

WhisperIT

CW Diode Lasers

User's Manual

This laser product complies with performance standards of United States Code of Federal Regulations, Title 21, Chapter 1 – Food and Drug Administration, Department of Health and Human Services, Subchapter J – Parts 1040.10 (a), (1), or (2), as applicable.



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Laser Safety



The Pavilion Integration Whisper IT lasers are Class IIIb – High Power Lasers whose beams are, by definition, a safety and fire hazard. Take precautions to prevent accidental exposure to both direct and reflected beams. Diffuse as well as specular beam reflections can cause severe eye damage.



Refer to the product serial label for wavelength (nm) and laser power.



This user information is in compliance with section 1040.10 of the CDRH Laser Products Performance Standards from the Health and Safety Act of 1968.

General Hazards

Hazards associated with the use of diode lasers generally fall into the categories listed below. At all times while working with these lasers, please be aware of these potential hazards and act accordingly. You are responsible for your health and the health of those working around you.

- Expose to laser radiation can result in damage to the eyes or skin.
- Exposure to chemical hazards, such as particulate matter or gaseous substances, can be health hazards when they are released as a result of laser material processing or as by-products of the lasing process itself. When these lasers are used with dye systems, be aware that the dyes used can be extremely hazardous to your health if inhaled or, in some cases, even touched.
- Exposure to high voltage electrical circuits present in the laser power supply and associated circuits can result in shock or even death.
- Possible health risks are present if pressurized hoses, cylinders, liquids and gases used in laser systems are damaged or misused.

Precautions for the Safe Operation of Class IIIb High Power Lasers

- Wear protective eyewear at all times; selection depends on the wavelength and intensity of the radiation, the conditions of use, and the visual function required. Protective eyewear is available from suppliers listed in the Laser Focus World, Lasers and Optronics, and Photonics Spectra buyer's guides. Consult the ANSI and ACGIH standards listed at the end of this section for guidance.
- Maintain a high ambient light level in the laser operation area so the eye's pupil remains constricted, reducing the possibility of damage.
- To avoid unnecessary radiation exposure, keep the protective cover on the laser head at all times.
- Avoid looking at the output beam; diffuse reflections are hazardous.
- Establish a controlled access area for laser operation. Limit access to those trained in the principles of laser safety.
- Enclose beam paths whenever possible.
- Post prominent warning signs near the laser operating area (Figure 2-1).
- Install the laser so that the beam is either above or below eye level.
- Set up shields to prevent any unnecessary specular reflections or beams from escaping the laser operation area.
- Set up a beam dump to capture the laser beam and prevent accidental exposure (Figure 2-2).

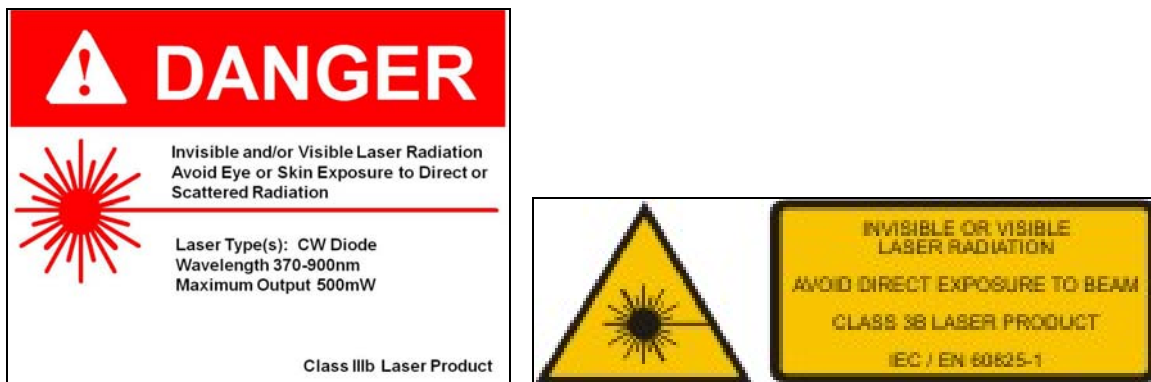


Figure 2-1: These CE and CDRH standard safety warning labels would be appropriate for use as entry warning signs (EN 60825-1, ANSI Z136.1 Section 4.7).

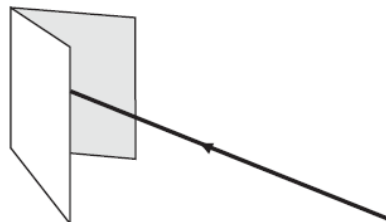


Figure 2-2: Folded Metal Beam Target



Use of controls or adjustments, or performing the procedures described in this manual in a manner other than specified may result in hazardous radiation exposure.



Operating this laser without due regard for these precautions or in a manner that does not comply with recommended procedures may be dangerous. At all times during installation, maintenance or service of your laser, avoid unnecessary exposure to laser or collateral radiation* that exceeds the accessible emission limits listed in "Performance Standards for Laser Products," United States Code of Federal Regulations, 21CFR1040.10(d).

**Any electronic product radiation, except laser radiation, emitted by a laser product as a result of or necessary for the operation of a laser incorporated into that product.*

Follow the instructions contained in this manual to ensure proper installation and safe operation of your laser.

Safety Devices

Figure 2-3 and Figure 2-4 (on the next page) show the locations of the safety devices on the laser head and power supply.

The laser head includes a manually operated shutter. All control and monitoring of the laser is through the Controller.

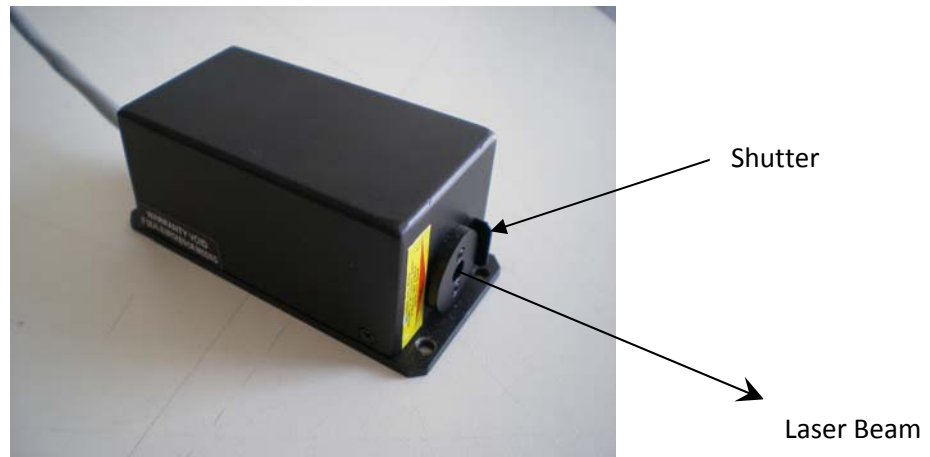


Figure 2-3: Laser Head Manual Shutter



There is no emission indicator on the laser head itself. In order to remain in compliance with CDRH Standards, the laser head must be operated using the 2 meter long laser control cable provided with the system. When connected to the Controller, the cable keeps the laser head with the CDRH-specified distance from the emission indicator located on the power supply front panel.

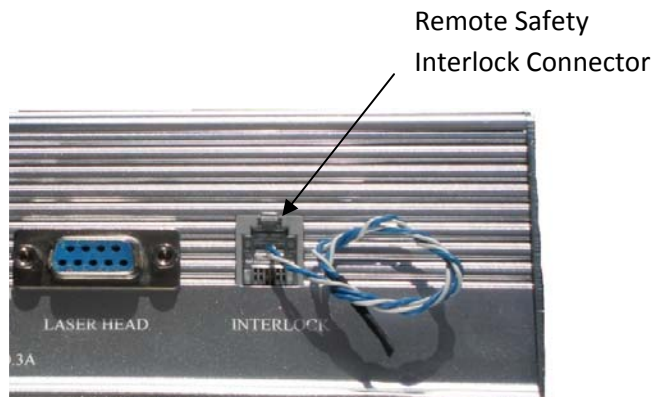
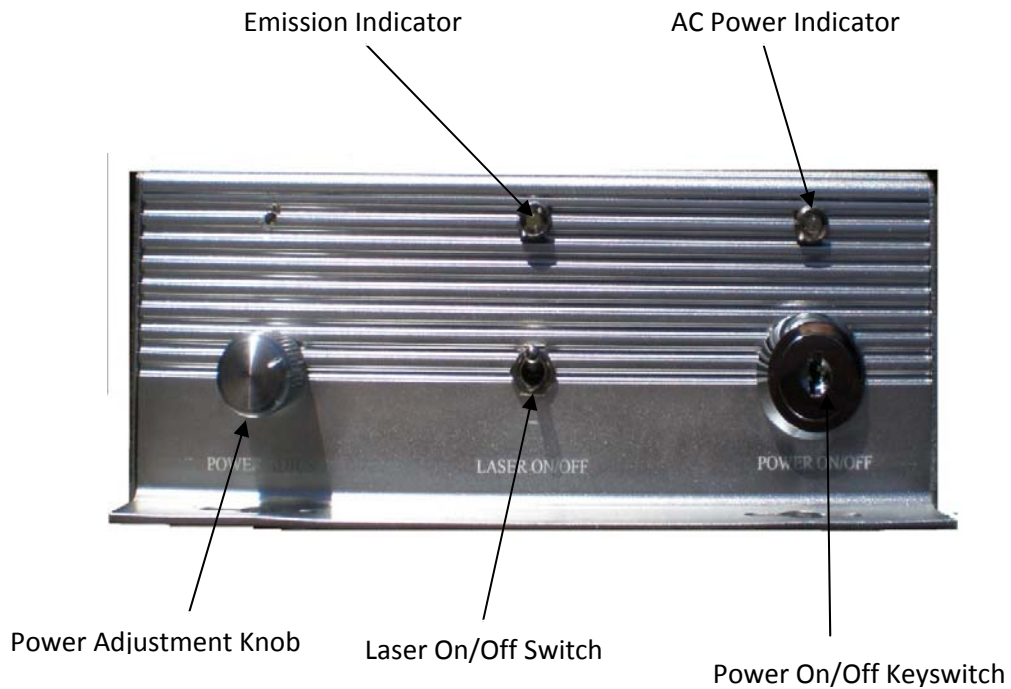


Figure 2-4: Safety Devices on the WhisperIT Controller.

POWER ON/OFF Keyswitch

Turning on the POWER ON/OFF keyswitch activates the Controller circuitry, as indicated by the green indicator above the keyswitch on the front panel. Activating this keyswitch begins the process of warming the components in the laser head to their operating temperature, which typically takes between 10 and 20 seconds. Please wait 20 seconds before turning on the laser using the LASER ON/OFF switch.

LASER ON/OFF Switch

Flipping the LASER ON/OFF switch to the up position starts the process that turns on the laser (after the POWER ON/OFF keyswitch is turned on first and waiting 20 seconds) after a safety delay of 5 seconds. If the shutter is open, the laser will then emit a laser beam.

Emission Indicator

This white indicator above the LASER ON/OFF switch illuminates when there is laser emission. Emission starts 5 seconds after the LASER ON/OFF switch is flipped to the up position. (Note that the light does not blink during the 5 second delay before laser emission starts, as is sometimes the case on other laser systems.)

If the remote interlock circuit is activated (see the description below), laser emission stops and this indicator turns off. If the remote interlock switch is then closed again, the emission indicator again illuminates after laser emission resumes after 5 seconds.

POWER ADJUST Knob

The POWER ADJUST knob is a high resolution potentiometer that provides the option to control the level of the laser output of the WhisperIT lasers. Turning the knob clockwise increases laser output, and turning the knob counterclockwise decreases laser output. The power level can be changed from 0% to 100%.



Special note for 532nm lasers: Operating the WhisperIT W532 lasers below the 100% power level is not recommended. The full set of WhisperIT laser specifications are guaranteed only at the 100% power level.

Safety Interlock

The INTERLOCK connector on the back of the power supply can be wired to an external safety switch to stop laser emission in the event the switch is opened. By connecting a safety switch in series with such a circuit, for example across a laboratory door or similar critical access point, the laser can be made to turn off when the safety switch is opened.

To ensure that the laser can operate when this interlock is not used, the system is shipped with a shorting plug that closes the interlock.

Maximum Emission Levels

The following are the maximum emission levels possible for the different WhisperIT laser systems. Use this information for selecting appropriate laser safety eyewear and implementing appropriate safety procedures. These values do not imply actual system specifications.

Table 2-1: Maximum Emission Levels

Emission Wavelength	Maximum CW Output Power
375nm	0.3W
405nm	0.3W
445nm	0.5W
473nm	0.1W
488nm	0.1W
532nm	0.1W
638nm	0.3W
658nm	0.3W
785nm	0.3W
810nm	0.3W
1064nm	0.3W
1500nm	0.5W

Electrical Safety

The CDRH Controller contains potentially hazardous voltages inside the protective enclosure. Do not open the protective enclosure. Do not operate the CDRH controller without a protective earth (safety) ground connected to the EN60320 power inlet connector.

Input Power

The input voltage rating is listed in the Specification table. Do not exceed the ranges listed.

Fuses

The CDRH controller is protected by a 5 mm x 20 mm fuse rated at 0.3A, 220VAC, type F. For continued protection from fire, do not operate the CDRH Controller with any other type or size of fuse.

Disconnect

The EN60820 power inlet connector may serve as the Power Disconnect Device. In the event that power needs to be completely disconnected from the CDRH controller, disconnect the main power cord at the power inlet connector.

POWER ON/OFF Keyswitch

The POWER ON/OFF keyswitch on the front panel of the CDRH Controller removes power from all of the internal circuitry. This keyswitch may not remove all hazardous voltages from the inside of the protective enclosure.

Protective Housing

The CDRH Controller is provided with a metal protective housing that protects the user from the hazardous voltages inside. This housing should be connected to the protective earth (safety) ground at all times. There is no reason for an operator to open the protective cover.

Requirements for Safely Operating the WhisperIT Laser with a User-Provided Control Device

When the WhisperIT laser systems is controlled by a device provided by the user or software written by the user, the following must be provided:

- **A key switch** – that limits access to the laser and prevents it from being turned on. It can be a real key lock, a removable computer disk, a password that limits access to computer control software, or a similar “key” implementation. The laser must only operate when the “key” is present and in the “on” position.
- **An emission indicator** – that indicates laser energy is present or can be accessed. It can be a “power-on” lamp, a computer display that flashes a statement to this effect, or an indicator on the control equipment for this purpose. It need not be marked as an emission indicator so long as its function is obvious. Its presence is required on any control panel that affects laser output.

Schedule of Maintenance in Accordance with Center for Devices and Radiological Health (CDRH) Regulations

This laser product complies with Title 21 of the United States Code of Federal Regulations, Chapter 1, subchapter J, parts 1040.10 and 1040.11, as applicable. To maintain compliance with these regulations, once a year, or whenever the product has been subjected to adverse environmental conditions (e.g. fire, flood, mechanical shock, spilled solvent, etc.) verify that all features of the product identified on the CDRH Radiation Control Drawing (found later in this chapter) function properly. Also, make sure that all warning labels remain firmly attached.

1. Verify that opening any safety interlock switch used with the system prevents laser operation.
2. Verify the laser can only be turned on when the keyswitch is in the on position, and that the key can only be removed when the switch is in the off position.
3. Verify the user-supplied emission indicator provides a visible signal when the laser emits accessible laser radiation that exceeds the accessible master system emission limits for Class I.¹
4. Verify the time delay between turn-on of the user-supplied emission indicator and the start of the laser emission; it must give enough warning to allow action to avoid exposure to laser radiation.

¹ 0.39mW for continuous-wave operation where output is limited from 400 nm to 1400nm.

Radiation Safety Control Drawings

Refer to the warning labels on page 2-9.

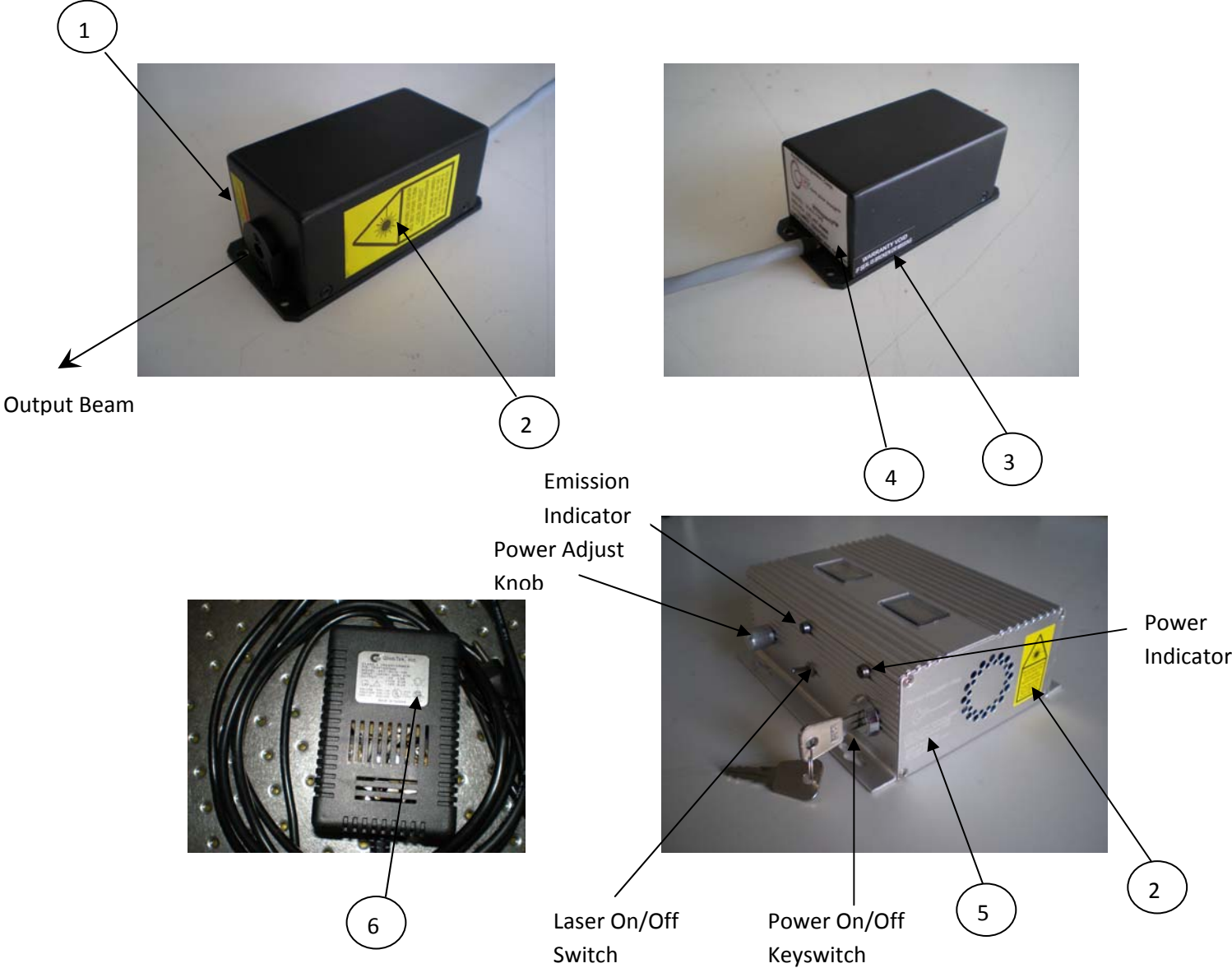


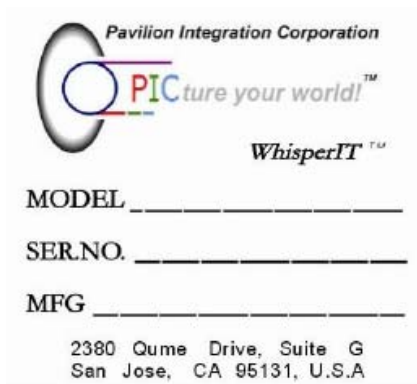
Figure 2-6: WhisperIT Radiation Control Drawings

Warning Labels

Aperture Label,
Laser Head (1)



CE Danger and CDRH
Compliance Label (2)



Laser Head Serial
Number Label (4)



Controller Model/Serial
Number Label (5)



UL Mark
Label (6)

Figure 2-7: Warning Labels

Sources for Additional Information

Laser Safety Standards

Safe Use of Lasers (Z136.1)
American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Phone: (212) 642-4900

Occupational Safety and Health Administration (Publication 8.1-7)
U.S. Department of Labor
200 Constitution Avenue N. W., Room N3647
Washington, DC 20210
Phone: (202) 693-1999
Internet: www.osha.gov

A Guide for Control of Laser Hazards, 4th Edition, Publication #0165
American Conference of Governmental and
Industrial Hygienists (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Phone: (513) 742-2020
Internet: www.acgih.org/home.htm

Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826
Phone: (800) 345-2737
Internet: www.laserinstitute.org

Compliance Engineering
Canon Communications LLC
11444 W. Olympic Blvd.
Los Angeles, CA 90064
Phone: (310) 445-4200

International Electrotechnical Commission
Journal of the European Communities
EN60825-1 Safety of Laser Products – Part 1: Equipment classification,
requirements and user's guide
Phone: +41 22-919-0211
Internet: www.iec.ch

Cenelec
35, Rue de Stassartstraat
B-1050 Brussels, Belgium
Phone: +32 2 519 68 71
Internet: www.cenelec.org

Document Center, Inc.
111 Industrial Road, Suite 9
Belmont, CA 94002
Phone: (650) 591-7600
Internet: www.document-center.com

Equipment and Training

Laser Safety Guide
Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826
Phone: (407) 380-1553, or toll-free
(800) 34LASER
Internet: www.laserinstitute.org

Laser Focus World Buyer's Guide
Laser Focus World
Pennwell Publishing
98 Spit Rock Road
Nashua, NH 03062
Phone: (603) 891-0123
Internet: lfw.pennet.com/home.cfm

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Photonics Spectra
Laurin Publications
Berkshire Common
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Pittsfield, MA 01202-4949
Phone: (413) 499-0514
Internet: www.photonics.com