

Operator's Manual
Diode LabLaser
Universal Power Supply

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Technical Support

In the US:

Should you experience any difficulties with your laser or need any technical information, please visit our web site www.Coherent.com. Additional support can be obtained by contacting our Technical Support Hotline at 800-367-7890 (408-764-4557 outside the U.S.) or E-mail (clg.tech.services@Coherent.com). Telephone coverage is available Monday through Friday (except U.S. holidays and company shutdowns).

If you call outside our office hours, your call will be taken by our answering system and will be returned when the office reopens.

If there are technical difficulties with your laser that cannot be resolved by support mechanisms outlined above, please E-mail or telephone Coherent Technical Support with a description of the problem and the corrective steps attempted. When communicating with our Technical Support Department, via the web or telephone, the model and Laser Head serial number of your laser system will be required by the Support Engineer responding to your request.

Outside the U.S.:

If you are located outside the U.S. visit our web site for technical assistance or contact, by phone, our local Service Representative. Representative phone numbers and addresses can be found on the Coherent web site, www.Coherent.com.

Coherent provides telephone and web technical assistance as a service to its customers and assumes no liability thereby for any injury or damage that may occur contemporaneous with such services. These support services do not affect, under any circumstances, the terms of any warranty agreement between Coherent and the buyer. Operation of any Coherent laser with any of its interlocks defeated is always at the operator's own risk.

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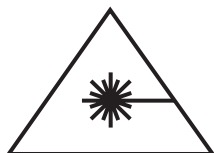
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Preface

This manual contains user information for the Diode LabLaser Universal Power Supply.



Read this manual carefully before operating the laser for the first time. Special attention should be given to the material in Laser Safety section, which describes the safety features built into the laser.



Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

U.S. Export Control Laws Compliance

It is the policy of Coherent to comply strictly with U.S. export control laws.

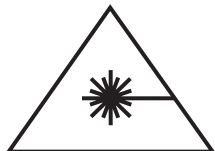
Export and re-export of lasers manufactured by Coherent are subject to U.S. Export Administration Regulations, which are administered by the Commerce Department. In addition, shipments of certain components are regulated by the State Department under the International Traffic in Arms Regulations.

The applicable restrictions vary depending on the specific product involved and its destination. In some cases, U.S. law requires that U.S. Government approval be obtained prior to resale, export or re-export of certain articles. When there is uncertainty about the obligations imposed by U.S. law, clarification should be obtained from Coherent or an appropriate U.S. Government agency.

Symbols Used in This Document



This symbol is intended to alert the operator to the presence of important operating and maintenance instructions.



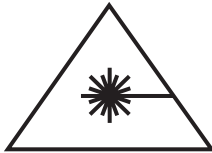
This symbol is intended to alert the operator to the danger of exposure to hazardous visible and invisible laser radiation.



This symbol is intended to alert the operator to the danger of Electro-Static Discharge (ESD) susceptibility.

LASER SAFETY

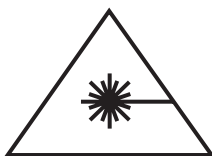
Laser light, because of its special properties, poses safety hazards not associated with light from conventional sources. The safe use of lasers requires that all laser users and everyone near the laser system are aware of the dangers involved. The safe use of the laser depends upon the user being familiar with the instrument and the properties of coherent, intense beams of light.



Direct eye contact with the output beam from the laser will cause serious damage and possible blindness.

Laser beams can ignite volatile substances such as alcohol, gasoline, ether and other solvents, and can damage light-sensitive elements in video cameras, photomultipliers and photodiodes. Reflected beams may also cause damage. For these reasons, and others, the user is advised to follow the precautions below.

1. Observe all safety precautions in the user's manual.
2. Extreme caution should be exercised when using solvents in the area of the laser.
3. Limit access to the laser to qualified users who are familiar with laser safety practices and who are aware of the dangers involved.
4. Never look directly into the laser light source or at scattered laser light from any reflective surface. Never sight down the beam into the source.
5. Maintain experimental setups at low heights to prevent inadvertent beam-eye encounter at eye level.



Laser safety glasses can present a hazard as well as a benefit. While they protect the eye from potentially damaging exposure, they block light at the laser wavelengths, which prevents the operator from seeing the beam. Therefore, use extreme caution even when using safety glasses.

6. As a precaution against accidental exposure to the output beam or its reflection, those using the system should wear laser safety glasses as required by the wavelength being generated.

7. Use the laser in an enclosed room. Laser light will remain collimated over long distances and therefore presents a potential hazard if not confined.
8. Post warning signs in the area of the laser beam to alert those present.
9. Advise all those using the laser of these precautions. It is good practice to operate the laser in a room with controlled and restricted access.

Laser Safety Precautions

1. This product is classified as a Class 3R or Class IIIB laser according to the CDRH/IEC standards. Reference the label attached to the front page for exact classification.
2. Since a laser beam can be damaging to the eyes, DO NOT look into the laser aperture when the laser is in operation. The power supply part #31-1050-000 emission indicator shows when the laser is on.
3. Be aware that laser light can also be dangerous when reflected off a mirror-like surface.
4. For further safety information regarding lasers, refer to ANSI-Z1 36.1 STANDARD FOR THE SAFE USE OF LASERS, available from the Laser Institute of America, phone 407-380-1553.



CAUTION: Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure.

5. **SHUTTER:** On the LabLaser a special shutter feature is incorporated into the front of the module housing. The shutter is to provide a mechanical means of blocking the laser beam. The thumb switch is used to engage the shutter into the closed or open position. **The VLM2 does not have the shutter feature; it is therefore not CDRH-compliant. It is the customer's responsibility to follow the appropriate guidelines to achieve compliance.**
6. Laser modules are not to be used with the part #31-1001-000 power supply. For CDRH compliance, the LabLaser must be used with the part #31-1050-000 power supply that offers the safety features of the emission indicator, key switch, delay, and interlock.

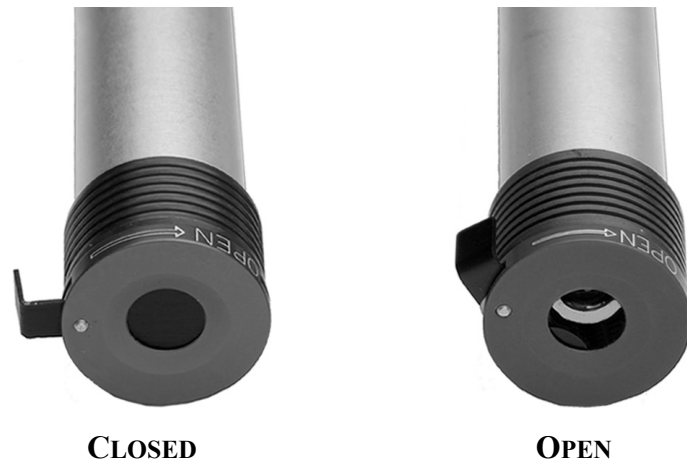


Figure 1. LabLaser Shutter

Electrical Safety Precautions

The LabLaser Universal Power Supply contains hazardous voltages. Do not disassemble the enclosure. There are no user-serviceable components inside. All units are designed to be operated as assembled. Warranty will be voided if the enclosure is disassembled.

CE MARK



Applicable EEC Directives:
89/336,92/31,93/68

Applicable Standards:
Generic Emission EN 50081-1
Generic Immunity EN 50082-1

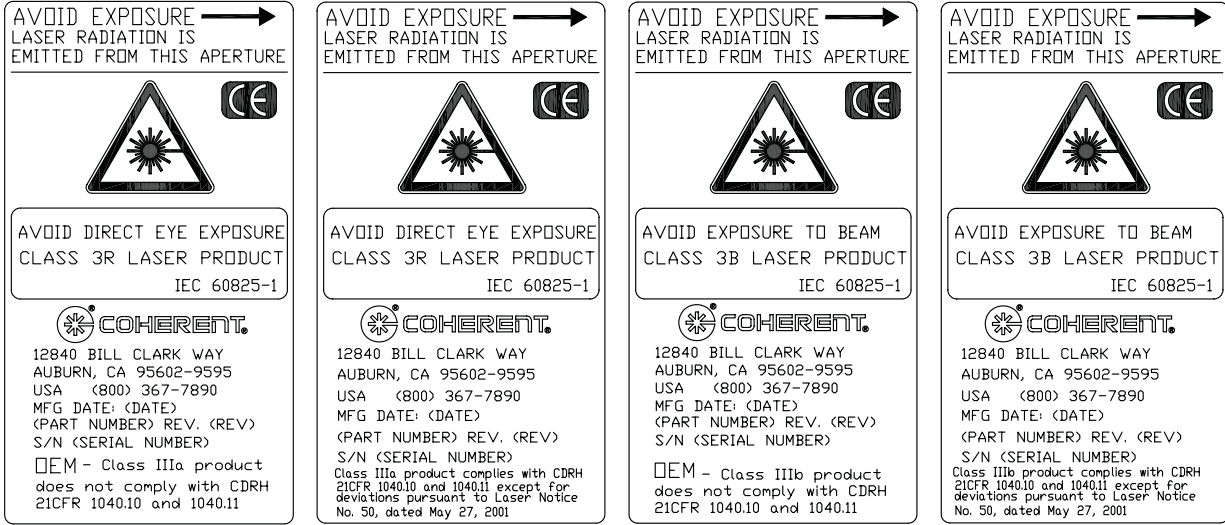


Figure 2. Laser Class Labels



Caution: ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and equipment and can easily discharge without detection. Although the LabLaser features impressive input protection, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation.

DESCRIPTION AND SPECIFICATIONS

Continuous Wave (CW) vs. Modulation & Variable Power (MVP)

Coherent offers systems that are either continuous wave (CW) or have modulation and variable power (MVP).

The CW system does not include a control input and the power is fixed at its rated output. The following pages describe the installation and operation of the LabLaser products with MVP. All references to power control or modulation features and instructions do not apply to CW lasers.

LabLaser Universal Power Supply

The LabLaser Universal Power Supply, part #31-1050-000, is a complete system used to power the Coherent Diode LabLaser and VLM2, as well as other laser module systems. The power supply is equipped with a laser emission indicator, key switch, interlock, and five-second delay to allow the system to be CDRH-compliant for Class IIIa and IIIb lasers.

Specifications

Table 1 describes the specifications of the LabLaser Universal Power Supply.

Table 1. LabLaser Universal Power Supply Specifications

PARAMETER	DESCRIPTION
Model	Coherent part #31-1050-000
Input	90-130 V or 180-260 VAC, 80/40 mA, 50/60 Hz IEC 320 input connector located on the back panel; the voltage selection switch is located on the bottom of the unit.
Output	6 VDC regulated, 250 mA, 5-second delay 3.5 mm stereo jack located on the front panel
Interlock	RCA jack located on back panel Enabled: RCA plug installed with short circuit the power supply output Disabled: RCA plug installed with an open circuit the power supply output
Key switch	Front panel key switch, key is non-removable when in ON position (1), removable in the OFF position (0)
Start Up	Smooth start
Control	Control knob located on front panel; approximately 10 turn

Table 1. LabLaser Universal Power Supply Specifications (Continued)

PARAMETER	DESCRIPTION
Indicator	Green LED, illuminates when supply is ON
Weight	0.38 kg (0.83 lb.)
Size	See Figure 3, "LabLaser Universal Power Supply Dimensions"

Dimensions

Figure 3 shows the dimensions of the LabLaser Universal Power Supply.

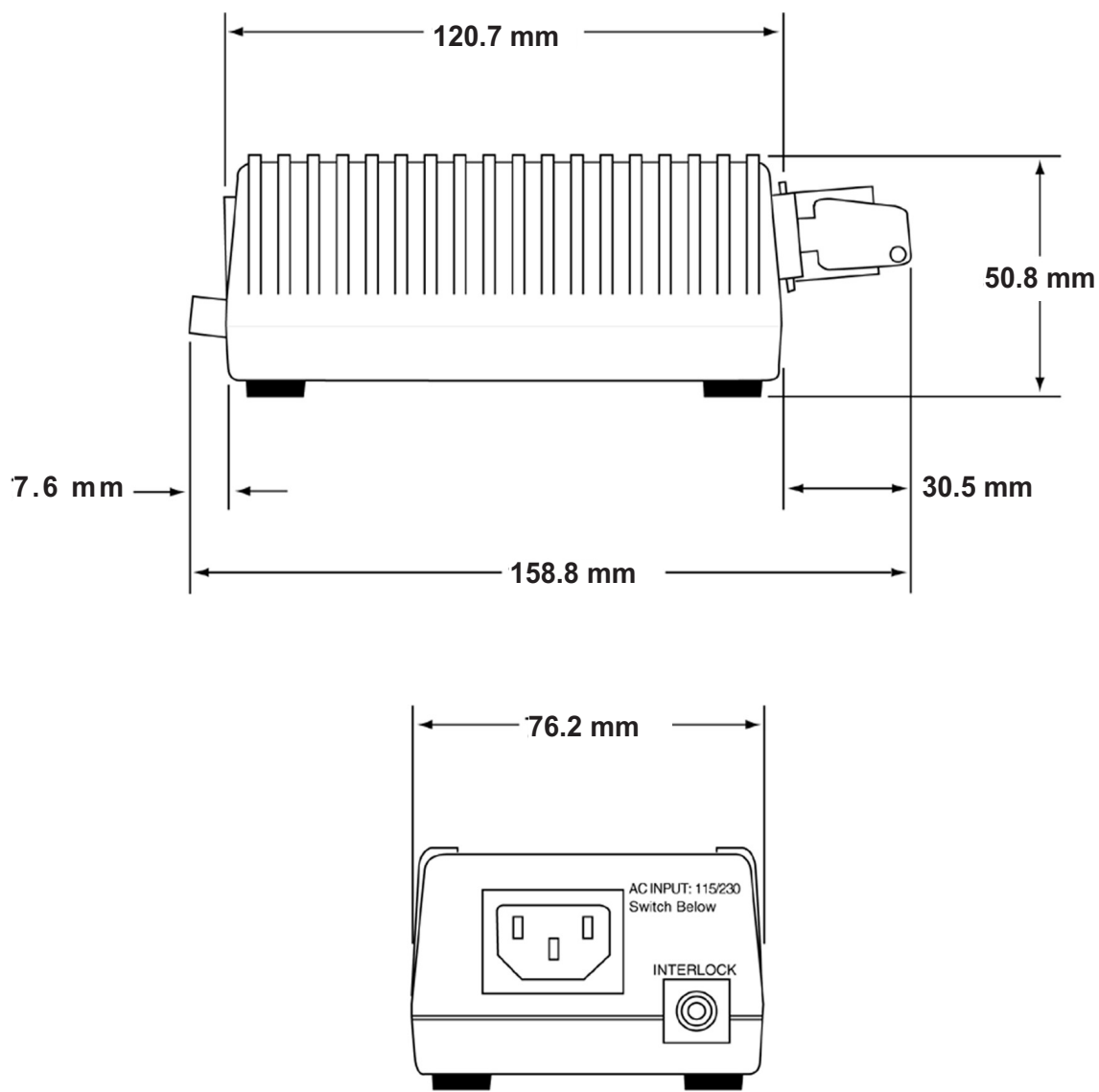


Figure 3. LabLaser Universal Power Supply Dimensions

Modulation Interface Cable

An external signal (see Figure 4) can be used to control the laser power. The signal can be connected to the laser with the optional interface cable, part #31-1068-000.



Figure 4. Interface Cable, Part #31-1068-000

Description and Specifications

Table 2 describes the description and specifications of the interface cable.

Table 2. Interface Cable

LASER: PHONO JACK	SIGNAL NAME	POWER SUPPLY: PHONO PLUG	MODULATION INPUT: BNC JACK
Case	Ground	Case	Case
Center	Control (MOD. IN)	N/C	Center Pin
Tip	+6 VDC	Tip	No Connection (NC)



Note: The front panel variable power knob will not function with the interface cable installed. An offset voltage will need to be applied to the BNC jack to vary the power. To use the front panel knob connect the laser directly into the power supply without the interface cable.

Do not allow voltages greater than ± 14 volts to come in contact with the Control Input of the MVP Laser. Take ESD precautions to insure that no static discharge damage occurs to the laser.

Do not connect the BNC center pin with the center of the Power Supply Plug. Damage to the power supply and the external control generator may occur if the two outputs are connected together.

Connector Plug

The connector plug (part #1057734) via the Modulation Interface Cable is a feature standard to all Coherent LabLasers, but is not included with the VLM2 or the power supply alone and must be purchased separately. The connectors are shown in Figure 5.

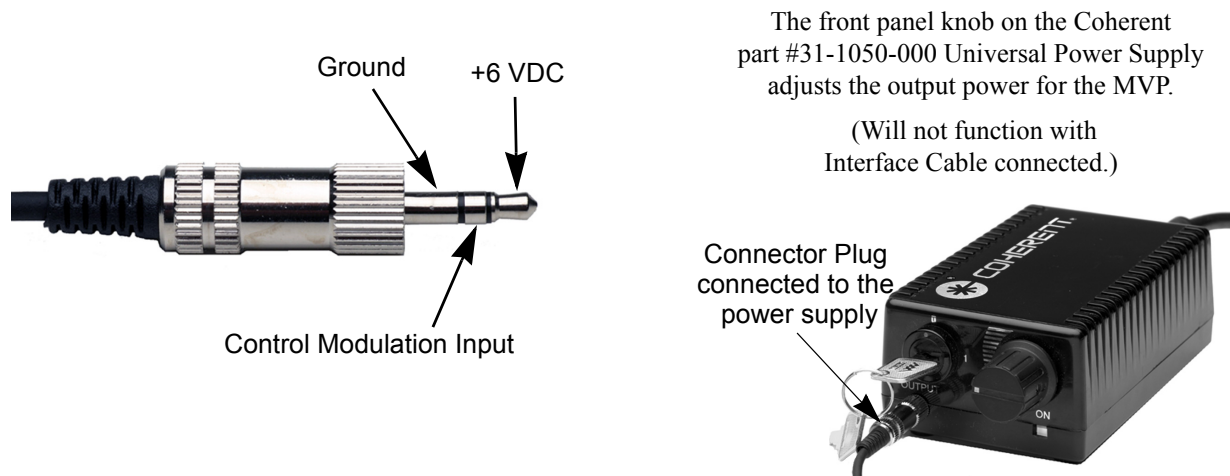


Figure 5. Connector Plug, Part # 1057734

INSTALLATION

Installing the Power Supply

Tools and Materials Required

- Laser module mounted to the appropriate heat sink
- LabLaser Universal Power Supply
- Power cord
- Interface cable, part #31-1068-000 (optional)
- Customer-supplied Function Generator (optional)

Steps

1. Confirm that the key switch on the power supply is in the OFF position (Figure 6).



Figure 6. Key Switch

2. Confirm that the voltage selection switch on the bottom of the power supply is set to the correct line voltage, either 115V or 230V (Figure 7).
3. Peel off the voltage-warning label. This label is only attached on the outside edges of the power supply (Figure 8).
4. Plug the power cord into the back panel of the power supply (Figure 9).

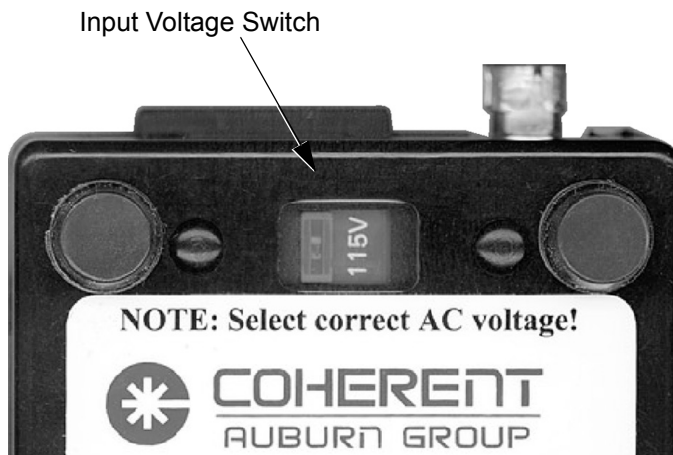


Figure 7. AC Voltage Selection (115 V or 230 V)



Figure 8. Voltage Warning Label

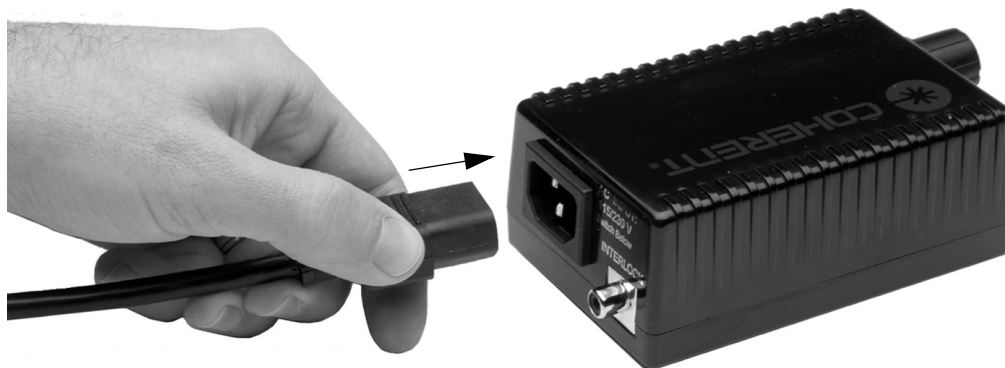


Figure 9. Power Cord

5. Connect the appropriate interlock to the interlock input (Figure 10).

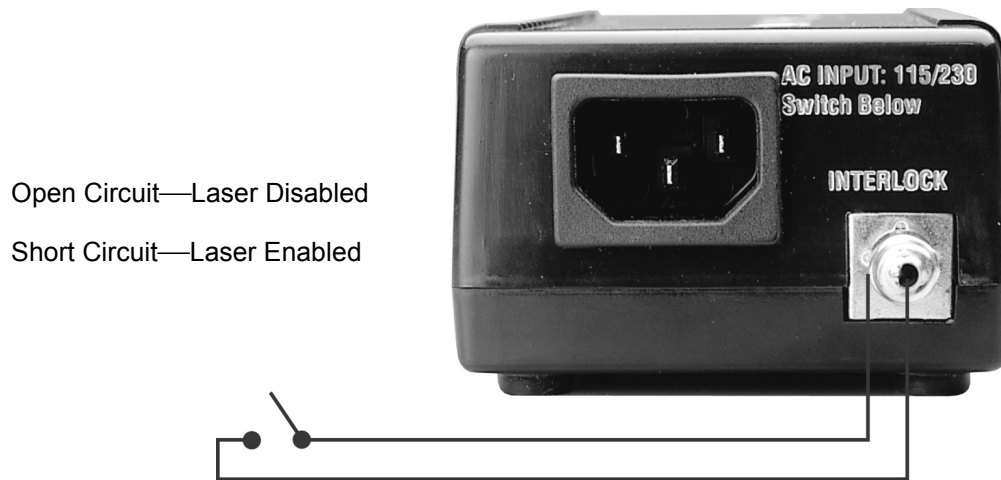


Figure 10. Remote Interlock Switch Wiring

- a. To enable the power supply for remote operation, wire the external interlock switch into the interlock input (Figure 10).

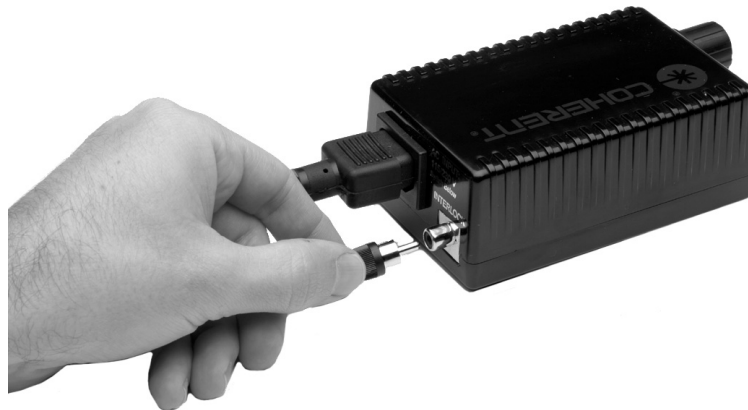


Figure 11. Defeated Safety Interlock with Shorting Plug

- b. To defeat the remote interlock feature, connect the factory-supplied interlock connector (a shorted RCA jack) (Figure 11 and Figure 12).

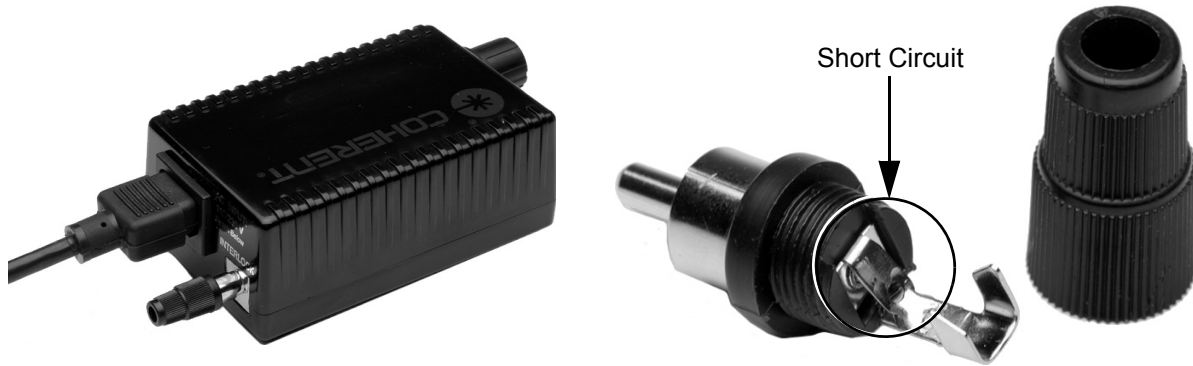


Figure 12. Defeated Interlock Connector with Short Circuit

3. If connecting the module to a function generator via the interface cable (shown in Figure 4), follow steps 6a to 6c. If not, go to step 7.
 - a. Connect the interface cable to the laser via the phono jack.
 - b. Connect the phono plug to the power supply.
 - c. Connect the BNC jack to the function generator, as shown in Figure 14.
4. If not using a function generator, connect the laser module cable directly to the front of the power supply, as shown in Figure 13.

Installing the shorting plug with the short circuit will bypass the remote interlock feature.

The power supply is now ready for operation.



Figure 13. LabLaser Direction Connection to the Power Supply

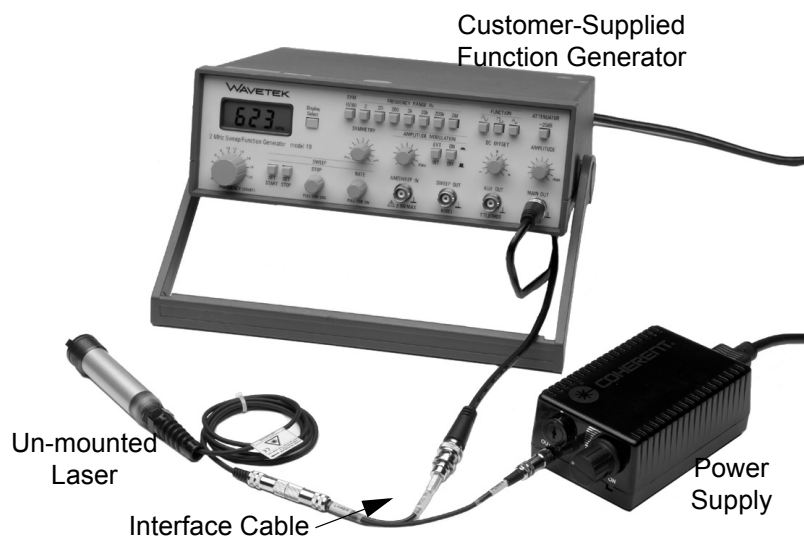


Figure 14. Interface Cable Installation Parts Connected for External Control and Modulation

OPERATION

Turn the Power Supply ON

Steps

1. Rotate the key switch into the ON position (Figure 15). The green LED on the front panel will illuminate to indicate that the power supply is active.

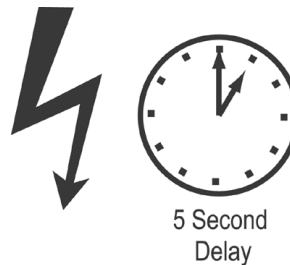


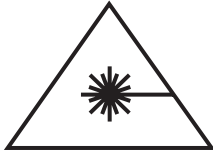
Figure 15. Power Supply Keyswitch ON Position

2. There will be a 5-second delay before the laser module activates. After 5 seconds elapse, the laser light will illuminate from the laser module aperture.



A break in the interlock circuit, an interruption on the line input, or turning the key off-on will cause the 5-second delay to be re-activated.





Direct eye contact with the output beam from the laser may cause serious damage and possible blindness.

3. The front panel knob on the power supply adjusts the output power (Figure 16).



Figure 16. Laser Output Power Control



CDRH-compliant lasers without shutters (such as the VLM2) are not to be used with the Coherent Basic Power Supply, part #31-1001-000.



For CDRH compliance, these laser modules must be used with the LabLaser Universal Power Supply, part number 31-1050-000, which offers the safety features of the emission indicator, key switch, delay, and interlock.

Turn the Power Supply OFF

Steps

1. Rotate the key switch on the power supply counter-clockwise into the OFF position. The green LED on the front panel will turn off.
2. All systems are now off.

External Variable Power Control

External variable power control of the MVP laser module can be accomplished with either a variable DC voltage source (Figure 17) or a potentiometer (Figure 18). This applies to both the VLM2 and the LabLaser.

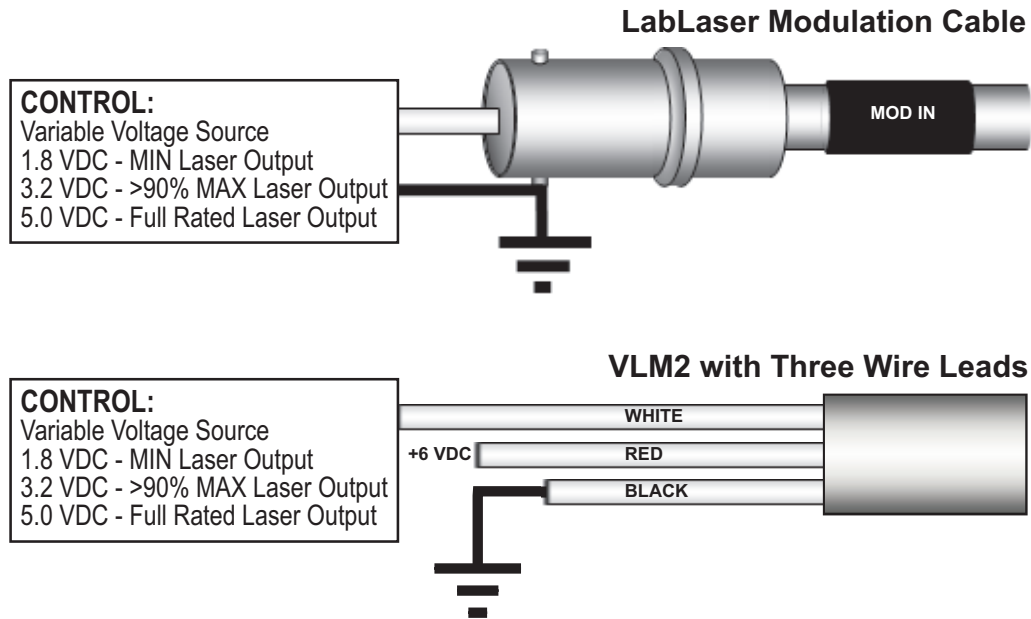


Figure 17. Variable Power with a Voltage Source

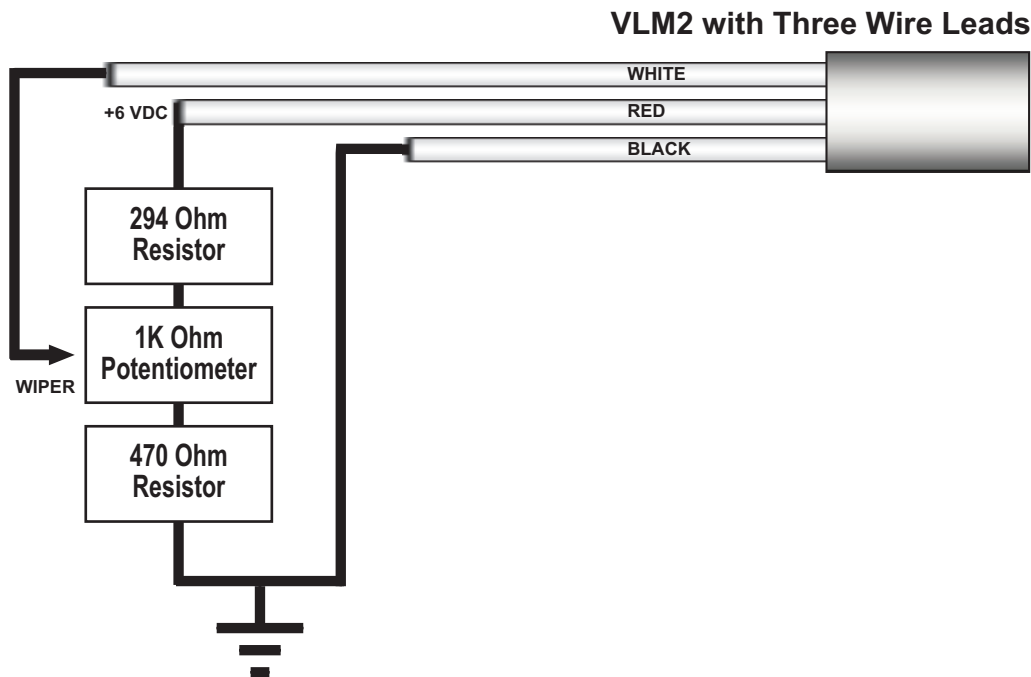


Figure 18. Variable Power with a Potentiometer

Analog Modulation of Laser Power

The MVP laser module can be modulated from an analog signal generator. This applies to both the VLM2 and the LabLaser. The signal generator must be a voltage source able to drive a 5 K Ohm load from +1.8 to +3.2 volts.

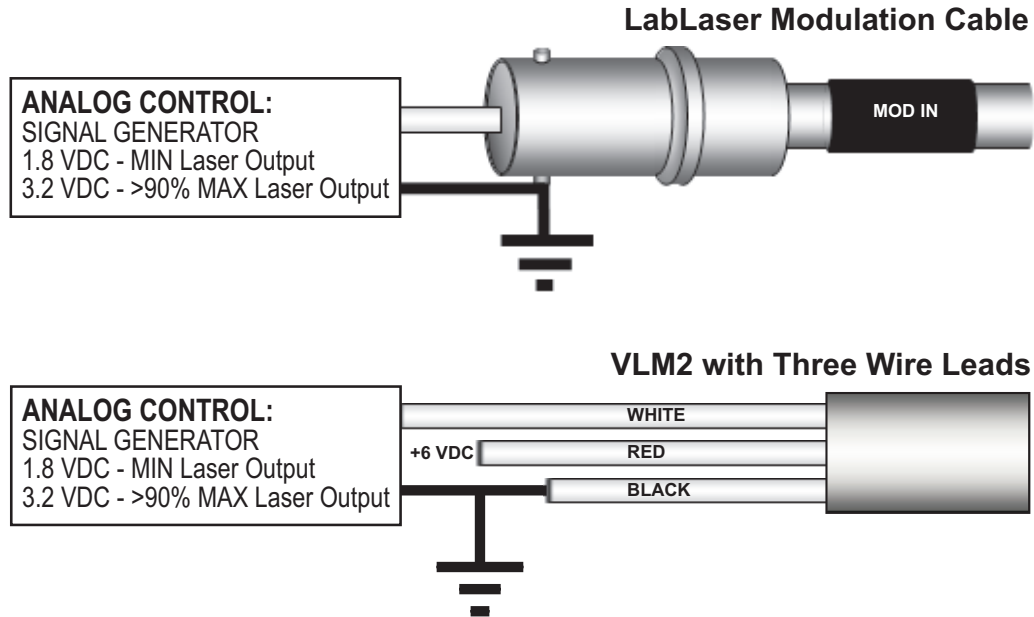


Figure 19. Analog Control

With analog modulation the output laser power will track the input voltage as shown below in an oscilloscope trace.

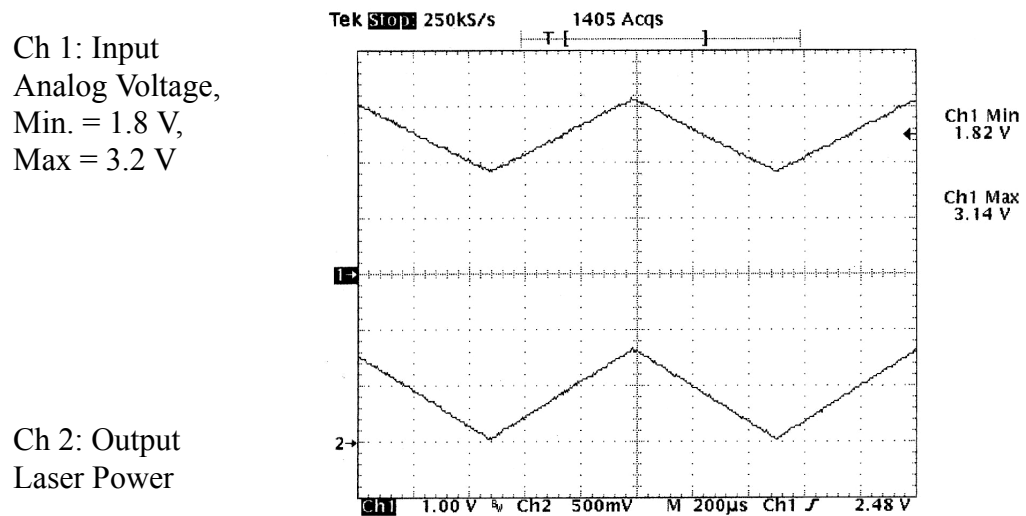


Figure 20. Analog Modulation

Digital TTL Modulation of Laser Power

With the MVP laser module, digital signal modulation can be accomplished with any TTL-compatible output signal. The TTL signal must be a voltage output able to drive a 5 KOhm load. This applies to both the VLM2 and the LabLaser.

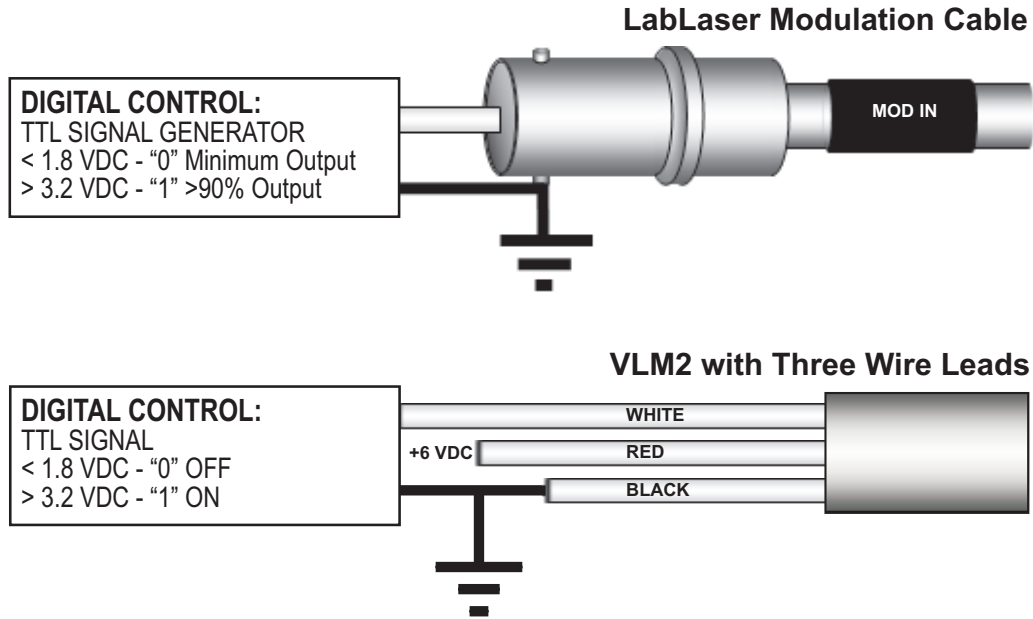


Figure 21. Digital Control

With digital modulation, the output laser power will track the input voltage in an oscilloscope trace, as shown in Figure 22.

The 490 ns delay from the rising edge of the input to the rising edge of the output can be minimized by setting the "0" level at 1.8 volts DC instead of zero volts DC, as shown in Figure 22.

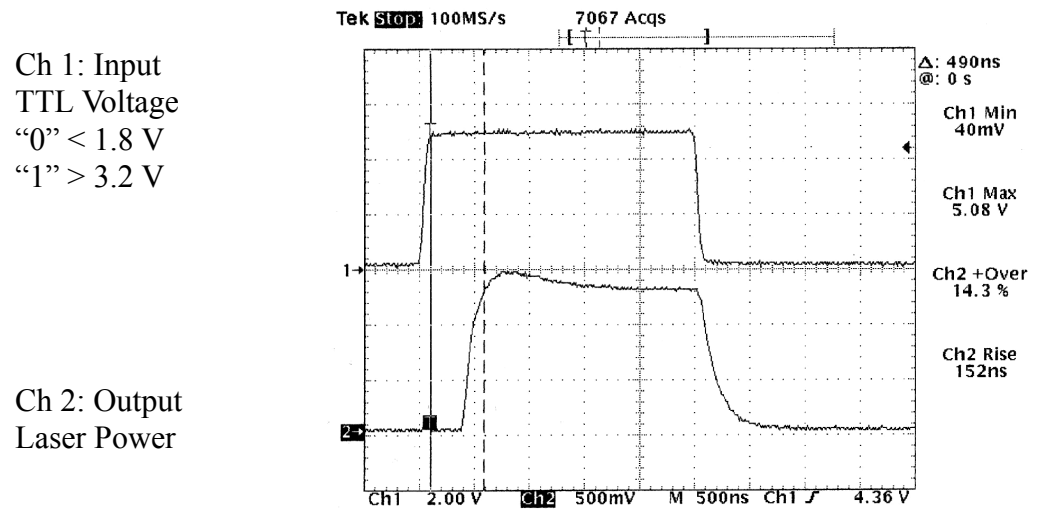


Figure 22. Digital Modulation

TROUBLESHOOTING

Troubleshooting the Power Supply

If power is not active after following the operation procedure, check the following conditions:

- Ensure that all plug connections are secure
- Ensure that the interlock circuit is closed
- Ensure that the voltage switch is in the correct position (see Figure 7). If the switch is set to 110 V and the unit is plugged into 220 V, the power supply will be damaged.

If all of these conditions are correct and power is still not flowing through the power supply, contact Coherent customer service.

WARRANTY

Coherent, Inc. warrants LabLaser laser systems to the original purchaser (the Buyer) only, that the laser system, that is the subject of this sale, (a) conforms to Coherent's published specifications and (b) is free from defects in materials and workmanship.

Laser systems are warranted to conform to Coherent's published specifications and to be free from defects in materials and workmanship for a period of twelve (12) months. Replacement units shipped within warranty, carry the remainder warranty of the failed unit.

Responsibilities of the Buyer

The Buyer is responsible for providing the appropriate utilities and an operating environment as outlined in the product literature. Damage to the laser system caused by failure of Buyer's utilities or failure to maintain an appropriate operating environment, is solely the responsibility of the Buyer and is specifically excluded from any warranty, warranty extension, or service agreement.

The Buyer is responsible for prompt notification to Coherent of any claims made under warranty. In no event will Coherent be responsible for warranty claims made later than seven (7) days after the expiration of warranty.

Limitations of Warranty

The foregoing warranty shall not apply to defects resulting from:

- Components and accessories manufactured by companies, other than Coherent, which have separate warranties
- Improper or inadequate maintenance by the Buyer
- Buyer-supplied interfacing
- Operation outside the environmental specifications of the product
- Unauthorized modification or misuse
- Improper site preparation and maintenance, or
- Opening the housing

Coherent assumes no responsibility for customer-supplied material. The obligations of Coherent are limited to repairing or replacing, without charge, equipment which proves to be defective during the

warranty period. Replacement sub-assemblies may contain reconditioned parts. Repaired or replaced parts are warranted for the duration of the original warranty period only. The warranty on parts purchased after expiration of system warranty is ninety (90) days. Our warranty does not cover damage due to misuse, negligence or accidents, or damage due to installations, repairs or adjustments not specifically authorized by Coherent.

Warranty applies only to the original purchaser at the initial installation point in the country of purchase, unless otherwise specified in the sales contract. Warranty is transferable to another location or to another customer only by special agreement that will include additional inspection or installation at the new site. Coherent disclaims any responsibility to provide product warranty, technical or service support to a customer that acquires products from someone other than Coherent or an authorized representative.

THIS WARRANTY IS EXCLUSIVE IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED, AND DOES NOT COVER INCIDENTAL OR CONSEQUENTIAL LOSS. COHERENT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

ACCESSORIES

Power Meter Accessories

Coherent offers a variety of instruments for laser test and measurement. For additional detailed information, including product selection guides, please visit our web site at www.Coherent.com.

For the most common diagnostics needs—measuring the output power of the LabLaser—Coherent recommends two different types of power meters that are ideal fits to the LabLaser product family.

First Recommendation

The product combination of the FieldMaxII - Top Power Meter and the PS10Q amplified Sensor covers the entire wavelength range at any power level. The sensor is a temperature-stabilized thermopile that was designed for measurements in the $\sim 100 \mu\text{W}$ -1 W region, called a PS10Q. We recommend the FieldMax-TOP to go with the PS10Q.

This is an affordable, versatile, easy-to-use digital meter designed for field service and production applications. The meter features an easy-to-read LCD with a backlight, and direct button-driven commands for simple, no-hassle use.



FieldMaxII - Top Power Meter	Part #1072788
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PS10Q High Sensitivity Amplified Sensors	Part #0012-4600
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**Alternative
Recommendation**

The LaserCheck™ Power Meter is a hand-held, inexpensive laser power meter specifically designed to provide power measurements in a small, lightweight, self-contained package that can easily be stored in a pocket or tool kit. With its compact size, it enables measurements in optical set-ups, where a standard detector head would not fit. With its built-in attenuator, this device is ready to measure output powers from 0.5 μ W up to 1 W.



LaserCheck Power Meter	Part #33-1553
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PARTS LIST

For complete descriptions, part numbers, and prices of these parts, contact your local Coherent representative and check Coherent's web site, www.Coherent.com.

Table 3. Parts List

DESCRIPTION	PART NUMBER
Diode LabLaser Universal Power Supply	31-1050-000
Modulation Interface Cable	31-1068-000
RCA Plug, Non-Shorted	1040408
635 and 670 nm Laser Diode Modules, VLM2	
670 nm, 0.95 mW, CW	31-0425-000
635 nm, 0.95 mW, CW	31-0441-000
670 nm, 4 mW, CW	31-0508-000
635 nm, 4 mW, CW	31-0524-000
635 nm Circular Beam Diode LabLasers	
635 nm, 4 mW, CW	31-0128-000
635 nm, 4 mW, MVP	31-0136-000
635 nm, 7 mW, CW	31-0227-000
635 nm, 7 mW, MVP	31-0235-000
635 nm, 10 mW, CW	31-0326-000
635 nm, 10 mW, MVP	31-0334-000
635 nm Elliptical Beam Diode LabLasers	
635 nm, 4 mW, CW	31-0102-000
635 nm, 4 mW, MVP	31-0110-000
635 nm, 7 mW, CW	31-0201-000
635 nm, 7 mW, MVP	31-0219-000
635 nm, 10 mW, CW	31-0300-000

Table 3. Parts List (Continued)

DESCRIPTION	PART NUMBER
635 nm, 10 mW, MVP	31-0315-000
635 nm Line Generator, 635 nm, 6 mW, CW	31-0268-000
LabLaser and VLM2 Mounts	
Variable Angle Mount for 19 mm Diameter Diode Laser Modules, Inch, with Allen Head Screws	0221-449-00
Variable Angle Mount for 15 mm Diameter Diode Laser Modules, Inch, with Allen Head Screws	0221-437-00

GLOSSARY

°C	Degrees centigrade or Celsius
°F	Degrees Fahrenheit
μ	Micron(s)
μm	Micrometer(s) = 10^{-6} meters
μrad	Microradian(s) = 10^{-6} radians
μsec	Microsecond(s) = 10^{-6} seconds
$1/e^2$	Beam diameter parameter = 0.13534
AC	Alternating current
Amp	Ampere(s)
BNC	Type of connector
CDRH	Center for Devices and Radiological Health
cm	Centimeter(s)
CW	Continuous wave
DC	Direct current
ESD	Electrostatic Discharge
HeNe	Helium Neon
Hz	Hertz or cycles per second (frequency) (= 1/pulse period)
IR	Infrared (wavelength)
I/O	Input/Output
kg	Kilogram(s) = 10^3 grams
KHz	Kilohertz = 10^3 hertz
Kohm	Kilohm(s)
LED	Light emitting diode
m	Meter(s) (length)
mA	Milliamp(s) = 10^{-3} Amperes
mAmp	Milliampere(s)
MHz	Megahertz = 10^6 hertz
mm	Millimeter(s) = 10^{-3} meters
mrad	Milliradian(s) = 10^{-3} radians (angle)
ms	Millisecond(s) = 10^{-3} seconds
mV	Millivolt(s)
MVP	Modulation and variable power
mW	Milliwatt(s) = 10^{-3} Watts (power)
nm	Nanometer(s) = 10^{-9} meters (wavelength)
OEM	Original equipment manufacturer
rms	Root mean square (effective value of a sinusoidal wave)

RMA	Return material authorization
TEM	Transverse electromagnetic mode (cross-sectional laser beam mode)
TTL	Transistor-to-transistor logic
UV	Ultra violet
V	Volt(s)
VAC	Volts, alternating current
VDC	Volts, direct current
VLM	Visible laser module
W	Watt(s) (power)

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