

# OPERATION INSTRUCTION FOR MODEL WITH PSU-A-DP

**Caution: Use of controls or adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.**



**Note: The laser can only be operated after the case temperature of the laser system returns to the room temperature to avoid the damage of the big temperature range. It is necessary to place the laser head which has the same serial number with the power supply on a stable and better heat-conducting plate, such as metal plate.**

**NOTE:**

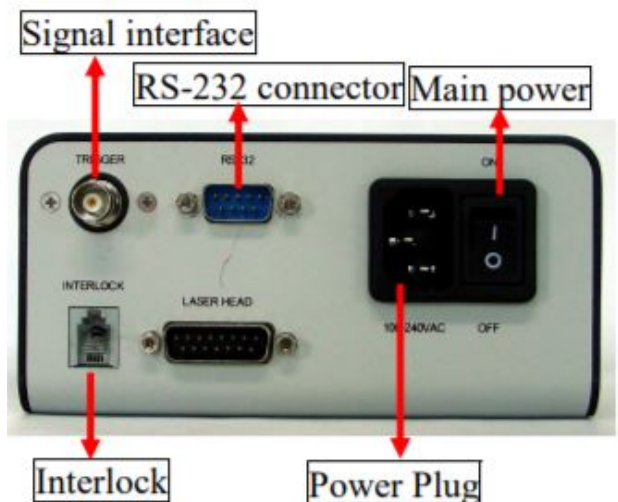
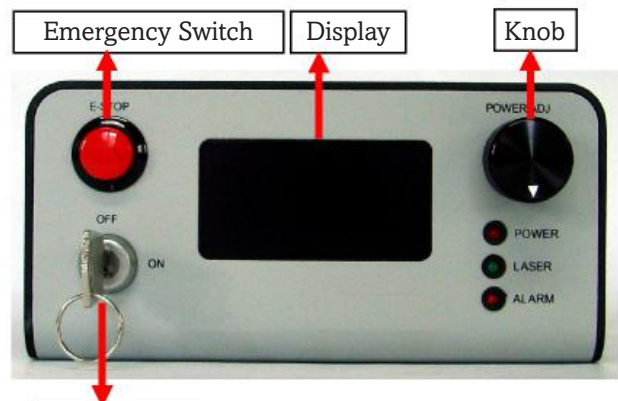
**A. The bottom plate of laser and the power supply PC board need full contact with metal (Such as aluminum plate) to get best heat dissipation. The dimension of metal must be greater than the bottom plate dimension of laser and PC board, thermal grease need to be applied between (or material with good heat conductivity which is non-corrosive and non-volatile). The proper temperature for laser and metal is  $(25 \pm 2) ^\circ\text{C}$  separately. Or else, the laser will not work well.**

**B. The power supply PC board should be used in nice heat dissipation state. Do not touch any element of the PC board Or else, the laser will not work well.**

**C. The laser system should not be blocked, and make sure there is nothing placed within 0.05m-0.1m.**

**D. If the laser system needs to be installed into equipment, please make sure that the air-flow is clear. If necessary, extra fans or heat sink can be used for better heat dissipation.**

**E. Suggested dimension for heat dissipation board: 150(L) $\times$ 80(W) $\times$ 50(H).**



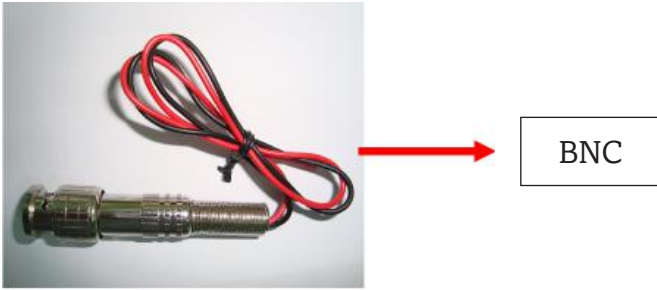
## 1.0 Powering the Laser

- 1.1 Check the main power and make sure it is in "OFF" state.
- 1.2 Check the key switch and make sure it is in "OFF" state.
- 1.3 Pressing the control knob:
  - a) Press the knob: Switch over between Function menus.
  - b) Press and hold the knob for a long time: Switch ACC mode or APC mode in first line menu.

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**POWER SUPPLY OPERATIONAL MODES:**

**NOTE: Factory default is constant power mode, TTL Modulation, display under Unlock condition.**



The laser works under the last condition when it opens again.

Connect the power cord of the power supply. Switch on the main power. The red LED - "Power" is on.

Then turn on the key switch at "ON" state. The display screen lit up as follows:

▶ **P: xxxmW APC**  
**Step: xxx**  
**Trig: TTL**  
**Option: Unlock**

▶ This triangle means the changeable Function menu at present under the unlocked display. Press Knob to switch over between Function menus.

▶ **P: xxxmW APC**  
**Step: xxx**  
**Trig: TTL**  
**Option: Unlock**

The first line shows the laser output power value. Turn the knob clockwise, the output power is increased. Turn the knob counter-clockwise, the output power is decreased. When press the knob for a long time, this line will display the actual working current value. Turn the knob clockwise, the output current is increased. Turn the knob counter-clockwise, the output current is decreased.

The second line shows the step length. Turn the knob clockwise, the step size is increased. Turn the knob counter-clockwise, the step length is decreased. The step length is 1, 10, and 50,100.

The third line shows Modulation mode. Turn the knob to switch TTL mode and Analog mode.

The fourth line shows lock state of the display. Unlock means the display is under unlock state, and you can change the laser working current, working power and step length, switch over between Function menus, switch ACC mode or APC mode in first line menu. Values cannot change when the option is in unlock mode.

**2.0 Basic Functions**

- 2.1 Display: it shows the working condition.
- 2.2 Emergency switch: When unexpected accident occurs, you can press it down to switch off the laser. You need to reset the main power and key switch to restart the laser.
- 2.3 Interlock: After pulling it out, the laser system will stop working you need to install the interlock, and then reset the main power and key switch to restart the laser.
- 2.4 Voltage range: Make sure your local voltage is in the range showed at the back panel.
- 2.5 Signal interface: TTL or Analogue external control signal interface. You should connect BNC when use it. There are two leads (red+, black-).
- 2.6 RS232 connector: You need a communication RS232 cable for connecting laser system to computer. The RS232 cable has the following connections: 1-1; 2-2; etc. (This is a simple extension cable!)

**3.0 Operation**

- 3.1 Attach the laser head to the connector of the power supply.
- 3.2 Connect the power cord of the power supply to AC Power Jack.
- 3.3 Remove the label at aperture. Open the shutter if it has.
- 3.4 Switch on the main power of the power supply. The red LED -"Power" is on.
- 3.5 Turn on the key switch at "ON" state. The laser starts to work after about 5 seconds delay. The green LED -"Laser" is on. The warming up time is about 10minutes.
- 3.6 If an unexpected accident occurs, the red LED-"Alarm" will turn on. This means the laser system is in an abnormal state. Switch off the main power. Reset the main power and key switch after a few minutes, to restart the laser system again.
- 3.7 External signal control (Select the instruction according to the modulation of product)
  - 3.7.1. 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 does not exceed 5.2V.
  - 3.7.2. 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 different powers.
    - e) Signal input does not exceed 5.2V.
- 3.8 Closing the laser system: Turn off the key switch first, and then switch off the mains power of the power supply.
- 3.9 To prevent optic path from dust, you should close the shutter if it has, replace aperture label

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## 4.0 Operating Environment


- 4.1 Temperature: 10-35 (environment temperature) 25±3 (bottom plate temperature /recommended temperature)

**NOTE: It is not recommended to operate the laser outside of this temperature range for prolonged periods. 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.**

- 4.2 It should also be noted that the laser must be operated in an environment with low vibration to meet the power stability specifications.
- 4.3 Humidity: <90% (RH) If the air humidity overruns the figure, the working capability of the laser system will be affected indirectly (e.g. intracavity crystal deliquescence, circuit board short etc.). And operate the laser in an environment in which there is normal aeration.
- 4.4 Rated voltage: (According to the testing report) Failure to comply with this procedure may cause permanent damage to the laser. Following is the possibility if the service voltage is unstable:
- 4.4.1 Integrated circuit will be damaged; crystal cooling exceeds the rated value (crystal cooling circuit invalid), output power decreased, and fan not run, caused by unstable service voltage.
  - 4.4.2 Unstable power supply makes LD damaged by instantaneous peak current passing.
  - 4.4.3 Unstable voltage static electronic makes potentiometer electric capacity resistor integrated circuit TEC circuit PC board damaged.

## 5.0 Laser Safety

- 5.1 Optical Safety 
- 5.1.1 Wearing a set of proper laser safety goggles is a good idea. Though laser safety goggles can protect a person's vision, it's always best to remember NEVER to look into a laser beam or bright reflection even when wearing laser safety goggles.
- 5.1.2 Viewing optics or display screens should be used during operation to make the accessible emission less than Class I, reflected beams can cause serious accident by aiming beam at reflective surfaces, e.g. mirror, glass and bright metal.
- 5.1.3 Never use your laser in the vicinity of highways and airports. DO NOT target moving vehicles and airplanes.
- 5.1.4 Never randomly aim a laser out the window
- 5.1.5 DO NOT use a laser at the place marked "No smoking" "inflammable and explosive" and easily caused the danger.
- 5.1.6 Use an infrared detector to verify that the laser beam is on or off before working on the laser.
- 5.1.7 Set up controlled access areas with for laser only in well marked areas with controlled access. Be sure to post appropriate warning signs visible to all.
- 5.1.8 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.

- 5.1.9 Limit access to the laser system to persons required to be present.
- 5.1.10 Laser should be operated in the ambient of clean and dry and no electric.
- 5.1.11 Maintain experimental setups at low level to prevent inadvertent eye encounter with beams.
- 5.2 Electrical Safety Precautions 
- 5.2.1 Disconnect main power lines before working on any electrical equipment when it is not necessary for the equipment to be operating, and maintain the laser head and the same serial number laser power tight junction to prevent electrostatic damage.
- 5.2.2 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 to administer first aid.
- 5.2.3 When 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.
- 5.2.4 Always use approved, insulated tool when working on equipment.
- 5.2.5 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.

## 6.0 Warranty and Maintenance

- 6.1 The warranty is one year from the shipping date.
- 6.2 This warranty will not apply to those products which have been repaired or altered other than in accordance with the terms of this agreement.
- 6.2.1 Abused, misused, improper handling in use, or storage, or used in an unauthorized or improper manner or without following written procedures supplied by manufacturer.
- 6.2.2 Original identification markings or labels have been removed, defaced or altered.
- 6.2.3 Any other claims not arising directly from defects in material or workmanship.
- 6.3 Laser should be operated in the ambient of clean and dry and no electric
- 6.4 Always use finger cots, latex gloves, or the equivalent when handling optics, and use a clean, cushioned work surface.
- 6.5 Please do not open the laser head without instructions from manufacturer, which may lead to the danger of exposure of hazardous visible and invisible laser radiation. Exceptional care must be taken when operating the laser with the covers removed. Laser protective eye ware must be worn.
- 6.6 Please operate the laser according to the operation