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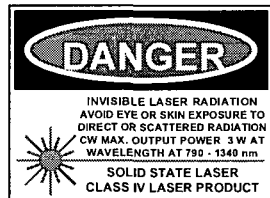
Diode Pumped Infrared *CrystaLaser*[®]

IRCL-XXX-WL

USER MANUAL

This laser is easy to operate, but you are strongly advised to read this manual carefully before operating the laser the first time

- ☞ 1. LASER RADIATION SAFETY
- ☞ 2. OPERATING INSTRUCTIONS



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USER MANUAL

The **Diode Pumped Infrared CrystaLaser[®]** is easy to operate, but you are strongly advised to read this manual carefully before operating the laser for the first time.

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

*** 1. LASER RADIATION SAFETY ***

- a. **Do not try to open the housing of the laser at any time.** The housing of the laser head is not removable and it is not permitted to open or remove it during operation, maintenance or service. It is dangerous and may result in hazardous radiation exposure and will cause laser failure if the cover of the laser head is opened. A 5-Watt laser diode is inside the laser head for pumping the laser crystal and the radiation of the laser diode is blocked by the protective housing.
- b. This is a Class IV laser product. **Dangerous! INVISIBLE LASER RADIATION. AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED LASER RADIATION.** Do not permit laser tracking of nontarget vehicles or aircraft.
- c. This Diode Pumped Infrared Crystal Laser is a class 4 laser. The laser output is of high intensity. A potential eye hazard exists for the direct beam or a specular reflection or scattered radiation. For all individuals working within the controlled area always use proper laser eye protection: safety goggles. Ensure that the goggles are suitable for the wavelength being emitted and they fit snugly. The wavelength of this diode laser pumped crystal laser is in the wavelength range from 1047 nm to 1342 nm; CW maximum output is less than 3W. The wavelength of pumping diode laser is 800 ± 15 nm, and maximum output is 5 Watts for pumping the laser crystal in the laser head. The radiation of less than 20 mW at the wavelength of 800 ± 15 nm emits from the laser aperture. Do not open the cover of the laser head.

The safety goggles should block the infrared light from 780 nm to 1350 nm wavelength range. The LASER ON and POWER ON red LED lights at 650 ± 50 nm are the laser emission indicators. The red light should be visible through the safety goggles.

- d. Permit only experienced personnel to operate the laser.
- e. Operate the laser only in a restricted area, and place a warning sign on the door. The laser should be operated within a localized enclosure, or in a light-tight room with interlocked entrances to ensure that the laser cannot emit while a door is open. Eye protection is needed for all individuals working within the controlled area.
- f. The laser beam or its specular reflection should never be directly viewed with optical instruments such as binoculars or telescopes without sufficient protective filters. Microscopic

viewing systems used to study the work piece should ensure against hazardous levels of reflection of laser irradiation back through the optics.

- g. Enclose as much of the beam path as possible. Even a transparent enclosure will prevent individuals from placing their head or reflecting objects within the beam path. Terminations should be used at the end of the useful paths of the direct and any secondary beams. Remove all unnecessary mirror-like surfaces from within the vicinity of the laser beam path.' Always double check that there are no obstacles in the beam path which will likely cause dangerous reflections.
- h. Never push objects of any kind into the power supply through the cabinet slots as they may touch dangerous voltage points that could result in a risk of electric shock or cause the laser system to fail. Never spill liquid on the product.

*** 2. OPERATING INSTRUCTIONS ***

Important Instructions

Mis-connecting the laser head will cause laser failure.

Each laser head has a product serial number (S/N) and should **only** be connected with the laser power supply having the same S/N; otherwise, the laser will fail. **Do not** connect the laser head to the other socket. The laser power supply has been adjusted for the corresponding laser head.

Connect the laser head with a heatsink. We recommend maintaining the temperature of the laser head at one constant temperature between 20°C and 28°C during laser operation to get a more stable output. An 8 inch x 8 inch (20 cm x 20 cm) or larger metal plate will be an efficient heat sink for the laser operating at room temperature (between 20°C and 25°C). Keep the temperature of the case of the laser head above 10°C and below 35°C during laser operation.

The laser head may fail if dropped to the ground and or subjected to heavy vibration.

The LASER ON and POWER ON lights are the laser emission indicators.

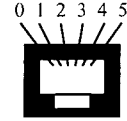
The OVER HEAT light is a caution and an indicator of the temperature of the laser head. If the over-heat light is on during the first 2 minutes when main power is on, then the LED light is off automatically, this is normal and it is not really over heat, the laser is **no problem**.

If the light is continuously on or it is flashing for more than 3 minutes, the laser head is overheated; the laser should be turned off. Otherwise, the lifetime of the laser diode may be shortened. Before you turn on the laser again, it is necessary to increase the heat dispersion of the laser head, for example, increasing the surface area of the heatsink, or connecting the heatsink with a large cold metal sheet.

Keep the master key in a safe place with an authorized person. The manufacturer has no spare key.

Check the line voltage before plugging in the electricity. Make sure it is the same as the voltage indicated on the package or cover of the laser power supply.

The LD current has been properly set by the manufacturer. The limit of the LD current is already set by the manufacturer to protect the laser diode. Adjustment through the adjustment screw located on the rear board shown on page 4 is permitted. Normally do not adjust it. If you do need to change the laser output, you may use the optical attenuator to reduce the laser output. **Please notice: changing the LD current may change the output frequency of the single longitudinal mode laser, and may cause multiple longitudinal mode operations in some cases.** Turning the current adjustment screw counter-clockwise will reduce the LD current, will reduce the laser output, and may prolong the life of the laser diode. Turning the current adjustment screw clockwise will increase the LD current and will increase the laser output.



REMOTE INTERLOCK
SOCKET

The socket of the remote INTERLOCK is at the rear board.
Short-circuiting Pin 2 and Pin 3 will keep the laser on.
Please do not apply any voltage or current to Pin 2 and pin 3.

For the TTL option laser, applying the TTL signals on Pin 1 and Pin 4 in the remote interlock may control the laser on/off.

Never apply electric voltage exceeding +/-5 volts to the pins of the socket. For modulating the laser output, we recommend 0 V or -1 V (on Pin 4) and a +3 V level square signals (on Pin 1). We recommend output resistance of the TTL circuit to be $< 300 \Omega$.

The laser power supply is equipped with a 3-wire grounding type plug, a plug having a third (grounding) pin. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace the plug. Do not defeat the purpose of the grounding-type plug. Power consumption of the laser system is 25 Watts maximum.

Operating Steps:

1. Read the laser safety directions and the operating directions above.
 2. Connect the laser head and the laser power supply. Make sure that the Serial No. of laser head and the Serial No. of power supply are the same. Connect the remote interlock properly.
 3. Turn off the master key switch.
 4. Plug into a power outlet.
 5. Turn on the power switch. The laser head starts to warm up. After >30 seconds delay, have an authorized person turn on the master key switch, and push the manual RESET button. The laser will emit TEM₀₀ mode from the aperture. The total warm up time is about 2 minutes.
 6. Use the master key switch to turn **off** the laser, then turn off power switch.
- Every time when the laser is interrupted, a manual RESET is required for safety reason.

If the laser has any problems, please contact with us. Do not attempt to service this product yourself. The housing or cover of the laser head is fixed and is not removable.

Caution: As opening or removing the housing of the laser head or the cover of the power supply may expose you to the danger of laser radiation, and the risk of electric shock, and may cause the laser system failure. **Do not open the housing of the laser head and the cover of the laser power supply.**

If the laser needs to be returned to us for repairing, please contact us to receive an RMA number. You may fill out the RMA form on the web site: <http://www.crystalaser.com/rma>

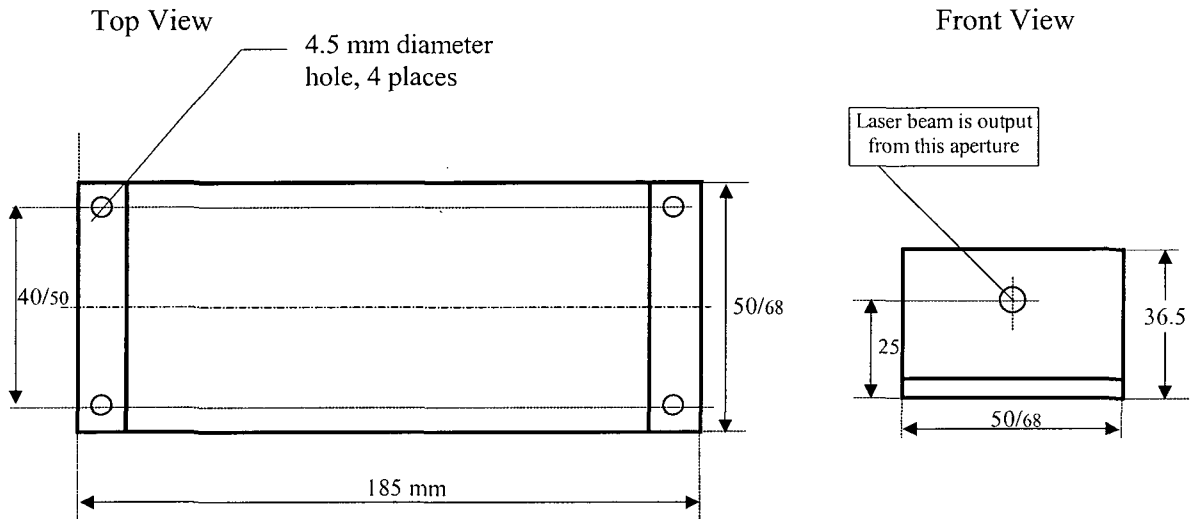
Please ship the laser well packaged, and preferably use the original box, through UPS with freight prepaid.

Product Package

Check the contents of the laser system package. The package should include the following items:

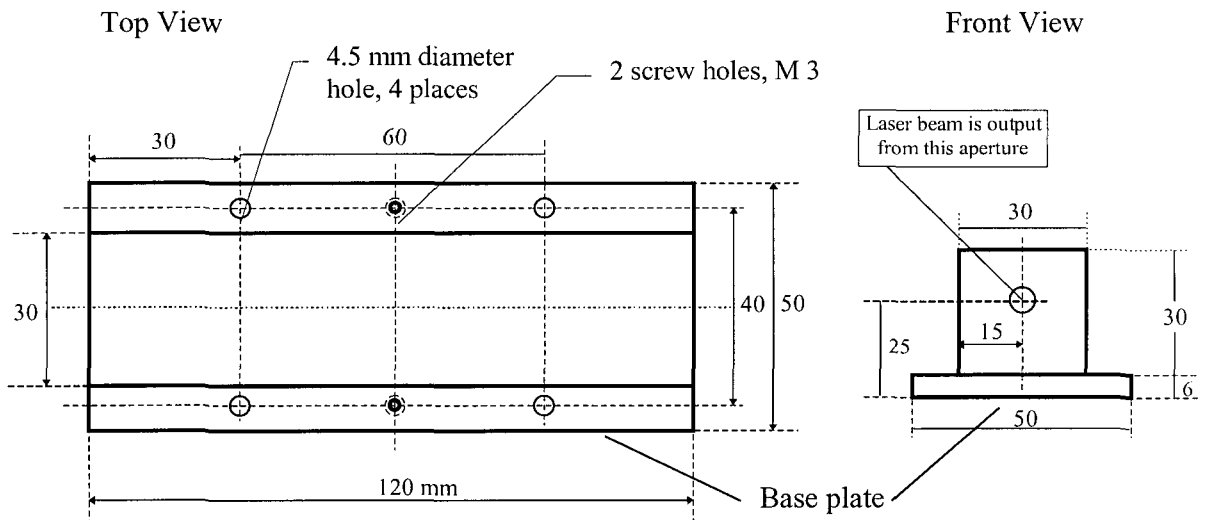
- | | | |
|------------------------|-----------------------|----------------|
| 1. Laser head | 2. Laser power supply | 3. Power cord |
| 4. Interlock connector | 5. Master key | 6. This manual |

Laser Head



Note: 4 holes on base plate for mounting the laser head on a metal heat sink.

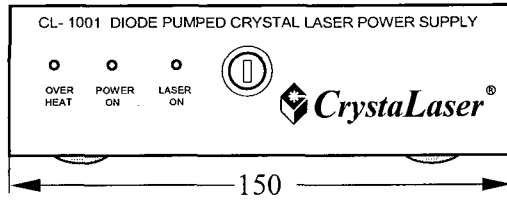
Or the dimensions for more compact laser head is below



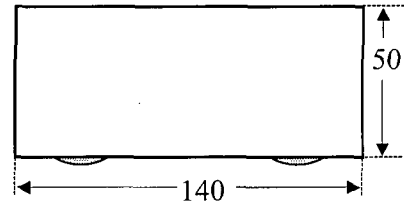
Note: 4 holes and 2 screw holes on base plate for mounting the laser head on a metal heat sink.

Power Supply

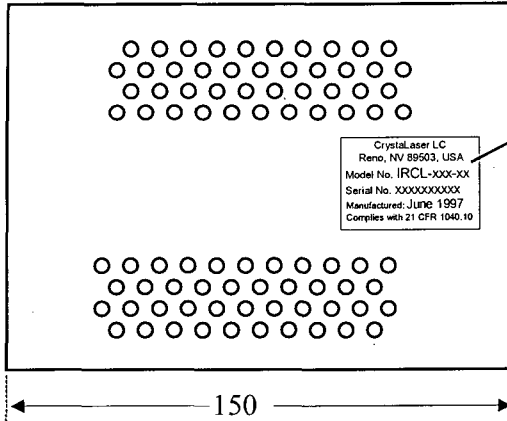
Front View



Side View



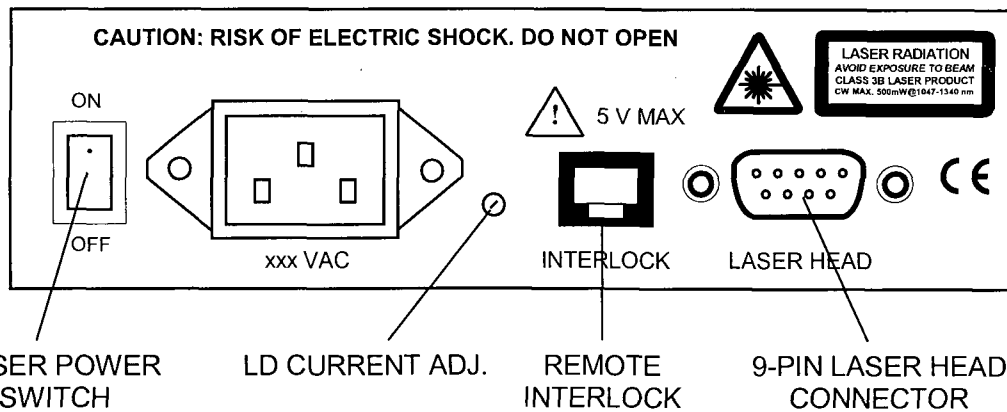
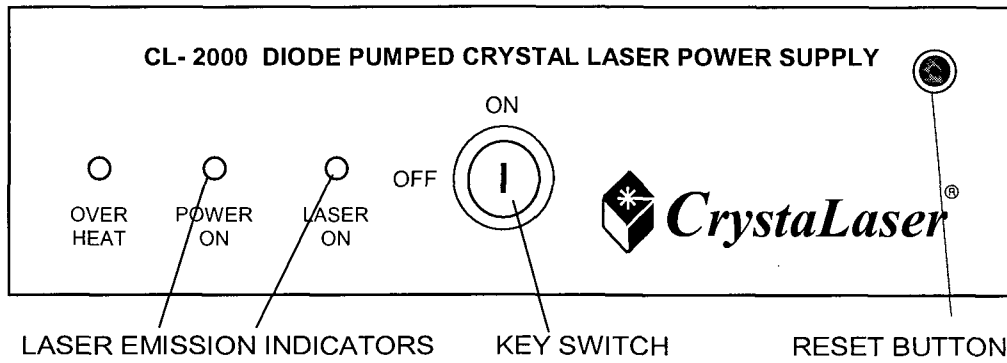
Top View



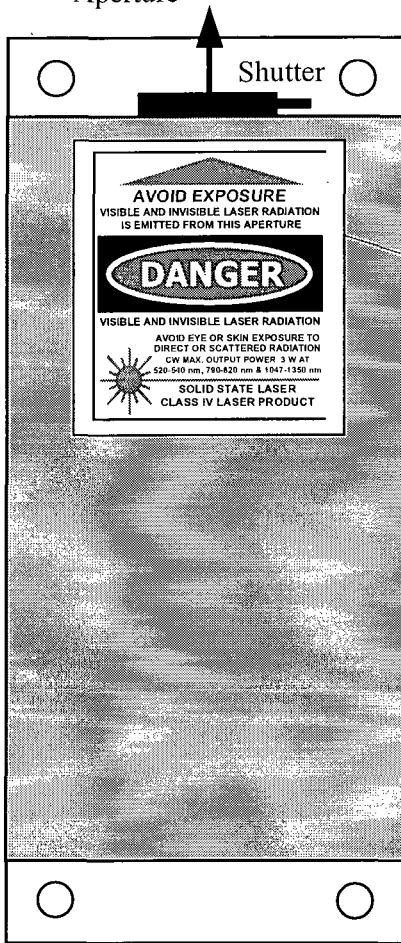
Identification and Certification label
Serial number

CrystaLaser LC
Reno, NV 89503, USA
Model No. IRCL-XXX-XX
Serial No. XXXXXXXXXXXX
Manufactured: Jun 1997
Complies with 21 CFR 1040.10

All dimensions in mm



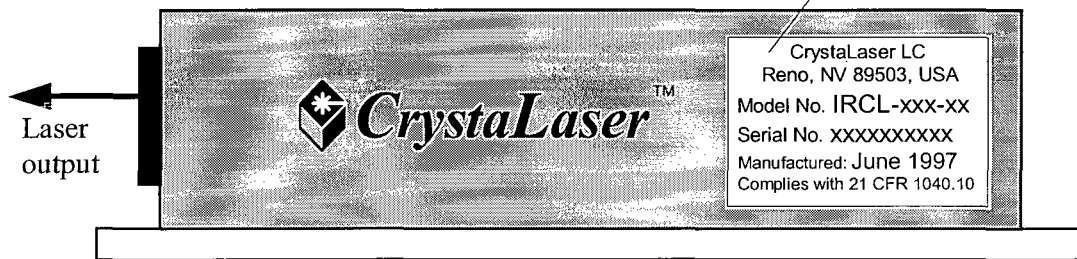
Laser Output
Aperture



Aperture label and
Warning logotype label

Top View

Identification and
Certification label



Side View