User Instruction

RFL-P70Q

Wuhan Raycus Fiber Laser Technologies CO., Ltd.

Safety Information

Please read this instruction carefully and familiarize yourself with the information we have provided before you use the product. In this brochure, important operation procedures, safety and other information is provided for you and all future users. In order to ensure operating safely and optimal performance of the product, please do according to following warnings, cautions and other information.

- Raycus pulsed fiber laser is classified as a high power Class IV laser device. Before supplying the power to the device, please make sure that the correct voltage of 24VDC power source is connected and the anode and cathode are right. Failure to connect power source correctly will cause damage to the device.
- The device emits invisible 1060~1085nm wavelength light with average power 70W. Do not expose your eyes or skin to the radiation of the laser.
- Do not take apart the device, because there are no replaceable accessories available for users to use. Any maintenance can only be proceeded in Raycus.
- Do not look into the light output end directly. Use appropriate laser safety eyewear when operating the device.

Safety labels and locations

Be careful
Avoid direct laser irradiation

The two labels above is located on the top of the cover of the device, representing laser radicalization.

Contents

1. Description

1.1. Product description

Raycus pulsed laser is specially designed for laser making system with high speed and high efficiency. It is an ideal high power laser source for industrial laser making system and other applications.

Compared with conventional lasers, pulsed laser has some unique advantages in accelerating the conversion efficiency of the pump light over 10 times higher, its automated design in low power consumption and being proper for operating both in and outside the lab. Besides, it is exquisite and convenient for its independence in placement, free time in using and facility in connecting to equipment directly.

The device can emit 1060~1085nm wavelength pulsed light under the control of industrial laser's standard interface driven by 24VDC power source.

1.2. Actual configuration list

Table 1 configuration list

Items	Quantity	Remark
Fiber Laser module	1	
User instruction	1	

1.3. Environmental requirements and cautions

Pulsed laser should be driven by 24VDC±1V power source.

1) Attention: Make sure the wire of the device is properly grounded.
2) All the maintenance of the device should be done by Raycus, for there is no accessory available provided inside. Please do not damage the labels or open up the cover in order to prevent against electric shock, or any damage to the device will not be warranted.
3) The output head of the product is connected with a optical cable. Please be careful dealing with the output head. Avoid dirt and any other contaminations. Please do use exclusive lens paper when cleaning the lens. Please lid the laser with protective cover of the light isolator to be against dirt when the laser is not installed in the device or not in working.
4) If the operating way to use the device fails to follow this instruction, the function of protection produced by the device will be weakened. Therefore, it should be used under normal conditions.
5) Do not install the collimating device into the output head when the laser device is in working.

6) The device has three fans at the rear panel to give off heat. In order to guarantee enough airflow to help giving heat off, there is a space in width of 10cm for airflow in both the front side and the rear of the device. Because the laser's fans are working at blow condition, so if laser is mounted in a cabinet with fans, the direction should be same as laser's fans.
7) Do not look into the output head of the device directly. Please do wear appropriate laser safety eyewear during the time when operating the device.
8) Make sure the pulse repetition rate is no lower than 20 kHz, because laser with high power may cause damage to the device.
9) Maximum absence of the pulse is $50*10^{-6}$ s.
10) Power source interrupt will do great harm to the laser device. Please make sure the power supply works in succession.

1.4. Specifications

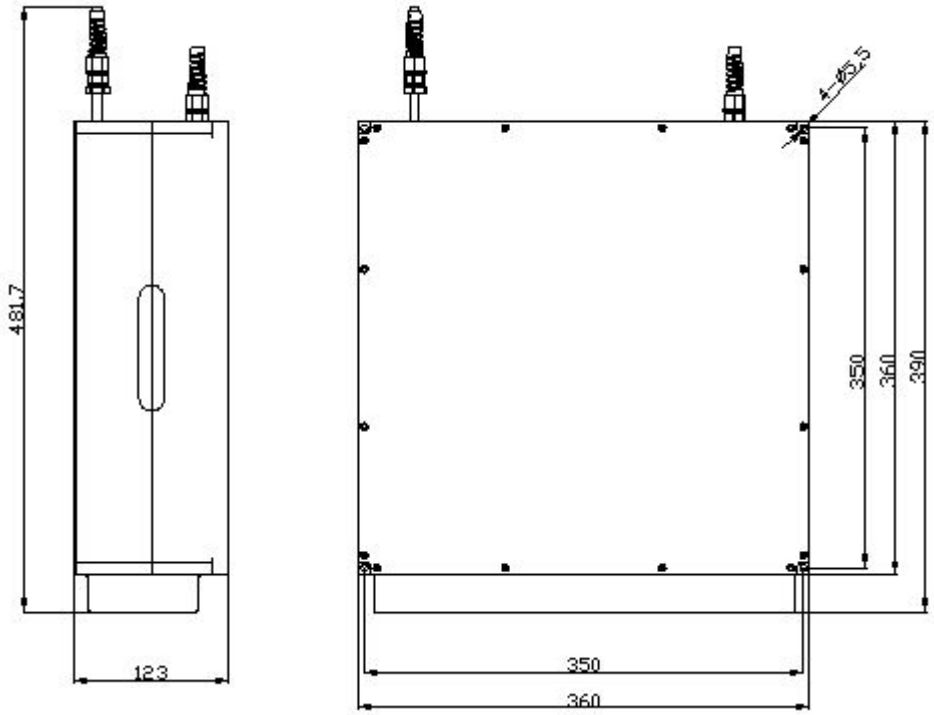
Table 2 70W pulsed fiber laser specifications

Pulsed fiber laser	70 W
Wavelength（nm）	1060~1085
Polarization	Random
Optical isolator	Yes
Nominal average output power (W)	≥70@70～100kHz
Single pulse energy (mJ)	1@20～70kHz
Beam quality（M^2）	≤2
Beam Diameter（mm）	6～8
Pulse duration（ns）	≤130
Pulse repetition rate（kHz）	20-70
Output Power Tunability（%）	10-100
Output Fiber Cable length（m）	2.0
Working voltage（VDC）	24±1
Power consumption（20℃）（W）	400
Cooling	Forced Air Cooled
Dimension W×D×H（mm）	396*360*123
Operating temperature	0℃～40℃
Store temperature	-10℃～60℃
humidity	30%～85%

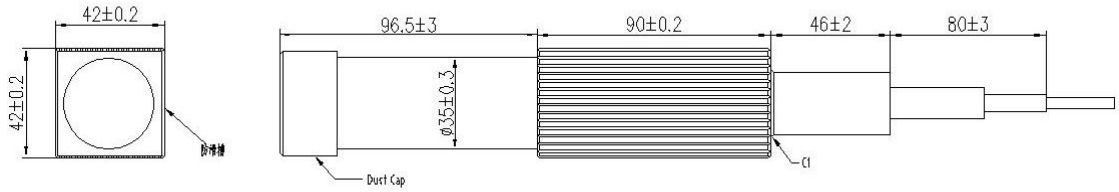
2. Mounting

2.1 Mounting dimensions

1) Fiber Laser module dimensions

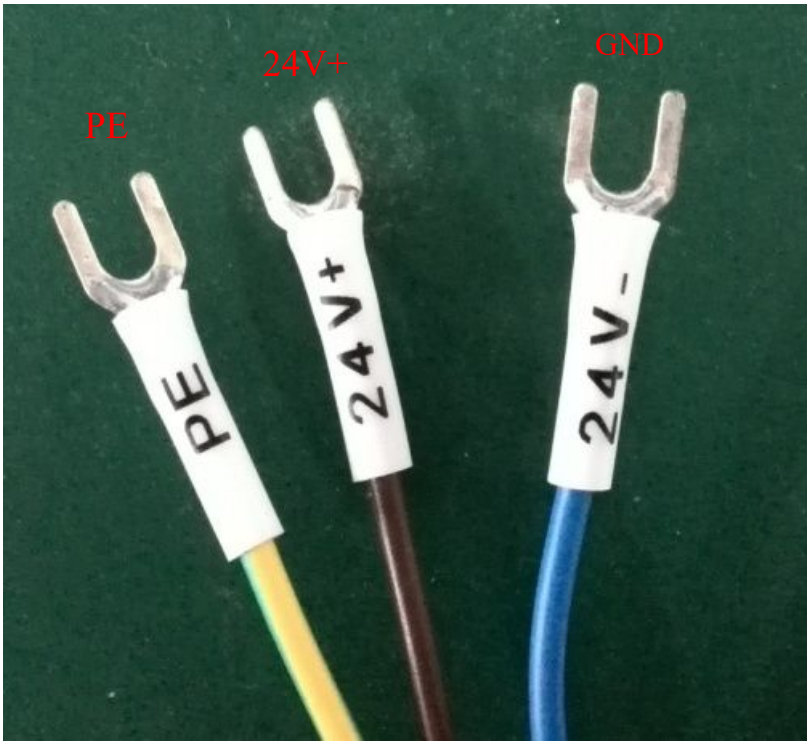


2) Isolated output head dimensions



2.2 Method of installation

1) Fix hard the module to the bracket, keep the laser in adequate ventilation.
2) Connect the power line to 24VDC power and make sure enough DC output power is guaranteed. Pay attention to the polarity of the electric current: anode-brown; cathode-blue; yellow and green: PE.

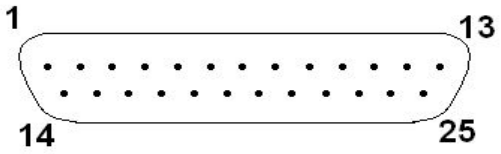


3) Make sure that the interface of the external controller matches the laser and the control cable is connected to the laser's interface well.

4) The bending radius of the delivery fiber should not exceed 15cm.

3. Control Interface

DB25 at the rear of the power module is the joint interface connecting control system with laser system. Please make sure the connection is reliable before operation. Feet of the connector are defined as follows.



PIN No.	Name	Description
1-8 (D0-D7)	Power Setting	Current settings of pump: 00H: zero power 01H ..... FFH: Full power MSB: PIN8 LSB: PIN1

12	Reserved	
10,13-15，24-25	Ground	Digital GND
11，16，21	Laser alarms status	see alarm codes in the table below
17	VCC	+5VDC power supply input for independent operation of the guide laser and PCB
18	EE	Emission Enable (EE) signal. HIGH: Emission Enable LOW or disconnected: Emission Disable
19	EM	Emission Modulation (EM) input. Galvanically isolated. HIGH (>3V): Emission ON LOW or disconnected (<1V): Emission OFF
20	Sync	Pulse Repetition Rate (Synchronization) input, square wave.
22	Guide	Guide Laser (red diode) ON/OFF input.
23	Obligate PIN	/

1) By combination of PIN1—PIN8 (TTL level), pump current of diode laser, i.e. the output of laser power can be setting. By PIN1-PIN8 of 0～255，corresponding the laser power of 0～100％ (the actual laser power may not be linear with these setting). For example:

	Setting 1	Setting 2	Setting 3	Setting 4
PIN 1	0	0	0	0
PIN 2	0	0	0	0
PIN 3	0	0	0	0
PIN 4	0	0	0	0
PIN 5	0	0	0	1
PIN 6	0	0	1	1
PIN 7	0	1	1	1
PIN 8	1	1	1	1
current	~50 %	~75 %	~87.5 %	~93.75 %

2) PIN 13 to PIN 15、PIN 10、PIN 24 are all digital GND.

3) PIN 20 is the pulse repeating rate signal(PRR, TTL level). The frequency range should be 20 kHz~1000 kHz. If the PRR need to be changed during the work, it must be changed 5ms earlier than the laser on/off signal turning into high.

4) PIN 22 is the guide laser(red diode)on/off signal. High level switch on the guide laser while low level switch off the guide laser.

5) Alarm setting

PIN 11	PIN 16	PIN 21	Alarm item
Low	Low	Low	Temperature alarm
Low	Low	High	Normal
Low	High	Low	High reflection alarm
Low	High	High	System alarm
High	Low	Low	Supply voltage
High	Low	High	Laser system is not ready for emission state
High	High	Low	Obligate alarm
High	High	High	Obligate alarm

4. Operation Regulations

4.1 Pre-inspection

1) Make sure whether the device appears to be in good condition, the output fiber is bended or broken off.
2) Make sure signal line of laser and marking system are properly connected.

4.2 Operation procedures

1) starting procedures

Please make sure the control system is on when you turn on the fiber laser. Only after at least 1 minutes since the power worked on the system can the rest procedures be proceeded.

2) Frequency set introductions

For this special laser device, the frequency setting range is from 20KHz to 100KHz.

3) Laser marking checking

When the device is started successfully, please play the power down to zero without turning the marking system on for the first time when the device is going to be tested. Then draw a quadrate, marking continuously with playing the power slowly from zero up to 100% at the same time. Meanwhile, use a ceramic material to observe the laser and the laser should be stronger and stronger, otherwise shut down the device and check it. You can operate the marking system in common order afterwards.

4.3 Cautions

1) Marking frequency should be in the range of 20kHz～100 kHz.
2) It is better not to modulate the frequency while marking.
3) Stop marking first before shutting the device off, then play the power down to zero and cut the power off.

5. Instructions for warranty, return and maintenance

5.1 General warranty

All products are warranted by Raycus against defects and problems in materials and workmanship during the warranty period according to the purchase order or specifications and we guarantee the product will accord with the specification under normal use.
Raycus has the right to choose to repair or replace any product that proves to be defective in materials and workmanship selectively during the warranty period. Only products with particular defects are under warranty. Raycus reserves the right to issue a credit note for any defective products produced in normal conditions.

5.2 Limitations of warranty

The warranty does not cover the maintenance or reimbursement of our product of which the problem results from tampering, disassembling, misuse, accident, modification, unsuitable physical or operating environment, improper maintenance, damages due to excessive use or not following the instructions caused by those who are not from Raycus. Customer has the responsibility to understand and follow this instruction to use the device. Any damage caused by fault operating is not warranted. Accessories and fiber connectors are excluded in this warranty. According to the warranty, client should write to us within 31days since the defect is discovered. This warranty does not involve any other party, including specified buyer, end-user or customer and any parts, equipment or other products produced by other companies.

5.3 Service and repairs

Raycus is responsible for all the maintenance, for there is no accessory available inside for users to use. Please contact Raycus as soon as possible when problems under warranty about maintenance happen to the product. The product returned with permission should be placed in a suitable container. If any damage happen to the product, please notify the carrier in document immediately.

All the items about warranty and service above provided by Raycus are for uses' reference, formal contents about warranty and service are subject to the contract.
