Operating Instructions for Models with PSU-III-LED

Caution: - Usage of this device in ways other than those specified in this manual may result in exposure to hazardous levels of radiation.

Note: The laser should only be operated after the surface temperature of the laser system returns to room temperature in order to avoid damage to the internal structure. It’s necessary to operate the laser head with the power supply that has the same serial number. Do NOT attempt to use this laser with any other power supply unit. Place both the laser head and power supply on a suitable heat sink before turning them on.

1. Product features

NOTE:
A. We suggest that the laser be mounted on a flat, thermally dissipating surface to maintain a high-level of heat dissipation, and reliability in performance.
B. Change the temperature slowly during operation, to a level between 10°C - 35°C. Sudden changes to the temperature will cause permanent damage to the laser. Do not try to open the laser or remove any element of the PC board.
C. The air duct should not be blocked, and nothing should be placed within 0.05m-0.1m of the duct.
D. If the laser system needs to be installed as a component into equipment, make sure the air flow is clear. If required, extra fans can be used for heat dissipation.

1.1. Check the main power to make sure it is in an “OFF” state.
1.2. Check the key switch to make sure it is in an “OFF” state.
1.3. Lock: Prevents any power adjustments by blocking movement of the power control knob.

Knob: The power control knob is fixed on the minimum power position (as shown) as the factory default. Please unlock it to use knob for power adjustments. Clock-wise movement increases power, while counter clock-wise movement decreases it.
1.4. Display: shows the current or resistance.

1.5. Please check your region’s voltage requirements to see whether it’s in the range shown at the back panel.

1.6. Interlock: Pull out the crystal plug to stop the laser system from working. To reininitiate the laser, ensure the key is in the ‘OFF’ position, plug the interlock back and turn the key to the ‘ON’ position.

1.7. Signal interface: Use the input labeled ‘Signal’ when you want TTL or Analog modulation using an externally controlled signal interface, like a function generator. The trigger requires a BNC cable. BNC has two leads (red+, black-).

1.8. Toggle switch:
   1.8.1. Toggle switch for modulation
   a) Toggle switch at “TTL”: the laser works under standard TTL modulation.
   b) Toggle switch at “Analog”: the laser works under analog function.

   1.8.2. Toggle switch for display
   a) Toggle switch at “Cur”: display at front panel shows the current of diode (unit = A) (factory default).
   b) Toggle switch at “R1.”: display at front panel shows the value of thermal resistance for diode (unit = KΩ).
   c) Toggle switch at “R2.”: display at front panel shows the thermal resistance value of crystal (unit = KΩ).

   Note: Make sure the key switch is on “off” state before changing the toggle switch.

1.9. Signal interface: A BNC cable is necessary in order to connect a signal interface, like a function generator to the trigger.

2. Operation

2.1. Please loosen the locking ring to remove the protective 15 pin connector of the laser head, as shown in the picture. (When the laser is not connected with the power supply, please cover the pin to avoid static damage.)

2.2. Attach the laser head to the connector of power supply firmly. Please make sure to fasten the screws on the connector.

2.3. Connect the power cord of the power supply to an AC Power Jack.

2.4. Remove the label at aperture. Open the shutter, if any.

2.5. Switch on the main power of the power supply. The red LED – “Power” will turn on.

2.6. Turn on the key switch at “ON” state. The laser starts to work after about a 5 second delay. The green LED
“Laser” will turn on. Moreover, you must wait 5 minutes after the laser is turned ON before obtaining a stable power output.

2.7. Only if an unexpected accident occurs, the yellow LED “Alarm” will be on. That means the laser system is operating in an abnormal state. Please switch off the main power. Reset the main power and key switch after a few minutes, then try to restart the laser system.

2.8. External signal control (Choose the instructions below according to the modulation requirements)
   2.8.1. Notes for TTL Modulation
   a) Without signal input (or the leads open), the laser is in CW operation.
   b) With signal low level (<0.7V) input, the laser is in the off state.
   c) With signal high level (>2.3V) input, the laser is in the on state.
   d) Signal input should not exceed 5.2V.
   2.8.2. Notes for Analog Modulation
   a) Without signal input (or the leads open), laser is in the off state.
   b) With signal low level (<0.7V) input, the laser is in the off state.
   c) With signal 5V input, the laser outputs maximum value.
   d) With other voltage between 0-5V, such as 1.5V, 2.6V...3.8V... the laser outputs at different powers.
   e) Signal input should not exceed 5.2V.

   Note: Make sure the key switch is on “off” state before changing the toggle switch.

2.9. Closing the laser system: Turn off the key switch first, then switch off the main power of the power supply.
2.10. To protect the optical path from dust, you should replace aperture label or close the shutter.

3. Operating Environment

3.1. Temperature: 10-35°C (environment temperature)

25±3°C (bottom plate temperature /recommended temperature)

**NOTE:** It is not recommended to operate the laser outside of this temperature range. The unit is designed to shut down if the laser exceeds operating temperature limits. Failure to comply with the environment temperature may cause permanent damage to the laser. All lasers are designed with ESD protection.

3.2. It should also be noted that the laser must be operated in an environment with low vibration to meet the power stability specifications.

3.3. Maximum humidity: 80 ± 10% (RH)

   If the air humidity exceeds the range, the working capability of the laser system will be affected indirectly (e.g. circuit board short circuit etc.).

3.4. Service voltage needs to be stable. Voltage fluctuations will cause damage to the laser.

Customers can encounter the following issues if the service voltage is unstable:

3.4.1. Integrated circuit will be damaged; LD cooling exceeds the rated value (LD cooling circuit invalid), output power decreases, fans do not run.

3.4.2. Unstable power supply makes LD damaged by instantaneous peak current being passed.

Unstable voltage can damage the TEC circuit PC board.
4. Laser safety

4.1. Optical Safety

4.1.1. Wearing a set of proper laser safety goggles is advised. Laser safety goggles can protect a person’s vision, however, NEVER look directly into a laser beam even when wearing laser safety goggles.

4.1.2. Viewing optics or display screens should be used during operation to make the excess emission less than Class I. Reflected beams can cause serious accidents if the beam bounces off reflective surfaces, e.g. mirror, glass and smooth metal.

4.1.3. Never use your laser in the vicinity of highways and airports. DO NOT target moving vehicles and airplanes. This is a serious offense and is treated as a crime in most countries.

4.1.4. Never randomly aim a laser out the window.

4.1.5. DO NOT use a laser near equipment marked “inflammable and explosive” or in areas subject to wide temperature changes. All bench-top lasers must be used in a lab with a proper optical table.

4.1.6. Use an infrared (IR) detector to verify that the IR laser beam is on or off before working on the laser.

4.1.7. Set up controlled access areas for laser operation. Be sure to post appropriate warning signs visible to all when the laser is operating. This avoids accidental retina exposure for people who may enter the area without goggles.

4.1.8. The operation of lasers should be under the supervision of qualified personnel only. When not in use, lasers should be shut down completely and made off-limit to unauthorized personnel.

4.1.9. Laser should be operated in a clean and dry environment which is not prone to static electricity.

4.1.10. Maintain experimental setups at low levels to prevent accidental eye or skin exposure to beams.

4.2. Electrical Safety Precautions

4.2.1. Disconnect main power lines on any electrical equipment when it is not operating, and maintain the laser head and laser power supply in a tight junction to prevent electrostatic damage.

4.2.2. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment, and who is competent in administering first aid.

4.2.3. Whenever possible, keep one hand away from the equipment to reduce the danger of current flowing through the body if a live circuit is accidentally touched.

4.2.4. Always use approved, insulated tools when working on equipment.

4.2.5. Special measurement techniques are required for this system. Ground references must be selected by a technician who has a complete understanding of the system operation and associated electronics.

Invisible or visible radiation is dangerous to humans and should not be viewed directly or indirectly with or without optical instruments. Please refer to EN60825-1:2007 “Safety of Laser Products” and 21 CFR 1040.10-1040.11 “Performance Standards for Light Emitting Products” for additional information.
5. Warranty and maintenance

5.1. The warranty is one year from the shipping date.

5.2. This warranty will not apply to those products which have been repaired or altered other than in accordance with the terms of this agreement, such as:

5.2.1. Abused, misused, improper handling in use, or storage, or used in an unauthorized or improper manner or without following written procedures supplied by manufacturer.

5.2.2. Original identification markings or labels have been removed, defaced or altered.

5.2.3. Any other claims not arising directly from defects in material or workmanship.

5.3. Laser should be operated in a clean and dry environment which is not prone to static electricity.

5.4. Always use finger cots, latex gloves, or the equivalent when handling optics.

5.5. Please do not open the laser head under any circumstances. Opening the laser head with void all warranty.

5.6. Please operate the laser according to the operating instructions.

5.7. In case you have any questions about laser operation, please contact us.