

Continuous Wave Fiber Laser User Manual

SHENZHEN JPT OPTO-ELECTRONICS CO.,LTD.

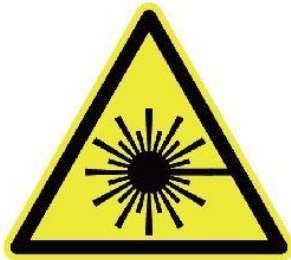
Safety Summary

Thank you for choosing continuous wave (CW) fiber laser from Shenzhen JPT Opto-electronics Co., Ltd.

Please read this manual carefully before attempting to install or operate the laser. This user manual details all the health and safety issues regarding the safe installation and operation. For safety and the best laser performance, please be aware of the laser hazard information and the operational instructions.

- This fiber laser module carries a Class 4 Laser rating. Before connecting it to alternating current (AC) power supply, please make sure that the 220 V AC power supply is connected properly. Wrong connection will spoil the fiber laser.
- Please make sure that a current-controlled AC power supply with proper grounding is used. This is essential to avoid possible personal injury.
- This fiber laser emits invisible laser radiation at 1080 nm with a rated average output power of more than 1000W. Contact with direct or scattered laser radiation can cause permanent damage to the eyes, burn human tissue and start a fire.
- Users are not allowed to open the casing of the laser. All maintenance and service can only be done at JPT factory. Without the permission from JPT, opening the laser casing will invalidate the warranty.
- Avoid direct eye exposure. Always wear the laser safety goggles when operate the laser.

Table 1 Safety and Compliance Labeling

Symbols	Definition
	Laser warning triangle. This symbol is to alert the user the danger to exposure of hazardous invisible laser radiation.


 <p>WAVELENGTH RANGE: 900-1200nm VISIBLE AND/OR INVISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION CLASS 4 LASER PRODUCT</p>	<p>Maximum output power of laser</p>
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Figure 1 Laser safety goggles

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1. Product Tour

Compared to traditional laser systems, fiber lasers possess many advantages, such as high electrical to optical conversion efficiency, compactness, maintenance free, and flexible output enabled by fiber delivery, etc. Fiber lasers are the ideal light source for laser machining, welding and other industrial applications.

High power CW fiber lasers from JPT are the optimal combination of optical, mechanical, electrical and software components. Through the controlling ports and the controlling software, the operating status of the laser can be monitored in real time, alarm messages can be received in time, and data can be collected. The laser uses water-cooling and the power consumption is low. It is also compact and convenient to use.

Below is the picture of an actual JPT CW fiber laser product:



Figure 2 Picture of a fiber laser product

2. Delivered Product

S/N	Part	Specification	Quantity
1	1000W fiber laser	1000W	1
2	Control cable(DB25)	5 m	1
3	Dust-free tissue, cotton swab		1
4	USB2.0-to-RS232 cable		1
5	Keys		2
6	Water Pipe,8*12 / 4*6		2

After unpacking, verify that all components are on hand using the packing list. Please keep all the packaging materials. If long-distance transport is needed again, please re-use the packaging materials in order not to damage the product.

3. General Specifications & Installation Instructions

3.1 Specifications

3.1.1 Optical Features

S/N	Features	Testing condition	Symbol	Min	Norm	Max	Unit
1	Laser type			CW/Modulate			
2	Polarization			Random			
3	Rated output power		P _{nom}	1000			W
4	Center wavelength	Output power: 1000 W	λ		1080		nm
5	Bandwidth	Output power: 1000 W	λ		4	6	nm
6	Short term stability	Output power: 1000 W 2 hour burn-in test			1	2	rms%
7	Long term stability	Output power: 1000 W 24 hour burn-in test			± 1	± 2	%
8	Turn on time	Output power: 1000 W				20	μ s
9	Modulate frequency					20	kHz
10	Red beam power			0.2			mW

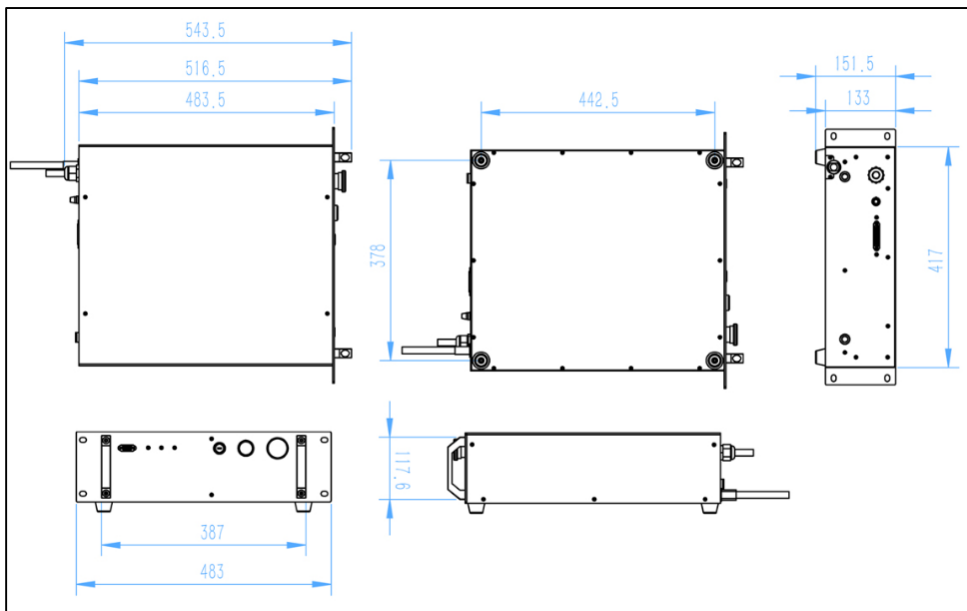
3.1.2 Laser Output

S/N	Feature	Symbol	Min	Norm	Max	unit
1	Output Fiber Tips		Universal QBH			
2	BPP	BPP	<2@50um			mm*mrad
3	Cable length	L		15		m
4	Bending radius	R	200			mm

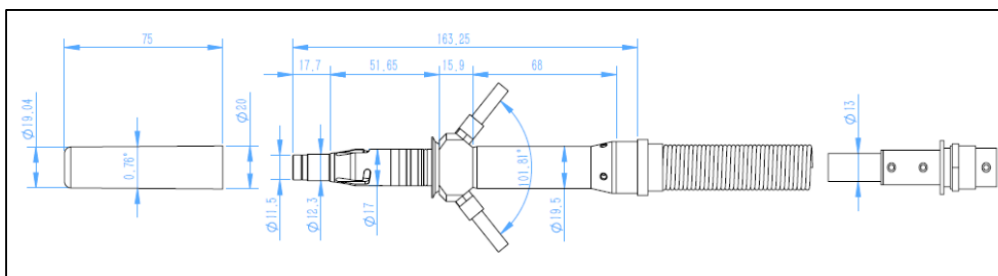
3.1.3 General Info

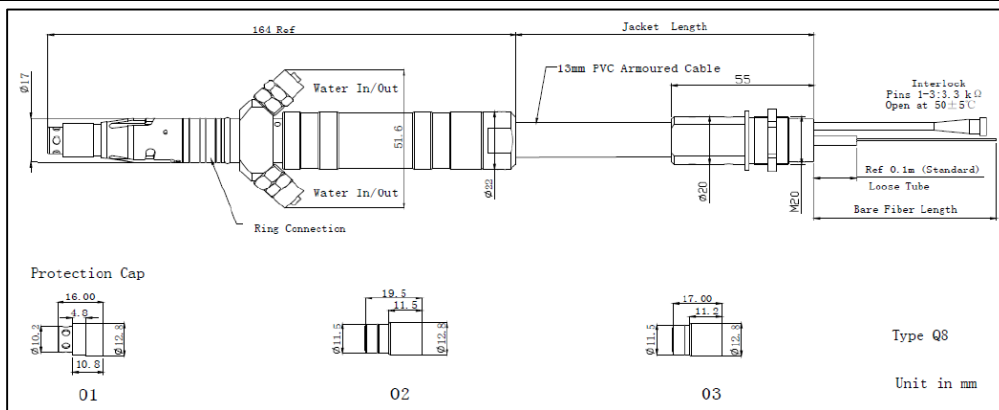
S/N	Feature	Min	Norm	Max	unit
1	Ambient temperature	10		40	℃
2	Humidity	10		90	%
3	Storage temperature	-10		+60	℃
4	Dimension (W x L x H)	483*516.5*151.5			mm
5	Weight		37		KG
6	Laser “cold boot” temperature	10			℃

3.2 Mechanical Drawing



3.3 QBH Laser Head





※ the real fiber connector may vary a little from the schematics (Figure 4)

3.4 Mounting and Alignment Procedure

※ Make sure that the laser and the fiber connector are placed on a steady horizontal operation platform. If the laser is placed on a metallic platform, then the laser must be in good electrical contact with the platform and the platform should also be grounded properly.

※ Make sure that during the installation and the processes afterwards, no component of the laser will be dropped or shaken severely. Beware of falling objects which make damage the laser.

※ The metal shield optical cable at the output of the laser should never be bent to a circle with a radius less than 20 cm, no matter in the storage, transport or operating state.

※ Before the installation, please make sure that all the power switches and the earth leakage protection are off.

3.4.1 Mounting Instructions for the fiber output connector

Please firstly put the fiber output connector into the external devices if needed (such as cutting head, welding head, etc.). Please make sure that during the whole process the operating environment is clean and the output end facet should not be contaminated. If necessary, special dust-free cotton swab with >99.9% alcohol can be used to clean the output end facet. Any damage to the laser caused by the actions not listed above is not covered by the warranty.

3.4.2 Water Cooling System Connection

This laser system uses water cooling and the diameter of the water pipe is ID8/OD12mm,

Please note that the inlet and outlet water pipes should be connected as indicated in Figure 5. In order to avoid the abnormal laser operation due to water leakage, the water pipe should not be bent when connecting at any place. More details about the cooling requirement can be found in Table 6.

This laser output head uses water cooling and the diameter of the water pipe is ID4/OD6mm, Please note that the inlet and outlet water pipes should be connected as indicated. The flow of water supply should be 1-2L/min. The temperature of water supply should be 28-30°C. To prevent damage to the output head, be careful not to bend the water pipe when installing.

※ Important: Before turn on the laser, please start the chiller firstly.



Figure 5 Inlet and outlet ports for water cooling

Table 6 Water cooling requirement for the laser

S/N	Feature	Min	Norm	Max	unit
1	Cooling media	Drinkable Distilled Water(change every month)			
2	Temp: Higher than dew point	Refer: Summer 28;Winter 25			°C
3	Pressure			7	Bar
4	Flow Rate	12			L/Min
5	Cooling Capacity	3.5	4.5		KW
6	Pump Lift	32			

Note: Suggested temperature setting of laser: 28 °C for summer;25 °C for winter and need to add anti-freeze liquid. **When the laser is not in use for a long time, the water cooling channel in the laser should be emptied and the inlet and outlet ports should be closed using the plugs provided.** If the weather is cold, please empty the cooling channel immediately after using the laser, in case it cracks or get blocked.

3.4.3 Power Supply Connection

1) This laser uses included 3PIN input with definition listed in Table 7 and standard listed in Table 8. Please make sure that the electric supply fulfills the requirements before connecting the laser to it. Wrong connection may lead to errors or even damage the laser. The power connection is as shown in Figure 6.



Figure 6 AC power input

Table 7 AC input connection

S/N	Cables	Electric supply	Color
1	Live wire	L	Brown
2	Neutral wire	N	Blue
3	Earth wire	Protective earth PE	Green/Yellow

Table 8 AC Power Supply

S/N	Parameters	Values	Units
1	Electric power	220±10%	VAC
2	Current frequency	50/60	Hz
3	Power Consumption	3300	W

3.4.4 I/O Connector and Control Cable

This laser uses DB25 connector with definition listed in Table 10.

The interface connection is as shown in Figure 7.

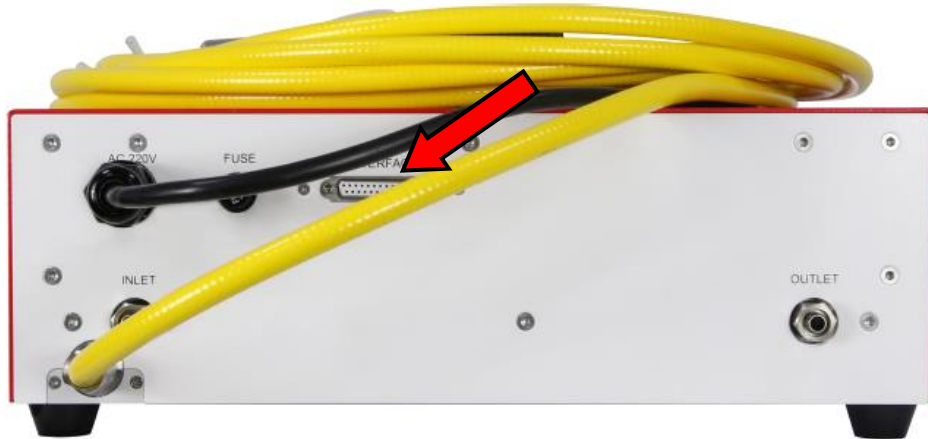


Figure 7 Interface connection

Description of Laser panel interface

Front Panel View:



Figure 6 1000W Front Panel Layout

POWER Indicator light: The indicator light turns green when switching on; after waiting for 10seconds, it turns to red when completed power on.

RUN indicator light: It is green when power switches on. It turns to red after waiting for 10seconds till laser is active, then user can press START button to emit laser radiation .

ALARM indicator light: The laser shows normal when ALARM indicator light is green, red with buzzer indicates laser alarm.

START Button: Press it when the RUN indicator light turns to red, and the START light will turn to green.

Key Switch: 3-position key switch controls the laser operation mode: left position - ROBOT mode; Right position -TEST mode; Central position- Laser Off.

EMERGENCY: Laser alarms and cuts off the internal power supply when pressing the emergency stop button. Reset by turning clockwise, the user needs to restart laser or reset alarm signal after resetting, then the alarm can be eliminated.

RS232 interface: The interface that is monitored and issued instructions to the laser by the upper computer.

1000W Rear Panel View:



Figure 7 1000W Rear Panel Layout

INTERFACE/DB25: DB25 interface input (see table 2 for details);

AC220V Interface: Laser Alternating Current adopts 220V input (see table 4 for details);

FUSE: Time-lag fuse(220V20A);

INLET: Laser inlet of cold water pipe diameter(8*12mm).

OUTLET: Laser outlet of cold water pipe diameter (8*12mm).

4. Control and Operation

4.1 I/O Connection

Table 10 I/O connection definitions

Pin	Signal		Signal Level	Description
1	AD/RS+	Digital Input	24V DC	RS232/Robot Control Mode
14	AD/RS-	Feedback		
2	Remote Start+	Digital Input	24V DC	Replace laser start button function
15	Remote Start-	Feedback		
3	Modulation+	Digital Input	24V DC	PWM modulation
16	Modulation-	Feedback		
4	Enable+	Digital Input	24V DC	High voltage when laser fault
17	Alarm Output	Digital Output		
5	Enable-/Alarm -	Feedback		4,17 GND
18	0-10V+	Analog input	1-10VDC	Power control: 1-10V=10-100% power
6	0-10-/Analog input GND	Feedback		
7	Red Beam+	Digital Input	24VDC	Red beam control
20	Red Beam-	Feedback		
8	Interlock 1+	Close contact input		Not allowed to contact external power supply and GND
21	Interlock 1-			
9	Interlock 2+			
22	Interlock 2-			
11	Reset +	Digital Input	24VDC	Alarm log clearing, signal input keep more than 600ms
24	Reset -	Feedback		
10				Reserve
23				
PE	GND			Connect to ground

4.2 Software Control

***Exact software version may different, contact JPT for latest software**

4.2.1 Function of the Software




Laser control, operation instructions, output mode selection, laser status monitoring, and alarm message, etc.

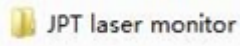
4.2.2 Driver Installation

1) Connect the delivered thumb drive to a computer(or download the software through the link). It contains two folders, as shown in Figure 10.



Figure 10

2) Firstly open  RS232 drive, then find the sub-folder  USB 2.0 TO RS232 Converter and open it. Then chose  driver, and open it. This folder contains several drivers to be used in different operating systems. Simply install the suitable driver to the computer will do. (Note: during the installation, no serial cable should be connected, otherwise errors will occur.)

3) After installing the RS232 driver, connect a standard USB2.0 to RS232 serial cable between the computer and the laser. Then open the folder  JPT laser monitor and execute the software



4.2.3 Port Selection

Once the installation is complete, open the monitoring software which will show as in Figure 11. Choose the appropriate port on the left and then click the button on the right to enter the user interface.

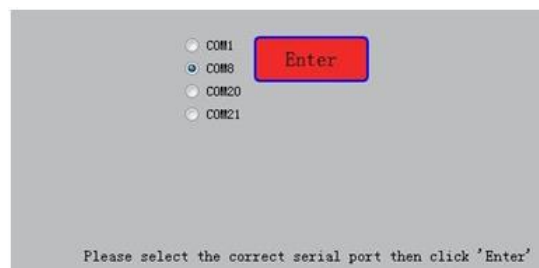


Figure 11 Serial port select

4.2.4 Connection Status

Check whether the monitoring interface is connected properly, as shown in Figures 12 and 13(pic for refer only, may not the exact software version).

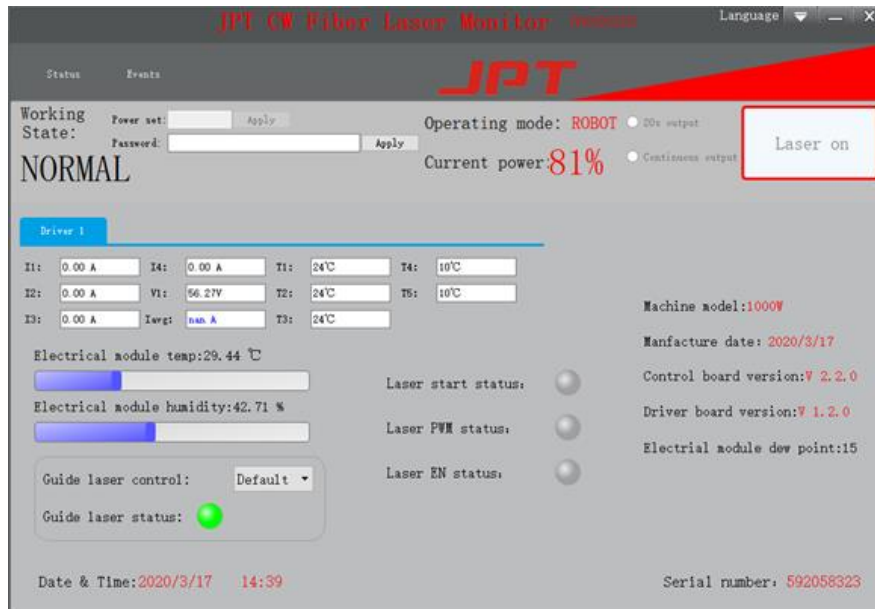


Figure 12 Connect Properly

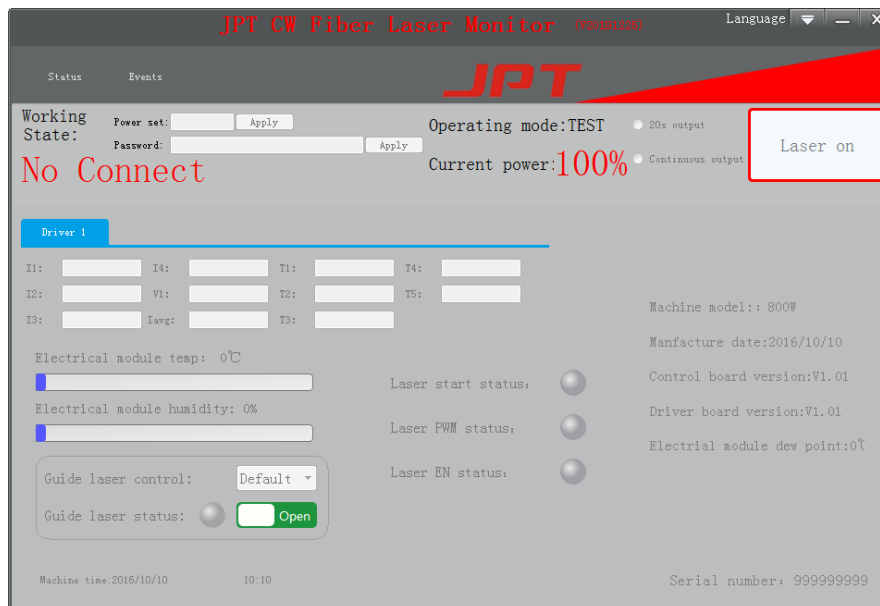


Figure 13 Disconnect

When you enter the interface, if it displays as shown in Figure 10, then it means the serial cable is connected properly and you can proceed to the next stage of operation.

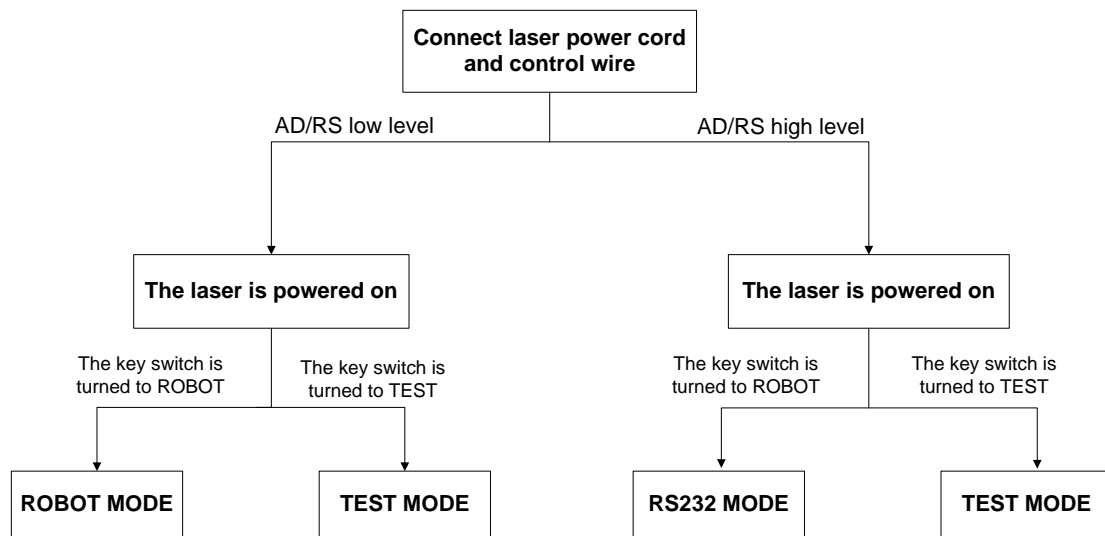
When you enter the interface, if it displays as shown in Figure 11, then it means the serial cable is disconnected. Under this condition, the laser cannot be controlled through the software. There

are 3 possible reasons for this: the laser is powered off, the standard USB2.0 to RS232 serial cable is damaged or wrong connected. Please check for the reasons one by one and restart the operation after troubleshooting.

4.3 Laser State

4.3.1 Laser Mode Selection

This laser has three operating modes: ROBOT ,TEST and RS232



※Important: **The laser cannot work until 10 seconds after power on, 10s for laser system ready.**

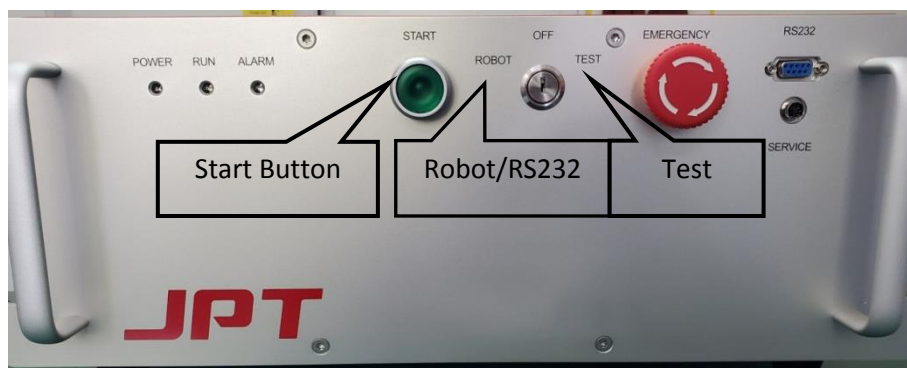


Figure 14 Mode selection

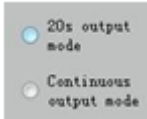
1) Test Mode: users can operate the laser using the controlling software.


Operating method: when the key switch is pointing at TEST on the front panel of the


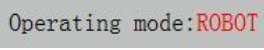


, Test Mode is selected and on the user interface, it will show Operating mode: TEST.

Set the power level using the software Power setting: [] Apply, and then choose either 20S output or

continuous-wave output . Once the setting is completed, press the “START” button

at the front panel of the laser and the laser will be ready to emit. Click  on the user interface will do.

2) Robot Mode: users can operate the laser from external control operating method: when the key switch is pointing at ROBOT on the front panel of the , Robot Mode is selected and on the user interface, it will show . Press the “START” button at the front panel of the laser and then once a signal is given from external the laser will emit. Emission under the Robot Mode needs to fulfill the following 3 conditions simultaneously:

- a) 18-6 analog quantity controls: external 0-10V
- b) 3-16 modulation signal PWM: high level 24V is effective, control frequency and duty cycle
- c) 4-5 Enable signal: Laser shutter

3) RS232 Control Mode

The key switch turns to “ROBOT”, high level 24V is active with AD/RS signal input; You are able to control laser power by monitoring software; External input signal 0-10V shows analog failure under this mode; can control laser emit by external signal.

4.3.2 Default Settings

Before leaving the factory, all the lasers have been set with the default parameters. There is no need and no way to change the settings. If under special requirement, please contact out technical staff.

5. Laser On and Off Operating

*Test before Laser On

---Checking when power off, chiller off

- 1). Whether the laser and QBH output head are well fixed.
- 2). Whether the operating space is well ventilated, and there is no combustible, flammable, explosive and volatile products, etc.
- 3). Whether the water cooling system has been configured according to the requirements in chapter 6
- 4). Whether the network voltage is normal, please check the detailed requirements in chapter 2
- 5). Whether the QBH laser head is inspected and cleaned according to the requirements in chapter 5
- 6). Whether the emission path of cutting head or welding head is shielded; Whether inside is clean and dust-free
- 7). Check whether there are any irrelevant personnel in the operation area

---Checking when power off, chiller working

- 1). Start the chiller to set the temperature and check whether the water pipe joints are leaking

---Checking when power on, chiller working,

- 2). Whether the laser is alarmed and whether the system can start normally through monitoring software and the panel indicator light
- 3). Check the red light quality below the connector. The normal red light is a red near-circular spot with moderate and stable brightness
- 4). After ensure that the laser system is normal, please refer to the "safety guide" to operate laser carefully.

5.1 Laser On

First make sure laser and I/O connect properly, then follow below steps to switch on the laser:

- 1) Turn on the Chiller, set temperature and make sure water flow properly,
- 2) Switch on the power supply of laser
- 3) Rotate Key to selected mode (Test or Robot)

- 4) Press the start button (or use remote control)
- 5) Set power percentage (cannot be lower than 10%)
- 6) Laser on to emit laser (with necessary safety measures)

5.2 Laser Off

- 1) Power off the laser
- 2) Switch Key to Off
- 3) Switch Laser Power Supply Controller to Off
- 4) Turn off the Chiller

※Important: when suddenly power cut, must switch the Key option to OFF, to avoid damage to laser when power recovery suddenly,

6. Alarm Messages and Troubleshooting

6.1 Working Log Display

Laser emission under both of the modes can be monitored using the controlling software. It will send alarm message when errors occur and will leave a record in the log, as shown in Figure 15.

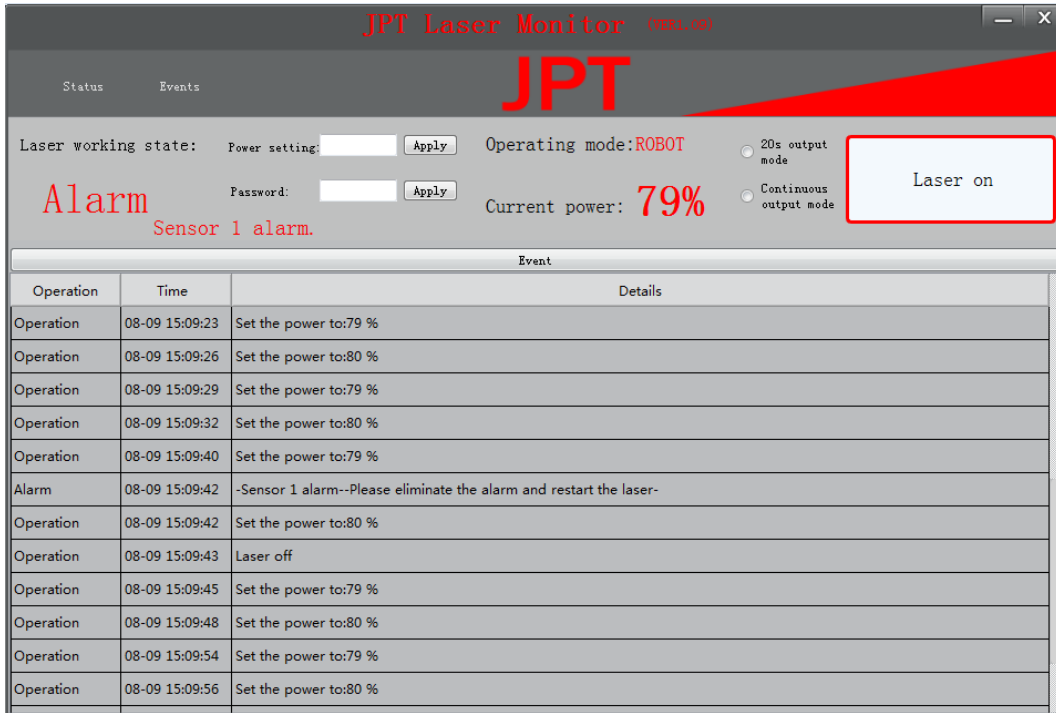


Figure 15

6.2 Alarm Messages and Corrective Actions

Table 11

S/N	Alarm Message	Phenomenon	Eliminate Methods	Note
1	Over-current alarm	Laser emission stop, alarm buzzer ringing, fault led lit	1.Restart or reset the laser.	After dismissing the alarm, restart the laser
			2.Reduce the power to test if the alarm is still on.	
3.Please contact the manufacturer directly if the alarm can't be eliminated.				
2	Over-pressure alarm	1.Restart or reset the laser.		
		2.Check whether AC220V is normal.		
		3.Please contact the manufacturer directly if the alarm can't be eliminated .		
3	Low pressure		1.Restart or reset the laser.	

	alarm		2.Check whether AC220V is normal.	
			3.Please contact the manufacturer directly if the alarm can't be dismissed.	
4	Hardware over-current will cut off the protection		1.Restart or reset the laser.	
			2.Reduce the power to test if the alarm is still on.	
			3.Please contact the manufacturer directly if the alarm can't be dismissed.	
5	Hardware current is abnormal		1.Restart or reset the laser.	
			2.Please contact the manufacturer directly if the alarm can't be dismissed.	
6	Emergency stop alarm		1.Check whether the emergency stop button is pressed.	
			2.Restart or reset the laser.	
			3.Please contact the manufacturer directly if the alarm can't be dismissed.	
7	485 communication alerts	Laser emission stop, alarm buzzer ringing, fault led lit	1.Restart or reset the laser.	After dismissing the alarm, restart the laser
			2.Please contact the manufacturer directly if the alarm can't be dismissed.	
			1.Please short connect the two sets of signals before starting.	
			2.Restart or reset the laser.	
8	Interlock 1, interlock 2 alarm		3.Check whether the signal lines are short connected if the alarm is still on.	
			4.Please contact the manufacturer directly if the alarm can't be dismissed.	
			1.Restart or reset the laser.	
9	Sensor 1 failure	Laser emission stop, alarm buzzer ringing, fault led lit	2.Check whether the laser is safely grounded.	After dismissing the alarm, restart the laser
			3.Please contact the manufacturer directly if the alarm can't be dismissed.	
10	Sensor 1 alarm		1.Check laser output head whether there is red light.(The red light control mode is the default control state.)	

			<ol style="list-style-type: none"> 2.Restart or reset the laser. 3.Check whether the laser is safely grounded. 4.Please contact the manufacturer directly if the alarm can't be dismissed. 	
11	Sensor 5 alarm		<ol style="list-style-type: none"> 1.Check whether the laser output head has red light .(The red light control mode is the default control state.) 2.Check whether the laser is safely grounded if the laser still occurs 3.Contact the manufacturer to unlock. 4.Check whether the laser is safely grounded Restart or reset the laser. 5.Please contact the manufacturer directly if the alarm can't be dismissed. 	
12	Temperature sensors alarm		<ol style="list-style-type: none"> 1.Restart or reset the laser. 2.Check whether the chiller is working normally if the laser still occurs. 3.Please contact the manufacturer directly if the alarm can't be dismissed. 	
13	Expired		<ol style="list-style-type: none"> 1.Connect monitoring software to check if the laser time is correct. 2.Restart or reset the laser if the time is wrong. 3.Please contact manufacturer if the laser time is still wrong after restarting. 4.Please contact manufacturer to send password for unlocking if the laser time is correct after restarting. 	

7. Maintenance, Customer Service and Repair

7.1 General Warranty Information

1.1 There is no components built into the product that can be maintained by users. All the maintenance and repair should be done by the specialists in JPT.

1.2 After all products manufactured according to the order or specification are shipped, JPT will guarantee to repair the products with material and technique problems during the warranty period. Ensure that they meet the specifications under normal use.

1.3 In order to protect your rights and interests, please be sure to contact JPT as soon as possible after finding any defects or damages, and also apply product maintenance or replacement service. After authorized by JPT, please return this product with original warranty package.

1.4 JPT has the right to repair or replace any products with material or technical problems within warranty period. All maintenance or replacement products within the warranty period that only with special problems are guaranteed free warranty. JPT reserves the rights to collect the payment for defective products under normal use.

1.5 If the product is not within the warranty period or warranty scope, the customer shall be responsible for the maintenance cost.

1.6 Please do not send any products back to JPT without confirmation.

1.7 JPT has the right to change any design or structure for the product without prior notice.

7.2 Warranty Limitation

This warranty excludes or does not cover defects or damage resulting from any of the following:

2.1 Output head (including bare fiber, optical fiber, optical fiber terminal, external coupler and collimator).

2.2 Unauthorized modification, maintenance, disassemble or opening neglect or damage from accident.

2.3 Improper use of operation outside of the specifications for the product.

2.4 Wrong operation, improper or inadequate maintenance or calibration by customer.

2.5 Do not follow the warning information in the manual.

2.6 Optical fiber is not warranted.

2.7 Components and accessories tampered, opened, disassembled or remolded by companies other than JPT, which have separate warranties.

2.8 The return of non-sale laser Non-sale laser returns, which affect the secondary sale of laser appearance, devices and accessories. According to processing method, fees will be charged

according to the treatment(e.g. the appearance of the laser has irretrievable damage, dirt or scratch, irreversible damage on the output head protector, crystal and structure parts.)

2.9 More than three months from the date of acceptance of laser output head.

7.3 Other Considerations

3.1 Warranty return: Buyers pay for one way freight cost and insurance to JPT. JPT will pay for freight return cost and insurance back to the buyers.

3.2 Non-warranty return: Buyers pay for 2-way freight costs and insurance to JPT. If it includes both warranty items and non-warranty items, the non-warranty shall prevail;

3.3 Buyers will be charged for testing fee for all returned products that if conform to corresponding specification and standards, non-manufacturing defects or not used in accordance with user manual.

3.4 All products must be carefully packed in a suitable containers to avoid any damages in shipment to JPT.

3.5 Provide complete packing list with product model and serial number to ensure prompt repair.

※ The relevant technical parameters listed in this manual are for reference only and related product information might be changed without notice. All the specifications, parameters and agreement are subject to the terms of sales contract.

※Shenzhen JPT Opto-electronics Co., Ltd reserves the right to the interpretation of the above Terms and Conditions.

Thank you!

For more support, please contact:

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