

Fencing Systems for Rotational Grazing



Energizers

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ELECTRIC FENCING BASICS

"UNDERSTANDING THE BASICS OF ELECTRIC FENCE ENERGIZERS"

With the increased use of electric fencing for containing animals and controlling grazing, many producers have found themselves trying to comprehend electrical terms and concepts.

The goal of this publication is to introduce the novice fence builder to some of the concepts and terms which are used in perhaps the most important part of any electric fence system, the energizer

A BRIEF HISTORY OF ENERGIZER DEVELOPMENT

Since the early days of electric fencing, the most commonly used energizers have converted electrical energy from either a standard 110 volt AC current, or a 9 volt DC dry cell battery into a higher voltage, DC, pulsing charge and sent it into a light gauge electric fence wire. Many people who grew up with, and still use these energizers, or fence controllers, can remember walking into the barn and hearing the steady click, click, click as the controller slowly turned on and off. They can also remember chasing stock back into the barn because a branch, twig or clump of grass was laying across the fence shorting it out. Attempts at increasing

the amount of electricity flowing out of these controllers became a great source of barn and grass fires because the long period of time that the current was allowed to flow through the wire caused both the wire and whatever it touched to heat up.

The development and promotion of new types of energizer systems progressed slowly until the early 1960's when researchers in New Zealand demonstrated technology which put large amounts of electrical power (high amperage and high voltage) through a fencing system, in an extremely short period of time (milliseconds), effectively flooding any short circuits that would have made a conventional energizer ineffective

The next step in the development of what are now referred to as the "New Zealand" style energizers was the development of the electronics that could reliably supply the high voltage, high amperage and short duration surge of power. The initial energizers that were developed used a system very similar to a car's distributor, using a mechanical switch and coil. These quickly evolved into the next generation of energizers which utilize solid state electronics enabling them to deliver large amounts of energy with very little resistance (impedance) in very short periods of time, usually around 0.0003 seconds.

ELECTRICAL TERMINOLOGY USED IN EVALUATING ENERGIZERS

Since electricity is not something that can be seen, it is difficult for many people to understand how it works, The following terms are often used to evaluate and compare energizer units.

1. Volts: Volts are a unit of measurement used to describe an amount of electrical

potential, or "pressure". The higher the voltage, the higher the pressure. In an electric fence system, a high voltage is important for making sure that an electrical charge can find its way through the hair on the animals it is intended on either keeping in or out. The more or thicker the hair, the greater the voltage required. For most animals, the optimal voltage range is generally considered to be between 2000 and 6000 volts. Voltages greater than this are not normally necessary or recommended and there are many animal species that are adequately controlled with less.

2. Amps: Amps are a measure of the "amount" of electricity that flows through the circuit (remember, electricity will not flow unless a circuit is being completed). It is amperage, not voltage that causes the greatest amount of numbing pain when anything receives a shock. It is high amperage that melts wires in houses and barns when more electricity is being carried than they are intended to handle. The reason that circuit breakers and fuses are put in electrical systems is to prevent an excessive flow of energy from being pulled through the circuit and heating up whatever it runs through.

3. Watts: Watts are a measure of the electrical rate of doing work. It is a unit of electrical power, which is very similar to horsepower and is calculated by the equation:

$$\text{amps} \times \text{volts} = \text{watts}$$

The term watt is not used much in discussions about energizers, but the definition of a watt is very important in understanding the next unit of measure that is often used when comparing energizers, the joule.

4. Joules: A joule is a unit of electrical energy equaling the amount of energy required to produce one watt for one second. The equation is:

$$\text{watts} \times \text{seconds} = \text{joules}$$

As can be seen by these equations, the higher the volts and amps that an energizer can deliver, the higher the watts. And the higher the watts delivered in the same pulse time, the higher the joules. These equations are important to understand when comparing energizers.

For Example:

- Unit A is listed as a 4.5 Joule energizer which can maintain 5000 volts under low weed pressure. If Unit A's pulse time, the time the fence is on, is 0.0003 seconds then we can make the following calculations by reversing the above equations to see how much electricity the energizer is delivering:

$$\begin{aligned} 4.5 \text{ joules} / 0.0003 \text{ sec.} &= 15000 \text{ watts} \\ 15000 \text{ watts} / 5000 \text{ volts} &= 3 \text{ amps} \end{aligned}$$

- Unit B also claims to be a 4.5 joule energizer that can maintain 5000 volts, but was rated using a 0.0006 second pulse time. Using these numbers in our calculation we find that:

$$\begin{aligned} 4.5 \text{ joules} / 0.0006 \text{ sec.} &= 7500 \text{ watts} \\ 7500 \text{ watts} / 5000 \text{ volts} &= 1.5 \text{ amps} \end{aligned}$$

Unit B is actually delivering half the amount of electricity of Unit A. If we compare them equally then Unit B would actually only be a 2.25 joule energizer.

There are currently no standards in effect to assure consumers that the manufacturers and distributors of electric fence energizers are fairly and

equally comparing the electrical attributes of their products to their competitors.

5. Low Impedance vs. High Impedance:

As was mentioned previously, a high amperage electrical charge is what causes the greatest amount of damage when it flows through anything that completes a circuit. In the older conventional electric fence controllers, the pulse rate was very long, sometimes nearly half a second. If the flow of electricity is not controlled in these style of energizers, they are not only a potential source of barn and grass fires, they can also be lethal to any animal that would become caught in the wire. This is especially true if the wire is barb wire.

No fencing system containing barb wire should ever be electrified. An owner of such a fence would be considered liable if any animal or person were to be caught up in such a fence.

In order to reduce the chances of injury or property damage, the manufacturers of long pulse rate energizers put in resistors which restrict the flow of current out of the energizers, thus the term "high impedance". These high impedance energizers keep the amount of amperage down to a safe level but also make them more prone to shorting out.

Low impedance energizers, don't want to restrict the volume of electricity to the extent the older style energizers do. They depend on the extremely high energy discharge and short pulse rate to keep an electric fence from being easily shorted out. It is the millisecond pulse rate that provides the safety factor in "low impedance" energizers.

6. Miles of fence: The standard of "Miles

of Fence" in describing the power of a fence controller has been in use for many years. Although many companies still use this standard in evaluating their energizers, a unit which is rated as a fifty mile unit only means that it can effectively power 50 miles of a weed free, properly insulated, single strand of 14 to 18 gauge wire that is 30 to 36 inches off the ground. It does not take into consideration the weed loading or the electromagnetic resistance that occurs in multiple wire fences. A 50 mile energizer will not necessarily power 10 miles of five wire high tensile fence. Although an energizer rated in "Miles of Fence" may be as good as a unit rated in joules, it is difficult to make a fair comparison using this method of rating.

CHOOSING THE RIGHT ENERGIZER FOR THE JOB

Choosing the "Right" energizer for the job is not an easy process. The power of the unit required for a fencing job will vary greatly depending on many factors, such as, the area to be fenced, the number of wires, the animal being controlled, the use of higher resistance temporary fencing and the expected weed pressure.

As is the case with any farm equipment which is purchased today, especially an electrical device such as an energizer that is containing and controlling livestock, one of the most important factors in deciding on what kind or make of energizer to buy is the dealers knowledge about what they are selling. A responsible energizer dealer should set a novice fence builder up with the right energizer for the job and supply a written guarantee that what they are selling will do what they say it will do.

Since the value of an electric fence is based on its ability to deliver an

adequate electrical charge to keep animals away, purchasing an energizer that is ill equipped for the job you are asking it to do makes a fence useless. On the other hand, purchasing a high powered energizer to do a small job can be a waste of money.