

Fiber Coupled Semiconductor Laser

Features

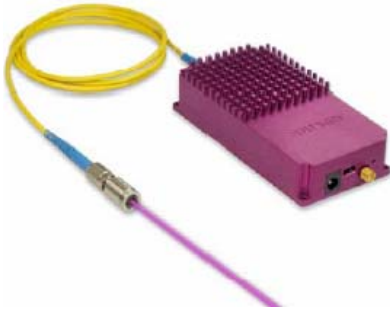
- ◆ Plug & Play
- ◆ ESD Protection
- ◆ Power Adjustable
- ◆ LD Current Full Protection
- ◆ LD Temperature Stabilized
- ◆ Compact Size

Applications

- ◆ Bio Technology
- ◆ Semiconductor
- ◆ Medical
- ◆ Scientific
- ◆ Photo Finishing

Option

- ◆ Polarization Maintaining Fiber
- ◆ High Speed Modulation
- ◆ Remote Control
- ◆ Collimated & Focused Beam
- ◆ Metal Jacket Protection



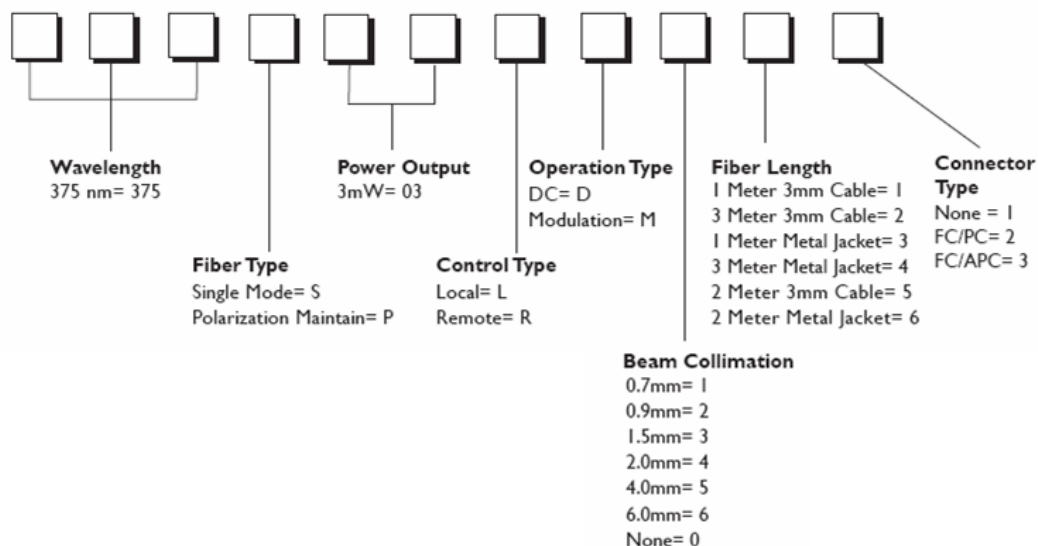
The Laser Module is a temperature stabilized semiconductor laser coupled with single mode fiber. It features very low M2 value Gaussian beam output with excellent beam pointing stability at a wide temperature range.

The Laser Module is a ClassIII b laser product.

Performance Specifications

Parameter	Condition	units	Typical							
Wavelength	T=25℃	nm	375	405	440	473	635	658	785	830
Power	T=25℃	mW	4	23	20	10	15 / 23	25 / 50	15 / 50	20
Noise(RMS)	10~20MHz	%	0.1							
Power Stability	1hrs, T=25℃	%	0.25							
Power Stability	24hrs, T=25℃	%	0.75							
PER		dB	min. 15							
M2			max. 1.1							
Beam dia.	1/e2	mm	0.7 / 0.9 / 1.5 / 2.0 / 4.0 / 6.0							
Beam Divergence	full angle	mrاد	max. 1							
Pointing Stability	2hrs, T=25℃	urاد	max. 5							
Fiber Type			SM / PM							

Ordering Information



FIBER PIGTAILED ULTRA STABLE LASER MODULE

OZ-1000, OZ-2000 & OZ-3000 SERIES

Features:

- Output power to 300mW
- Wavelengths from 375nm to 1625nm available
- Excellent power & wavelength stability
- Low RMS noise
- Electrically or optically variable output power
- Compact size and low cost
- Easily configured analog interface
- USB interface optional; other interfaces are also available
- Level 4 ESD protection
- Single mode, multimode, or polarization maintaining fiber version
- Available with fiber pigtail or connector receptacle
- Optional collimator or focuser on the pigtail output
- Guaranteed lifetime: 18 months or 5000 hours. Extended warranty is also available

Applications:

- Confocal microscopy
- Flow Cytometry
- DNA Sequencing
- Medical Imaging
- Insertion loss measurement and attenuation measurement
- High power or remote fiber delivery systems
- Accurate fiber optic testing
- Optical component manufacturing and testing
- Materials evaluation and testing
- RGB illumination systems

Product Description:

The OZ-1000, OZ-2000 and OZ-3000 laser modules are temperature stabilized, fiber coupled, laser delivery systems. The compact housings contain both the laser and the temperature control, and are powered by a single 5 volt DC supply. The units have an operating temperature range of 10 - 45°C, and hold the temperature variation of the laser diode to within less than 0.01°C. This maintains the wavelength variation to better than 0.1nm, also reduces the tendency of the laser diode to mode hop, assuming no feedback into the laser cavity. The electrical interface on the OZ-1000 is located on the front face of the unit alongside the optical interface, while on the OZ-2000 and OZ-3000 it is on the rear of the unit.

The three configurations have a standard analog and TTL interface for OEM applications and an optional computer interface through USB upon request.

The units are equipped with an adjustable output power feature. The output power can be adjusted by simply changing the DC voltage on the Power Control Input. The voltage range is 0 - 5 Volts, with 0 Volts corresponding to maximum power, and 5 Volts minimum power.

The standard parts can be analog modulated at up to 100 kHz. Special versions are available from OZ Optics to cover even higher modulation frequencies, up to 150 MHz for the TTL option. Contact OZ Optics with your requirements.

A manual blocking-style attenuator can be added as an option to adjust the power. This reduces the tendency of the laser diode to change wavelength when varying power by allowing the user to keep the laser diode current constant.

An interlock feature is also standard. This enables the user to shut the unit down if a safety issue or other error condition arises. This feature can also be used as a TTL on/off control. In addition, a mechanical shutter option is available to provide the operator with extra flexibility for controlling laser output power.

The standard OZ-1000, OZ-2000 and OZ-3000 units operate the laser at a fixed temperature. OZ Optics can also provide units with a variable laser temperature, which can be used to tune the wavelength of the laser over a typical range of 2 nm. Contact OZ Optics for further information, or view the datasheet titled *Intelligent Tunable Laser Diode Source*.

Both the pigtail and receptacle style sources offer the choice of polarization maintaining, singlemode, or multimode fiber outputs and a wide range of connector or receptacle types. Also available on the fiber output is the choice of either a fiber collimator or fiber focuser.



Standard Product Specifications:

Optical Performance

AVAILABLE WAVELENGTHS ¹ (nm)																		
Wavelength (nm)	375	405	440	473	488	532	635	660	685	780	830	850	980	1060	1310	1490 ²	1550	1625
Standard Fiber Coupled Output Power (mW)	0.5	1					1				1			5				
	1.0	10					5	10		5	5	1	50	15	1		1	2
	2.0	20	5-20	3-8	8	5-20	10	20	10	10	10	5	100	50	10	1-2	10	5
	3.0	30					20	40		35	20	10	300	100	20		20	10
							40				60	60		150				
Long-term Power Stability(24 hr) ³	<3%					<5%	Typically <2%								Typically <1%			
Short-term Power Stability(1 hr) ³	Typically <0.5% Better stability available as an option						Typically <0.1%								Typically <0.05%			
Polarization Extinction ratio ⁴	>18 dB						>20 dB								>23 dB			
Wavelength Stability ⁵	Typically ± 0.1 nm																	
RMS Noise (20 Hz- 20 MHz)	< 0.2% other than 532 nm																	
	< 0.5% 532 nm																	
Peak to Peak Noise (20 Hz- 20 MHz)	< 0.75% other than 532 nm																	
	< 5% 532 nm																	
Fiber Type	Singlemode, Multimode or Polarization maintaining fiber																	

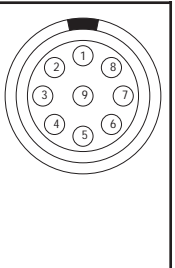
- ¹ These are standard center wavelengths. Typical tolerances vary from ± 5 nm to ± 20 nm depending on laser diode manufacturer. Contact OZ Optics if a specific wavelength is required.
- ² Other available CWDM wavelengths are: 1430, 1450nm, 1470nm, 1510nm, and 1530nm
- ³ Depends on the source wavelength, power level and other options. Refers to typical values achieved at full power over a period of 24 hours for the long-term case and 1 minute for the short-term case after 15 minutes warm up time. Tested with low return loss connector at low power laser module with no bias on power control line.
- ⁴ With polarization maintaining fiber only
- ⁵ Based on thermal stability achieved with TEC controller and optimum connector termination. Assumes absence of mode-hopping

Electrical Specifications

Power supply	5VDC
Operating Current	Typically <1.2 A for standard product, 4 A for high power
Power Consumption	<6 W typical
Warm up time	<1 min
Analog/TTL Control Interface	Via 9 Din connector, see pin configuration.
Computer interface	USB (optional)
Power control	0 to 5 V (100% - 1%)
Analog Modulation	100 kHz
TTL Modulation	155 MHz(optional)

Analog/TTL interface 9 Din connector pin out

1	Input	5VDC
2	Input	GND
3	Input	Laser ON/OFF control
4	Input	Power control (analog modulation)
5	Output	Laser status (confirm laser is working)
6	Output	Read laser current
7	Output	Read laser monitor current
8	Output	Fault status (Temp fault , over current)
9	Output	Temperature locked



Mechanical and Environmental Specifications

Dimensions	114 x 80 x 61 mm (4.50 x 3.15 x 2.40 inch) (OZ 1000 & OZ 2000)
	101.6 x 50 x 38 mm (4 x 2 x 1.5 inch) (OZ 3000)
Operating Temperature	10 to 45 °C
Operating Humidity	0-95% Non-condensing
Storage temperature	0-50°C



* This module sold for OEM applications; purchaser is responsible for compliance with all safety regulations.

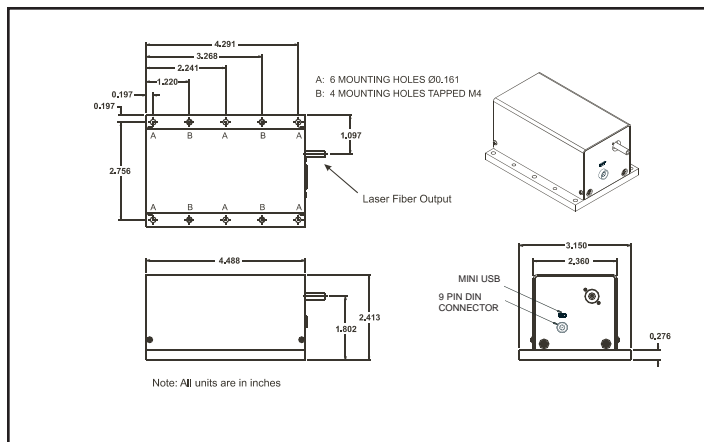


Figure 1: Pigtail style OZ-1000

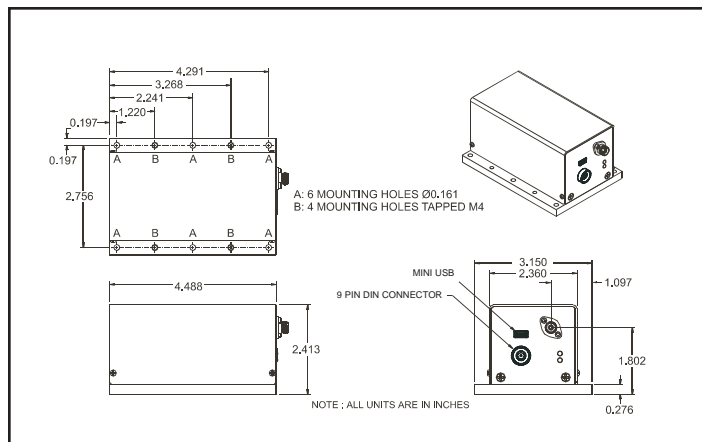


Figure 2: Receptacle style OZ-1000

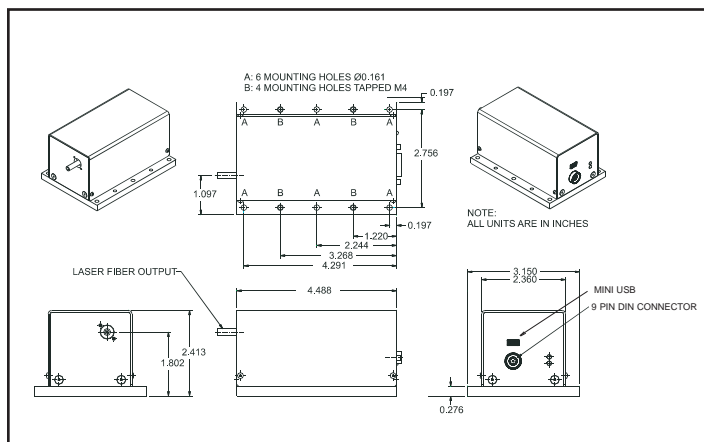


Figure 3: Pigtail style OZ-2000

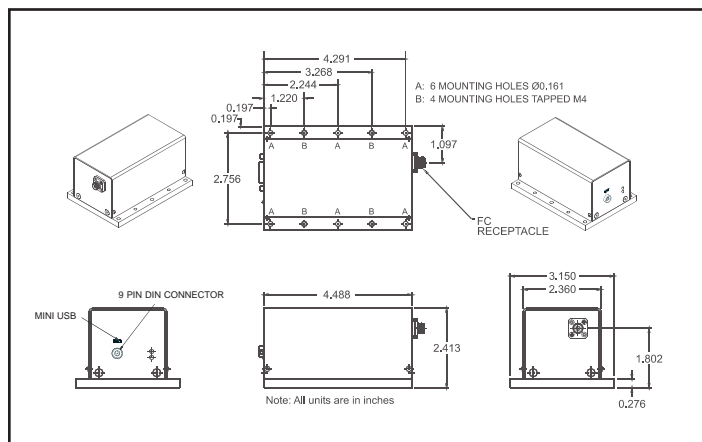


Figure 4: Receptacle style OZ-2000

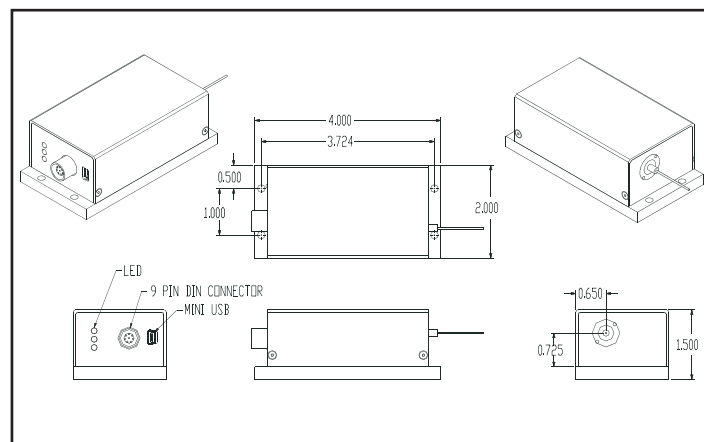


Figure 5: Pigtail style OZ-3000

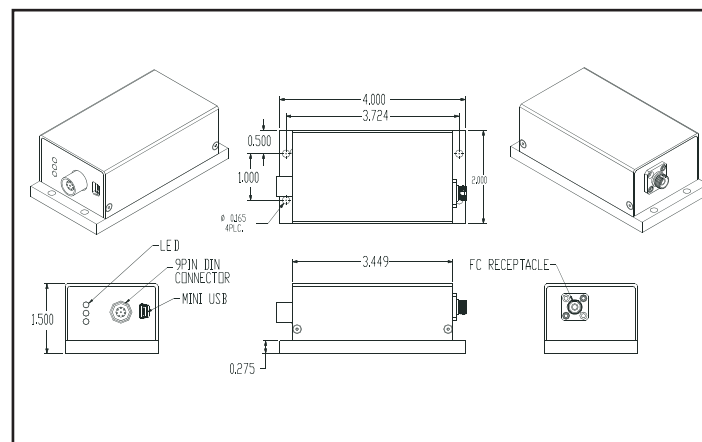


Figure 6: Receptacle style OZ-3000

Warranty And Lifetime

18 months or 5000 hours, whichever comes first when operated under the environmental conditions as stated above. Not applicable for wavelengths less than 600nm, for which the manufacturer's warranty for appropriate laser diodes will apply. The warranty does not apply for damage to exposed fiber or connectors. Please consult OZ Optics for extended warranty for up to 5 years.

Laser Eye Safety



Warning: Up to class 3b product. Read and follow the appropriate laser safety warnings. Avoid direct exposure to the eyes and implement a level of laser safety that is appropriate for this class of laser as serious injury can result from improper use.

Description:
Pigtail Style Source

Part Number
OZ-N000-W-a/b-F-LB-X-JD-L-P

N = 1000 for electrical & optical connections in same front panel
2000 for electrical connection on rear panel & optical connection on front panel
3000 compact version

W = Wavelength ¹: 375, 405, 440, 473, 488, 532, 635, 660, 685, 780, 830, 850, 980, 1060, 1310, 1490, 1550, 1625.

a/b = Fiber size: core/cladding diameters (in μm): (see tables 1 to 5 in the Standard Tables data sheet)

F = Fiber type: M = Multimode Fiber
S = Singlemode Fiber
P = Polarization Maintaining Fiber

LB = Backreflection level ²:
35 = 35dB return loss (MM only)
40 = 40dB return loss (SM & PM)
60 = 60dB return loss (SM & PM - 1300/1550nm only)

P = Output power available from the fiber end, in mW ³

L = Fiber length (in meters)

JD = Jacket Diameter:
1 = 900 μm jacketed fiber
3 = 3mm OD Kevlar jacketed fiber
3A = 3mm OD black armored cable
3AS = 3mm OD Stainless Steel armored cable
5A = 5mm OD black armored cable
5AS = 5mm OD Stainless Steel armored cable

X = Connector type: 3 = FC/PC
3S = Super FC/PC
3A = Angled FC/APC
5 = SMA905
8 = AT&T-ST
SC = SC or ultra SC
SCA = Angled SC
EA = Angled E2000
LC = LC connector
For other connector types contact OZ Optics.

Description:
Receptacle Style Source

Part Number
OZ-N000-X-a/b-W-F-P

N = 1000 for electrical & optical connections in same front panel
2000 for electrical connection on rear panel & optical connection on front panel
3000 compact version

X = Connector Receptacle:
2.5U = 2.5mm universal receptacle (for FC, ST, or SC).
3S = Super FC/PC
3A = Angled FC/APC
5 = SMA905
8 = AT&T-ST
SC = SC
SCA = Angled SC

P = Output power ³:
Output power available from the receptacle

F = Fiber type: M = Multimode Fiber
S = Singlemode Fiber
P = Polarization Maintaining Fiber

W = Wavelength ¹: 375, 405, 440, 473, 488, 532, 635, 660, 685, 780, 830, 850, 980, 1060, 1310, 1490, 1550, 1625.

a/b = Fiber size: core/cladding diameters (in μm): (see Tables 1 to 5 in the Standard Tables data sheet)

1 These are standard center wavelength values. The tolerance may vary depending on both wavelength and the laser diode manufacturers' tolerances. (Typical tolerances vary from $\pm 5\text{nm}$ to as high as $\pm 30\text{nm}$).

2 The backreflection specification refers to the reflected signal strength relative to the output power seen by the laser diode from internal reflections. It does not include external sources of reflection, including those from the connector at the end of the fiber. To minimize external reflections, OZ Optics recommends using angle polished FC/APC or SC/APC connectors. Backreflection values are limited by the wavelength and fiber type selected. Other backreflection levels may be possible. Please contact OZ for further information.

3 Note that due to variations in the optical characteristics of the laser diodes available, not all output powers are available at every wavelength for every fiber type. For wavelengths below 750nm, we recommend pigtail style to eliminate connection loss at the receptacle interface.

Options: Add "-ISOL" if an optical isolator is required (Please note that this option is only available for the 1300 to 1625nm wavelength range).
Add "-SH" For shutter.
Add "-TTL" For up to 155MHz modulation.
Add "-CSP" For customer supplied laser diode or fiber.
Add "-USB" For computer interface.



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iFLEX-2000

The iFLEX2000™ is a compact laser diode system with a modular singlemode fiber delivery system. The laser is mode-hop free and wavelength stabilized as a direct result of active temperature control. A closed loop control provides long term power stability and an ability to monitor the power via an external output signal.

The laser module is guaranteed for long lifetime and delivers exceptional power stability with low amplitude noise. All models feature an interlock and output diagnostics for laser current and temperature as standard. Features include a high dynamic range 5MHz TTL modulation option or a variable power control via analog modulation up to 5MHz. All lasers feature diffraction limited output beams with zero astigmatism, high spatial coherence and low dynamic pointing error.

The iFLEX2000™ is compatible with a number of commercially available imaging software packages such as Olympus cell^R™, MetaMorph® and µManager and a number of add-on interfaces ensure a complete solution for all microscope systems.

The kinematic design of the laser to fiber coupler enables true 'Plug & Play' benefits for singlemode and polarization-preserving fiber designs. Sub-micron repeatability and sub-microradian stability mean systems can be 'factory set' and stable for multiple remove and insert operations. The laser and fiber systems are also optimized for unmatched laser modules thus providing true modularity for instrument design and ease of replacement.

Laser systems can be made available in constant current mode and in ultra-low noise versions. OEM options also include custom multiplexed laser modules with customer specific lasers.

Operating Wavelengths

Wavelength (nm)	405	445	473	488	640	660	670	780	830
Fixed output power (mW)	30	20	5	15	20	35	4	35	50

Technical Specifications

Operating performance	
Polarization ratio	≤ -20dB
Laser parameters	
Center wavelength	± 5nm
Power stability	< 2% (over 8 hours)
Noise (20Hz to 2MHz)	< 0.1% rms *
Noise (20Hz to 20kHz)	< 1% pk to pk
Electrical	
Power Supply	12V DC, 0.5A (laser)
	5V DC, 3A max, 1 A running (TE Controller)
Max. base plate temperature	+40°C
Max. heat dissipation	12.5W
Connectorised output beam	
Polarization maintaining fiber	FCP,(polarization keyed) FCP8, APC (polarization keyed and 8 degree polished)

Fiber parameters	
Fiber length	1 to 3 meters
Fiber protective jacket	Stainless steel, 5mm OD
Collimated output beam	
Beam diameter (mm)	0.7
M squared	≤ 1.1
Pointing stability	≤ 1µrad/°C
Beam divergence	Diffraction limited
Mechanical dimensions	Ø12 x 50mm
Beam position (mm)	≤ ±0.15
Beam angle (mrad)	≤ ±0.5
Environmental conditions	
Storage temperature	10 to 50 °C
Operating pressure	Atmospheric
Operating temperature	10 to 40 °C
Operating humidity	Non-condensing
Modulation	
Analog	5MHz, <200ns rise time, input voltage level 0 - 5V

*Model specific - contact Point Source for clarification

Order code: iFLEX2000 -

Fiber type, (P)olarization maintaining

Fiber length (m)

Laser Wavelength (nm)

Output termination 0.7, FCP, FCP8, APC

Output power (mW)

Modulation Options (-A=Analogue) (-T=TTL)

(-N=CW) (-NP=CW with power control)



PSM1002_6

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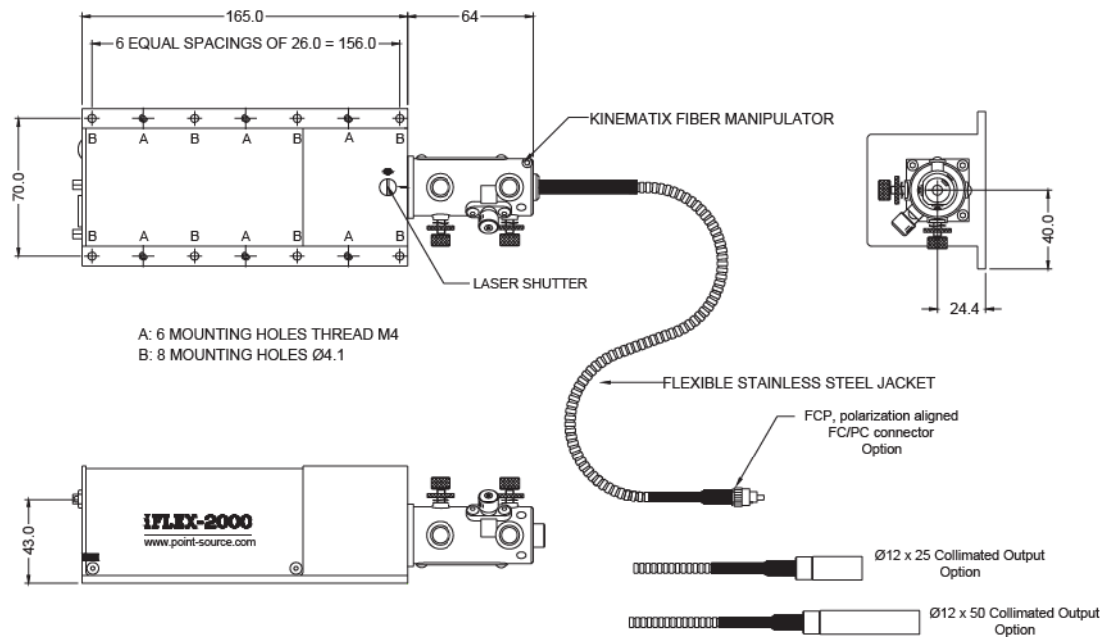
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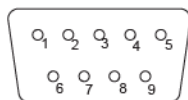
iFLEX-2000



Laser head



Electrical interface



1. 5V \pm 5% DC/3A (Temperature controller)
2. 12V \pm 5% DC/0.5A (Laser driver)
3. Laser enable; 4-5V to enable, <1.2V to disable
4. Temperature OK signal, TTL logic level output (high = temperature locked)
5. External current control (0V fully on; 5V fully off)
6. 0V Temperature controller
7. 0V Laser driver
8. Diode operating current output; (Vop is scaled 10mV/mA laser diode current)
9. Monitor photodiode output (uncalibrated)

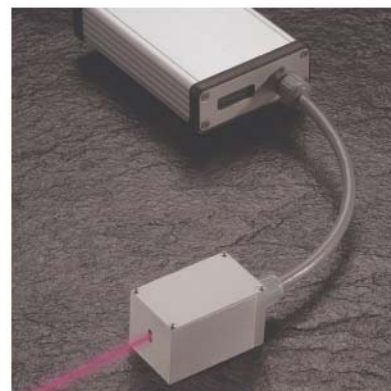


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iFLEX-Q3

The iFLEX-Q3™ is a compact laser diode module with a small form laser head and remote electronics module. The laser is mode-hop free and wavelength stabilized as a direct result of active temperature control. A closed loop control provides long term power stability and an ability to monitor the power via an external output signal.

The diode laser system is guaranteed for long lifetime and delivers exceptional power stability with low amplitude noise. All models feature an interlock and output diagnostics for laser current and temperature as standard.

All lasers feature diffraction limited collimated output beams with elliptical profiles as standard. Customised options for circular beam profiles are available. A feature of this laser is low dynamic pointing error and precise static beam alignment tolerances.

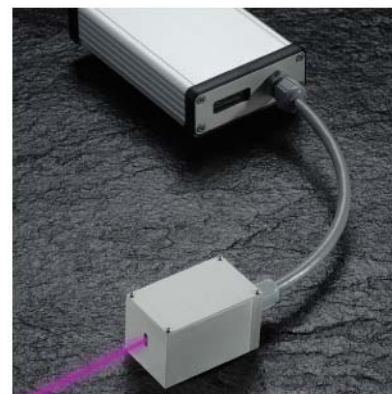
The iFLEX-Q3™ is compatible with a number of commercially available imaging software packages such as Olympus cell^R™, MetaMorph® and µManager and a number of add-on interfaces ensure a complete solution for all microscope systems.

The laser has been designed for integrated measurement applications where a small optical head is required to deliver an exceptionally stable and precise laser beam. The highly polarized nature of the beam makes the laser ideal for scatter and reflection based measurement such as ellipsometry. Models at 375, 405, 445, 473, 640, 660, 670, 780 and 830 nm deliver exceptional brightness and reliability for optical media inspection applications.

Technical Specifications

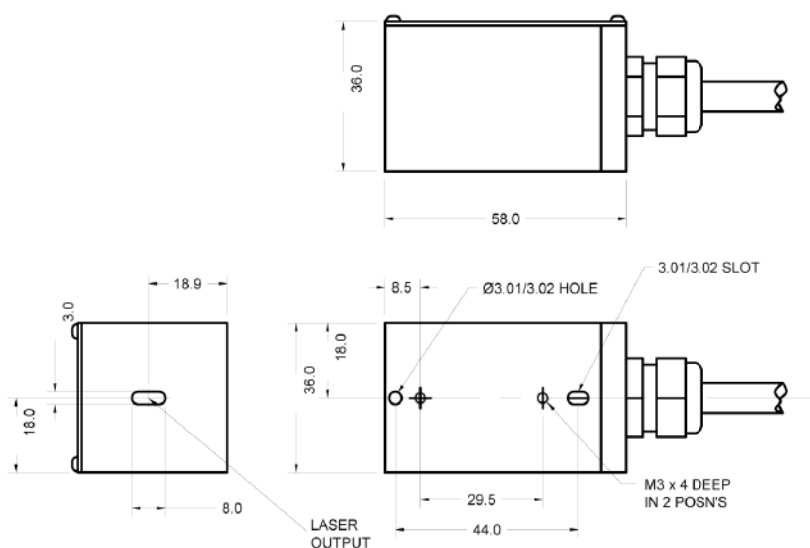
Lasers										units
Wavelength	375 ^a	405 ^b	445 ^a	473 ^a	640 ^c	660 ^c	670 ^a	780 ^d	830 ^d	nm
Output power	15	50	40	10	35	60	8	60	100	mW
Centre wavelengths	± 5									nm
Optical power stability	< 2% (over 8 hours)									-
Optical noise (20Hz to 2MHz)	< 0.1%rms									-
Laser beam parameters										
Polarisation ratio	≤ -27									dB
Beam diameter	^a 2.2 (vertical) x 0.7 (horizontal) ^b 2.1 (vertical) x 0.9 (horizontal) ^c 1.6 (vertical) x 0.9 (horizontal) ^d 2.0 (vertical) x 0.9 (horizontal)									mm
M squared	≤ 1.2									-
Beam divergence	Diffraction limited									-
Beam position	≤ ±0.25									mm
Beam angle	≤ ±0.5									mrad
Pointing stability	≤ 5µrad/°C									-
Mechanical, electrical and environmental										
Dimensions (laser head)	36 x 36 x 58									mm
Power supply (laser)	12 V DC, 0.5A									-
Power supply (TE controller)	5 V DC, 3A max, 1A running									-
Max. base plate temperature	+ 40									°C
Max. heat dissipation	12.5									W
Storage temperature	10 to 50									°C
Operating pressure	Atmospheric									-
Operating temperature	10 to 40									°C
Operating humidity	Non-condensing									-

iFLEX-Q3



Laser head

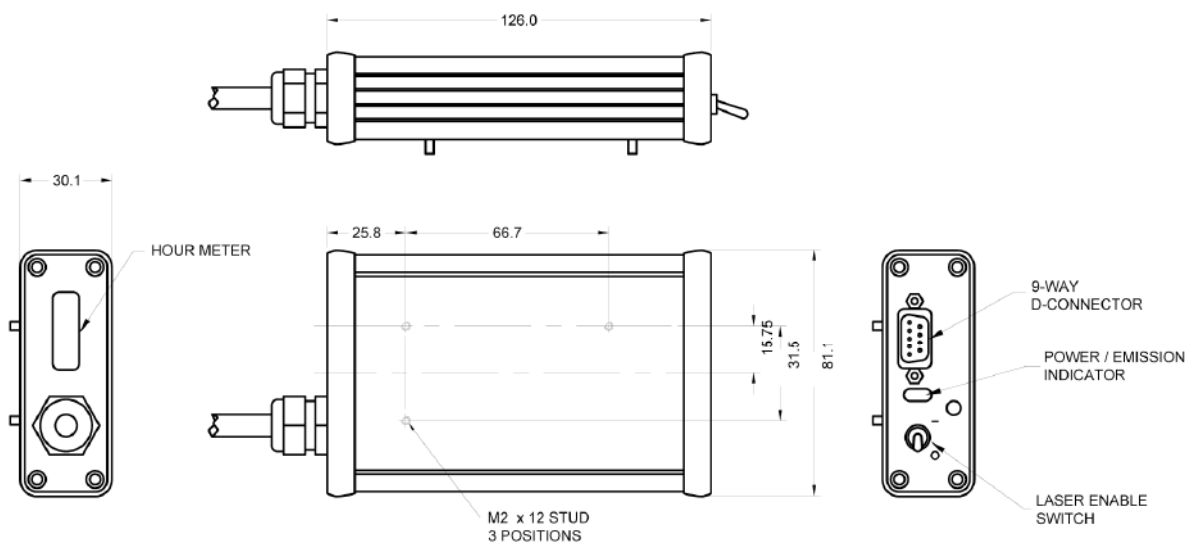
Electrical interface



9 way 'D' pin connections

1. 5V \pm 5% DC / 3A (Temperature Controller)
2. 12V \pm 5% DC / 0.5A (Laser Driver)
3. Laser Enable; 4.0V to 5.0V to enable, <1.2V or floating to disable
4. Temperature OK signal, TTL logic level output (high = Temperature locked)
5. External Current Control (0V fully on; 5V fully off)
6. 0V Temperature Controller
7. 0V Laser Driver
8. Diode Operating Current Output (Readout Vop is scaled to 10mV/mA laser diode current)
9. Monitor Photodiode Output (un-calibrated)

Laser controller





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iFLEX-Mustang

The iFLEX-Mustang™ is a fiber-coupled solid-state laser system with on-board acousto-optic modulation. The system operates at 488 or 561nm and delivers 25mW of power from a singlemode fiber with a polarization extinction ratio of greater than 100:1.

The iFLEX-Mustang™ is supplied with the Point Source kineFLEX™ fiber delivery system which enables true 'Plug & Play' benefits with both sub-micron and sub-microradian repeatability and stability. The kineFLEX™ fiber features diffraction-limited output beams with zero astigmatism, high spatial coherence and low dynamic pointing error. The perfect TEM₀₀ output beam is available with the option of collimated, divergent, circular or elliptical beams profiles.

The iFLEX-Mustang™ is manufactured with an on-board acousto-optic modulator operating in first order to ensure a modulation dynamic range of 30dB, modulation speed of 3 MHz and a rise and fall time of 350 ns.

The iFLEX-Mustang™ is compatible with a number of commercially available imaging software packages such as Olympus cell[^]R™, MetaMorph® and µManager and a number of add-on interfaces ensure a complete solution for all microscope systems.

With an operating wavelength of 488 or 561nm the iFLEX-Mustang™ is ideal for use in biomedical instrumentation including confocal microscopes, flow cytometers and DNA sequencers and is also suitable for demanding specialised semiconductor metrology.

Technical Specifications

Laser module				units
Wavelength	488	532	561	nm
Fiber coupled power	25	25	25	mW
Optical noise (20Hz to 2MHz)	< 0.3			%
Optical power stability	< 2% (over 4 hours)			-
Modulation speed	Upto 3MHz <350ns risetime, input voltage level 0-5V with a dynamic range of 30dB			-
Centre wavelengths	± 5			nm
Fiber delivery system				
Polarisation ratio	≤ -20			dB
Output termination	0.7 mm collimated, FCP, FCP8 or APC connectors			-
M squared	≤ 1.1			-
Beam divergence	Diffraction limited			-
Beam position (collimated beam)	≤ ± 0.15			mm
Beam angle (collimated beam)	≤ ± 0.5			mrad
Fiber protective jacket	Stainless steel, 5 mm OD			-
Fiber length	1, 2 or 3			m
Environmental				
Max. base plate temperature	+ 40			°C
Storage temperature	10 to 50			°C
Operating pressure	Atmospheric			-
Operating temperature	10 to 40			°C
Operating humidity	Non-condensing			-
Warranty				
5000 hours or 12 months (whichever comes sooner)				

iFLEX-Mustang



Order code: iFLEX-Mustang

Fiber type, (P)olarization maintaining

Fiber length (m)

Laser Wavelength (nm)

Output termination 0.7, FCP, FCP8, APC

Output power (mW)

