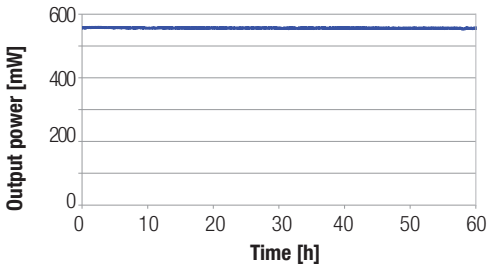
# C-Fiber

## Femtosecond Fiber Laser 1560 nm

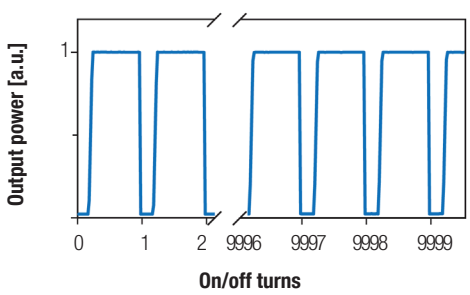

Menlo Systems' fiber-based femtosecond laser sources integrate the latest achievments in fiber technology into easy-to-use products. Menlo Systems' unique figure 9® design results in reproducible and long-term stable operation. It is based on the well-established nonlinear optical loop mirror (NOLM) mode locking mechanism. Both oscillator and amplifier use polarization maintaining (PM) fiber components only, ensuring excellent stability and low-noise operation. The laser is maintenance free, user installed and ready to use at the press of a single button. Customize your laser with the available options to match the requirements of your application.

## PERFORMANCE DATA

**Amplitude noise**
< 0.5% rms (over 24h)




**Reproducibility**
Identical and consistent laser performance




## KEY SPECIFICATIONS

- Wavelength 1560 nm
- Output Power >500 mW
- Pulse Length <90 fs
- Repetition Rate 50-250 MHz

## APPLICATIONS

- Synchronization and Timing
- Ultrafast Spectroscopy
- Supercontinuum Generation
- Material Characterization
- Testing at Telecom Wavelengths

## FEATURES

- High Stability
- Low Amplitude and Phase Noise
- All-PM Solution
- Single Mode-Lock State
- Menlo figure 9® Technology

## OPTIONS

- **SYNC100**
  **Repetition Rate Synchronization**
  Tunable cavity length by high-bandwidth piezo-controlled synchronization
- **RRE-SYNCRO**
  **Repetition Rate Stabilization**
  Feedback electronics to phase lock pulses to an external clock (see separate data sheet for more details)
- **VARIO**
  **User-Defined Repetition Rate**
  Factory-set value selectable in the 50-250 MHz range
- **MULTIBRANCH**
  **Additional Seed Ports**
  Seeding of multiple amplifiers with optional subsequent frequency conversion to cover multiple wavelengths

# C-Fiber

MenloSystems

## Femtosecond Fiber Laser 1560 nm

| SPECIFICATIONS | C-FIBER | C-FIBER HIGH POWER |
|---|---|---|
| Center Wavelength | 1560 nm ± 20 nm | 1560 nm ± 20 nm |
| Average Power | >100 mW | >500 mW |
| Pulse Energy | >1 nJ | >5 nJ |
| Pulse Width | <90 fs | |
| Repetition Rate | 100 MHz (50-250 MHz with VARIO)* | |
| Repetition Rate Instability | <1 ppm over 20 hours at constant temperature | |
| Timing Jitter | <2 fs [rms, 10 kHz.. 10 MHz] | |
| Output Port | fiber-coupled (FC/APC) | free space |
| Additional Fiber-Coupled Seed Port | 1 (up to 4 with MULTIBRANCH) | |
| Polarization | linear, PM fiber | linear, s-polarized |
| Beam Height | n.a. | 102 mm |

*Please inquire for your specific combinations of average power, pulse duration and repetition rate.

| REQUIREMENTS | | |
|---|---|---|
| Operating Voltage | 100/115/230 VAC | |
| Frequency | 50 to 60 Hz | |
| Power Consumption | 120 VA | |
| Cooling Requirements | no water cooling is required | |
| Laser Head Stabilization | actively temperature stabilized | |
| Operating Temperature | 15 °C - 35 °C | |
| Laser Head Dimensions/Weight | 413 x 90 x 178 mm³ / 7 kg | 413 x 120 x 178 mm³ / 10 kg |
| Control Unit Dimensions/Weight | 448 x 132 x 437 mm³ / 10 kg | 448 x 132 x 437 mm³ / 12 kg |
| Warm-Up Time | <60 s | |

| ORDERING INFORMATION | | |
|---|---|---|
| **Product Code** | C-Fiber | C-Fiber HIGH POWER |

Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.

# ELMO

## Femtosecond Fiber Laser 1560 nm

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Menlo Systems' fiber-based femtosecond laser sources integrate the latest achievements in fiber technology into easy-to-use products. Menlo Systems' unique figure 9® mode locking technology results in reproducible and long-term stable operation. The ELMO with its all-fiber design guarantees excellent stability and low-noise operation. As seed source for fiber amplifiers the oscillator is maintenance free, user installed and ready to use at the press of a single button. In short: An OEM laser engineered for 24/7 operation.

### KEY SPECIFICATIONS

- Wavelength 1560 nm
- Output Power :
  >330 mW in free space version,
  up to 200 mW with fiber coupling
- Repetition Rate 50-100 MHz

### APPLICATIONS

- Amplifier Seeding
- THz Generation & THz Physics
- Ultrafast Spectroscopy

### FEATURES

- High Stability
- Low Amplitude and Phase Noise
- All-PM Solution
- Single Mode-Lock State
- Menlo figure 9® Technology

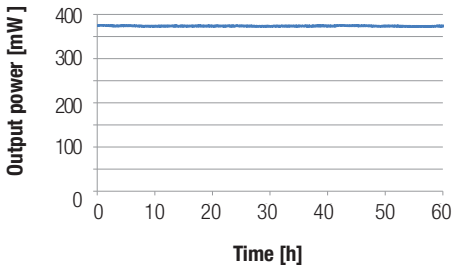
### OPTIONS

- **VARIO**
  **User-Defined Repetition Rate**
  Factory-set value selectable in the 50-100 MHz range

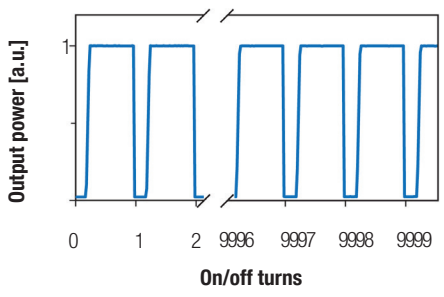
- **MULTIBRANCH**
  **Additional Seed Ports**
  Seeding of multiple amplifiers with optional subsequent frequency conversion to cover multiple wavelengths

## PERFORMANCE DATA

**Amplitude noise**
< 0.5% rms (over 24h)




**Reproducibility**
Identical and consistent laser performance



# ELMO

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## Femtosecond Fiber Seed Laser 1560 nm

| SPECIFICATIONS | ELMO | ELMO HIGH POWER |
|---|---|---|
| Center Wavelength | 1560 nm ± 30 nm | 1560 nm ± 30 nm |
| Average Power | >1 mW ( up to 15 mW)* | >330 mW in free space version**<br>>100 mW in fiber coupled version (up to 200 mW)* |
| Pulse Width | chirped (<150 fs)* | <90 fs |
| Output Port | fiber-coupled | free space** or fiber-coupled |
| Polarization | linear, PM fiber | linear, p-polarized* |
| Dispersion Management | dispersion can be factory set to achieve short pulses after 1-10 m of additional fiber | |
| Repetition Rate | 100 MHz (50-100 MHz with VARIO)* | |
| 2nd Fiber-Coupled Seed Port | yes | |
| 2nd High Power Output Port | available with MULTIBRANCH | |

*Please inquire for your specific combinations of average power, pulse duration, repetition rate and external fiber length.

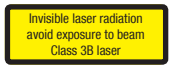
**Free space version (ELMO High Power-FS) with additional compressor module: versatile handheld compressor module can also be mounted in s-polarized orientation.
Standard external patch cord length is 0.5 m.

| REQUIREMENTS | ELMO | ELMO HIGH POWER |
|---|---|---|
| Operating Voltage | 12 VDC/2 A*** | 12 VDC/3 A*** |
| Power Consumption | 10 VA | 20 VA |
| Operating Temperature | 15 °C - 35 °C | 15 °C - 35 °C |
| Laser Head Dimensions/Weight | 195 x 95 x 28 mm³ / 0.7 kg | 195 x 95 x 75 mm³ /2.9 kg |
| Compressor Dimensions/Weight | - | 182 x 95 x 32 mm³ /1 kg (free space version) |
| Warm-Up Time | <60 s | <60 s |

*** Power supply for 100/115/230 VAC can be provided as option.

| ORDERING INFORMATION | | |
|---|---|---|
| **Product Code** | ELMO | ELMO High Power (fiber coupled version) |
| | | ELMO High Power-FS (free space version) |

Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.

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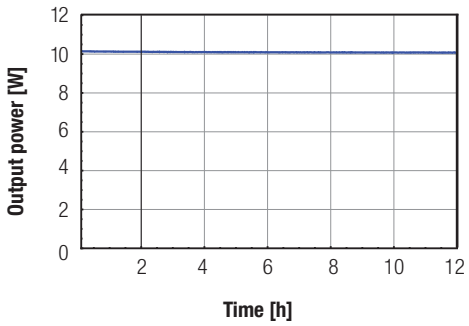
# orange

## Femtosecond Fiber Laser 1040 nm & 520 nm

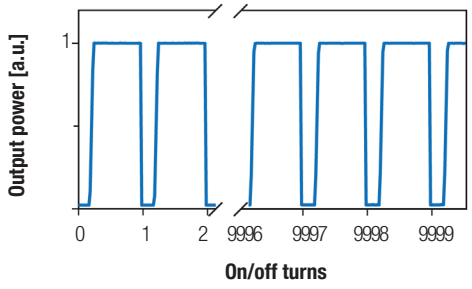

Menlo Systems' femtosecond Yb fiber-baser laser sources now offer more than 10 W in average power with a pulse duration of <200 fs. Based on our unique figure 9® design, the lasers offer reproducible and long-term stable operation. Both oscillator and amplifier use polarization maintaining (PM) fiber components only, ensuring excellent stability and low-noise operation. The second harmonic generation is a highly efficient module for maximum performance. The laser is maintenance free, user installed and ready to use at the press of a single button. Customize your laser with the available options to match the requirements of your application.

## PERFORMANCE DATA

**Amplitude noise**
< 1% rms (over 12h)




**Reproducibility**
Identical and consistent laser performance




## KEY SPECIFICATIONS

- Wavelength 1040 nm & 520 nm
- Output Power >10 W
- Pulse Length <150 fs
- Repetition Rate 50-250 MHz

## APPLICATIONS

- OPA/OPO pumping
- Amplifier Seeding
- Ultrafast Spectroscopy
- Cell Surgery
- Multi-Photon Excitation
- 2-Photon Polymerization and 3D Printing

## FEATURES

- High Stability and High Beam Quality
- Low Amplitude and Phase Noise
- All-PM Solution
- figure 9® Technology
- Laser Output in less than 60 Seconds after Pressing On-Button

## OPTIONS

- **SHG 520**
  Frequency doubling to 520 nm
- **CHIRPED PULSES**
  Picosecond pulses for seeding applications
- **SYNC100**
  **Repetition Rate Synchronization**
  Tunable cavity length by high-bandwidth piezo-controlled synchronization
- **RRE-SYNCRO**
  **Repetition Rate Stabilization**
  Feedback electronics to phase lock pulses to an external clock (see separate data sheet for more details)
- **VARIO**
  **User-Defined Repetition Rate**
  Factory-set value selectable in the 50-250 MHz range
- **MULTIBRANCH**
  **Additional Seed Ports**
  Seeding of multiple amplifiers with optional subsequent frequency conversion to cover multiple wavelengths

# orange

## Femtosecond Fiber Laser
## 1040 nm & 520 nm

MenloSystems

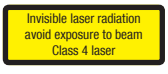
| SPECIFICATIONS | ORANGE | ORANGE HIGH POWER | ORANGE HIGH POWER 10 |
|---|---|---|---|
| Center Wavelength | 1040 nm ± 10 nm | 1040 nm ± 10 nm | 1040 nm ± 10 nm |
| Average Power | >100 mW | >1 W | >10 W |
| Pulse Energy | >1 nJ | >10 nJ | >100 nJ |
| Pulse Width* | <150 fs | <150 fs | <200 fs |
| Repetition Rate** | 100 MHz (50-250 MHz with VARIO) | 100 MHz (50-250 MHz with VARIO) | 100 MHz (50-250 MHz with VARIO) |
| Output Port | free space | free space | free space |
| Beam Quality | TEM00, $M^2$ <1.2 (typ.<1.1) | TEM00, $M^2$ <1.2 (typ.<1.1) | TEM00, $M^2$ <1.2 (typ.<1.1) |
| Auxiliary Output Port | optional | optional | optional |
| Additional Fiber-Coupled Seed Port | 1 (up to 4 with MULTIBRANCH) | 1 (up to 4 with MULTIBRANCH) | 1 (up to 4 with MULTIBRANCH) |
| Polarization | linear, p-polarized | linear, p-polarized | linear, p-polarized |
| Beam Height | 95 mm | 95 mm | 95 mm |
| **SECOND HARMONIC MODULE SHG 520** | | | |
| Key Specifications | >400 mW @ 520 nm, <150 fs | | |
| Dual Output | 520 nm & 1040 nm, linear, p-polarized | | |

*Chirped pulse option available. Please ask about your specific combination of output port configurations
**Please inquire for your specific combinations of average power, pulse duration and repetition rate.

| REQUIREMENTS | | | |
|---|---|---|---|
| Operating Voltage | 100/115/230 VAC | | |
| Frequency | 50 to 60 Hz | | |
| Cooling Requirements | no water cooling is required | | |
| Laser Head Stabilization | actively temperature stabilized | | |
| Operating Temperature | 22 °C ± 5 °C | | |
| Laser Head Dimensions | 400 x 415 x 140 $mm^3$ | 400 x 415 x 140 $mm^3$ | 580 x 500 x 140 $mm^3$ |
| Laser Head Weight | 23 kg | 23 kg | 36 kg |
| Control Unit Dimensions | 449 x 435 x 132 $mm^3$ | 449 x 435 x 132 $mm^3$ | 449 x 435 x 132 $mm^3$ |
| Control Unit Weight | 11 kg | 11 kg | 17 kg |
| Warm-Up Time | <60 s | | |

| ORDERING INFORMATION | | | |
|---|---|---|---|
| **Product Code** | orange | orange HP<br>orange HP-520 | orange HP 10 |

Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.

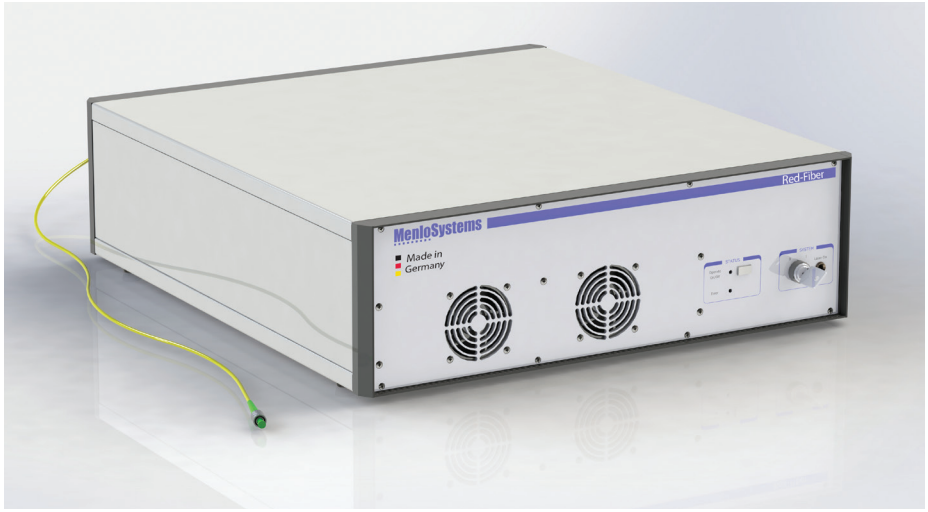



MenloSystems

# Red-Fiber

## Mode Locked, 2 µm Fiber Laser

MenloSystems




The Red-Fiber is a front end laser at 2.05 µm central wavelength and MHz repetition rate. The compact laser is based on our all polarization maintaining figure 9® mode locking technology. Intracavity dispersion compensation allows for spectral bandwidths supporting <500 fs pulse duration. To support compatibility to fiber coupled high power amplifier applications, the pulses are normally prechirped to multi ps pulse duration. An additional preamplifier module can be integrated to boost the output pulse energy to >10 nJ (>100 mW). The Red-Fiber is designed for reliable and long term stable operation in both scientific as well as industrial applications fields. The compact rack mount housing with integrated full remote control over RS232 or USB interface allows easy integration into subsequent high power laser systems.

### KEY SPECIFICATIONS

- Wavelength: 2.05 µm
- Repetition Rate: 10 MHz
- All Polarization Maintaining
- Bandwidth: > 10 nm (typ. 20 nm)
- Pulse Length: Multi ps (normally pre-chirped, compressible to < 500 fs
- Output Power
  Oscillator: >1 mW (>100 pJ)
  Amplifier: >100 mW (>10 nJ)

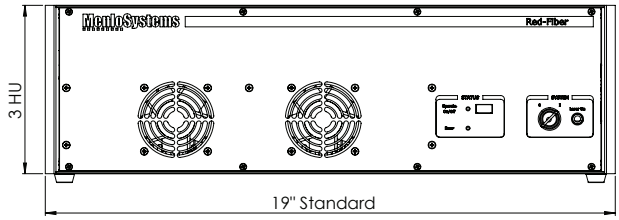
### APPLICATIONS

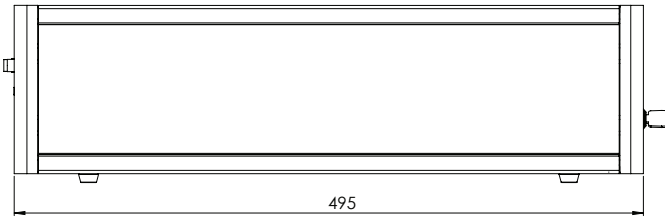
- Seed for Ho:YAG Based Regenerative Amplification
- Pump for Fiber Based Mid-IR Super-continuum Generation
- Silicon Semiconductor Processing
- Front End Laser for Mid-IR Based High Harmonic Generation
- Driving Dielectric Laser Acceleration of Electrons

### FEATURES

- figure 9® Mode Locking
- Turnkey Operation
- All Polarization Maintaining Design
- Modular Internal Design
- Air Cooling
- Fiber Based Linearly Polarized Output

### LASER HEAD



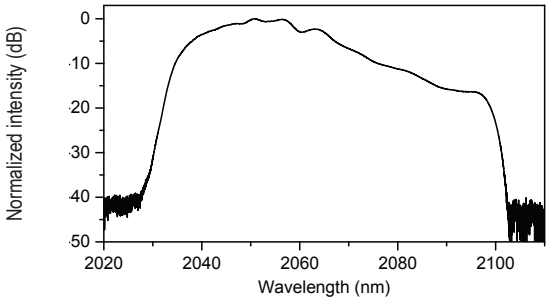
# Red-Fiber

## Mode Locked, 2 µm Fiber Laser

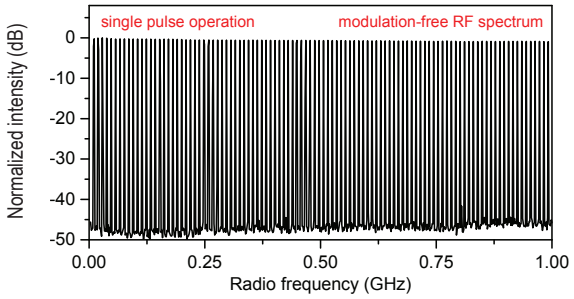
MenloSystems

## PERFORMANCE DATA

### Typical Output Spectrum

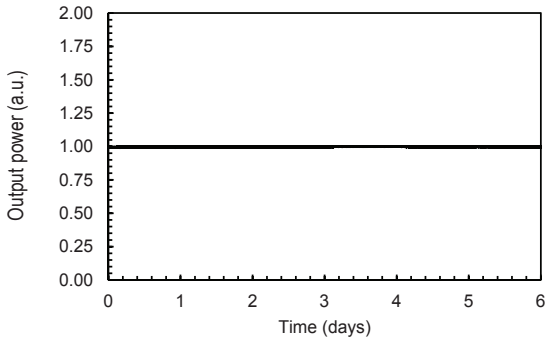



### Typical RF Output Spectrum



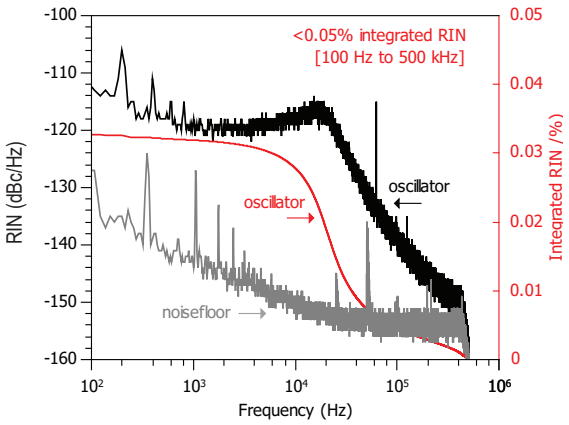

### Long Term Stability

<0.5% power fluctation




### Typical RIN Measurement

<0.05% from 100 Hz to 500 kHz




## ORDERING INFORMATION

| Product Code | Red-Fiber |
|---|---|

Please call for pricing. Specifications are subject to change without notice.

Invisible laser radiation
avoid exposure to beam
Class 4 laser

MenloSystems

# YLMO

## Femtosecond Fiber Seed Laser 1030 nm

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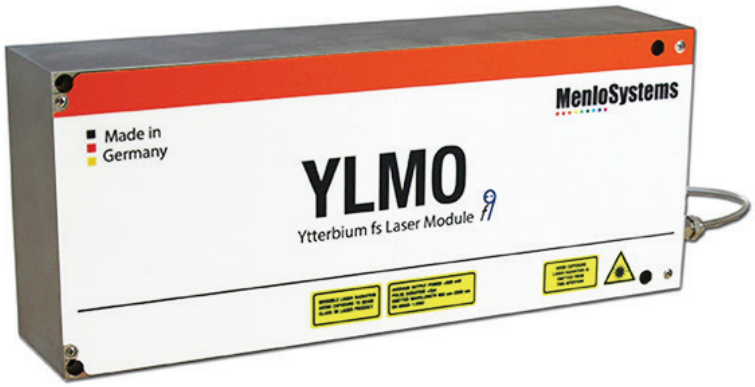



Menlo Systems' fiber-based femtosecond laser sources integrate the latest achievements in fiber technology into easy-to-use products. Menlo Systems' unique figure 9® mode locking technology results in reproducible and long-term stable operation. The YLMO with its PM-fiber design guarantees excellent stability and low-noise operation. As seed source for amplifiers the oscillator is maintenance free, user installed and ready to use at the press of a single button.
In short: An OEM laser engineered for 24/7 operation.

### KEY SPECIFICATIONS

- Wavelength 1030 nm
- Output Power >2W
- Repetition Rate 50-100 MHz

### APPLICATIONS

- Amplifier Seeding for
  - High Harmonic Generation
  - Attosecond Science
  - Ultrafast Spectroscopy
  - Material Processing
  - Opthalmology

### FEATURES

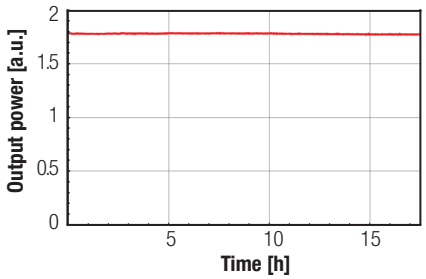
- High Stability
- Low Amplitude and Phase Noise
- All-PM Solution
- Single Mode-Lock State
- figure 9® Technology
- Laser Output in Less than 60 Seconds after Pressing On-Button

### OPTIONS

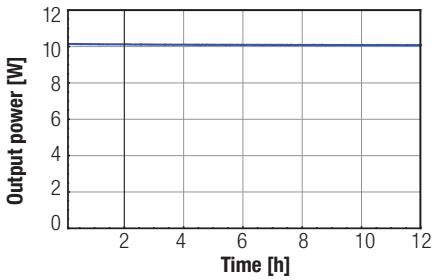
- **VARIO**
  **User-Defined Repetition Rate**
  Factory-set value selectable in the 50-100 MHz range
- **MULTIBRANCH**
  **Additional Seed Ports**
  Seeding of multiple amplifiers

### PERFORMANCE DATA

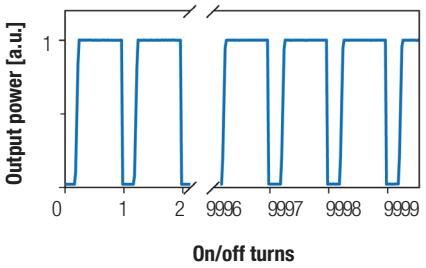
**Amplitude noise**
YLMO Seed Laser
< 0.5% rms (over >15h in ambient temperature)




YLMO with Amplifier
< 1% rms (over >12h in ambient temperature, YLMO seeding Menlo BlueCut)




**Reproducibility**
Identical and consistent laser performance



# YLMO

MenloSystems

## Femtosecond Fiber Seed Laser 1030 nm

| SPECIFICATIONS | YLMO | YLMO HIGH POWER | YLMO-2W* |
|---|---|---|---|
| Center Wavelength | 1030 nm ± 10 nm** | 1030 nm ± 10 nm** | 1030 nm ± 10 nm** |
| Average Power | >5 mW | >200 mW | >2 W |
| Pulse Energy | >100 pJ | >4 nJ | >20 nJ |
| Bandwidth | 10 nm (other bandwidths on request) | | |
| Pulse Width | chirped (bandwidth limited pulses with <150 fs on request) | | <150 fs |
| Repetition Rate | 50 MHz (50-100 MHz with VARIO)*** | 50 MHz (50-100 MHz with VARIO)*** | 100 MHz*** |
| Output Port | fiber-coupled, SC/APC | fiber-coupled, SC/APC | free space |
| Polarization | linear, PM fiber | linear, PM fiber | linear |

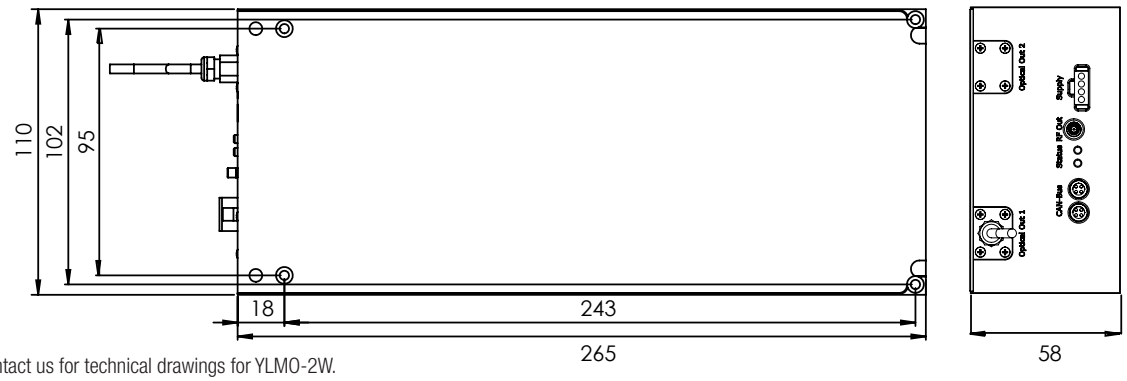
*Delivered with additional electronic unit 19", 2HE **Other wavelengths on request ***Please inquire for your specific combinations of average power, pulse duration, repetition rate and external fiber length.

### REQUIREMENTS

| | | | |
|---|---|---|---|
| Operating Voltage | 5 VDC, 12 VDC/2 A** | 5 VDC, 12 VDC/2 A** | 100/115/230 VAC |
| Power Consumption | 10 VA | 10 VA | 120 VA |
| Operating Temperature | 15 °C - 35 °C | | |
| Laser Head Dimensions/Weight | 265 x 110 x 58 mm³ / 3 kg | 265 x 110 x 58 mm³ / 3 kg | 265 x 110 x 76 mm³ / <5 kg |
| Control Unit Dimensions/Weight | | | 495 x 483 x 95 mm³ / <20 kg |
| Warm-Up Time | <60 s | | |

** Power supply for 100/115/230 VAC can be provided as option.

### TECHNICAL DRAWING




Please contact us for technical drawings for YLMO-2W.

### ORDERING INFORMATION

| Product Code | YLMO | YLMO HIGH POWER | YLMO-2W |
|---|---|---|---|

Please call for pricing. Specifications are subject to change without notice. Custom modifications are available, please inquire.

Invisible laser radiation
avoid exposure to beam
Class 3B laser