more. Consult your local ASCO sales office with your specific needs.

IX. Response Time

The response time from fully closed to fully open position, or vice versa, is dependent upon the valve size and operating mode, electrical service, fluids, temperature, inlet pressure and pressure drop. The response time for AC valves on air service under average conditions can be generalized as follows:

- a. Small direct acting valve — 5 to 10 milliseconds.
- b. Large direct acting valve — 20 to 40 milliseconds.
- c. Internal pilot operated valves:
 1. Small diaphragm type — 15 to 50 milliseconds.
 2. Large diaphragm type — 50 to 75 milliseconds.
 3. Small piston type — 75 to 100 milliseconds.
 4. Large piston type — 100 to 150 milliseconds.

Generally speaking, operation on liquids has relatively little effect on the small direct acting valves; however, large direct acting valves and internally piloted valves will show an increase in response time between 50 and 100%.

DC valves will yield approximately a 50% increase in response time over that listed for AC service.

For specific response time on any application where timing is critical, consult your local ASCO sales office with complete application details. Response time can be improved to meet special conditions when required.

X. Approval Listing Code and Information

UL, FM, and CSA listings have been indicated in this catalog under the appropriate bulletin number with reference to the listing code and information in this section.

Valves are approved with standard features and for the standard voltages listed in the catalog for each bulletin. Many optional features and other voltages are also approved. Consult your local ASCO sales office for details.

Valve Classifications and Code References are:

- **General Purpose Valve** — one intended to control the flow of a fluid, but not to be depended upon to act as a safety valve. It may be a normally closed or normally open valve. This is a UL and CSA valve classification and is not intended to indicate valve service or application.
- **Safety (Shut-off) Valve** — a normally closed valve of the “on” and “off” type intended to be actuated by a safety control or an emergency device to prevent the unsafe delivery of a fluid. It may be used also as a general purpose valve. A multiple port valve may be designated as a Safety Valve only with respect to its normally closed port. This is a UL and FM valve classification.

IMPORTANT:

Symbols printed in RED indicate that valves or solenoids or both have been, or will be, submitted to the respective agencies for listing and/or approval prior to or during catalog printing. Listings and approvals may have been received after the catalog was issued. Check with your local ASCO sales office when necessary.

Symbols printed in BLACK indicate that listing and/or approval has been received.

Unless otherwise stated under the individual bulletin numbers, valves are listed as general purpose valves.

Underwriters Laboratories, Inc.



UL Standards governing solenoid valves are:

UL 429, “Electrically Operated Valves” and UL 1002, “Electrically Operated Valves for Use in Hazardous Locations.”

UL provides two “Listing” categories for solenoid valves:

General Use. Valves authorized for general use are complete in their requirements and, therefore, may be installed in the field. They are identified by the UL symbol followed by the word “LISTED” and valve classification. ASCO UL Listings of “General Use” type valves and solenoids may be found in the UL Gas and Oil Equipment Directory (gray book) under Electrically Operated Valves, guide no. YIOZ (File MP-618) and in the UL Hazardous Location Equipment List (red book) under Electric Valves, guide no. YTSX (File E25549) or Solenoids, guide no. VAPT (File E12264).

Component. Valves covered under this category are incomplete in certain constructional features, or restricted in performance capabilities, and are, therefore,

intended for use as factory installed components on equipment where final acceptability must be determined by UL rather than direct separate installation in the field. Component valves are termed "UL Recognized" and may, at the manufacturer's option, use UL's special Recognized Component Mark. ASCO UL Listings of "Component" type valves may be found in the UL Recognized Component Index (yellow book) under Electrically Operated Valves, guide no. YIOZ2 (File MP-618).

Factory Mutual Research Corporation



FM "approves" and lists fuel oil and gas safety (shut-off) and intrinsically safe valves in the Factory Mutual "Approval Guide." Valves designated for other fluids and operational characteristics, although not subject to FM "approval," are usually "accepted" by FM on the specific equipment installation.

F.I.A.* Solenoid Valve Standards

The Factory Insurance Association *does not* approve equipment. It establishes "recommended good practices" in such areas as combustion safeguards on single burner boiler-furnaces and safeguarding Class B and Class C furnaces and ovens. Conforming to these good practices results either in insurability for fire protection or in obtaining a more advantageous rate for such protection.

In order for safety controls to meet the Association's standard of good practice,

*Now consolidated into "Industrial Risk Insurers."

they must be either *Underwriters Laboratories, Inc.* listed or accepted by the F.I.A. The National Fire Protection Association (NFPA) maintains similar requirements and recommendations for safety shut-off and vent valves in oil and gas burner boiler systems.

Canadian Standards Association



Standards governing solenoid valves are listed in the CSA Certified Electrical Equipment Book under Valves, guide no. 440-A-0, File 10381 and guide no. 440-A-0.8, File 13976.

CSA certified valves and solenoids are listed in the CSA Certified Electrical Equipment Book under Valves, guide no. 440-A-0, File 10381 and guide no. 440-A-0.8, File 13976.

CSA valves require special handling, testing, and marking; they are only supplied when specified on order.

XI. OSHA

OSHA (Occupational Safety and Health Act) does not approve products but requires employers to provide a safe and healthful environment for employees.

ASCO valves are manufactured to meet the standards of various approval agencies such as UL, FM, etc.; however, valves must be installed properly by the user in order to comply with OSHA and must also be installed in accordance with local codes.

For example, an installation where equipment exhausts air to atmosphere

might require air silencing devices (exhaust mufflers) in order to meet noise level requirements of OSHA.

XII. Seismic Capabilities

Seismic tests have been conducted on a number of standard valves as a result of many inquiries received, resulting in certification that our valves can operate during and following a simulated earthquake. This is a continuing test program.

Our method of testing complies with IEEE Standard 344 entitled, "IEEE Recommended Practices for Seismic Qualification of Class IE Equipment for Nuclear Power Generating Stations."

For specific seismic data on particular catalog items, consult your local ASCO sales office.

XIII. Solenoid Coils

ASCO valves are equipped with continuous duty coils except when noted. These can be energized continuously without danger of overheating or failure. Coils are provided standard with two 18" coil leads which can be connected to any controlling device. Spade and screw terminal coils also are available. For three-phase power systems, the two leads can be connected to any two of the three phases.

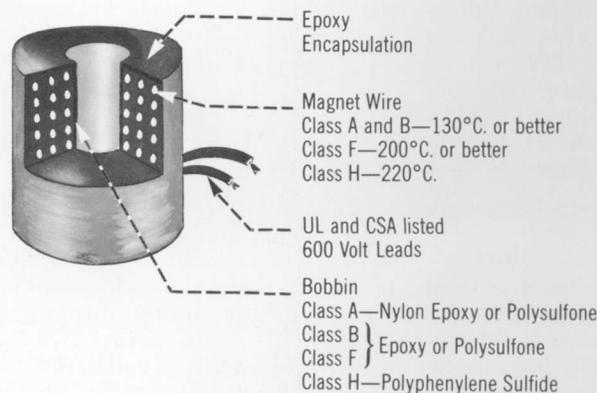
All coils are constructed in accordance with Underwriters Laboratories, Inc., NEMA, IEEE, and other industry standards.

ASCO Class B, F, and H insulation systems are UL listed in the Recognized Component Index (yellow book) under guide no. OBJ2.

COIL INSULATION SYSTEMS AND TEMPERATURE LIMITATIONS

CLASS A (105°C.), CLASS B (130°C.), CLASS F (155°C.) AND CLASS H (180°C.)

- FUNGUS PROOF
- MOISTURE PROOF
- WIDER OPERATING RANGE FOR CLASS B, F AND H COILS
- RADIATION RESISTANT CLASS H ONLY

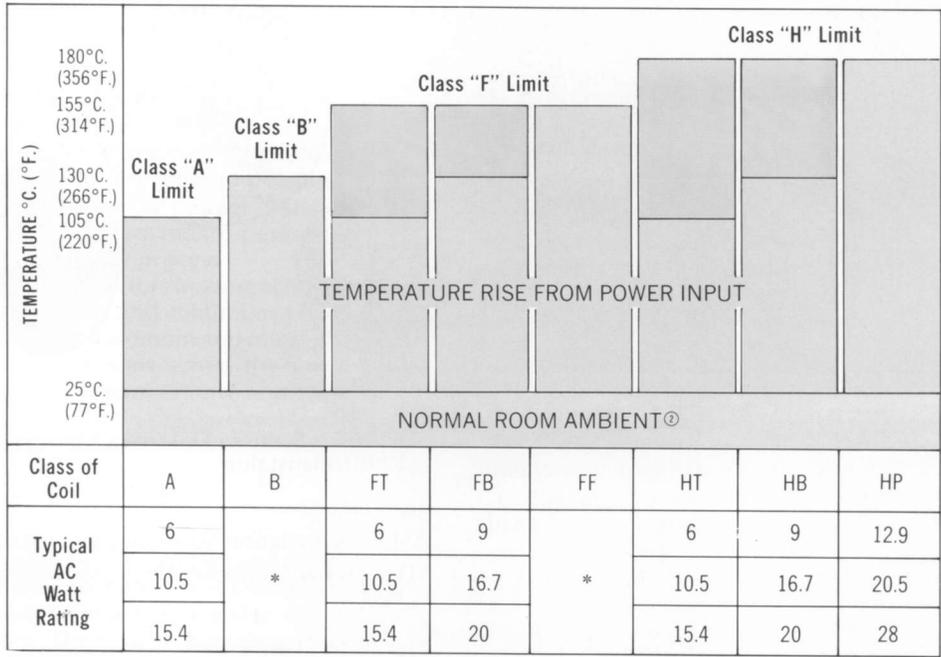


SOLENOID COILS (continued)

The following table illustrates the temperature parameters of ASCO Coils:

INDUSTRIAL TEMPERATURE LIMITATIONS^① AND THERMAL CHARACTERISTICS OF ASCO SOLENOIDS AND COILS.

The typical watt ratings given show the relationship between different classes of coil insulation and the watt ratings to achieve higher temperature capability.



CLASS OF COIL INSULATION

- Normal 25°C. (77°F.) Room Ambient.
- Temperature Rise Due to Power Input.
- Excess Margin for Higher Fluid or Ambient Temperatures.③

Notes:

- ① As measured by the "Resistance Method."
 - ② Equipment rated at an ambient temperature of 25°C. (77°F.) can be employed in areas where the ambient temperature reaches 40°C. (104°F.) **occasionally.**
 - ③ Ambient temperatures are directly additive to coil rise — fluid temperatures are not.
- * Only available in limited watt ratings. Consult ASCO when required.

Coil Operating Voltage Ranges

All coils are designed for industrial operating voltages and can be used on the following voltage ranges:

AC		DC	
Nominal Voltage Rating	Normal Operating Range	Nominal Voltage Rating	Normal Operating Range
24	20- 24	6	5.1- 6.3
120	102-120	12	10.2-12.6
240	204-240	24	20-25
480	408-480	120	102-126
		240	204-252

Note: Special coils are required for battery charging circuits where wider voltage ranges are typically encountered. For these applications, special continuous duty Class H coils are available that will accommodate a voltage range equivalent to 12% over, 28% under nominal and a 60°C. (140°F.) ambient. Standard nominal voltages are 125 and 250 DC which translate to a voltage range of 90-140 and 180-280, respectively. Add prefix "HC" to the catalog number.

All ASCO valves are tested to operate at 15% under the nominal voltage and at maximum operating pressure differential, and are capable of operating for

short periods at 10% over the nominal voltage. For wider voltage ranges than shown at left, a different coil or insulation system must be used.

Power Consumption

Power consumption of solenoid valves may be determined from the rating in ASCO bulletins. For valves on AC service, the watt rating, the volt-ampere "inrush" and the volt-ampere "holding" are given.

The volt-amp (VA) "inrush" is the high momentary surge of current which occurs at the moment an AC solenoid is energized.

The volt-amp (VA) "holding" is the continuous current draw after the initial "inrush."

The current rating for the "inrush" and "holding" may be determined by dividing the voltage into the volt-amp rating.

$$\text{AMPS (INRUSH)} = \frac{\text{volt-amp "inrush"}}{\text{voltage}}$$

$$\text{AMPS (HOLDING)} = \frac{\text{volt-amp "holding"}}{\text{voltage}}$$

Valves supplied for DC service have no "inrush" current. The amp rating can be determined by dividing the voltage into the DC watt rating.

$$\text{AMPS} = \frac{\text{watts (DC)}}{\text{voltage}}$$

Note: (1) When a valve has been energized for a long period the solenoid enclosure becomes hot and cannot be touched by hand except for an instant. This is a perfectly safe operating temperature. Any excessive heating will be indicated by the smoking and burning odor of the coil insulation.

(2) Valves for AC service can be converted for use on other AC voltages simply by changing the coil; similarly, DC valves can be converted for use on other DC voltages. When converting from AC to DC or vice versa, consult your local ASCO sales office for instructions.

WORLDWIDE Agency Approvals

When desired, ASCO Red-Hat Solenoid Valves can be supplied to meet the additional requirements of a variety of approval agencies around the world. Following is a list of countries and the approvals that can be requested.

Consult your local ASCO sales office for details.



United States of America

A.G.A. — American Gas Association
ANSI — American National Standards Institute, Inc.
FIA — Factory Insurance Association (Now consolidated into Industrial Risk Insurers.)
FM — Factory Mutual Research Corporation
IEEE — Institute of Electrical and Electronics Engineers, Inc.
JIC — Joint Industrial Council
MIL — Military Standards
NAVSEA — Naval Sea Systems Command
NEC — National Electrical Code
NEMA — National Electrical Manufacturers Association
NFPA — National Fire Protection Association
NFPA — National Fluid Power Association, Inc.
NSF — National Sanitation Foundation
UL — Underwriters' Laboratories, Inc.
USCG — United States Coast Guard

International — European

CEE — International Commission on Rules for the Approval of Electrical Equipment
CENELEC — European Committee for Electrotechnical Standardization
IEC — International Electrotechnical Commission
ISO — International Organization for Standardization

Australia

AGA — Australian Gas Association
SAA — Standards Association of Australia

Belgium

CEB — Comite Electrotechnique Belge
IBN — Institut Belge de Normalisation
K.V.B.G. — Koninklijke Vereniging der Belgische Gasvlieden
VERGAS — Technische Vereniging van de Gasindustrie in België V.Z.W.D.

Canada

CGA — Canadian Gas Association
CSA — Canadian Standards Association
EEMAC — Electrical and Electronic Manufacturers Association of Canada
ULC — Underwriters' Laboratories of Canada

Denmark

DEMKO — Dansk Elektroteknisk Komite Organization

Finland

SL — Sähkötarkastuslaitos Laboratoria

France

AFNOR — Association Française de Normalisation
BUREAU VERITAS
LCIE — Laboratoire Central des Industries Electriques
MDIS — Ministère du Développement Industriel et Scientifique

Italy

CEI — Comitato Elettrotecnico Italiano

Japan

JEM — Japan Electrical Manufacturers Association
JIS — Japanese Industrial Standards
ML — Ministry of Labor
NK — Japan Maritime Association
RIIS — Research Institute of Industrial Safety, Department of Labor

Norway

DET NORSKE VERITAS
NEMKO — Norges Elektriske Materiellkontroll

Russia

USSR REGISTER OF SHIPPING

South Africa

SABS — South African Bureau of Standards

Sweden

SEMKO — Svenska Elektriska Material Kontrollanstalten

Switzerland

ASE — Association Suisse des Electriciens
SEV — Schweizerischer Electrotechnischer Verein

The Netherlands

DGA — Directoraat — Generaal van de Arbeid
KEMA — N.V. tot Keuring van Elektrotechnische Materialen, Divisie Elektrotechnische Keuringen (N.V. Kema)
NEC — Nederlands Elektrotechnisch Comité
NNI — Nederlands Normalisatie — Instituut
REGO — Richtlijnen Voor de Samenstelling van Elektrisch Material in Verband Met Gasontploffingsgevaar
VEG — VEG-Gasinstituut N.V.
VGN — Vereniging van Gasfabrikanten in Nederland

United Kingdom

BASEEFA — British Approvals Service for Electrical Equipment in Flammable Atmospheres
BGC — British Gas Corporation
BSI — British Standards Institution
CSA — Canadian Standards Association
LLOYD'S REGISTER OF SHIPPING
MRS — Midlands Research Station
NWC — National Water Council
SFA — Special Flammable Atmospheres
WH — Watson House

West Germany

DIN — Deutsches Institut Für Normung
DVGW — Deutscher Verein des Gas — Und Wasserfaches e.V.
GERMANISCHER LLOYD
PTB — Physikalisch — Technische Bundesanstalt
VDE — Verband Deutscher Electrotechniker

Engineering Information

FLOW DATA

Valve Sizing is Important . . . The automatic control industry requires a positive method of valve sizing. Oversizing or undersizing the solenoid valve introduces needlessly greater initial investment or below standard performance in controlling any process.

The basic factors in valve sizing include — maximum and minimum flows to be controlled, maximum and minimum pressure differentials across the valve, specific gravity, temperature and viscosity.

The Cv method of valve sizing has proven to be practical in that it reduces all variables to a common denominator. Existing conditions or variables (pressure differential, specific gravity, temperature, etc.) of the fluids flowing through the valve are converted into a reference condition. This is called the flow coefficient (Cv). After the existing conditions have been converted into this coefficient, the valve size is found by referring to the catalog pages.

This section presents the complete procedure and reference data for the accurate sizing of ASCO solenoid valves in liquid, steam, and gas services. The graphs provide the simplest means of finding the required Cv factor and are based on the formula:

$$C_v = \frac{\text{Flow Required}}{\text{Graph Factor}}$$

The graph factor can be picked out by aligning known pressure conditions on the graphs.

ESTIMATING Cv or ORIFICE SIZE:

The table below can be used to estimate a Cv if the orifice size is known or relate the approximate orifice size if the Cv is known. The chart is **based on the ASCO designs** of in-line globe type valves.

Approx. Orifice Size (ins.)	Approx. Cv	Approx. Orifice Size (ins.)	Approx. Cv
1/32	.02	1/2	3.5
3/64	.06	5/8	4.5
1/16	.09	11/16	5
3/32	.20	3/4	7.5
1/8	.30	1	13
9/64	.36	1 1/4	17
3/16	.53	1 1/2	25
1/4	.70	2	48
5/16	1.7	2 1/2	60
3/8	2	3	100

The flow charts must be used for precise sizing and converting Cv factors to actual flow terms and the catalog must be consulted for the actual Cv of a particular valve.

SAMPLE PROBLEMS

Liquids: ①

To find Cv: What Cv is required to pass 20 GPM of oil with a specific gravity of .9

and a pressure drop of 25 psi? The viscosity is less than 300 SSU's. ②

Solution: Formula is

$$C_v = \frac{\text{GPM}}{\text{Fg} \times \text{Ft}}$$

To find Fg, use Liquid Flow Graph on page 122. The Fg factor is that corresponding to 25 psi pressure drop and equals 5. The Fsg factor can be obtained from Fsg Chart and is that corresponding to .9 specific gravity and equals 1.05.

$$\text{Therefore, } C_v = \frac{20}{5 \times 1.05} = 3.81.$$

Air and Gases:

To find Cv: A valve is required to pass 500 SCFH at an inlet pressure of 60 psig and a Δp of 10 psi. Find Cv if the fluid is carbon dioxide at room temperature.

Solution: Refer to 10-100 psig graph on page 123: the formula to be used is

$$C_v = \frac{\text{SCFH}}{\text{Fg} \times \text{Fsg} \times \text{Ft}}$$

Locate Fg at the intersection of 60 psig inlet pressure and 10 psi Δp (curved lines). Read down to Fg. Fg = 1560.

Locate Fsg corresponding to specific gravity of carbon dioxide (S.G. = 1.5). Fsg = .81. (Refer to page 122.) Since the gas is at room temperature the Ft factor can be ignored.

Insert values into formula,

$$C_v = \frac{\text{SCFH}}{\text{Fg} \times \text{Fsg} \times \text{Ft}} = \frac{500}{1560 \times .81} = .395$$

Steam:

To find Cv: A valve is required to pass 25 lb/hr of saturated steam at an inlet pressure of 7 psig and a Δp of 3 psi. What is the Cv?

Solution: Refer to the Steam Graph on page 124. Use formula

$$C_v = \frac{\text{lb/hr}}{\text{Fg}}$$

Locate Fg on graph corresponding to 7 psig inlet pressure and 3 psi Δp (curved lines). Fg = 23.5.

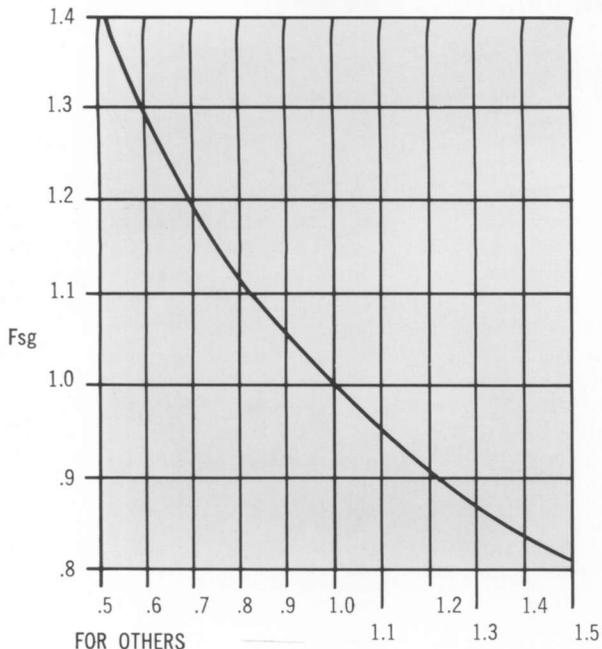
Insert values into formula,

$$C_v = \frac{\text{lb/hr}}{\text{Fg}} = \frac{25}{23.5} = 1.06$$

For further information, consult your local ASCO sales office.

- NOTES:**
- ① Liquid formulas and flow graphs are based on U.S. gallons.
 - ② If viscosity is less than 300 SSU, correction factors are not necessary.
 - ③ Δp stands for pressure drop.

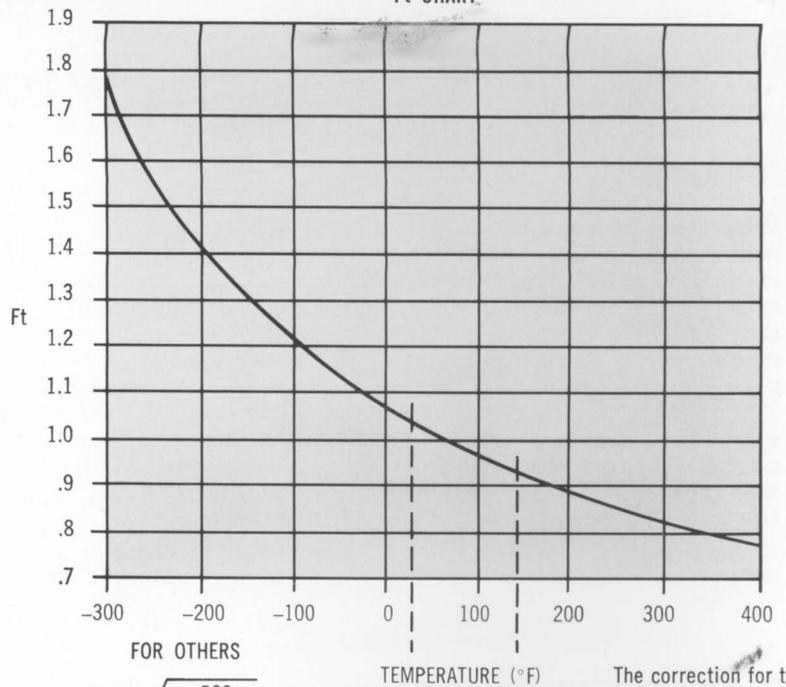
Fsg CHART



FOR OTHERS

$$Fsg = \frac{1}{\sqrt{\text{S.G.}}} \quad \text{Specific Gravity @ 14.7 PSIA and 60°F.}$$

Ft CHART



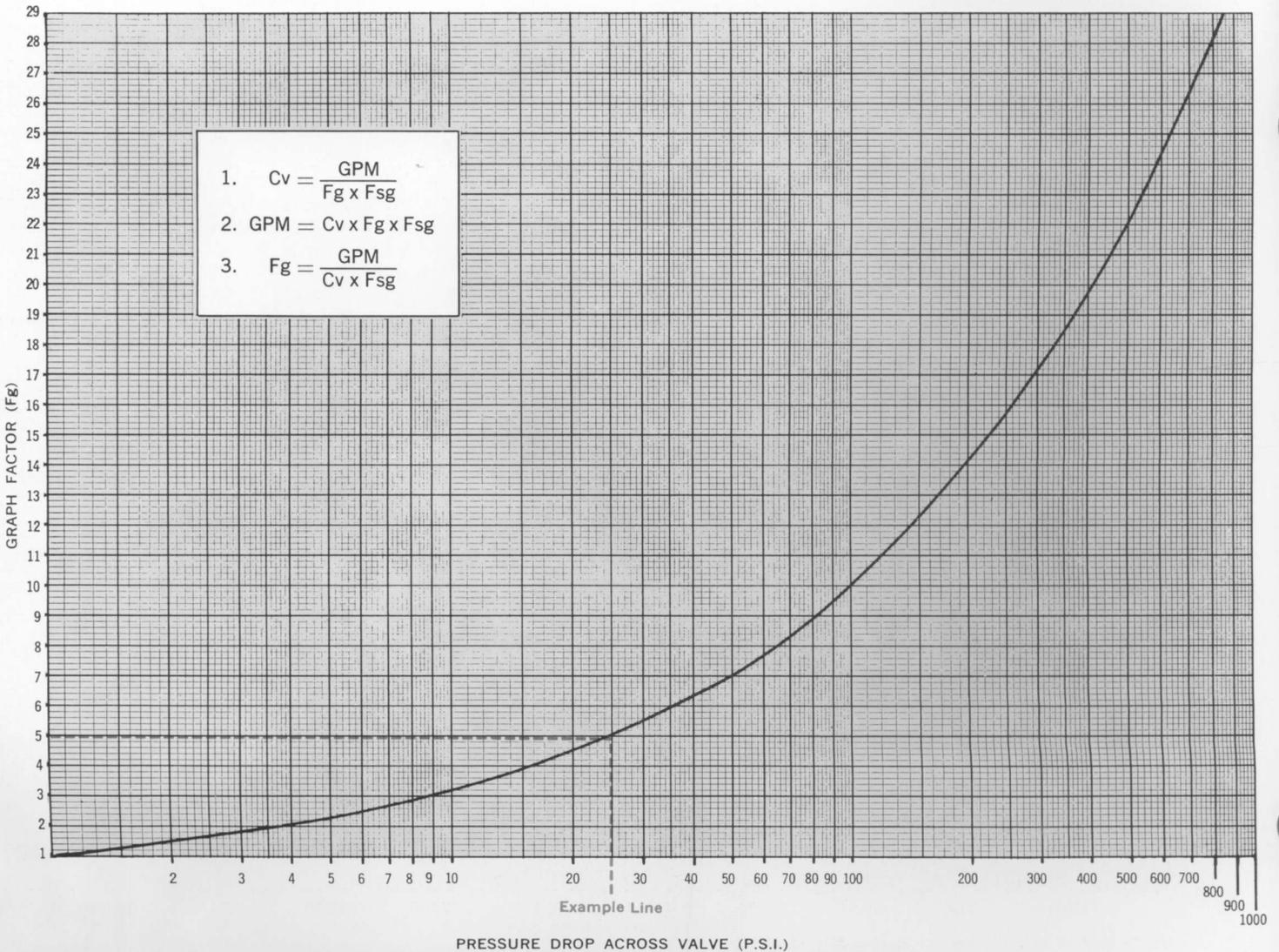
FOR OTHERS

$$Ft = \sqrt{\frac{530}{(460 + F.)}}$$

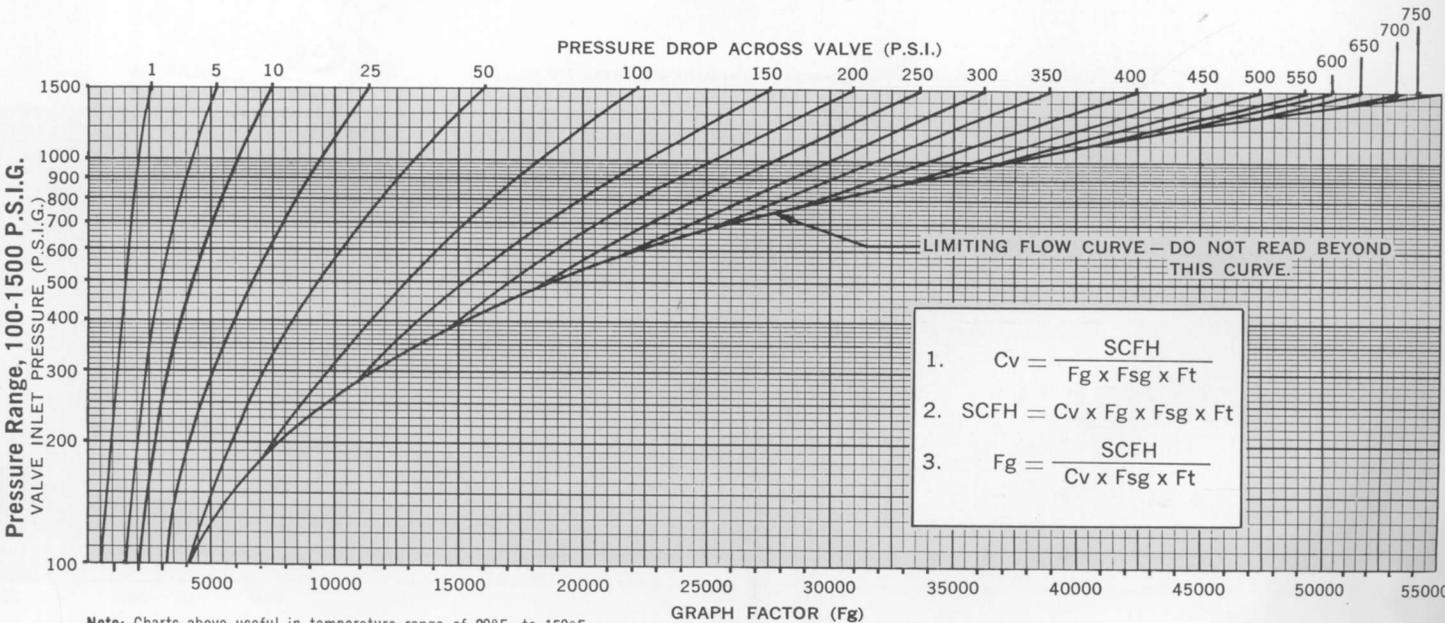
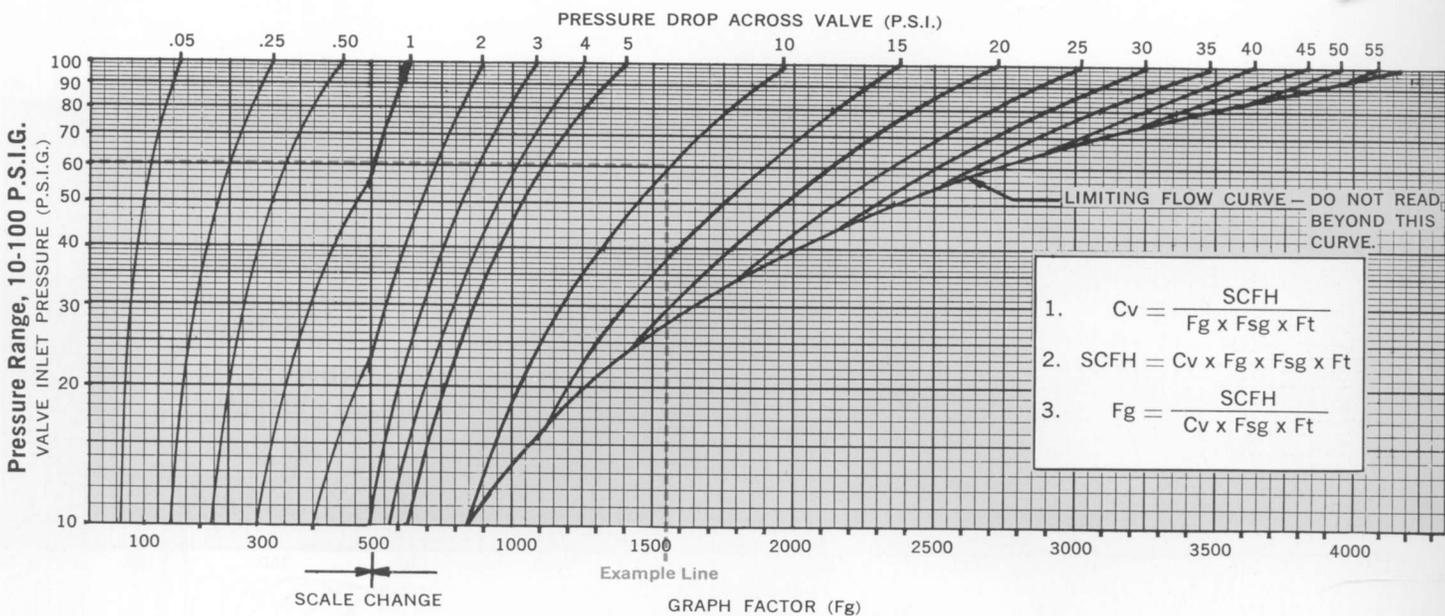
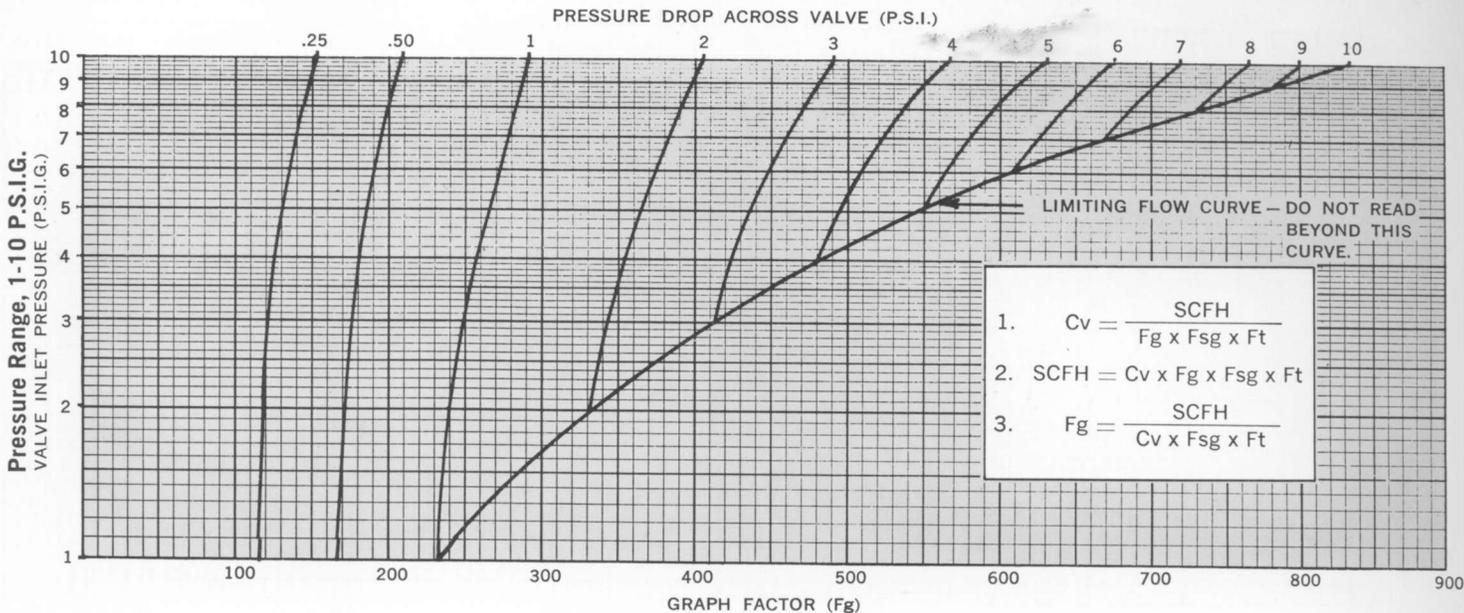
TEMPERATURE (°F)

The correction for temperature in the range of 20°F. to 150°F. is very small and, therefore, can be ignored in ordinary applications.

LIQUID FLOW GRAPH

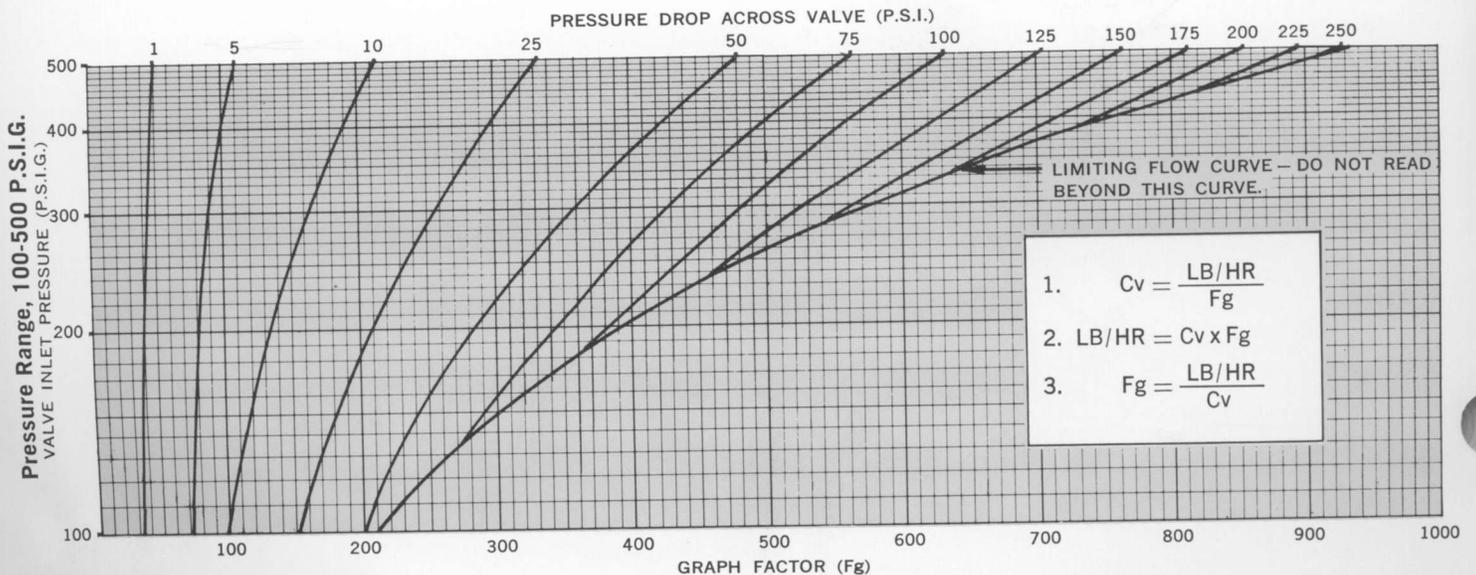
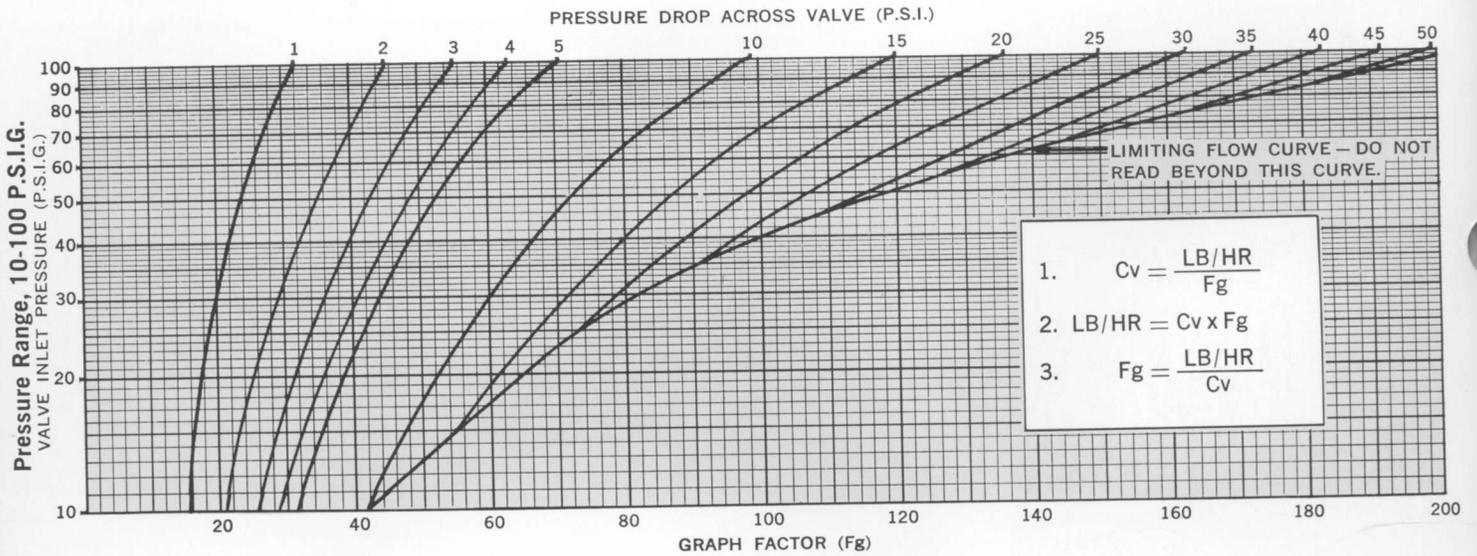
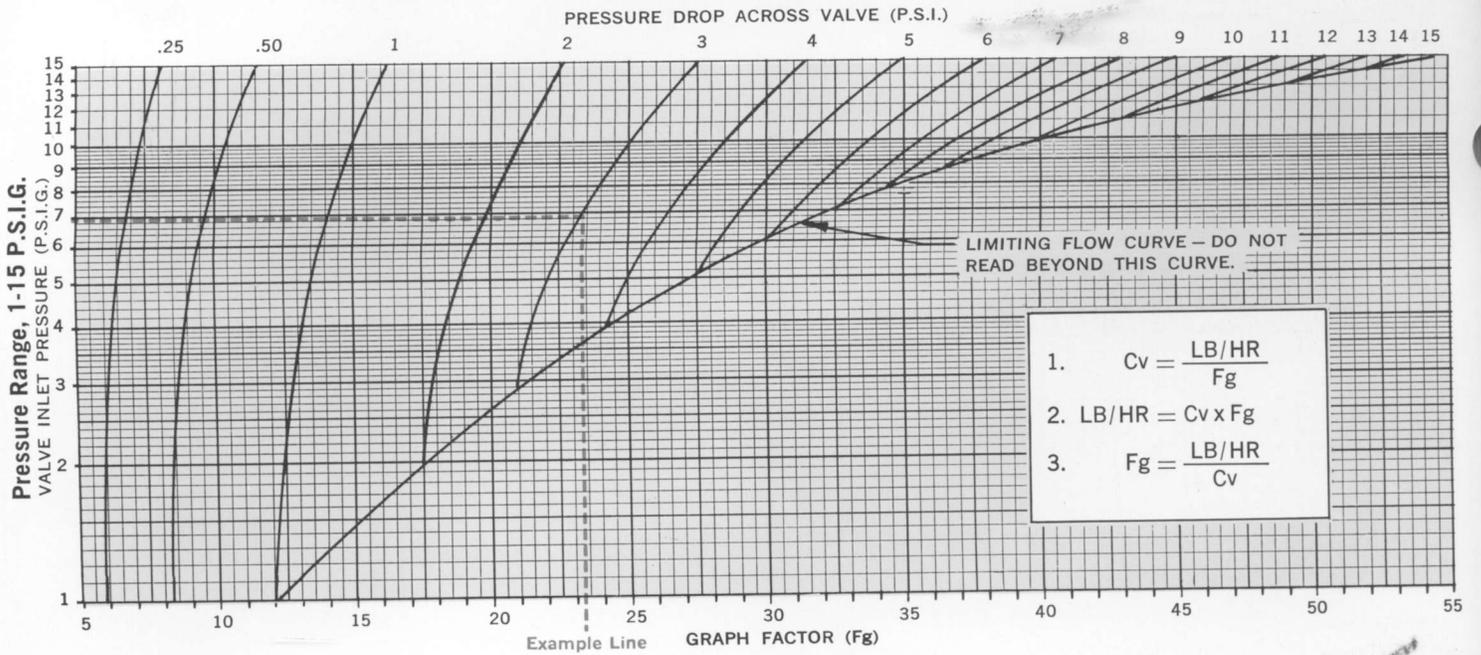


AIR AND GAS FLOW GRAPHS

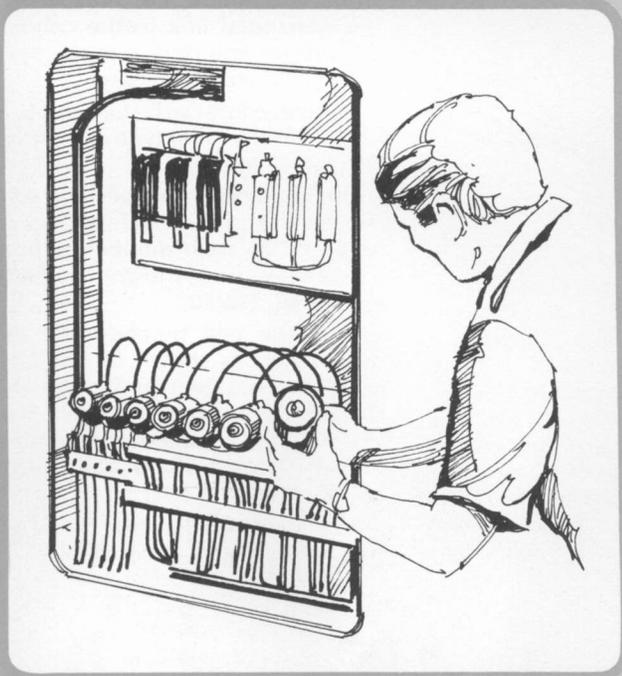


Note: Charts above useful in temperature range of 20°F. to 150°F.
Refer to Ft chart page 122.

STEAM FLOW GRAPHS



ASCO Coil Replacement and Substitution Guide



The ability to make a coil change in an ASCO valve in the field is obviously advantageous for several reasons:

1. Minimize Inventory Expense: When a variety of voltages exists in a plant, inventory can be reduced by stocking the most widely used valves in a common voltage with a selection of coils for other voltages.
2. Obtain Higher Ambient Temperature Capability: Some locations may have higher than normal ambient temperatures. Changing to a higher grade of insulation should materially increase coil life. (Example: Replace Class "A" with Class "FT" or Class "FT" with Class "HT" or Class "FB" with Class "HB".)
3. Provide a Variety of Electrical Connections: When spade or screw terminals or leaded coils are desired, the correct coil can be selected.
4. Replace a dual voltage coil with a single voltage coil.

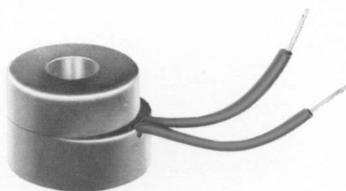
ASCO's separate List Price Schedule contains replacement coil part numbers for every valve listed in the current catalog. The following information is intended to guide you in selecting optional coil substitutions when desired. Several common reasons are:

1. Changing voltages.
2. Changing single voltage to dual voltage coils, or vice versa.
3. Substituting coils with different grades of insulation to suit fluid or ambient temperature conditions.
4. Changing coils with leads to coils with spade or screw terminal connections, or vice versa.

It is advisable that you contact your local ASCO sales office when assistance is required.

(continued)

ASCO COIL REPLACEMENT AND SUBSTITUTION GUIDE (continued)



Changing Coil Insulation

Coils with a higher class of insulation than that furnished with a standard catalog valve will provide longer coil life or a greater margin of protection for higher ambient temperatures. Refer to Engineering Section for details. For example, a Class F (FT) coil will provide a margin of 50°C. (90°F.) above a Class A coil; a Class H (HT) coil will provide a margin of 75°C. (135°F.).

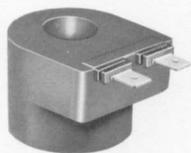
Changing the Voltage of an ASCO Valve

A valve manufactured for AC service may be converted to any other AC voltage merely by installing the proper coil. A DC valve may also be converted to any other DC voltage by replacing the coil.

Refer to the List Price Schedule to obtain the complete coil number; i.e., 64-982-1D for a 16.7/F coil suitable for 120/60, 110/50.

An AC valve usually cannot be converted to DC, or vice versa. Contact your local ASCO office for details.

Spade Terminal and Screw Terminal Coils



Most standard ASCO solenoid valves are supplied with coils having 18" leads. If desired, leaded coils may be replaced with coils having spade or screw terminal

connections. The spade and screw terminal coils are shown in the Optional Feature Section.

Spade or screw terminal coils may only be used in Open Frame Solenoids, Panel Mount Construction, Junction Box or Watertight Junction Box Solenoid Enclosures. They are not suitable for use in General Purpose or Explosion-Proof Solenoid Enclosures. Bulletins 8318 and 8319 are supplied standard with spade terminal coils.

When used in Type 1 or Type 4 Watertight Junction Box Solenoid Enclosures, terminal coils must have insulating barriers. Insulating barriers must be ordered separately for the spade or screw terminal coils when required.

Insulating barriers required for terminal coils:

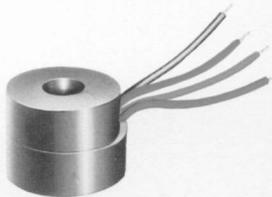
Spade Terminal Coils, Watts: 6, 9, 9.7, Barrier 208-514-1;

Screw Terminal Coils, Watts: 6, 9, 9.7, Barrier 158-894-1;

Spade or Screw Terminal Coils, Watts: 10.5, 11, 11.2, 16.7, Barrier 170-250-1.

(No barriers are required for 6.5, 15.4, 20 watt coils.)

Dual Voltage Coils



Dual voltage coils operate from either one of two rated voltages. The coils are furnished with a wiring diagram for easy selection of the low or high voltage hook-up. To determine a suitable dual voltage coil, refer to the valve catalog Electrical Information Table at the end of each bulletin to find the standard coil number using Watt Rating/Class of Coil Insulation from the Specification Table. Next, refer to table on page 127 for the corresponding dual voltage coil. Finally, refer to the

Replacement Coil List Price Schedule to find the complete coil number, the dual voltage ratings, and the list price.

To determine the single voltage coil to replace a dual voltage coil, refer to the Coil Substitution Guide. Look in the dual voltage column and move horizontally to the left to determine the correct single voltage coil to replace a dual voltage coil.

To Select and Price a Coil

To select the coil required, refer to the Electrical Information Table at the end of each bulletin to find the standard coil number using the Watt Rating/Class of Coil Insulation from the Specification Table; i.e., 64-982,FB for a 16.7/F coil.

Next, refer to the table for the corresponding type of coil required; i.e., Class F, Class H, spade terminal, etc., on the same horizontal line as the coil standard in the valve. For example, a Class H coil for 64-982,FB is 216-758,HB.

To select a replacement coil for a valve with a coil option; i.e., FT8210D2; follow the horizontal line to the column with the proper coil option prefix; i.e., "FT" and read the coil number.

This procedure can be followed to replace a coil with any other type coil on the same horizontal line.

The table does not specify a complete coil number; individual voltages are denoted by an item number suffix to the base coil number shown; i.e., 64-982-1D for 120/60, 110/50.

Both the coil number and the coil designation as shown in the table are required to select and price the coil chosen. Refer to the List Price Schedule to obtain the complete coil number; i.e., 64-982-1D for a 16.7/F coil suitable for 120/60, 110/50.

All leaded coils have 18" leads as standard; other lengths are available.

COIL SUBSTITUTION GUIDE

Coil No. (Leaded) ②	Watt Rating/ Class of Coil Insulation	Class A Insulation			Class F Insulation								Class H Insulation	
		Spade Terminal	Screw Terminal	Dual Voltage	Leaded Coils②		Spade Terminal		Screw Terminal		Dual Voltage②		Leaded Coils②	
		S	KA	DA	FT	FB	SF	SP	KF	KP	DF	DP	HT	HB
27-462, AM	10.5, 11, 11.8/A (AC)	218-409, SAM	—	198-217, DAM	64-982, FT	—	218-410, SFT	—	72-533, KFT	—	198-218, DFT	—	216-758, HT	—
64-982, FT	10.5/F (AC)	—	—	—	—	—	218-410, SFT	—	72-533, KFT	—	198-218, DFT	—	216-758, HT	—
64-982, FB	16.7/F (AC)	—	—	—	—	—	—	218-410, SFB	—	72-533, KFB	—	198-218, DFB	—	216-758, HB
96-619, AM	6/A (AC)	204-556, SAM	168-886, KAM	198-215, DAM	99-216, FT	—	204-558, SFT	—	158-877, KFT	—	198-216, DFT	—	222-344, HT	—
96-817, AM	15.4/A (AC)	210-510, SAM	—	198-223, DAM	99-257, FT	—	206-089, SFT	—	—	—	198-224, DFT	—	222-345, HT	—
99-216, FT	6/F (AC)	—	—	—	—	—	204-558, SFT	—	158-877, KFT	—	198-216, DFT	—	222-344, HT	—
99-216, FB	9/F (AC)	—	—	—	—	—	—	204-558, SFB	—	158-877, KFB	—	198-216, DFB	—	222-344, HB
99-257, FT	15.4/F (AC)	—	—	—	—	—	206-089, SFT	—	—	—	198-224, DFT	—	222-345, HT	—
99-257, FB	20/F (AC)	—	—	—	—	—	—	206-089, SFB	—	—	—	198-224, DFB	—	222-345, HB
204-945, BP	6.5/B (AC)	174-879, SBP①	186-160, KBP①	—	—	216-099, FB	186-548, SFB	—	204-107, KFB	—	—	—	—	—
206-408, AM	28.2/A (AC)	—	—	—	206-409, FT	—	—	—	—	—	—	—	204-806, HT	—
206-409, FB	59.5/F (AC)	—	—	—	—	—	—	—	—	—	—	—	—	204-806, HB
206-409, FF	66/F (AC)	—	—	—	—	—	—	—	—	—	—	—	—	204-806, HB
27-463, AM	11.2/A (DC)	218-411, SAM	—	—	66-611, FT	—	218-855, SFT	—	76-272, KFT	—	—	—	222-346, HT	—
66-611, FT	11.2/F (DC)	—	—	—	—	—	218-855, SFT	—	76-272, KFT	—	—	—	222-346, HT	—
66-611, FF	19.7/F (DC)	—	—	—	—	—	—	218-855, SFF	—	76-272, KFF	—	—	—	222-346, HB
62-691, LB	14.9/B (DC)	—	—	—	—	—	—	—	—	—	—	—	—	166-673, HB
96-671, AM	16.8/A (DC)	—	—	—	97-617, FT	—	—	—	—	—	—	—	222-184, HT	—
103-832, AM	9.7/A (DC)	204-557, SAM	216-889, KAM	—	103-833, FT	—	204-838, SFT	—	168-134, KFT	—	—	—	222-182, HT	—
103-833, FB	15.3/F (DC)	—	—	—	—	—	—	204-838, SFB	—	168-134, KFB	—	—	—	222-182, HB
206-410, FB	35.1/F (DC)	—	—	—	—	—	—	—	—	—	—	—	—	208-492, HB

Notes: ① Class B Coil Insulation. ② Supplied with 18" long leads.

ASCO TRI-POINT® Pressure and Temperature Switches

These are high-quality, precision instruments that will automatically monitor the rise and fall of pressures and temperatures in any system. With simple field adjustments of the "set points," any electrical device can be accurately controlled through the TRI-POINT snap-action switch element.

Over 170,000 Variations from Stock!

ASCO's patented "TRI-POINT" design, consisting of two separate modules (the switch and the transducer), is available fully assembled or as separate units for customer in-the-field stocking and assembly. Over 170,000 variations are possible from off-the-shelf units so there is never a wait for "factory specials."... And... you get the exact switch you need.

More Agency Approvals

The entire ASCO line of TRI-POINT industrial and compact pressure and temperature switches is designed to meet the most demanding UL standards. The complete pressure and temperature switch is approved — not just the snap-action switches alone. Also, approvals covering FM, CSA and many International Agencies for combustion, marine and general applications are listed.

ASCO Sales and Service

ASCO's world-wide reputation for quality products includes a vast sales and service network that is unmatched in the industry. You can expect and get whatever help you may need — wherever you are — when you need it.

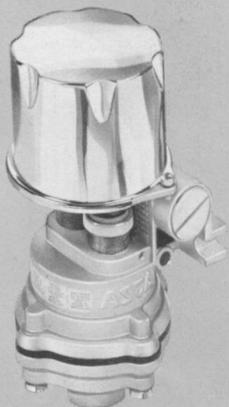
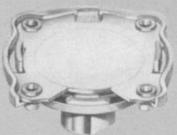
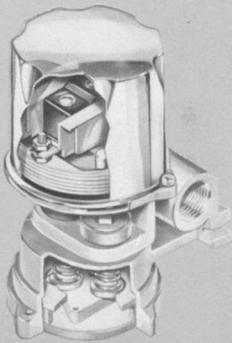
Send for Our Complete 68-Page Catalog



In addition to the normal variety of pressure and temperature switches, you will discover the many standard "specials" in our catalog. For example, we have approved switches for Nuclear and Marine applications, International Explosion-Proof designs, Liquid Level Controls, Off-Highway Equipment and Off-Shore Platforms.

For your Free catalog, write or call the sales office nearest you (see back cover) or your local ASCO Authorized Stocking Distributor.

INDUSTRIAL



The Switch module features:

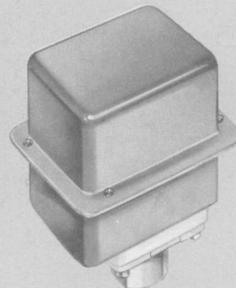
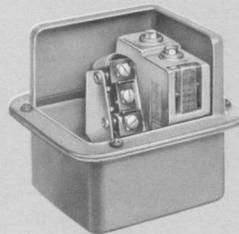
- A variety of snap-action switch elements.
- Watertight, Explosion-Proof, Open Frame or Corrosion Resistant Stainless Steel Housings.
- Wide Adjustable Deadband (i.e., on-off differential), narrow Fixed Deadband, Two-Stage Dual Fixed Deadband or Manual Reset operating characteristics.

The Transducer module features:

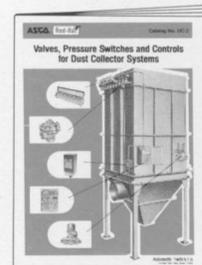
- A selection of materials compatible with virtually any known fluid.
- Pressure ranges from full vacuum to 6000 psig.
- Temperature ranges from - 60°F. to + 640°F.

Available fully assembled or as separate units for customer in-the-field stocking and assembly.

COMPACT

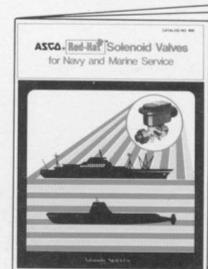


Special Additional Catalogs Free from ASCO



ASCO Valves and Controls for Dust Collector Systems.

Request Catalog No. DC-2.



ASCO Valves for On-Board and On-Land Marine Applications.

Request Catalog No. 600.



New ASCO Solenoid Valves for Refrigeration Service.

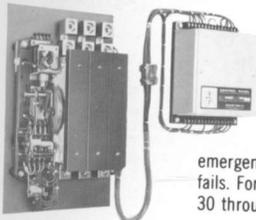
Request Bulletin 8521.

OTHER ASCO PRODUCTS

ASCO[®] CONTROLS for

- Emergency & Standby Power
- Cogeneration
- Peak Load Shaving
- Prime Power
- Lighting
- Energy Management
- Other Electrical Applications

Complete information on the following products may be obtained by contacting the ASCO Sales Office (see back cover) nearest you.



Automatic Transfer Switches

automatically transfer loads from a normal or preferred source to an emergency source when the normal fails. For all classes of loads from 30 through 4000 amps.



Automatic Transfer & Bypass-Isolation Switches

make it possible to perform periodic inspection and maintenance on the emergency power system without downtime on the loads. The ASCO 962 combines the functions of an automatic transfer switch along with a bypass-isolation switch. The transfer switch can be removed from the system without disturbing the loads. Sizes through 4000 amps.



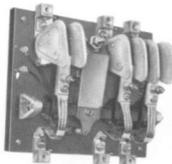
Non-Automatic Transfer Switches

are for use in applications where operating personnel are present and the load is not of an emergency nature. Two types: electrically operated from one or more toggle switches and manually operated by a handle. Sizes from 150 through 800 amps.



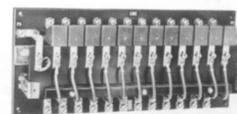
Remote Control (RC) Lighting Contactors

provide convenient and accessible control of lighting and power circuits from any number of control stations. Ideally suited for use with energy management systems. Mechanically held, for all classes of loads from 30 through 4000 amps.



Contactors

for load circuits that are closed and opened repeatedly. Designs allow unlimited combinations including multipole, special contact arrangements, etc. For all classes of loads, magnetically held, normally open or closed.



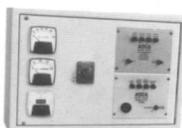
Relays

magnetically and mechanically held in unlimited pole combinations. Also, a highly diversified selection of special purpose relays that are listed as standard items. Moreover, ASCO will design relays to meet your needs.



Solenoids, AC and DC

for applications where a load must be pushed or pulled in a straight line. ASCO Solenoid Engineering Specification Forms make it easy to get the solenoid that meets your needs.



Engine and Generator Controls

include battery chargers for trickle, high rate, or fully automatic charging; engine starting controls; remote and prealarm panels; engine generator controls for starting, stopping, and monitoring the operation of engine generator sets; and load demand controls.



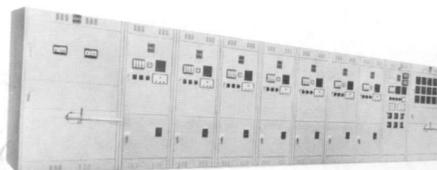
Accessory Equipment

includes break-glass switches for stopping equipment in emergencies; and control stations for operating mechanically held relays and remote control switches.



Solid-State Electronic Monitors and Controls

for monitoring voltage, frequency and current; controls for original equipment manufacturers. Also, monitors for synchronizing, phase band monitoring, area protection, etc.



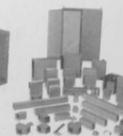
Power Control Systems

for cogeneration; peak load shaving; prime power; emergency and standby power; selective load transfer; etc. Modular units easily assembled and installed to control one engine generator, or to control multiple engine generators using ASCO SYNCHROPOWER[®] systems to parallel the generators.

ASCO Electrical Products: Switchboards, Switchgear, Panelboards and Electrical Enclosures



Electrical Division



Metal Division

for standard and custom industrial, commercial and utility applications. Also, a complete line of screw-cover wireway, fittings, boxes and cabinets (JIC and NEMA).

Combinations of the above controls are also available to meet individual requirements. For information, contact your nearest ASCO source or the ASCO Customer Engineering Department in Florham Park, N.J.

ASCO Manufacturing & Sales Organization

ALASKA
Refer to Seattle District Sales Office

ALBUQUERQUE, NEW MEXICO
Electromagnetic/Electronic Control:
Ralph B. Black Co., Inc.
3206 Candalaria, N.E.
Albuquerque, N.M. 87107
Tel. (505) 884-1173

ARLINGTON, VIRGINIA
DISTRICT SALES OFFICE
Automatic Switch Co.
100 W. Jefferson St.
Falls Church, Va. 22046
Tel. (703) 237-0700

ATLANTA DISTRICT SALES OFFICE
Automatic Switch Co.
8395 Dunwoody Place
Atlanta, Georgia 30338
Tel. (404) 998-9933

BALTIMORE DISTRICT SALES OFFICE
Automatic Switch Co.
1900 Sulphur Spring Rd., Suite 120
Baltimore, Maryland 21227
Tel. (301) 247-4400

BIRMINGHAM
DISTRICT SALES OFFICE
Automatic Switch Co.
600 Century Park South, Suite 204
Birmingham, Alabama 35226
Tel. (205) 979-5262

BOSTON DISTRICT SALES OFFICE
Automatic Switch Co.
149 California St.
Newton, Mass. 02158
Tel. (617) 527-8230

DENVER DISTRICT SALES OFFICE
Automatic Switch Co.
Suite F102
7200 East Dry Creek Rd.
Englewood, Colorado 80112
Tel. (303) 779-6990

DETROIT DISTRICT SALES OFFICE
Automatic Switch Co.
24555 Southfield Rd., Suite 105
Southfield, Michigan 48075
Tel. (313) 569-2620

HOUSTON DISTRICT SALES OFFICE
Automatic Switch Co.
3131 W. Alabama St., Suite 212
Houston, Tex. 77098
Tel. (713) 523-6801; 523-3878

INDIANAPOLIS, INDIANA 46268
C. M. Buck & Associates, Inc.
P. O. Box 68143 (6850 N. Guion Rd.)
Tel. (317) 293-5704

KALAMAZOO SALES OFFICE
Automatic Switch Co.
4613 West Main St.
Kalamazoo, Michigan 49007
(Detroit Office Jurisdiction)
Tel. (616) 381-6282

KANSAS CITY, MISSOURI 64133
Duncan Sales & Engineering, Inc.
8705 East 63rd St.
Tel. (816) 356-1888

LOS ANGELES, CALIFORNIA
DISTRICT SALES OFFICE,
WAREHOUSE & FACTORY BRANCH
Sales, Service & Stock
Automatic Switch Co.
P. O. Box 487

PITTSBURGH, PENNSYLVANIA 15235
Continental Sales & Engineering Co.
P. O. Box 10505 (211 Neilson Ave.)
Tel. (412) 241-5660

RICHMOND SALES OFFICE
Automatic Switch Co.
Rm. 489, 3600 W. Broad St.
Richmond, Va. 23230
(Arlington District Office Jurisdiction)
Tel. (804) 359-0708

ROCK ISLAND SALES OFFICE
Automatic Switch Co.
Rm. 415, Safety Bldg., 1800 3rd Ave.
Rock Island, Illinois 61201
(Chicago Office Jurisdiction)
Tel. (312) 640-3450

ST. LOUIS DISTRICT SALES OFFICE
Automatic Switch Co.
Suite 200, 111 West Port Plaza
St. Louis, Mo. 63141
Tel. (314) 878-6130

SALT LAKE CITY, UTAH 84115
Control Equipment Co.
265 Crossroads Sq.
Tel. (801) 487-7741

SAN FRANCISCO
DISTRICT SALES OFFICE
Automatic Switch Co.
Suite #21, 2041 Pioneer Ct.
San Mateo, Calif. 94403
Tel. (415) 574-2726

SEATTLE DISTRICT SALES OFFICE
Automatic Switch Co.
(814 — 102nd Avenue, N.E.,
Bellevue 98004)
P. O. Box 1006, Bellevue, Wa. 98009
Tel. (206) 454-6157

SYRACUSE DISTRICT SALES OFFICE
Automatic Switch Co.
P. O. Box 387 (428 S. Main St.)
Syracuse, N. Y. 13212
Tel. (315) 458-3383

TAMPA DISTRICT SALES OFFICE
Automatic Switch Co.
Suite 419
1211 North West Shore Blvd.
Tampa, Florida 33607
Tel. (813) 872-2723

TULSA, OKLAHOMA 74120
Automatic Engineering, Inc.
(Main Office) 1501 E. Sixth St.
Tel. (918) 585-5703

VANCOUVER, WASHINGTON
SALES OFFICE
Automatic Switch Co.
P. O. Box 2637
Vancouver, Washington 98668
(Seattle Office Jurisdiction)
Tel. (206) 254-1715 (Answering
Service) or call Seattle Office

**MARKETING SUBSIDIARY OF
AUTOMATIC SWITCH CO.:**

SWITZERLAND, 6301 ZUG
ASCO CONTROLS A.G.
Grienbachstr. 35

**MARKETING SUBSIDIARY
OF ASCO CONTROLS A.G.:**

WEST GERMANY
4030 RATINGEN 1
ASCO GmbH
Sandstr. 59

**MANUFACTURING &
MARKETING SUBSIDIARY OF
ASCO CONTROLS A.G.:**

THE NETHERLANDS
3925 ZG SCHERPENZEEL (GLD)
CONTROLASCO, B.V.
(Industrielaan 21) P. O. Box 3

**MANUFACTURING &
MARKETING SUBSIDIARIES OF
AUTOMATIC SWITCH CO.:**

AUSTRALIA
SYDNEY, N.S.W. (Main Office)
ASCOMATION PTY. LTD.
25 Cross Street
Brookvale, N.S.W. 2100

QUEENSLAND SALES OFFICE
ASCOMATION PTY. LTD.
431 Logan Road
Stones Corner, Queensland 4120

VICTORIA SALES OFFICE
ASCOMATION PTY. LTD.
Suite 1, 23 Koornang Rd.
Carnegie, Victoria 3163

BRAZIL
06400 BARUERI, SAO PAULO
ASCOVAL, Ind. E. Com. Ltda.
Caixa Postal 86
(Rodovia Presidente Castelo Branco
Km. 20 — Jardim Sta. Cecilia,
Barueri, São Paulo)

CANADA
BRANTFORD, ONTARIO N3T 5M8
ASCOLECTRIC LIMITED (Main Office)
P. O. Box 160
(Airport-Road)

**BURNABY,
BRITISH COLUMBIA V5G 4E1**
ASCOLECTRIC LIMITED
District Sales Office
160 — 6450 Roberts St.

CALGARY, ALBERTA T2E 6K9
ASCOLECTRIC LIMITED
District Sales Office
4208 Twelfth St., N.E.

**DARTMOUTH,
NOVA SCOTIA B2W 4B7**
ASCOLECTRIC LIMITED
District Sales Office
P. O. Box 2548
Dartmouth East Post Office

MISSISSAUGA, ONTARIO L5N 1A6
ASCOLECTRIC LIMITED
District Sales Office
6537 Mississauga Rd.

MONTREAL, QUEBEC
ASCOLECTRIC LIMITED
District Sales Office
5500 Vanden Abeele
Ville St. Laurent
Montreal, Que. H4S 1P9

MEXICO
MEXICO D.F. 01020
ASCOMATIC S.A. de C.V.
Apartado Postal 20-822
(Calzada del Desierto #31-1er Piso
Col. Guadalupe Inn)

REPUBLIC OF SOUTH AFRICA
JOHANNESBURG, TRANSVAAL
ASCOREG (PTY) LTD.
P. O. Box 737,
Bergvlei 2012, Tr., So. Afr.
(Commerce Crescent East,
Eastgate Ext. 12,
Sandton, Tr., So. Afr.)

UNITED KINGDOM
ENGLAND WN8 9PG
SKELMERSDALE, LANCASHIRE
ASCO (UK) LTD.
Pit Hey Place, West Pimbo

**MANUFACTURING &
MARKETING AFFILIATE OF
AUTOMATIC SWITCH CO.:**

JAPAN
NISHINOMIYA, HYOGO
KONAN ASCO CO., LTD.
89-1 Takahatacho

**SOLENOID VALVE & PRESSURE/
TEMPERATURE SWITCH
REPRESENTATIVES OF
AUTOMATIC SWITCH CO.:**

CHILE, SANTIAGO
Veto y Cia. Ltda.
Av. Vicuna Mackenna, 1220
Casilla 10289

1-COLOMBIA, BOGOTA
Equipos y Controles Industriales, Ltda.
Cra. 4a, No. 19-78; Apt. 502
(Ap. Aereo 9128)

COSTA RICA, SAN JOSE
Importadora Tecnica Industrial S.A.
(P. O. Box 10204)

ECUADOR, GUAYAQUIL
La Llave S.A.
Av. Domingo Guayn 1115 y Calle H
(P. O. Box 10204)

GUATEMALA, GUATEMALA CITY
Orion — Representaciones
Internacionales
5A Calle 3-21, Zona 9
(Apartado Postal 919)

HONG KONG
Eagle Process Controls Limited
Nin Lee Commercial Building
45 Lyndhurst Terrace

INDIA, CALCUTTA 700 001
Macneill & Magor Limited
2 Fairlie Place
(P. O. Box 61)

KOREA, CHOONG-KU, SEOUL
Eagle Process Controls Limited
c/o Ahn, Kwon & Co.
6th Floor, Seoul Tokyu Hotel Bldg.
120, 5-KA, Namdaemoon-Ro

MALAYSIA, SELANGOR
Mecomb Malaysia Sdn. Bhd.
No. 2 Lorong 13/6A
(P. O. Box 24, Petaling Jaya)

PAKISTAN, KARACHI 3
Zelin Limited
(Post Box No. 7318)

PERU, MIRAFLORES, LIMA 18
IEMCO S.A. Industrial
Equipment & Materials Co. S.A.
380 Avenida Diagonal — Of 44
(P. O. Box L 18-191)

PHILIPPINES, MAKATI, METRO MANILA
Eagle Process Controls Limited
CCH Building, Room 106
Alfaro St. Salcedo Village

PUERTO RICO, SANTURCE 00908
Mario R. Franceschini, Inc.
605 Condado St., Stop 17
(P. O. Box 13696)

SINGAPORE, 0315
Mecomb Singapore Ltd.
10-12 Jalan Kilang

TAIWAN, TAIPEI
Eagle Process Controls Limited
Kuang Fu Building, 5/F
312 Chung Hsiao E. Road, Sec. 4

VENEZUELA, CARACAS
Ferro-Caribe C.A.
Cruz Verde A. Velazquez No. 81
(Apartado No. 372)

Manufacturer's Representatives and Distributors
MATT MARSHALL & COMPANY
Industrial Equipment & Supplies
Boiler & Burner—Sales & Service
MAIL TO - P. O. Box 77357 - Greensboro, N.C. 27417-7357
I-85-S - Exit 120 - 3363 Commercial Rd. - Greensboro, N.C. 27407
Phone (919) 292-8477 - NC TOLL FREE 1-800-632-1274
OUTSIDE - NC TOLL FREE 1-800-845-6073

1000 Kings Hwy.
Cherry Hill, N. J. 08034
Tel. N. J. (609) 429-0300; 429-0305;
(201) 966-2420
Phila. (215) 627-6144; 627-2563

CHICAGO DISTRICT SALES OFFICE
Sales & Service
Automatic Switch Co.
1500 Greenleaf Avenue
Elk Grove, Illinois 60007
Tel. (312) 640-3450

**CHICAGO WAREHOUSE &
FACTORY BRANCH**
Midwest Sales, Service & Stock
Automatic Switch Co.
1500 Greenleaf Avenue
Elk Grove, Illinois 60007
Tel. (312) 640-3466

CINCINNATI, OHIO 45242
McNay Equipment Company, Inc.
P. O. Box 42174 (4850 Cooper Rd.)
Tel. (513) 984-ASCO

CLEVELAND, OHIO 44120
Anderson-Bolds, Inc.
(Main Office) 11701 Shaker Blvd.
Tel. (216) 229-4700

COLUMBUS, OHIO
Anderson-Bolds, Inc. (Br. Office)
P. O. Box 123, Worthington, Oh. 43085
Tel. (614) 885-3933

DALLAS DISTRICT SALES OFFICE
Automatic Switch Co.
13531 North Central Expressway,
Suite 2309
Dallas, Tex. 75243
Tel. (214) 699-1781

Milwaukee, Wisconsin 53217
Tel. (414) 962-2294; 963-0808

MINNEAPOLIS
DISTRICT SALES OFFICE
Automatic Switch Co.
5009 Excelsior Blvd.
Minneapolis, Minnesota 55416
Tel. (612) 925-5520

NEW ORLEANS
DISTRICT SALES OFFICE
Automatic Switch Co.
4033 Jefferson Hwy., Jefferson 70121
Tel. (504) 834-3584

N.Y./N.J. METROPOLITAN
DISTRICT SALES OFFICE
Automatic Switch Co.
409 Minnissink Road
Totowa, New Jersey 07512
Tel. N. J. (201) 785-9450; 966-2456;
N. Y. (212) 349-3530

OKLAHOMA CITY, OKLAHOMA 73114
Automatic Engineering, Inc.
(Branch Office)
516 West Britton Rd.
Tel. (405) 848-0180

OMAHA SALES OFFICE
Automatic Switch Co.
Suite 138, 7171 Mercy Rd.,
Omaha, Neb. 68106
(Denver Office Jurisdiction)
Tel. (402) 397-4355

PHOENIX, ARIZONA
Portis & Associates, Inc.
6730 E. McDowell Rd.
Scottsdale, Ariz. 85257
Tel. (602) 947-4379

Automatic Switch Co. MAIN PLANT AND EXECUTIVE OFFICES

Florham Park, New Jersey 07932 • Telephone Numbers: N.Y. — (212) 344-3765; N.J. — (201) 966-2000 • Telex: 136422 and 136423
WAREHOUSES IN CHICAGO AND LOS ANGELES; AUTHORIZED STOCKING DISTRIBUTORS THROUGHOUT THE UNITED STATES

Address List 2431 VS
Issued 9-82

