Shenzhen JPT Opto-electronics

Seal-355-3E

User Manual

File No.:JG-GTGC-SM-0007

Security information

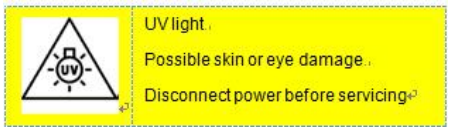
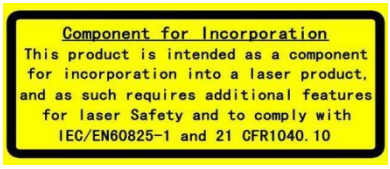
Please read this manual carefully before using this product.

In this user manual, important product safety operation specifications, as well as other reference information are provided. In order to ensure your personal safety during the operation of this product and to achieve the best performance of the product, please follow the following cautions and warnings and other relevant operating specifications in this manual.

- Do not disassemble the equipment without permission. All maintenance can only be carried out within the company. The upgrade can be carried out by technical support personnel on site. If the equipment is disassembled without permission, the damage will not be covered by the warranty.
- The output wavelength of the laser is 355 nm (invisible light), with an average output power of more than 3W, categorized as IV laser. It not only does great harm to the eyes, but also burns the skin. The reflected and scattered light of the device may cause harm to the human body.
- Please wear laser safety glasses during use.
- It is forbidden to place inflammable and explosive articles on laser path and low ignition point substances such as black paper, cloth and leather.
- The laser could be operated only when the external requirements are satisfied, such as power supply, chiller and protection.
- There may be strong reflected energy when laser emits on the mental. Please use shelter or working platform with CLASS IV during use.
- Please check whether the grounding protection, button and other safety measures are normal.
- Please switch off the power and check if there is any abnormal situation.
- **Caution**：Even when the indicator light is set, there will be a weak output of the ultraviolet indicator light at the laser output port.

Laser safety label

Label figure	Label information
	Laser label (placed on the top cover of laser module near the output port).
	Warning! if you do not follow the "warning" correctly, it may lead to physical injury to you or others. Do not use beyond the scope of 'Security information', unless you fully understand the product and use it in the specified environment.

	Danger! This product should be integrated in the terminal equipment, and needs to use 12V power supply, supporting switching power supply for 220V input. High voltage danger. Beware of electric shock!
	Precaution! To prevent accidental exposure to laser or reflected laser, laser protective glasses with specific wavelength (355-1064nm) should be worn when using, maintaining and repairing the laser.
 注意高温	Danger! The laser has enough energy to burn the skin. And in a certain distance, the laser can ignite the volatile substances, which may cause the explosion of volatile substances. It is forbidden to place inflammable and explosive dangerous goods in the laser processing area and use volatile substances carefully.
	Warning! Visible or invisible laser emitted by laser can cause serious damage to eyes and skin and may cause blindness. Reflected, scattered and diffuse light are also dangerous. Please note: the human eye is not visible to the laser whose wavelength is beyond 400-700nm (visible). That is, the laser may actually exist, but the human eye can not see the laser.
	Warnings (placed on the top cover of the laser module).
	Safety Warning

Laser safety glasses

Content

1 Product introduction and technical parameter

1.1 Introduction

Compared with IR lasers, the UV laser is directly breaking the chemical bond in materials. This process generates much less heat and separate matter into atom level, without destroying the environment. The UV laser has the advantages of short wavelength, easy focusing, small spot size, intense energy and high resolution. Because of its high processing accuracy, narrow line width, high quality and precision, small heat-affected area, good long-term stability, it can process various irregular patterns and heterogeneous patterns. It is mainly used in fine micro-processing, especially in high-quality drilling, cutting and grooving. It has been successfully applied in metals, semiconductors, ceramics, glass and a variety of polymer materials.

Seal-355-3E laser is all-solid-state UV lasers with end-pumped structure. Stable and compact resonator design makes high electro-optical conversion efficiency, good beam quality, high reliability, good consistency and maintenance-free operation. The new integrated structure design not only saves installation space for customers, but also greatly enhances the

anti-interference ability of laser head. The introduction of a new optical cavity self-purification system greatly improves the service life of the laser.

1.2 Technical parameter

Table 1. Parameters for Product

Parameter List	
Laser Type	3W UV laser, All-in-one
Model Number	Seal-355-3E
Wavelength	355nm
Average Output Power	>3W@30 kHz
Pulse Duration	<18ns@30 kHz
Frequency Range[1]	20 kHz - 150 kHz
Spatial Mode	TEM_{00}
Beam Quality (M^2)	$M^2 \leq 1.2$
Beam Roundness	>90%
Beam Full Divergence Angle	≤2 mrad[2]
Bam Diameter ($1/e^2$)	Non-expand: 0.7±0.1 mm[3]
Internal beam expander	6X[4]
Polarization Ratio	>100:1
Polarization Orientation	Horizontal
Average Power Stability	RMS≤3%@24hr
Pulse-to-Pulse Stability	RMS≤3%@30 kHz
Operating Temp.&RH	0℃~40℃; ＜80%
Storage Temp.&RH	-15℃~50℃; ＜90%
Cooling Mode	Water-cool
Cooling Capacity	500 W
Electricity Requirement	DC 12V
Average Power Consumption	< 180 W
Three-Dimensional Size	263 mm*120mm*107 mm (L* W* H)[5]
Weight	≈5.95 kg

[1] Refers to the better pulse stability during this frequency range.
[2] Refers to the direct output beam from the window, without beam expand.
[3] The measured position is at the laser output window.
[4] Refers to standard beam expander, 6X. And 10X could be customized.
[5] Refers to the dimension without expander.

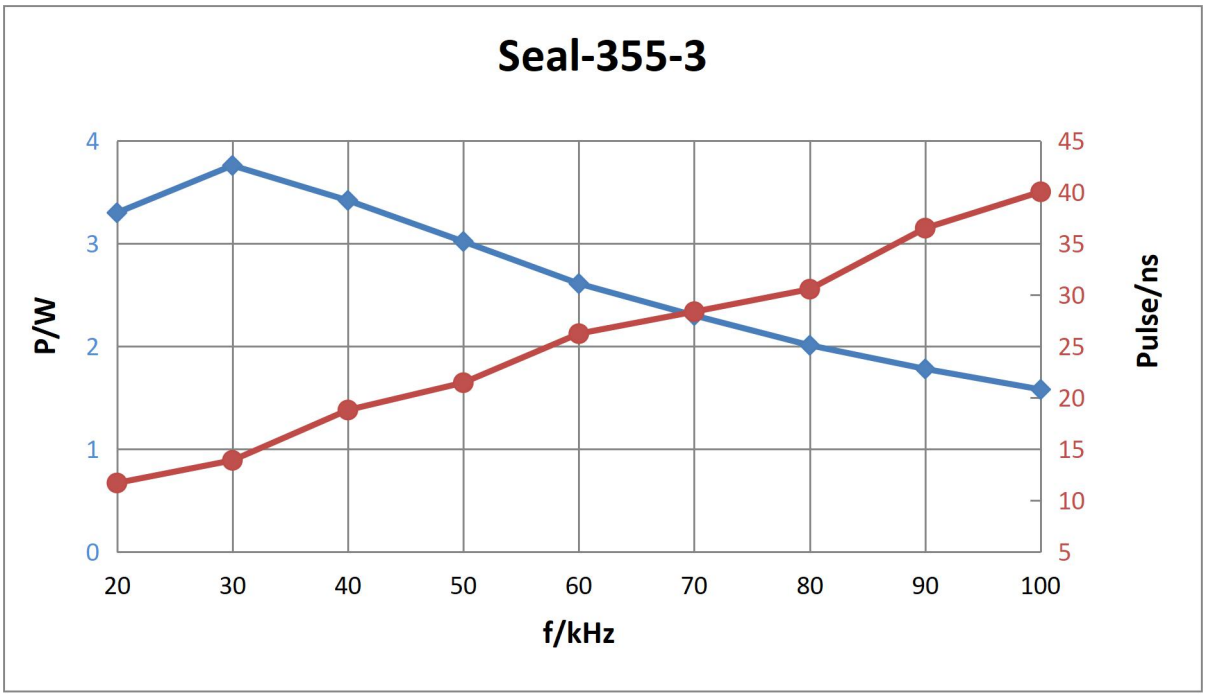


Fig.1 The relationship between output power and pulse width for Seal-355-3E

2 Installation

2.1 Dimension

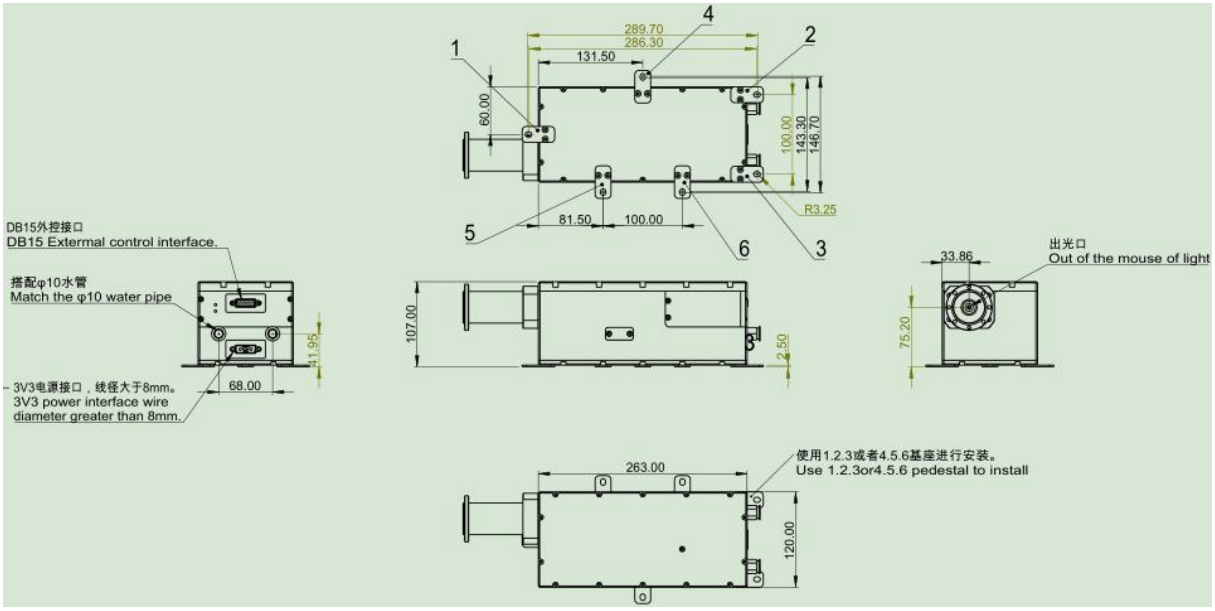


Fig.2 Laser case(with beam expander)

2.2 Installation

1) Fix method: Fix three M6 screw holes on both sides of laser housing on the worktable with M6*20 screw (suggested length) and corresponding cushion flat pad, as shown in the figure below.

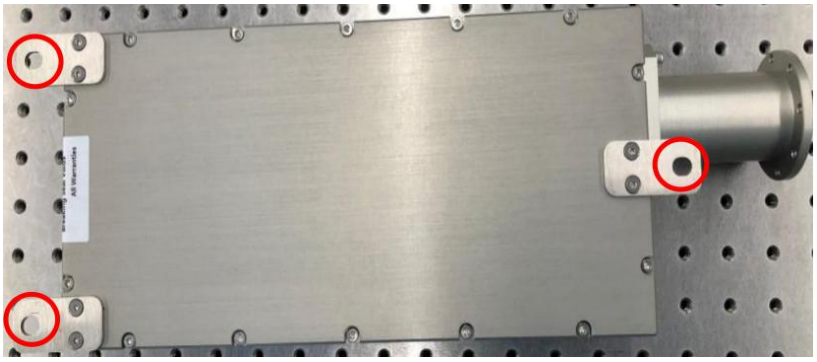


Fig.3 Fixing position for Laser case

2) Chiller Connection Method: Connect the output and input of the chiller (external diameter 10mm) to the connector (through joint) on the laser output head in turn, as shown in the figure below (Please notice the chiller is power off during this process).

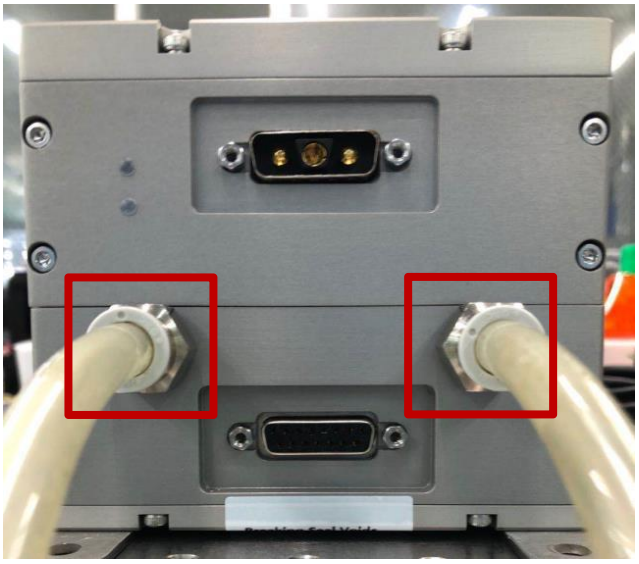


Fig.4 Chiller connection

3) Power Cable Connection Method: Connect the 3V3 plug to the laser and tighten the screw.

The other end is connected to the power supply (+12V) according to the positive and negative marks.

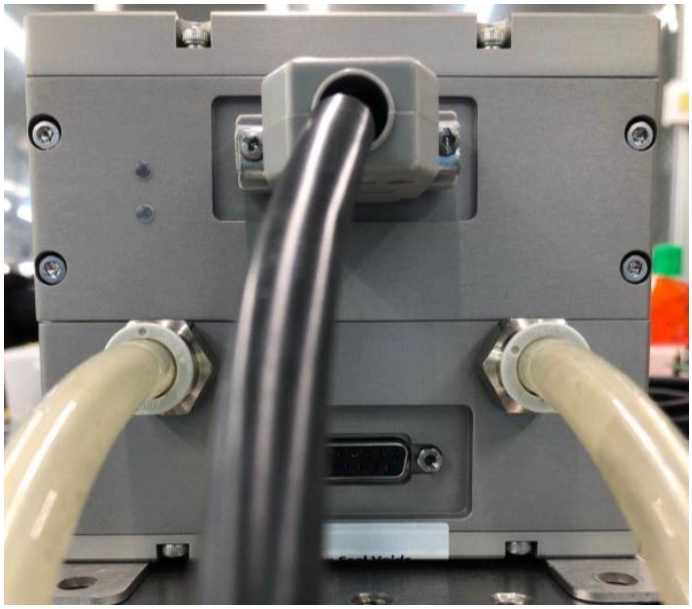


Fig.5 Power supply connection

4) Control Board Connection: Connect the DB15 signal wires to the laser, tighten the screws, and connect the adapter card at the other end.

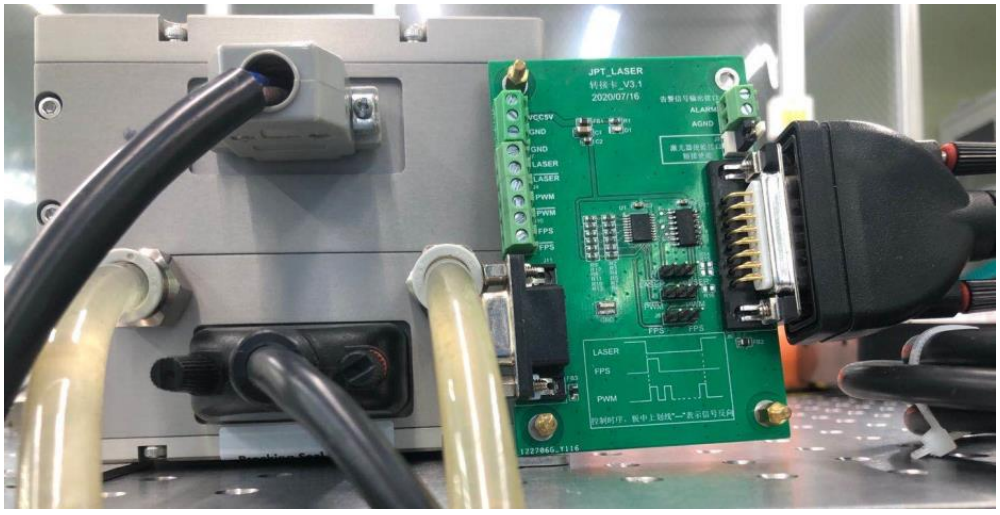


Fig.6 Control board connection

5) Dismantle the beam expander(not suggested to do):

In order to facilitate the use of customers, the 3W ultraviolet integrated laser produced by our company will be presented with a set of beam expander (including 6x or 10x beam expander and one installation sleeve of beam expander) and has been adjusted for customers. If the customer does not need the device, you can disassemble it by yourself, as shown in the following picture.

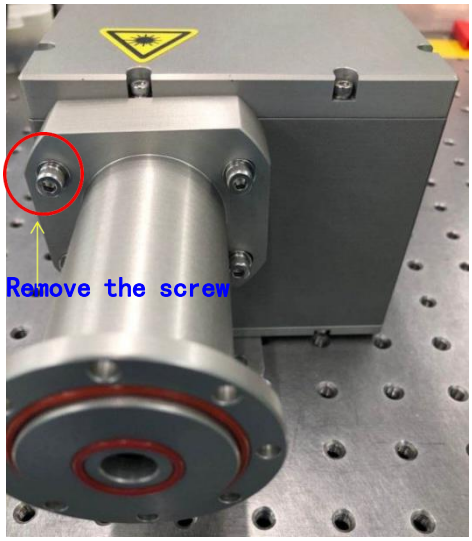


Fig.7 Beam expander housing remove

***Notice: Beam expander and installation sleeve are not covered by warranty**

3 Interface and GUI control

3.1 Interface Explanation

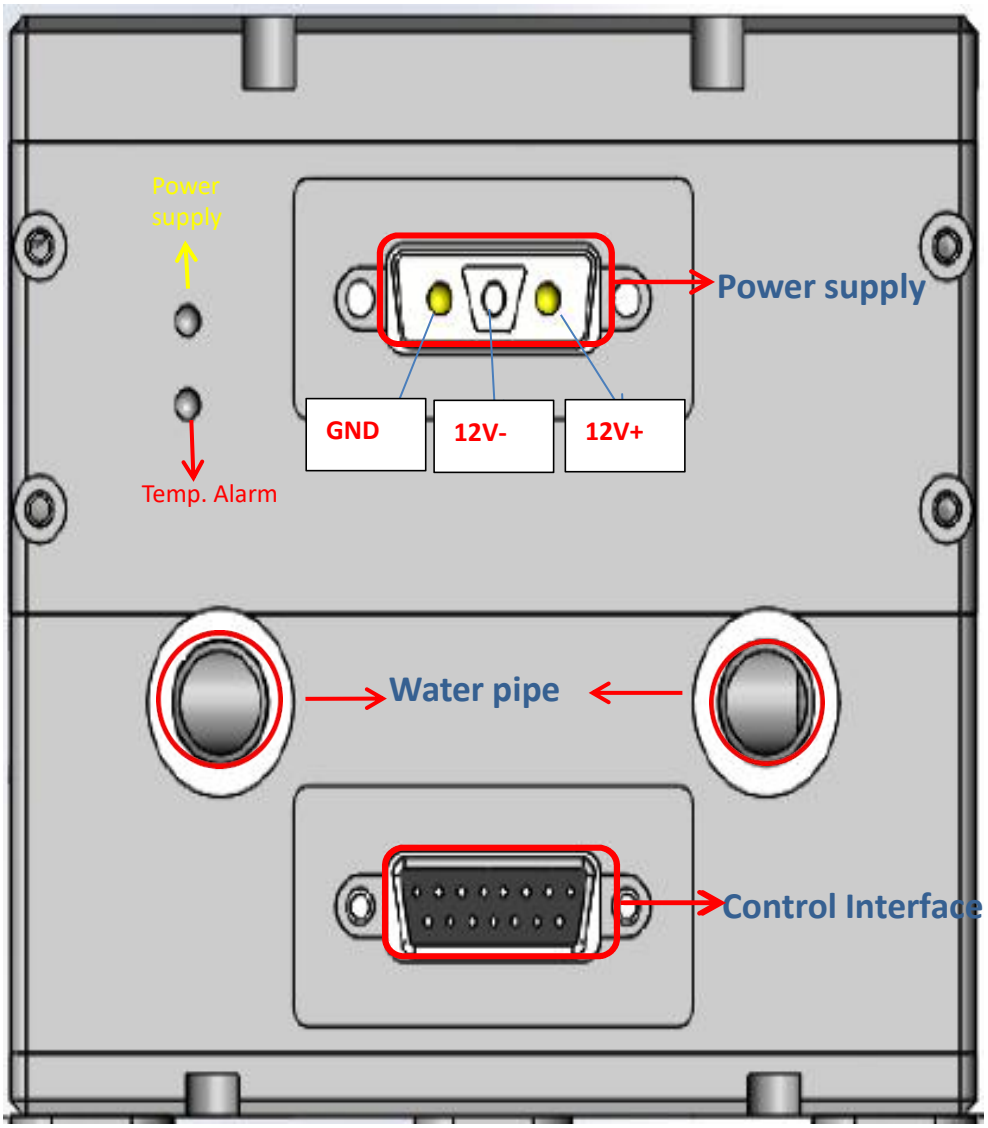


Fig. 8 Laser interface

***Indicator light**

Red light Temperature alarm, when the temperature of LD is abnormal or the water temperature is abnormal, it will light up. Should cut off the power of laser immediately and find the issue.

Yellow light When the laser works well, it will show this light.

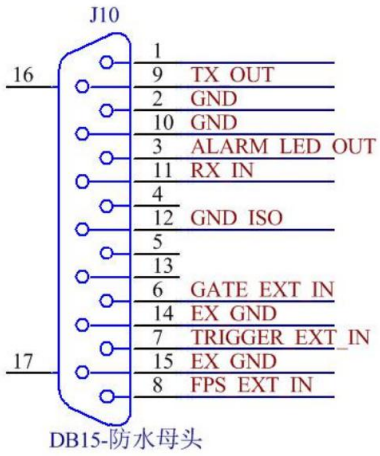
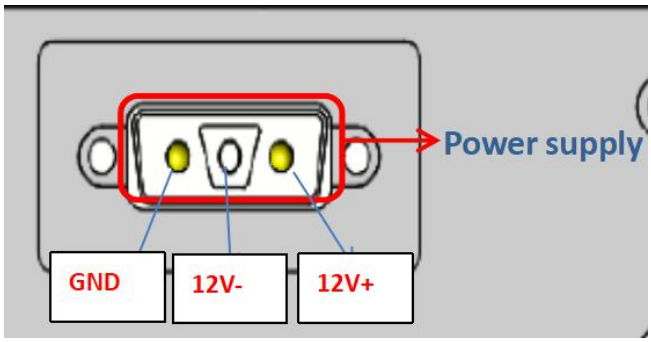


Table 2 DB15 Pin out

Pin	Type	Definition	Description	Comment
1,4,5	Reserve	N/A	N/A	N/A
2, 10	Ground, Digit	GND	The GND for PIN3	Return circuit
3	Output, Digit	ALARM_LED	Alarm signal output	High；Alarm; Low：normal TTL output
6	Input, Digit	GATE	Laser on	High；Guide beam Low：Laser 5V TTL input
7	Input, Digit	TRIGGER	Modulation	5V TTL input
8	Input, Digit	FPS	First pulse killer	External marking card provide, TTL
9	Output, Digit	TX_OUT	Command Port Output	Com Port
11	Input, Digit	RX_IN	Command Port Input	Com Port
12	GND ,Digit	GND_ISO	GND for Pin 9,11	
13	Reserve	N/A	N/A	N/A
14~15	Ground, Digit	GND	The GND for PIN6 / PIN7 / PIN8	GND extern

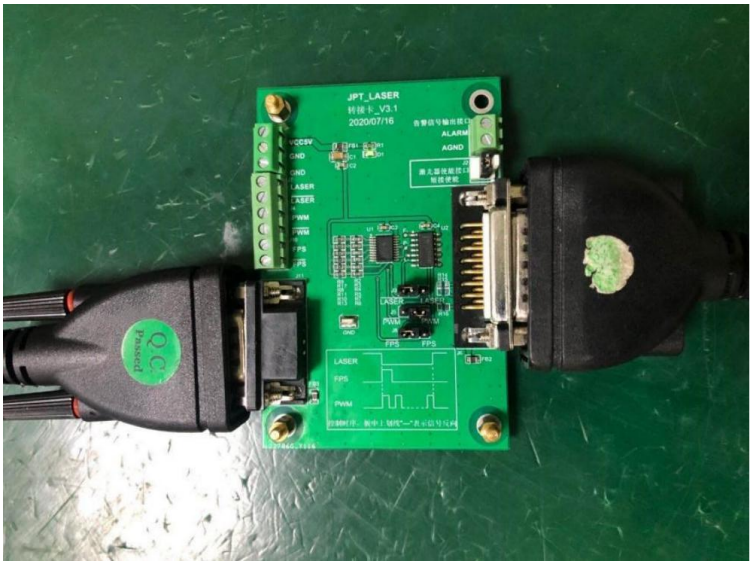
3V3 Power Interface Pin Definition:



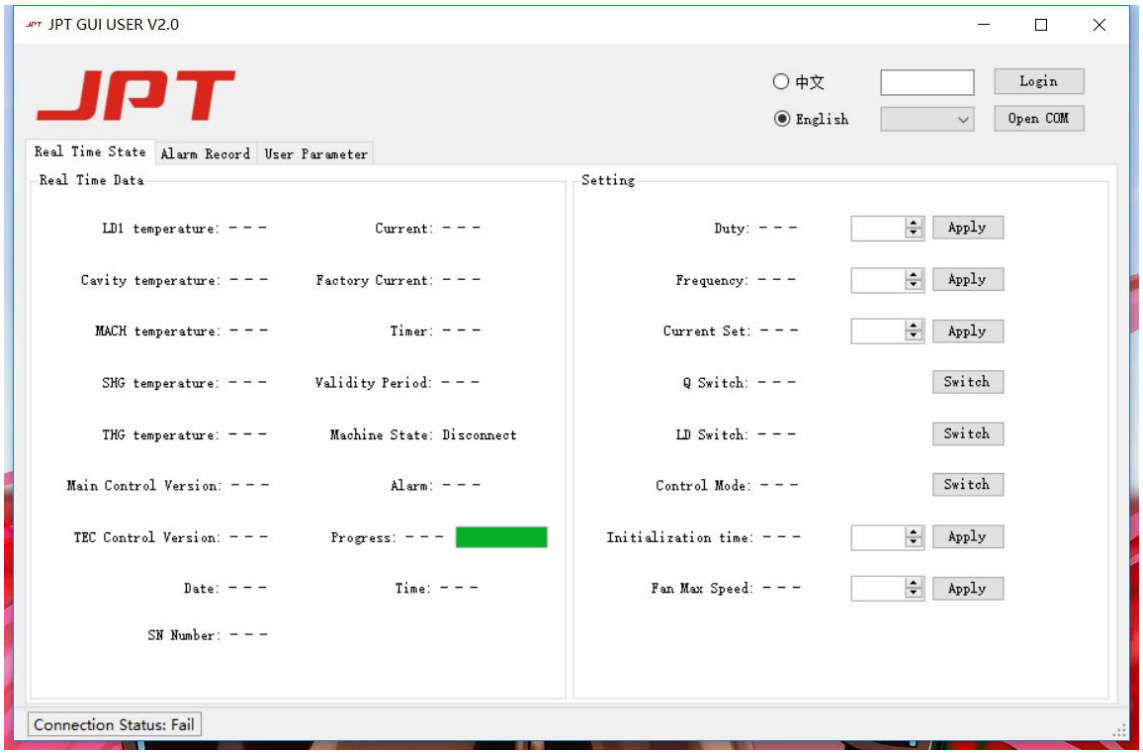
***Make sure the right connect of power supply,otherwise damage the laser,

3.2 Control and GUI

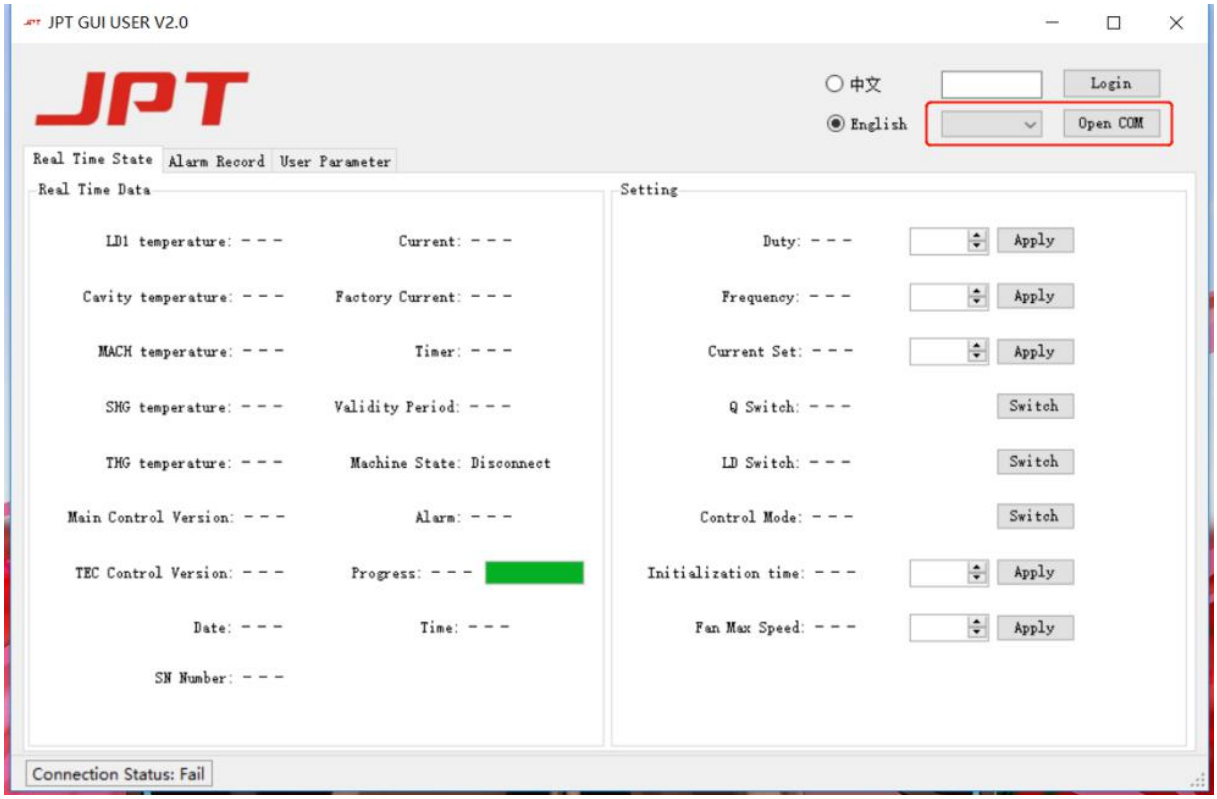
The function of GUI control is internal debugging and monitoring. All parameters have been debugged before ship out. Customers only need to ensure that the external control signals are properly connected, and can be used easily according to the correct operation.And 3/5E laser integrated the internal control to adapter card,if need to control laser with GUI,connect as below:PC-(DB9 Cable)-to Adapter Card-(DB15 Cable)-to Laser.



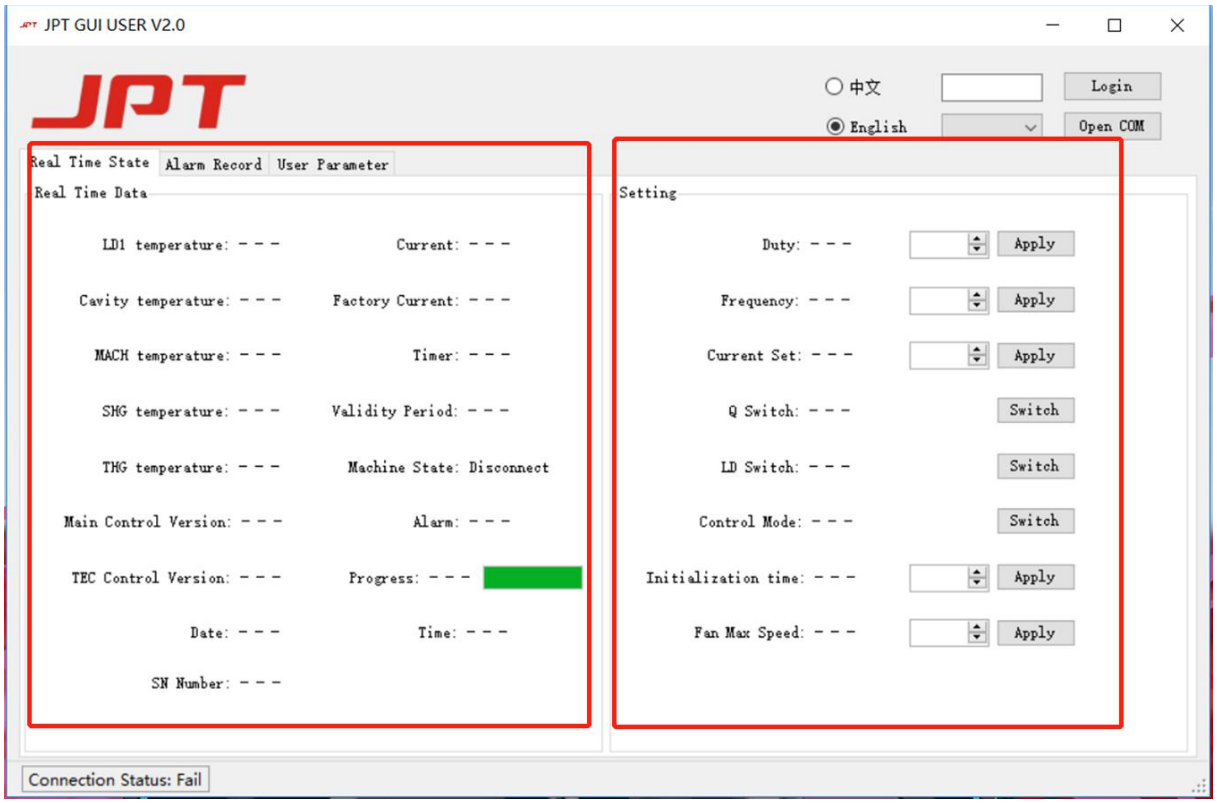
1)Run JPT GUI V2.0 User Software,Show Below Page1



2)Choose the right com port,



3)Left of GUI page can check laser running data,right part for parameter control and setting.



Below chart the explanation of setting parameter:

SN	Description	Remarks
1	Duty Cycle	Adjust Q signal pulse width to adjust power
2	Frequency	Adjust Q signal frequency to adjust power, “30 “ be 30kHz
3	Current Set	Adjust pump current,not suggest client to change
4	Q switch	Turn on be Q-swtich mode, off be CW mode
5	LD Switch	Pump current switch
6	Control Mode	Q-switch control mode,default be external,not suggest client to change.
7	Initialization Time	Water cooling laser available,can set longer if extremely bad weather to avoid alarm when laser start.
8	Fans Max. Speed	Air cooling laser fans max. Speed setting,not suggest client to change

4)Alarm info record page,can check alarm info and times.

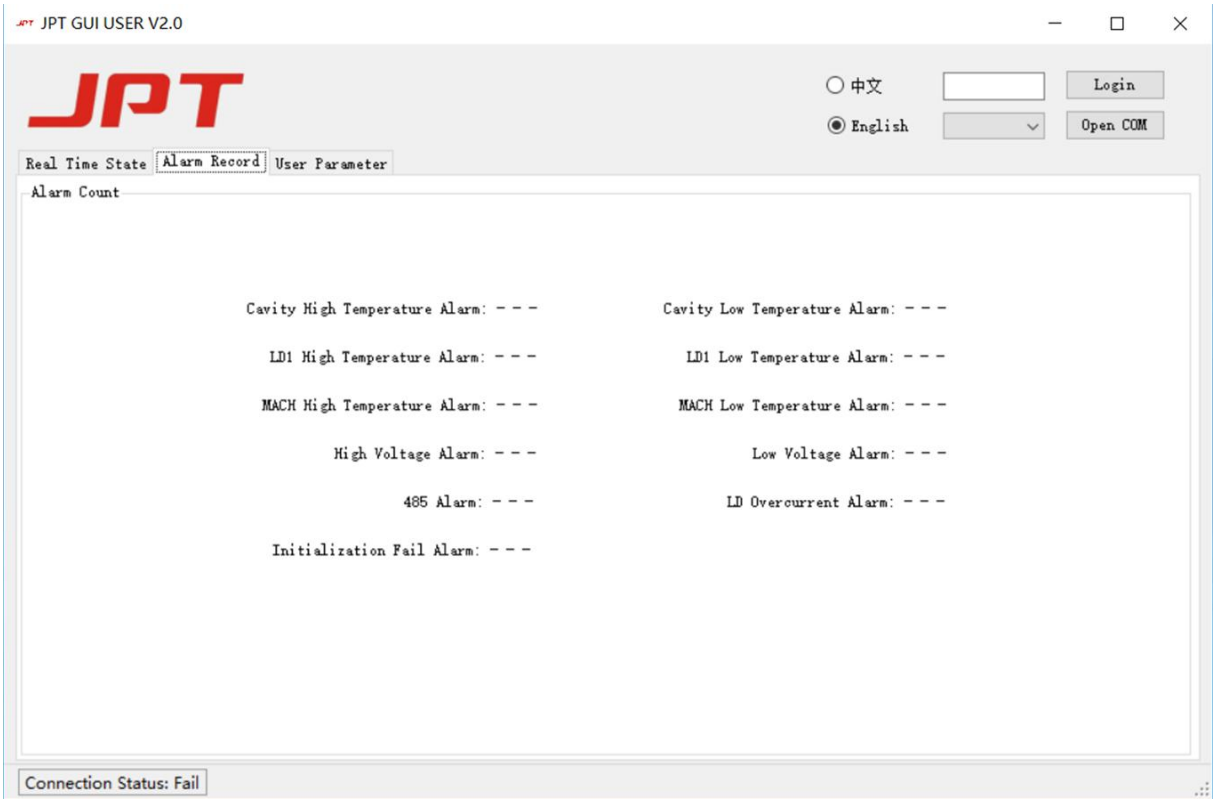
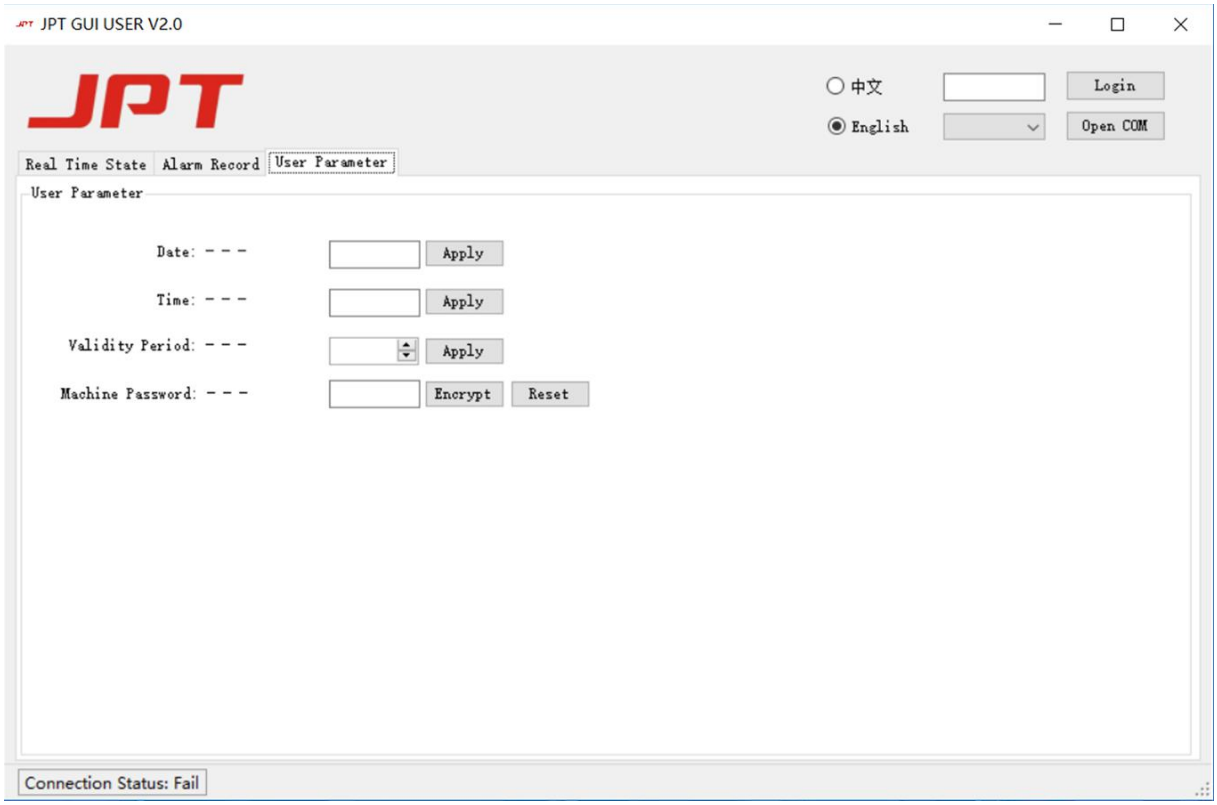
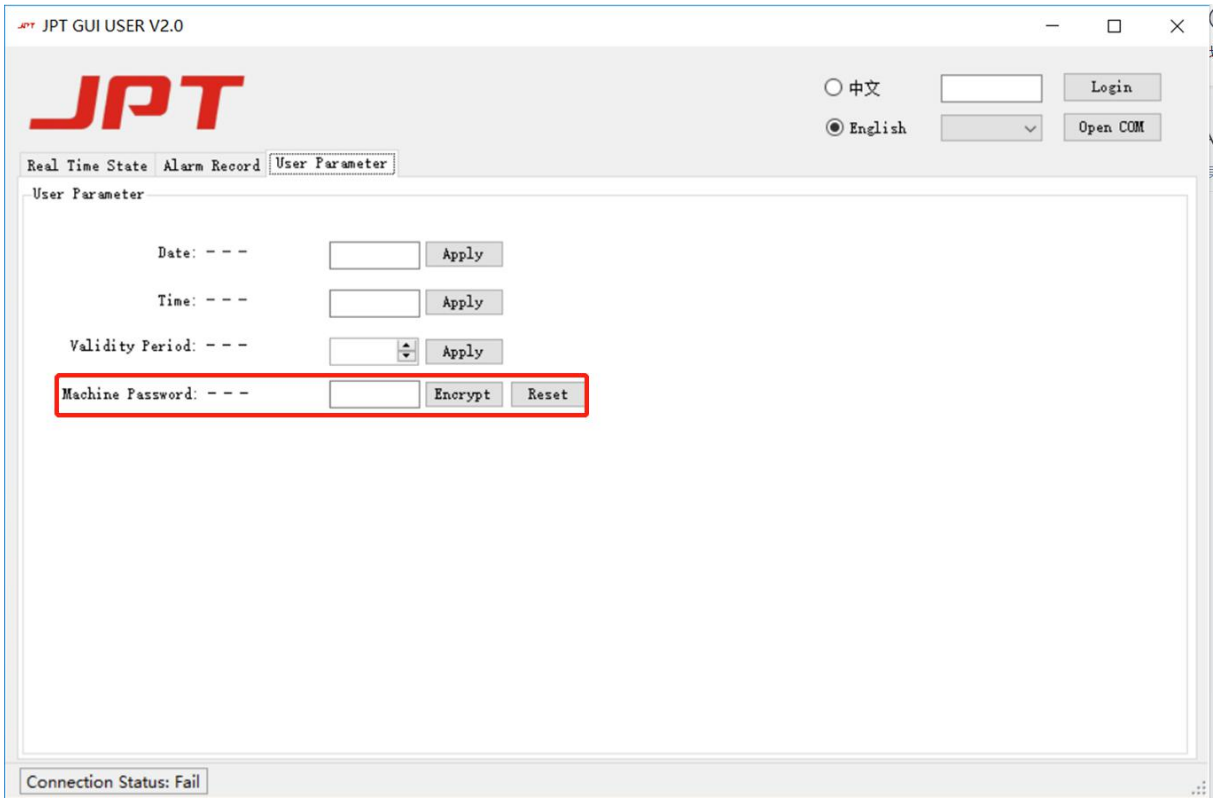


Table 3 GUI function explanation

5）When user parameter page no any data,then need to be active,input the 6 digit password to active.



6)After active the laser, can change password as below page:



4 Laser control

4.1 Control mode

The output control of laser is mainly controlled by GATE signal, and the output frequency and power are controlled by PWM signal, mainly by changing the frequency and duty cycle of PWM.

Duty ratio: the ratio of the high level holding time to the time of the clock cycle in the output PWM signal. For example, if the frequency of a PWM is 50KHZ, then its clock cycle is 20 mu s. If the time of high level is 6 mu s, then the time of low level is 14 mu s, then the duty cycle is 6:20, that is to say, the duty cycle of PWM is 3:10.

At a certain frequency, the ADJUST = 100% corresponds to the high level of the laser PWM signal when it is 1us, which represents the maximum power, the minimum pulse width and the highest peak power at that frequency. Increasing the high level pulse width (i.e. reducing the ADJUST value), the power of the flat rate laser decreases and the optical pulse width increases.

Through the frequency and duty ratio of the PWM signal (the signal driven by Q), the frequency, power and pulse width of the optical pulse can be controlled.

4.2 Mode of Control:

Laser available for Internal control and External control mode,option in GUI page,

Internal Control:Laser emit as per GUI setting value of Frequency and Duty Cycle,

External Control:Laser emit at input setting value of Frequency and Duty Cycle,

Both control mode can emit laser after LD and Q-switch ready.

4.2.1 Control Timing

In order to control the laser, it needs the correct timing signal from control card. When the

laser works, the GATE corresponds to the Laser and the TRIG corresponding to the PWM. Need the following timing.

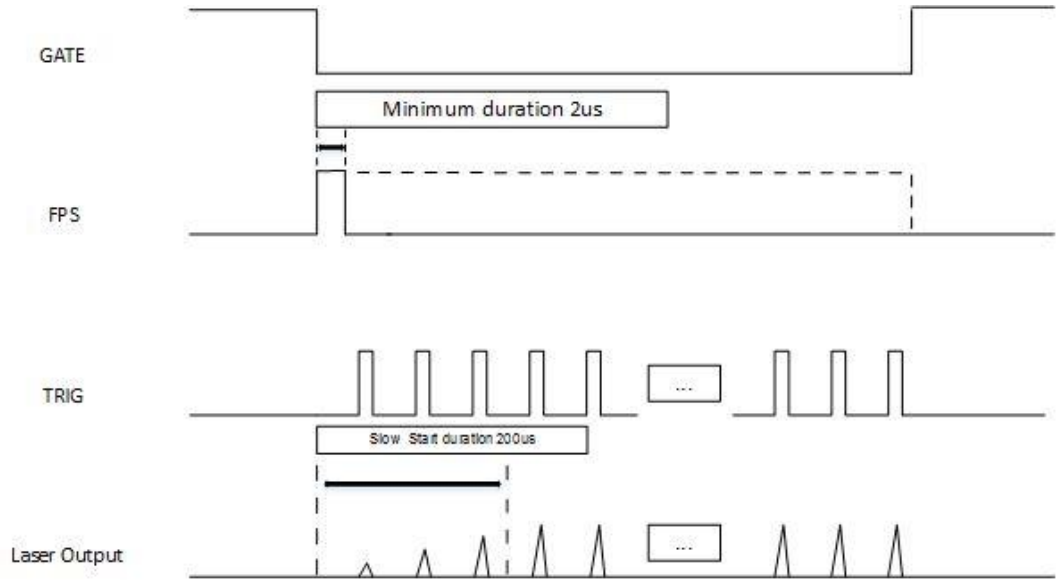


Fig.12 Control timing

Timing Control:

1.Gate be laser start signal,low voltage active,correspond to adapter card LASER,

2.TRIG be frequency signal,correspond to adapter card PWM,

3.FPS be first pulse suppression signal, high voltage >2us active;When use FPS signal,correspond slow start duration be 150us,

4.If no need FPS function,just input TRIG and GATE signal to work,

5.All signal be 5V-TTL signal,

*To match with different control card, JPT offer adaptor card with laser,customer can refer below connection guide to match the timing request.

*Default FPS suppression time be 150us,

4.3 Convert card connection

4.3.1 Connect instruction

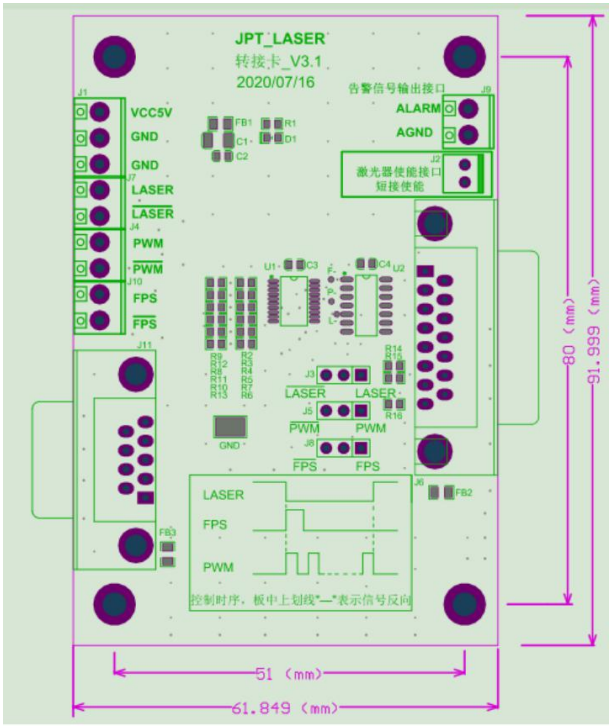


Fig.13 Convert card

1)Laser Control Interface of Marking Card Connected by Three Joints on the Left

2)Left J9 for alarm signal output,J2 reserve

3)The right DB15 plug is connected to the corresponding interface of the laser head.
Method：

4)Right DB9 RS232 Interface

User Guide:

1. Convert card VCC +5V to marking control card VCC +5V; convert card GND to marking control card GND.
2. “Laser” on convert card means the input laser on signal is the same polarity as the GATE, “$\overline{\text{Laser}}$” means the input laser on signal is the converse polarity as the GATE. When the laser on signal to “laser”, use the short cap short circuit PIN2 and PIN3 of J1. When the

laser on signal to "$\overline{\text{Laser}}$", use the short cap short circuit PIN1 and PIN2 of J1.

3. "PWM" on convert card means the input modulation signal is the same polarity as the TRIG, "$\overline{\text{PWM}}$" means the input modulation signal is the converse polarity as the TRIG. When the modulation signal to "PWM", use the short cap short circuit PIN2 and PIN3 of J2. When the modulation signal to "$\overline{\text{PWM}}$", use the short cap short circuit PIN1 and PIN2 of J2.
4. "FPS" on convert card means the input fps signal is the same polarity as the FPS, "$\overline{\text{FPS}}$" means the input first pulse killer signal is the converse polarity as the FPS. When control card fps signal to convert card "FPS", use the short cap short circuit PIN2 and PIN3 of J8. When the fps signal to convert card "$\overline{\text{FPS}}$", use the short cap short circuit PIN1 and PIN2 of J8. When the FPS function is not enabling, please use jumper cap to connect 1,2 pins of J8, if no need to use FPS function,no need to connect it.

4.3.2 Control card connection

1) JCZ card

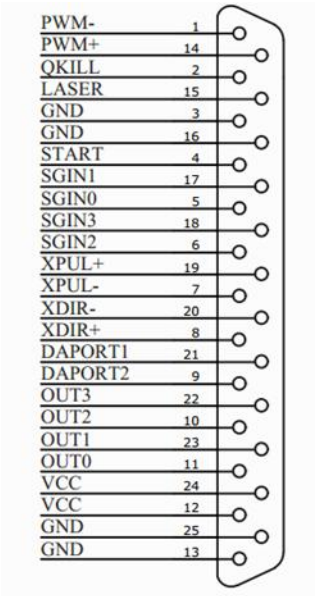


Figure 14 Type A of JCZ card

PIN12 to LASER + ,short connect J3 Pin2&3
PIN22 to PWM + ,short connect J5 Pin2&3
Pin 20 to FPS,Short connect J8 Pin2&3

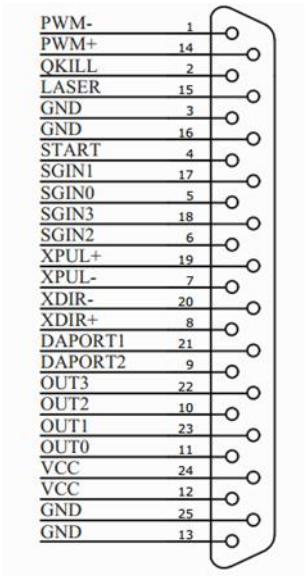


Figure 15 Type B of JCZ card

PIN15 to LASER- and short J3 Pin1&2
PIN14 to PWM + , short J5 Pin2&3
Pin2 to FPS,short J8 Pin2&3

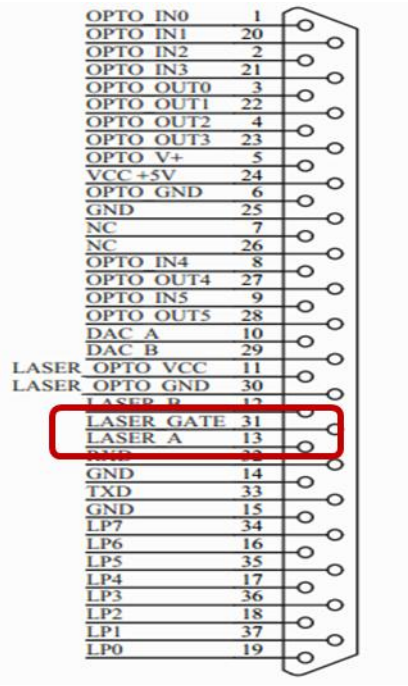


Figure 16 Type C of JCZ card

PIN31 to LASER- and short J3 Pin1&2

PIN13 to PWM + ,short J5 Pin2&3

Pin12 to FPS,short J8 Pin2&3

5 Operation

5.1 Boot procedure

1) Connect chiller with laser water connector, lock tight.

2) Turn on chiller and set temperature at 25℃ until it is stable at 25±0.5℃

3) Check laser outlook condition. If any particle/sticker blocks output port, please remove it.

4) Make sure laser controller and laser head properly connected, check if marking system and laser System been connected properly.

5) Before connect power supply, before operation, we must connect the control card and ensure that the card has been supplied to prevent laser damage. Confirm there is no abnormal indicator light, and wait for the laser to get stable then we can use the laser to mark.

***When laser temperature abnormal, the protection will lock the laser, please check if chiller is running or the power cable is connected properly.**

5.2 Shutdown procedure

1）Stop the processing.

2）Turn off power supply.

3）Turn off the chiller.

5.3 Caution

1) Wear Laser safety glasses all the time;

2) Stop marking first, and then turn off the laser.

This manual is for user operation. Official service and warranty will follow the actual sales contract and terms and condition. Thanks for your support.