

CHAPTER 2 LSM 510 - SETUP REQUIREMENTS

CONTENTS

| | | Page |
|----------|--|------------|
| 2 | LSM 510 - SETUP REQUIREMENTS | 2-3 |
| 2.1 | Space Requirements | 2-3 |
| 2.1.1 | LSM (one microscope, large system table): 300 × 250 cm | 2-3 |
| 2.1.2 | LSM with Ar UV Laser | 2-4 |
| 2.1.3 | LSM prepared for Two Photon Lasers (NLO)..... | 2-6 |
| 2.2 | Power Requirements..... | 2-8 |
| 2.2.1 | Phase 1 (LSM)..... | 2-9 |
| 2.2.2 | Phase 2 (LSM, Power 3) | 2-9 |
| 2.2.3 | Separate Connection | 2-9 |
| 2.3 | Physical Dimensions | 2-10 |
| 2.4 | Dimension of Shipment Crates..... | 2-11 |
| 2.5 | Environmental Requirements..... | 2-11 |
| 2.6 | Vibrations..... | 2-12 |
| 2.7 | Laser Specifications..... | 2-12 |
| 2.7.1 | Coherent Enterprise 653 II: 352, 364 nm, 80 mW, Laser Class 3 B | 2-12 |
| 2.7.2 | Point Source i-flex 2000: 405 nm, 25 mW, Laser Class 3 B..... | 2-12 |
| 2.7.3 | LASOS LGK 7786 P / Power supply 7460 A: 543 nm, 1 mW, Laser Class 3 B | 2-13 |
| 2.7.4 | LASOS LGK 7628-1: 633 nm, 5 mW, Laser Class 3 B | 2-13 |
| 2.7.5 | LASOS LGK 7812 ML-4 / LGN 7812: 458, 477, 488, 514 nm, 30 mW, Laser Class 3 B..... | 2-13 |
| 2.7.6 | Melles Griot 643-YB-A02 / Power supply 171B: 488, 568 nm, 30 mW, Laser Class 3 B.... | 2-13 |
| 2.7.7 | AOTF..... | 2-13 |
| 2.8 | Microscopes | 2-14 |
| 2.9 | Scanning Module..... | 2-15 |
| 2.10 | Laser Module VIS (405, 458, 477, 488, 514, 543, 633 nm)..... | 2-16 |
| 2.11 | Laser Module UV (351, 364 nm) | 2-16 |
| 2.12 | System Overview LSM 510 META..... | 2-17 |
| 2.13 | System Overview LSM 510 META - NLO | 2-19 |

2 LSM 510 - SETUP REQUIREMENTS

2.1 Space Requirements

2.1.1 LSM (one microscope, large system table): 300 × 250 cm

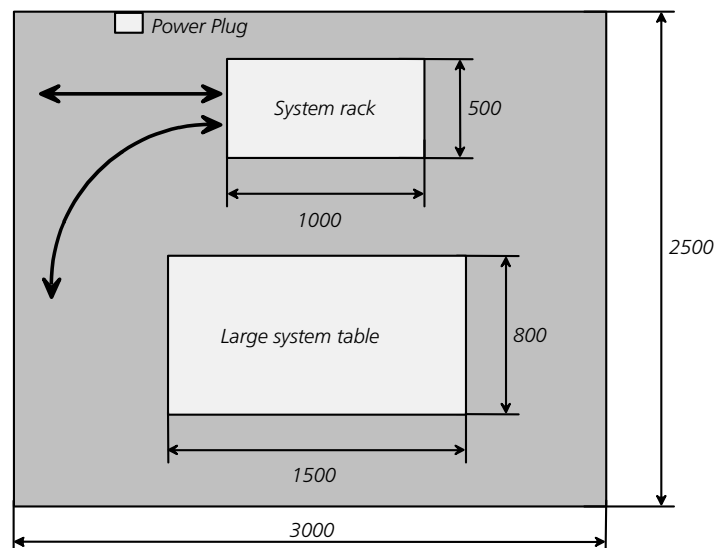



Fig. 2-1

The system rack contains the laser module (Helium-Neon laser 543 nm, 633 nm and Argon ion laser), the power supply for the Argon ion laser, for HBO lamp and halogen lamp, the electronic control unit (ECU) and the MCU28 unit (if a motorized XY stage is applied).

2.1.2 LSM with Ar UV Laser

 We recommend placing the cooling unit of the Ar laser (UV) in a separate room to prevent heat accumulation and vibration. Length of the water hose: 400 cm

One microscope:

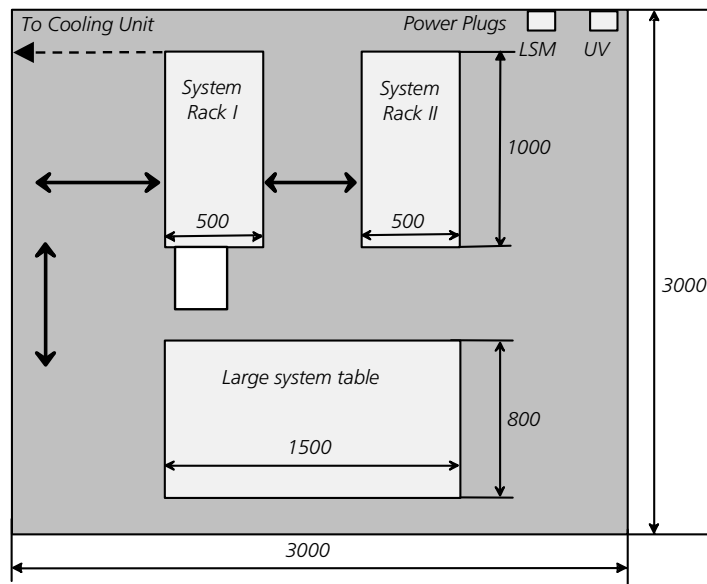


Fig. 2-2

Two microscopes:

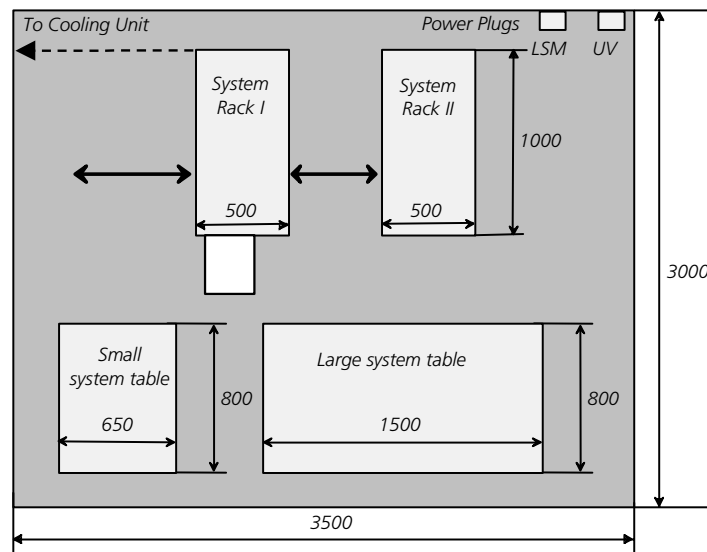


Fig. 2-3

The system rack I contains the VIS laser module (Helium-Neon laser 543 nm, 633 nm and Argon ion laser) and the Argon UV laser module. The system rack II contains the power supplies for lasers, for HBO and halogen lamps, the electronic control unit (ECU) and the MCU28 unit (if a motorized XY stage is applied).

2.1.3 LSM prepared for Two Photon Lasers (NLO)

2.1.3.1 Coherent "Mira 900" Direct-coupling with Inverted Stand (Upright Stand also possible)

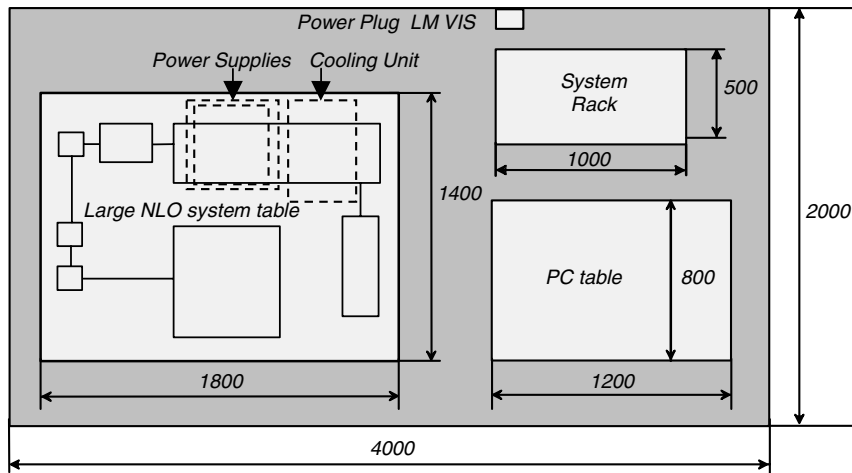


Fig. 2-4

2.1.3.2 Spectra Physics "MaiTai" Direct-coupling with Upright Stand (Upright Stand also possible)

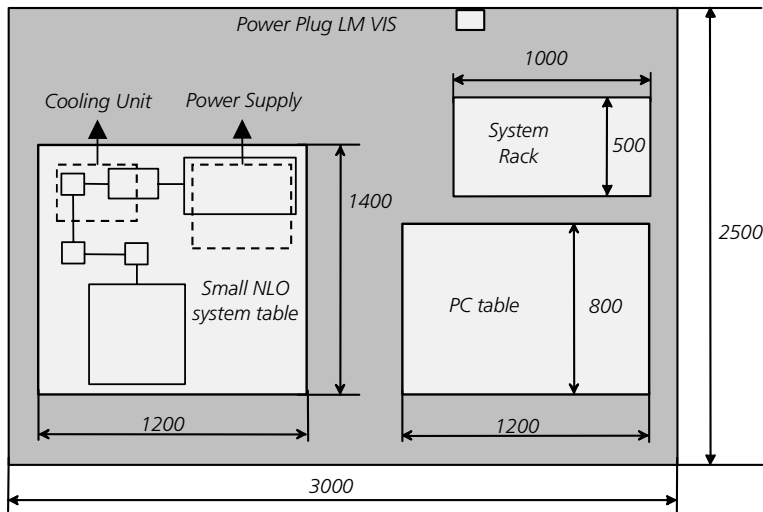


Fig. 2-5

2.1.3.3 Coherent "Mira" Fiber-coupling with Inverted Stand (Upright Stand also possible)

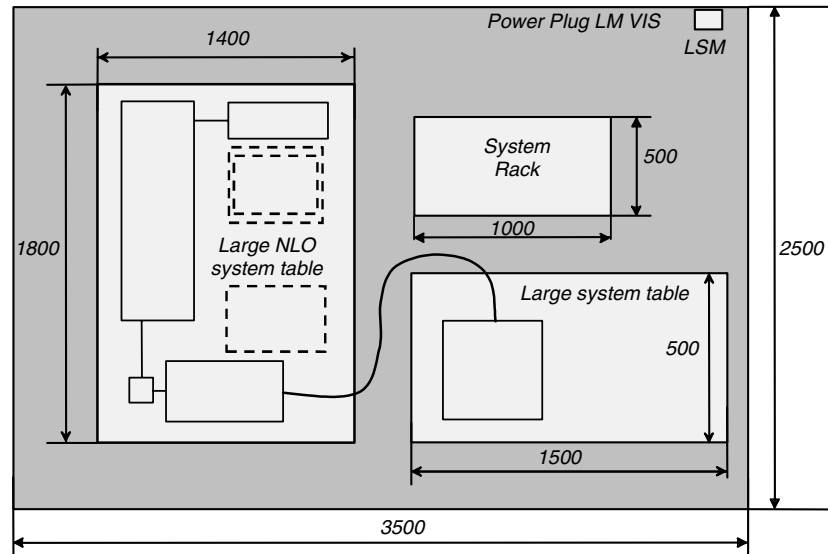


Fig. 2-6

2.1.3.4 Coherent "Chameleon" Direct-coupling with Upright Stand (Inverted Stand also possible)

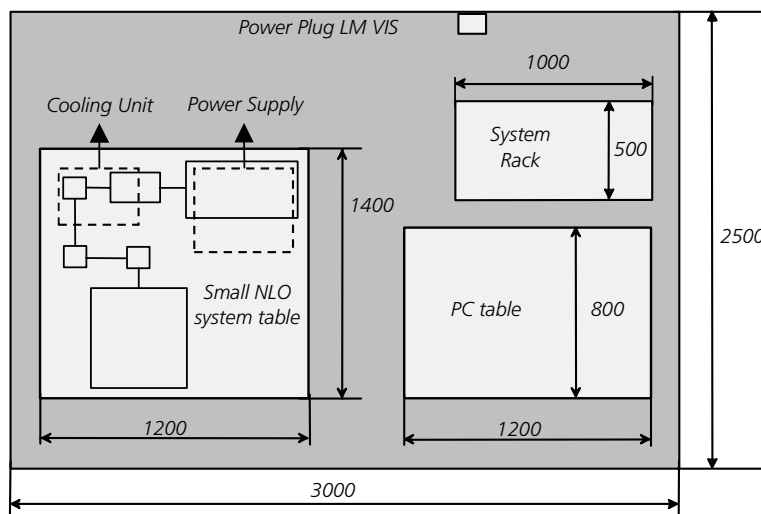




Fig. 2-7

2.2 Power Requirements

 The LSM 510 comes with a mains power supply cord and plug, either CEE red (230 V, 16 A, 3 phases), or CEE yellow (115 V, 32 A, 3 phases), and with the matching mains socket outlet.

| | | |
|----------------------|--|--|
| Line voltage | 230 V AC: 220...240 V AC ($\pm 10\%$) | 115 V AC: 100...125 V AC ($\pm 10\%$) |
| Line frequency | 50...60 Hz | 50...60 Hz |
| LSM incl. VIS laser | | |
| – Max. current | 2 phases at 16 A Phase 1 = 1.8 kVA max. Phase 2 = 2 kVA max. | 2 phases at 25 A Phase 1 = 1.8 kVA max. Phase 2 = 2 kVA max. |
| – Power consumption | 2000 VA per phase | 2000 VA per phase |
| – Power plug | CEE red (230 V, 16 A): 3 phases+N+PE, phases 1 and 2 connected | CEE yellow (115 V, 32 A): 3 phases+N+PE, phases 1 and 2 connected |
| Argon UV laser | | |
| - Line Voltage | 208...240 V AC ($\pm 10\%$) 50 / 60 Hz | 208...240 V AC ($\pm 10\%$) 50 / 60 Hz |
| – Max. current | 1 phase at 63 A Note: For Line Voltage 220 V the connector and power plug are rated for 63 Amps, However wiring and fuse should be rated for 32 Amps. | 1 phase at: 208 V: 34 Amps 230 V: 31 Amps 240 V: 29 Amps |
| – Power consumption | 7000 VA | 7000 VA |
| Class of protection | I | I |
| Type of protection | IP 20 | IP 20 |
| Overvoltage category | II | II |
| Pollution degree | 2 | 2 |

 If the line voltage in your country is 115 V AC, you need to order an additional 2.5 kW step-up-transformer, part no. 234.366, to be able to run the ArKr laser. Reason: The ArKr laser requires a 220 V input.

Power distribution inside the Laser Module VIS:

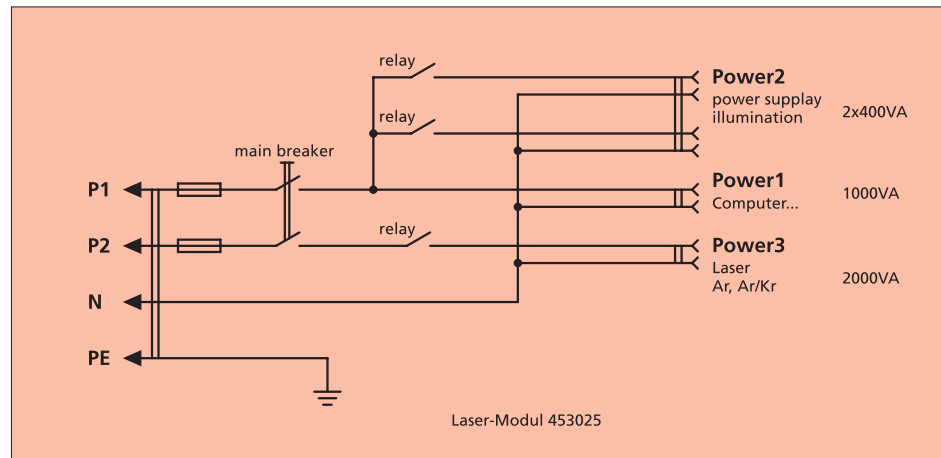


Fig. 2-8

2.2.1 Phase 1 (LSM)

feeds the following units:

- Laser Module
- HeNe 2x
- via Power 1 (5-socket adapter)
 - Computer + monitor
 - Microscope
 - MCU28
 - Scanning Module
- via Power 2:
 - HAL lamp
 - HBO lamp

2.2.2 Phase 2 (LSM, Power 3)

feeds the following units:

| | |
|---------------|---------|
| Ar laser | 2000 VA |
| or ArKr laser | 2000 VA |

2.2.3 Separate Connection

| | |
|---------------|---------|
| Ar laser (UV) | 7000 VA |
|---------------|---------|

2.3 Physical Dimensions

| | Length (cm) | Width (cm) | Height (cm) | Weight (kg) |
|--|--------------------|-------------------|--------------------|--------------------|
| Large system table | 150 | 80 | 78 | 100 |
| Small system table | 65 | 80 | 78 | 60 |
| Active anti-vibration table | 75 | 75 | 75 | 125 |
| Active anti-vibration table (NLO) | 120 | 140 | 75 | 200 |
| For Mai Tai Laser or Chameleon | | | | |
| Active anti-vibration table (NLO) | 180 | 140 | 75 | 400 |
| For Mira or Tsunami Laser | | | | |
| Scanning Module LSM 510 | 25 | 20 | 25 | 15 |
| Scanning Module LSM 510 META | 28 | 27 | 30.5 | 13 |
| Microscope | 50 | 35 | 50 | 20 |
| Laser Module, VIS(ible light) | 90 | 40 | 50 | 60 |
| Laser Module, UV | 140 | 20 | 20 | 60 |
| Electronics box | 50 | 30 | 30 | 10 |
| Power supply for Ar, ArKr | 30 | 30 | 20 | 10 |
| Power supply for Ar (UV) | 50 | 50 | 30 | 30 |
| Cooling unit for Ar (UV) | 80 | 45 | 50 | 30 |
| Water hose for Ar (UV) | 700 | | | |
| Fiber optic cable, VIS(ible) | 200 | | | |
| Fiber optic cable, UV | 200 | | | |
| Cables | 250 | | | |
| SCSI cable | 200 | | | |

2.4 Dimension of Shipment Crates

| Crate containing | Length (cm) | Width (cm) | Height (cm) | Weight (kg) |
|---|-------------|------------|-------------|-------------|
| Large system table | 160 | 85 | 95 | 120 |
| Small system table | 90 | 75 | 80 | 80 |
| Active anti-vibration table | 145 | 115 | 115 | 150 |
| Active anti-vibration table (NLO) | 145 | 160 | 110 | 330 |
| For Mai Tai Laser or Chameleon Active anti-vibration table (NLO) | 200 | 160 | 110 | 460 |
| For Mira or Tsunami Laser LSM | 190 | 85 | 120 | 350 |
| Monitor, computer | 120 | 80 | 90 | 80 |
| UV laser unit | 125 | 55 | 50 | 100 |
| UV cooling unit | 120 | 60 | 90 | 50 |
| META scan head | 52 | 47 | 47 | 13 |
| META upgrade kit | 64.5 | 60.5 | 42.5 | 20 |

2.5 Environmental Requirements

| | |
|-------------------------------------|---|
| 1. Operation, specified performance | T = 22 °C ± 3 °C without interruption (24 h a day independently whether system is operated or switched-off) |
| 2. Operation, reduced performance | T = 10 °C to 35 °C, any conditions different from 1. and 5. |
| 3. Storage, less than 16 h | T = -40 °C to 55 °C |
| 4. Storage, less than 6 h | T = -55 °C to 70 °C |
| 5. Temperature gradient | ± 0.5 °C/h |
| 6. Warm up time | 1 h, for high-precision and/or long-term measurements ≥ 2 h |
| 7. Relative humidity | < 65 % at 30 °C |
| 8. Operation altitude | max. 2000 m |

2.6 Vibrations

| Vibrations under operation conditions (with system table) | Shipping shock (LSM 510 box) |
|---|-------------------------------------|
| 5 µm pp at 5 Hz 10 µm pp at 10 Hz 10 µm pp at 20 Hz | 3 g |

2.7 Laser Specifications**2.7.1 Coherent Enterprise 653 II: 352, 364 nm, 80 mW, Laser Class 3 B**

| | |
|--------------------------|---|
| Line voltage | 208...240 V |
| Line frequency | 50...60 Hz |
| Max. current | 1 phase at: 208 V: 34 Amps 230 V: 31 Amps 240 V: 29 Amps |
| Power consumption | 7000 VA |
| With heat exchanger LP5: | |
| Water flow | 8.0 l/min (max. 16 l/min) |
| Water pressure | 1.4...4.2 kg/cm ² |
| Water temperature | 10...60 °C at 8.0 l/min |

2.7.2 Point Source i-flex 2000: 405 nm, 25 mW, Laser Class 3 B

| | |
|-------------------|-------------|
| Line voltage | 100...240 V |
| Line frequency | 50...60 Hz |
| Power consumption | 30 VA |

2.7.3 LASOS LGK 7786 P / Power supply 7460 A: 543 nm, 1 mW, Laser Class 3 B

| | |
|-------------------|--------------------------------|
| Line voltage | 115/230 V with factory setting |
| Line frequency | 50...60 Hz |
| Power consumption | 20 VA |

2.7.4 LASOS LGK 7628-1: 633 nm, 5 mW, Laser Class 3 B

| | |
|-------------------|----------------------------------|
| Line voltage | 100...240 V with factory setting |
| Line frequency | 50...60 Hz |
| Power consumption | 20 VA |

LASOS LGK 7812 ML-4 / LGN 7812: 458, 477, 488, 514 nm, 30 mW, Laser Class 3 B

| | |
|-------------------|----------------------------------|
| Line voltage | 100...240 V with factory setting |
| Line frequency | 50...60 Hz |
| Max. current | 1 phases at 25 A |
| Power consumption | 2000 VA |
| Cooling fan | on top of laser head |

2.7.6 Melles Griot 643-YB-A02 / Power supply 171B: 488, 568 nm, 30 mW, Laser Class 3 B

| | |
|-------------------|----------------------------------|
| Line voltage | 100...240 V with factory setting |
| Line frequency | 50...60 Hz |
| Max. current | 1 phase at 16 A |
| Power consumption | 2000 VA |

2.7.7 AOTF



In the unlikely case of complete utilization of the acousto-optical tunable filter (100 % intensity of all AOTF-supported lines) the tolerable limits of the EMV regulations could be slightly exceeded in the MHz range.

2.8 Microscopes

Upright Axioplan 2 imaging MOT

Upright Axiotron 2 mot

Inverted Axiovert 200 M BP or SP

Upright Axioskop 2 FS MOT

Upright Axioskop 2 MAT mot

All Zeiss ICS objectives and accessories can be accommodated.

Z motor

DC servomotor, opto-electronically coded

Least Z interval: 50 nm (Axioplan 2 imaging MOT,
Axiovert 200 M BP or SP)
100 nm (Axioskop 2 FS MOT)

HRZ 200

Galvanometer-driven precision focusing stage

Max. travel 200 μm ; resolution 6 nm; accuracy 40 nm

Allows continuous Z-scan at up to 10 Hz

Piezo Objective focus

Piezo-driven single objective drive

Max. travel 100 μm ; resolution 5 nm

Allows continuous Z-scan at up to 20 Hz

2.9 Scanning Module

| | |
|------------------|--|
| | 2 individually driven galvanometric scanners |
| Scanning speed | Up to ~5 frames/sec (512 × 512 pixels) |
| Field resolution | Max. 2048 × 2048 pixels (individually adjustable for each axis) |
| Field of view | 10 × 10 mm ² with a 1.25× objective |
| Zoom | 1× ... 40×, continuous control |
| Channels | a) Up to 4 channels simultaneously or b) 3 traditional confocal channels and 1 META channel 4 confocal reflection/fluorescence channels (PMT) or 3 PMT and 1 META 1 transmitted light channel (PMT) and 3 NDD or 4 NDD 1 reference monitor diode Cooled PMTs (option, forthcoming) Fiber-optic adaptation of external detectors (option, forthcoming) |
| Dynamic range | 12-bit DAC for each detection channel |
| Pinholes | 4 individual variable pinholes (one per confocal channel) Computer controlled automatic alignment |

2.10 Laser Module VIS (405, 458, 477, 488, 514, 543, 633 nm)

Single-mode polarization preserving fiber

Laser beam attenuation for all lasers by VIS-AOTF

HeNe laser (543 nm, 1 mW)

HeNe laser (633 nm, 5 mW)

Diode laser (405 nm, 25 mW)

Ar laser (458, 477, 488, 514 nm, 30 mW)

ArKr laser (488, 568 nm, 30 mW)

Fuses and automatic circuit breakers

for 230 V: G-type fuse 5 × 20 mm; slow-blow 3.15 A / H / 250 V, acc. to IEC 127
2 circuit breakers; C 10 A

for 110 V: G-type fuse 5 × 20 mm; slow-blow 3.15 A / H / 250 V, acc. to IEC 127
Circuit breaker; B 25 A
Circuit breaker; C 25 A
Circuit breaker; B 16 A
Circuit breaker; B 10 A

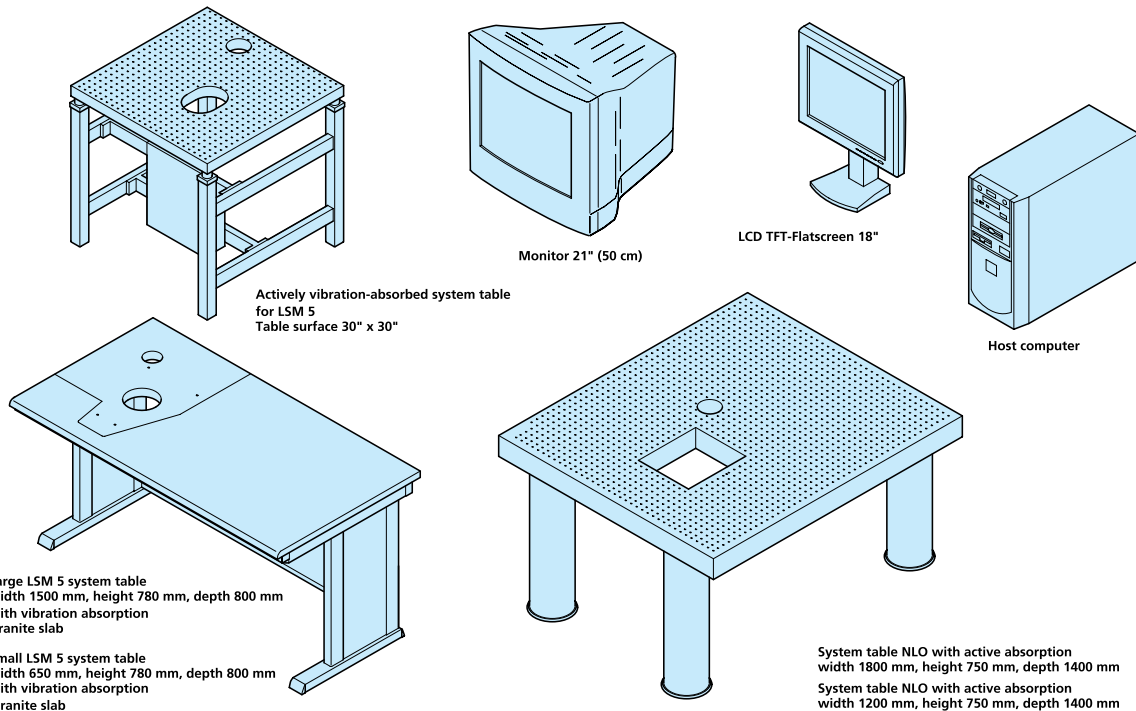
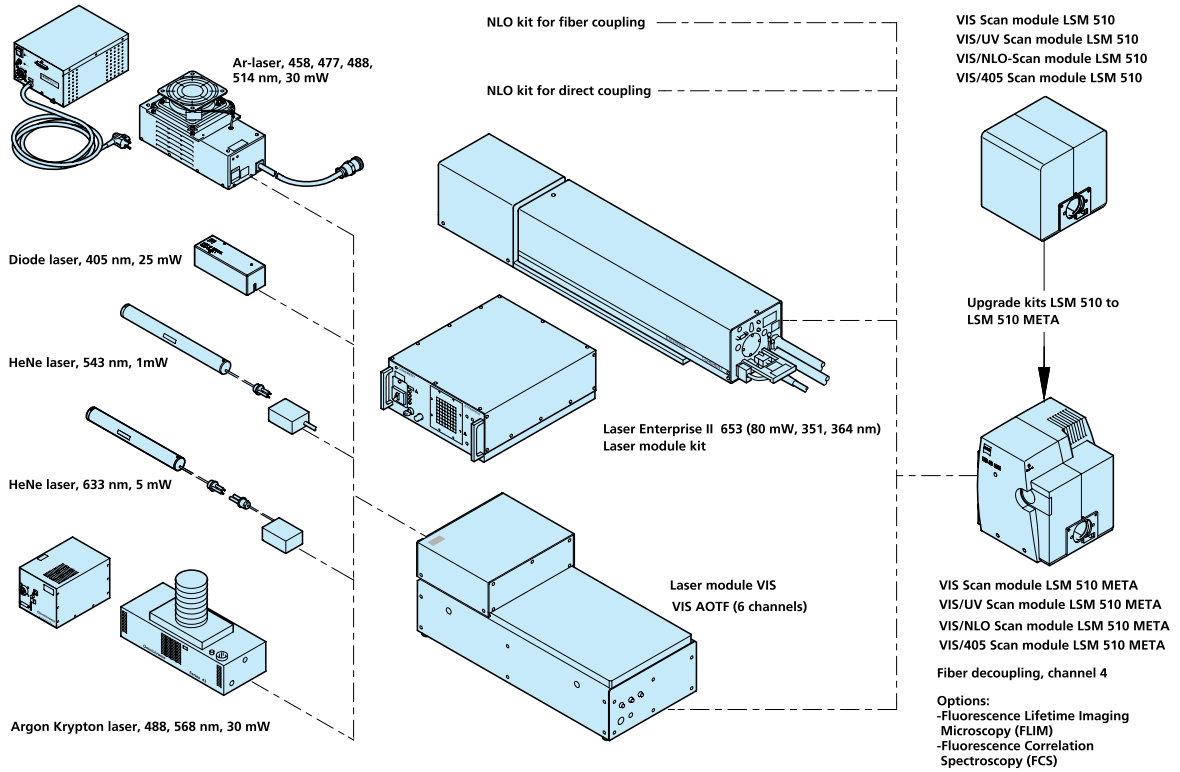
2.11 Laser Module UV (351, 364 nm)

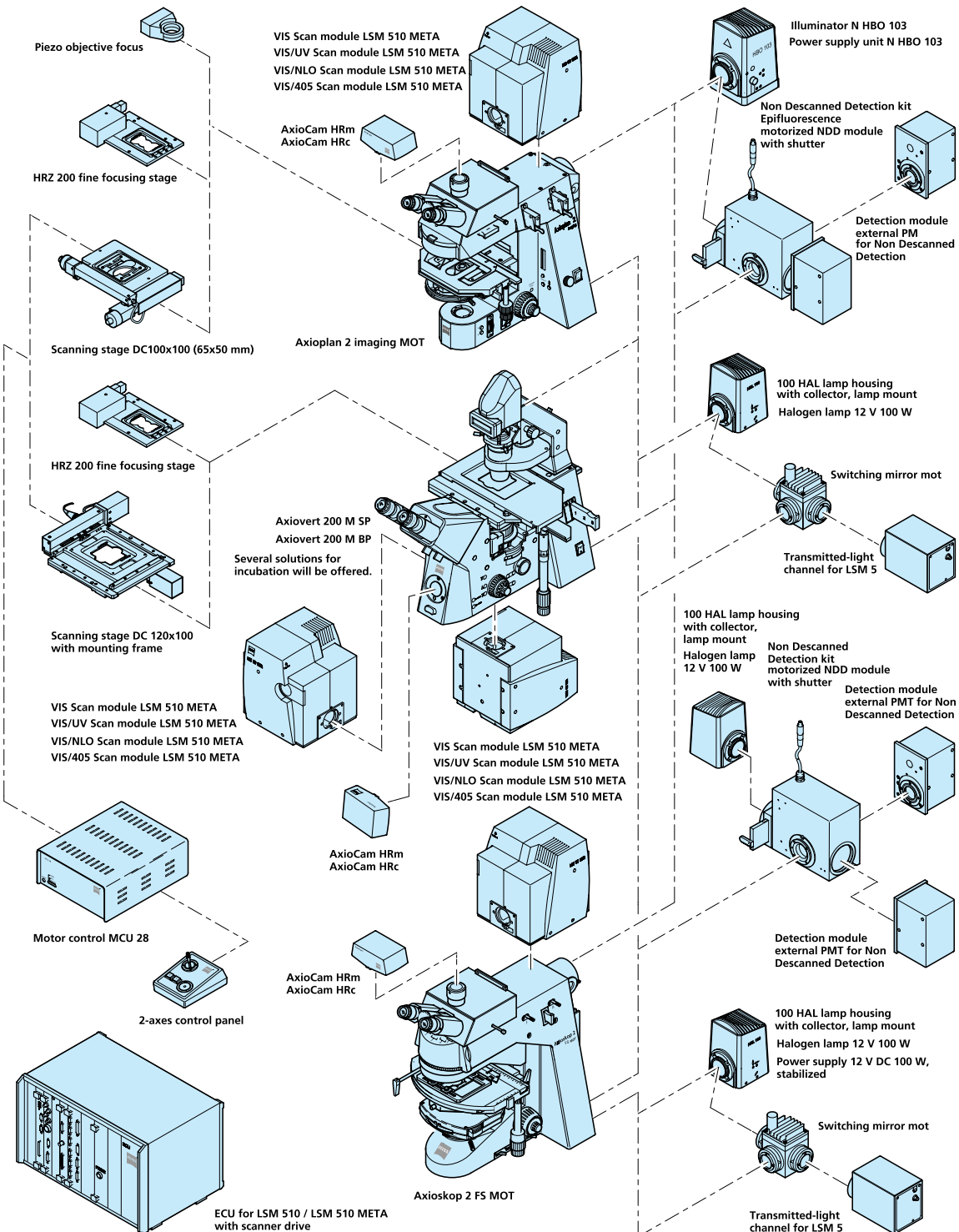
Single-mode polarization preserving fiber

Laser beam attenuation for all lasers by UV-AOTF

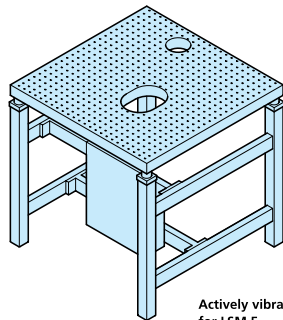
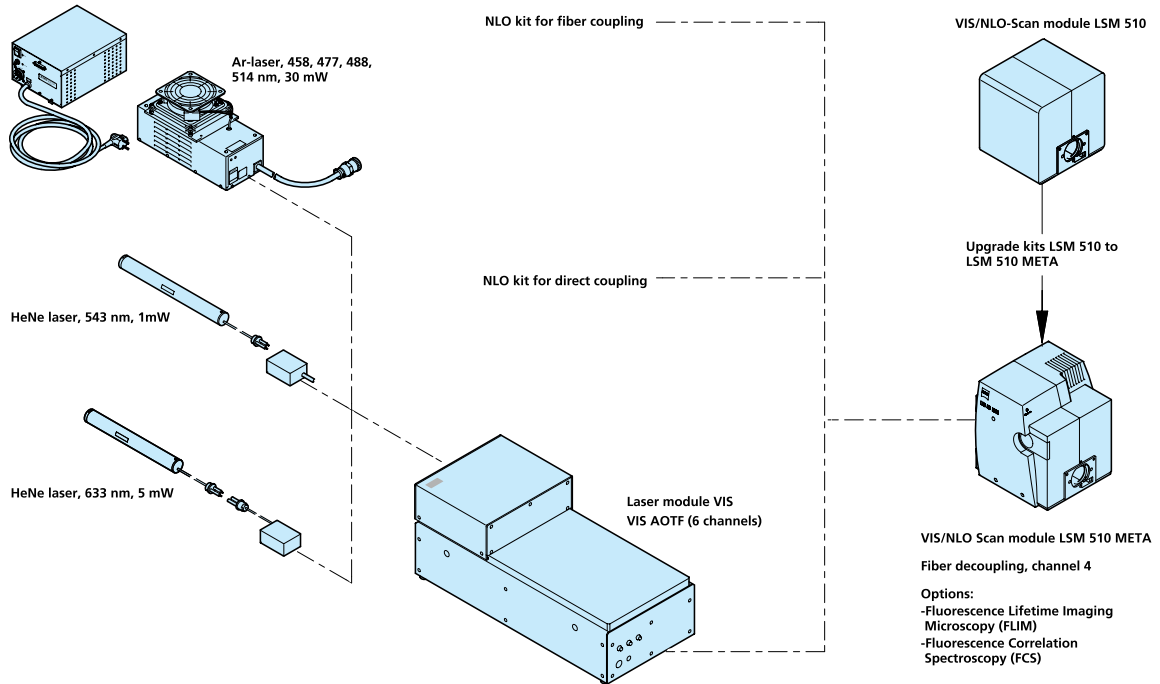
Ar laser (351, 364 nm, 80 mW)

2.12 System Overview LSM 510 META

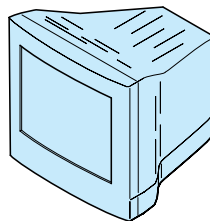




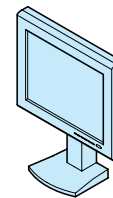
2.13 System Overview LSM 510 META - NLO



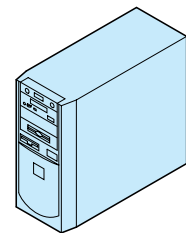
Actively vibration-absorbed system table for LSM 5
Table surface 30" x 30"



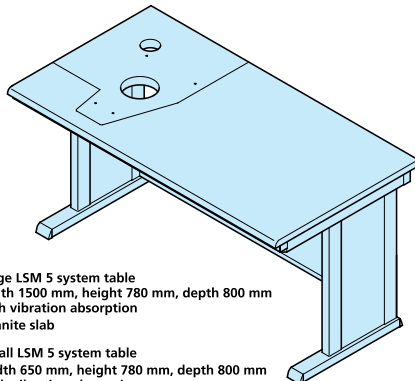
Monitor 21" (50 cm)



LCD TFT-Flatscreen 18"

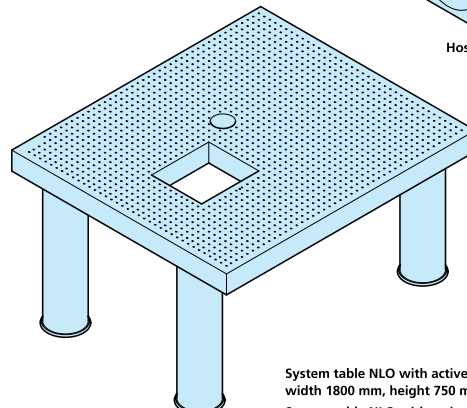


Host computer



Large LSM 5 system table
width 1500 mm, height 780 mm, depth 800 mm
with vibration absorption
Granite slab

Small LSM 5 system table
width 650 mm, height 780 mm, depth 800 mm
with vibration absorption
Granite slab



System table NLO with active absorption
width 1800 mm, height 750 mm, depth 1400 mm
System table NLO with active absorption
width 1200 mm, height 750 mm, depth 1400 mm

