INST Series Water Cooled DPSS Picosecond Laser

User manual

V 1.0

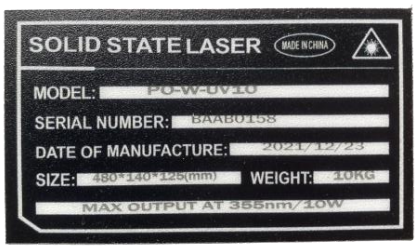
Table of contents

Chapter 1: Laser Safety Science

1.1 Laser class

Laser products are classified according to their output power level as Class I, Class II, Class IIIA, Class IIIB and Class IV. Class IV laser radiation can cause damage to eyes and skin, and the diffuse reflection of laser radiation is also dangerous, as it can ignite the material being irradiated and produce harmful radiation and fumes by interacting with the target material.

1.2 Hazard warning labels

	**Avoid exposure sign:** To prevent accidental exposure to laser or reflected laser light, protective laser glasses of a specific wavelength should be worn when using, maintaining or servicing this laser.
	**Laser radiation warning sign:** Wear appropriate goggles when operating the machine; keep the machine away from flammable objects; do not touch the laser head or lens as they can become hot; do not look directly into the laser beam as this may damage your eyes; in case of emergency, switch off the machine immediately.
	**Safety warning sign:** This product is a Class 4 laser radiation rating, avoid direct contact with eyes and skin.
	**Laser production label mark:** Contains laser power and model, serial number, factory date, dimensions and weight.

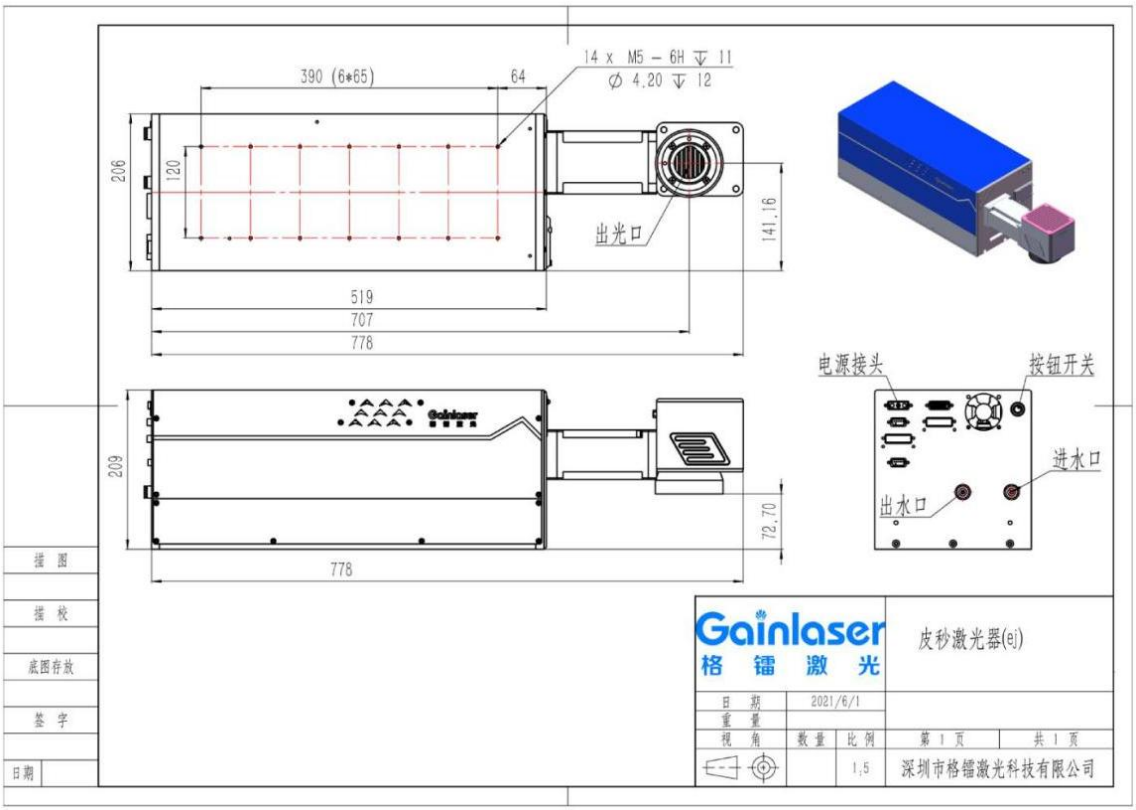
1.3 Precautions

- Non-specialists are not allowed to turn on the power or the laser for any operation.

- When the laser is directed at a metal part to be machined, there may be strong reflections of the laser beam, which must be shielded by means of measures or a work platform with Class IV protection.
- Please read this manual carefully before using the appliance and follow the instructions in the manual to the letter.
- The operator of the equipment needs to be systematically trained. Please carry out regular maintenance on the equipment to eliminate potential faults.
- Use the equipment with a suitable power connection and ensure a reliable earth connection.
- If you have any questions about this product, please contact our after-sales maintenance staff.

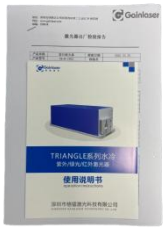
Chapter 2: Introduction of Laser Products

2.1 Mechanical dimension drawing



2.2 List of products and accessories

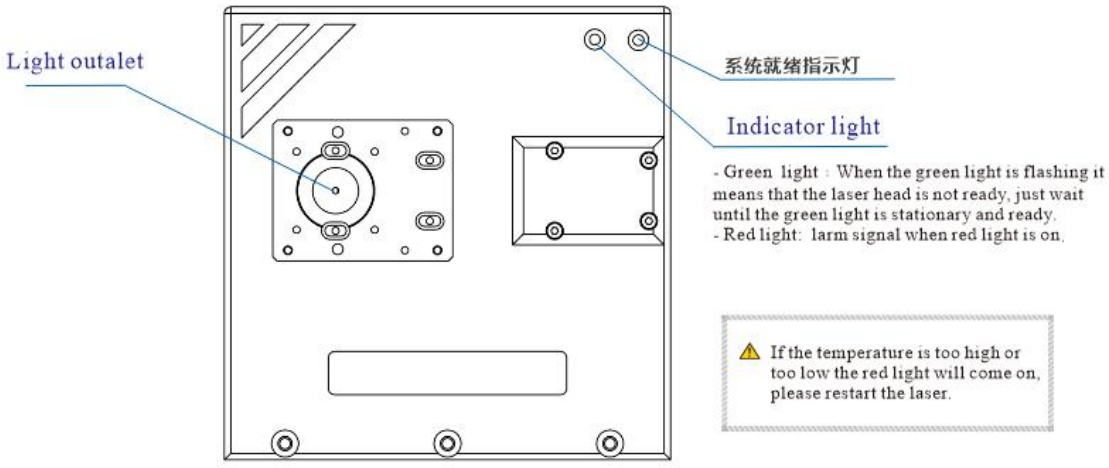
1		Water cooled picosecond laser

2		Water pipe
3		Test report and instructions
4		Power supply
5		Power cable and external control plug
6		Round neck and adapter plate
7		Beam expander
8		Keypad

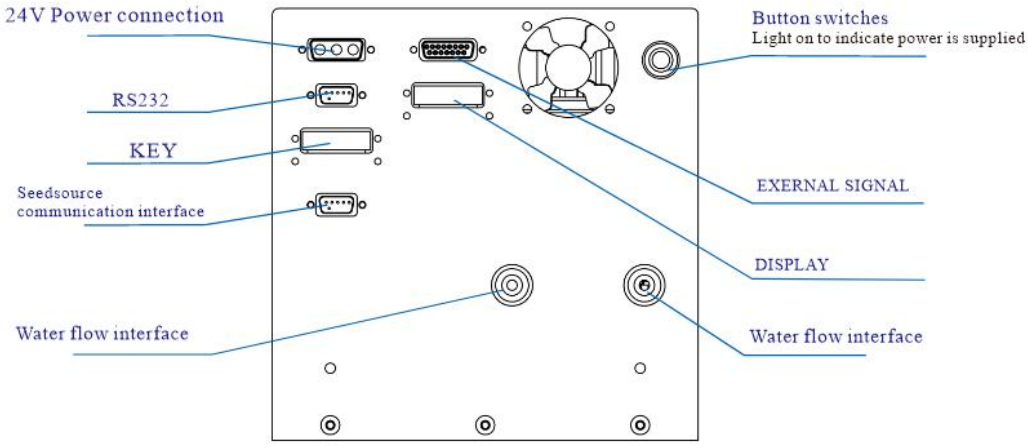
2.3 Product parameters

Type	Infrared Picosecond Laser
Model	GL-INWC-IP
Wavelength	1064nm
Output Power	>10W@500KHz
Max Pulse Energy	20uJ@500KHz
Pulse Repetitive Frequency	100-1000KHz
Pulse Duration	<15ps
Average Power Stability	<3%
Spatial Mode	TEM00(M2<1.2)
Polarization Ratio	>100:1 Horizontal
1/e2 Spot Diameter at Outlet	2mm
Laser Spot Roundness	>90%
Warm-up time	<15min
Storage Temperature	-10℃~50℃

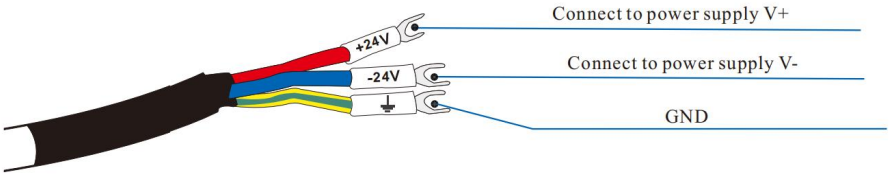
2.4 Cavity interface description



「Front view」



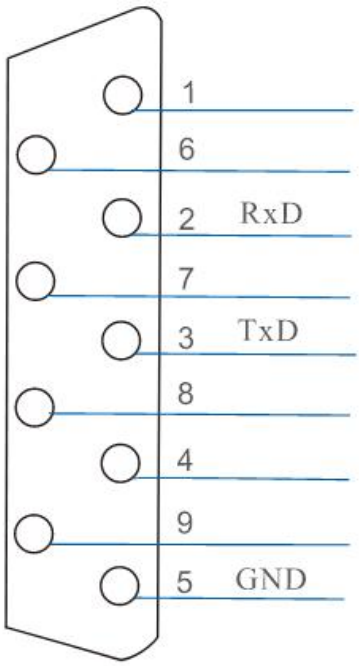
「Rear view」



「Wiring Definition」

2.5 RS232 interface pin description

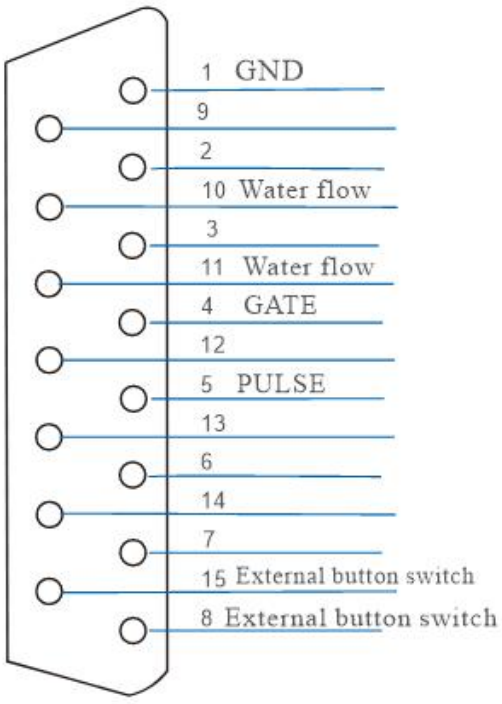
Pin No.	Name	Instruction
1	Null	
2	RxD	
3	TxD	
4	Null	
5	GND	



[DB9 communication interface]

2.6 External control trigger signal interface pin definition

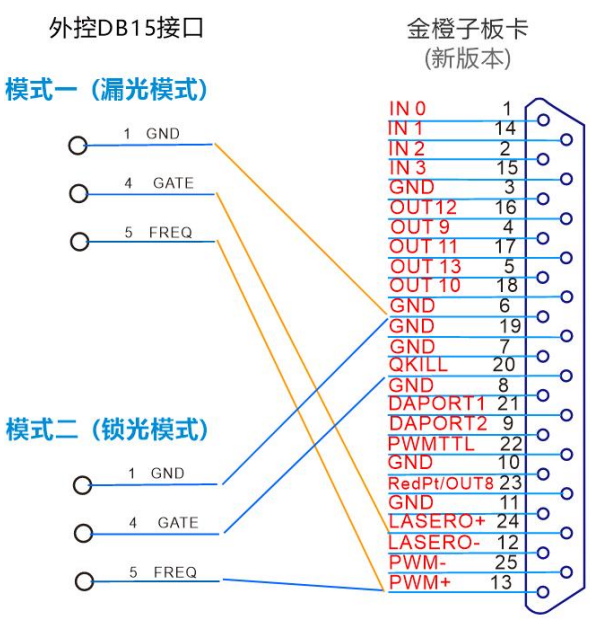
pin number	Model Name	illustrate
1	Common ground (GND)	GND
2	Null	
3	Null	
4	switch signal	GATE
5	frequency trigger signal	PULSE
6	Null	
7	Null	
8	External push button switch	
9	Null	
10	Water flow	
11	Water flow	
12	Null	
13	Null	
14	Null	
15	External push button switch	

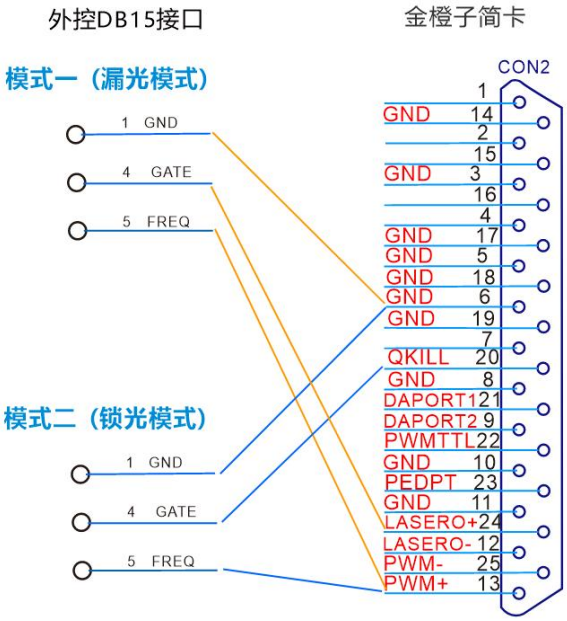


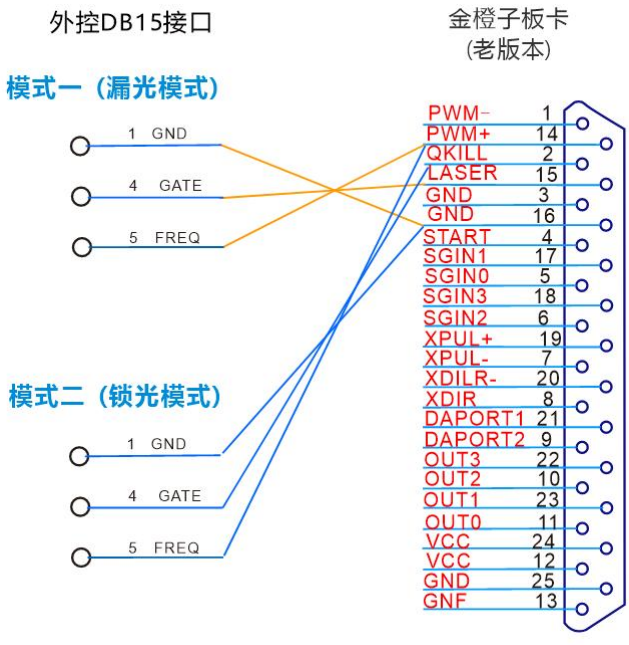
[DB15 External Control Interface]

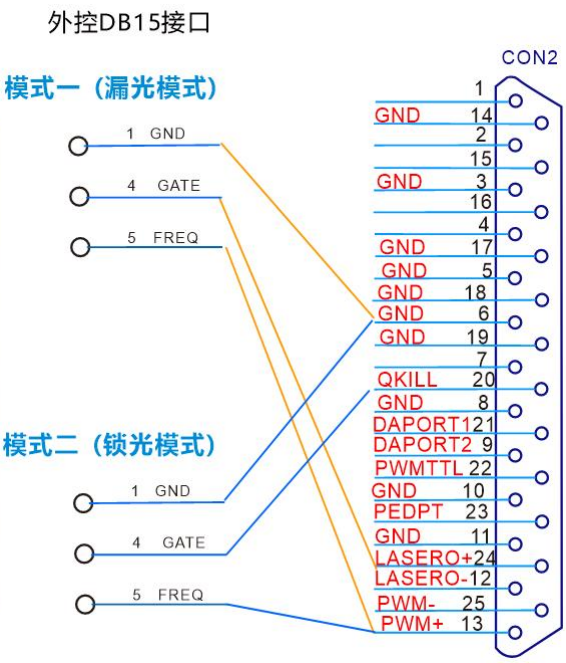
2.7 Schematic diagram of common control card wiring circuit

➢ **Ezcad control card wiring diagram:**

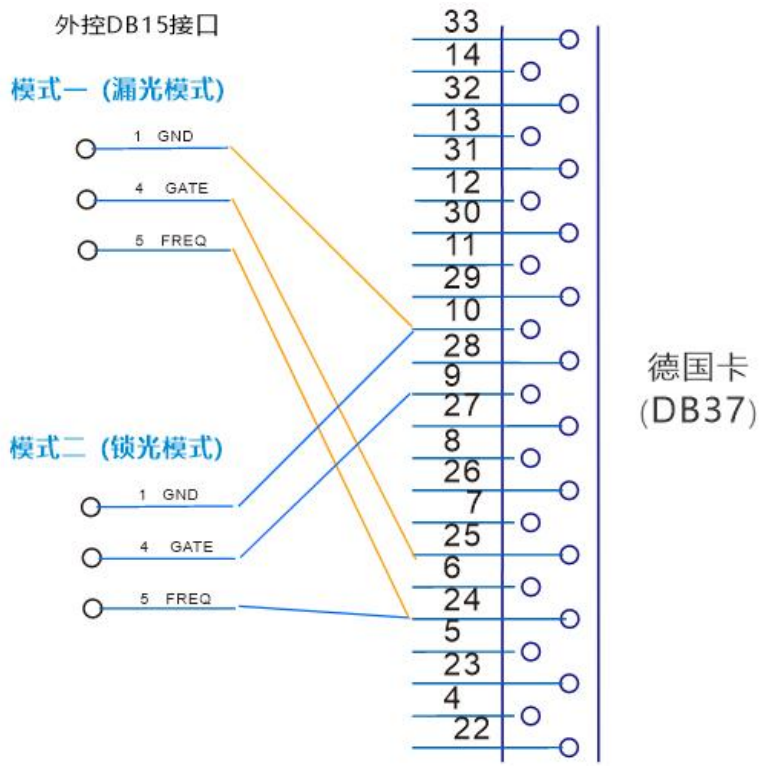




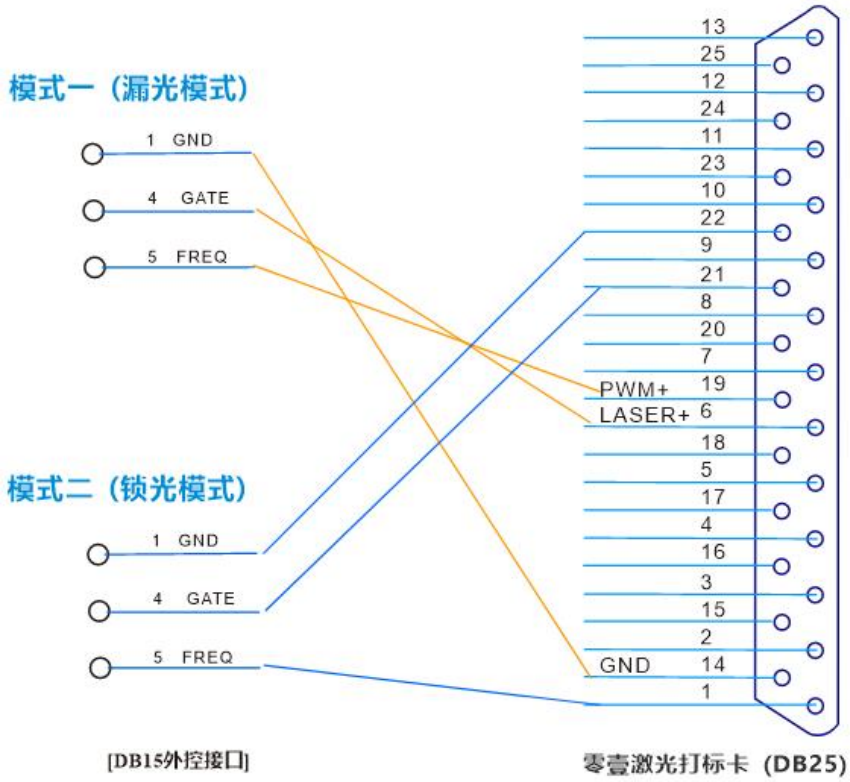




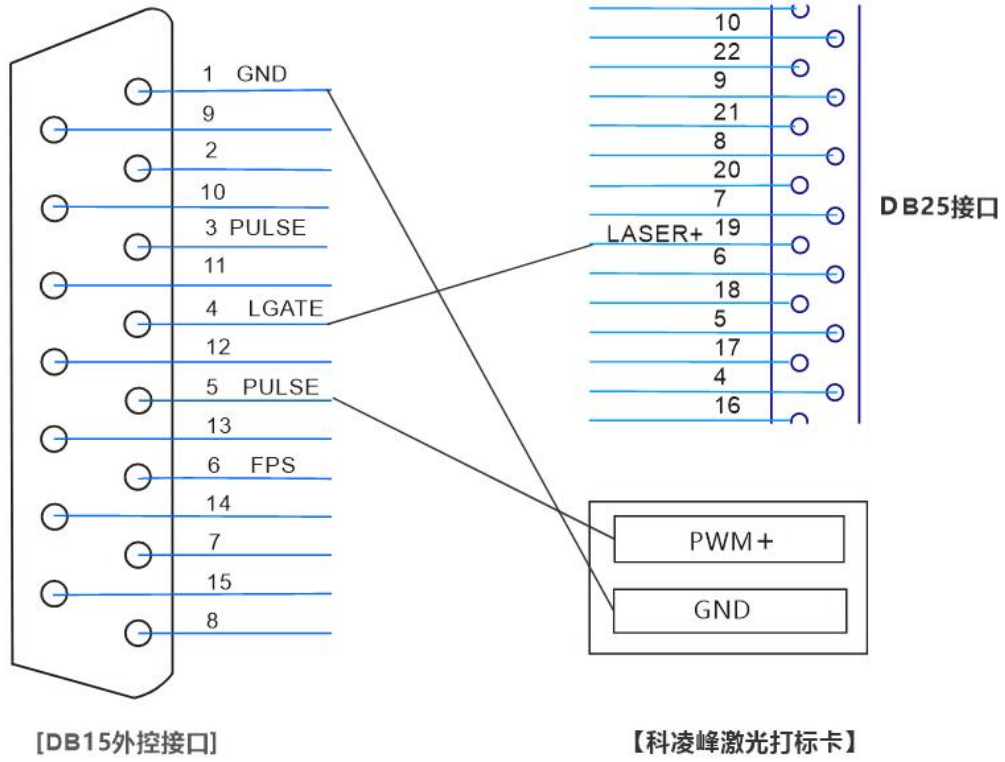
➢ **German control card wiring diagram:**



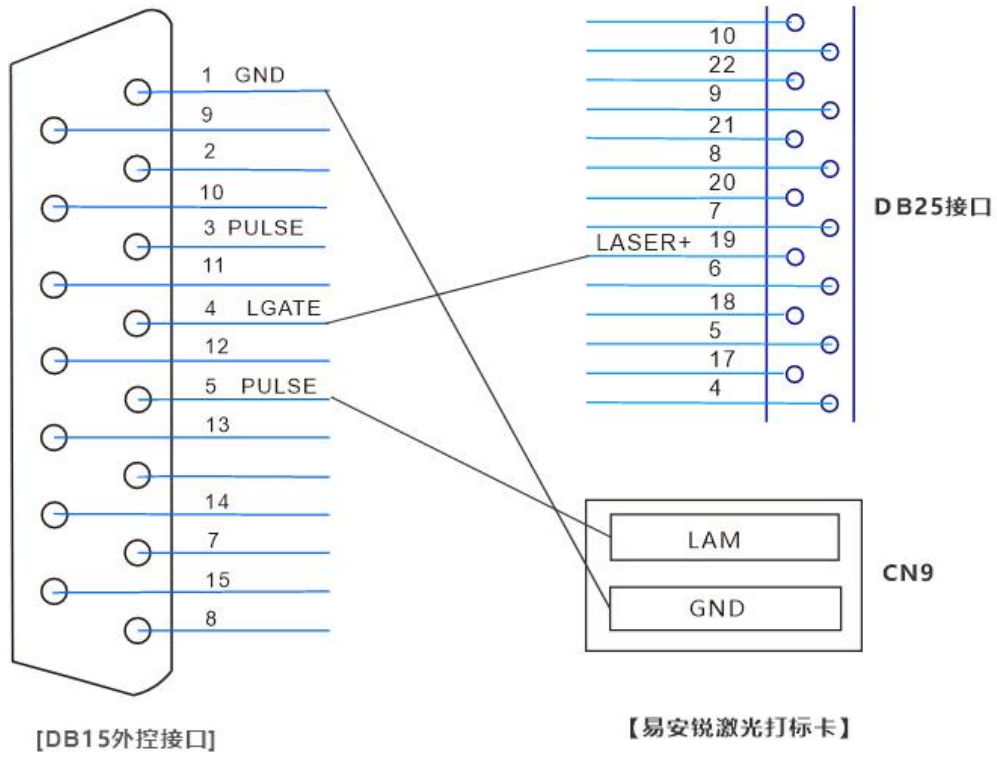
➢ **Zero one control card wiring diagram:**



➢ **Kelingfeng control card wiring diagram:**

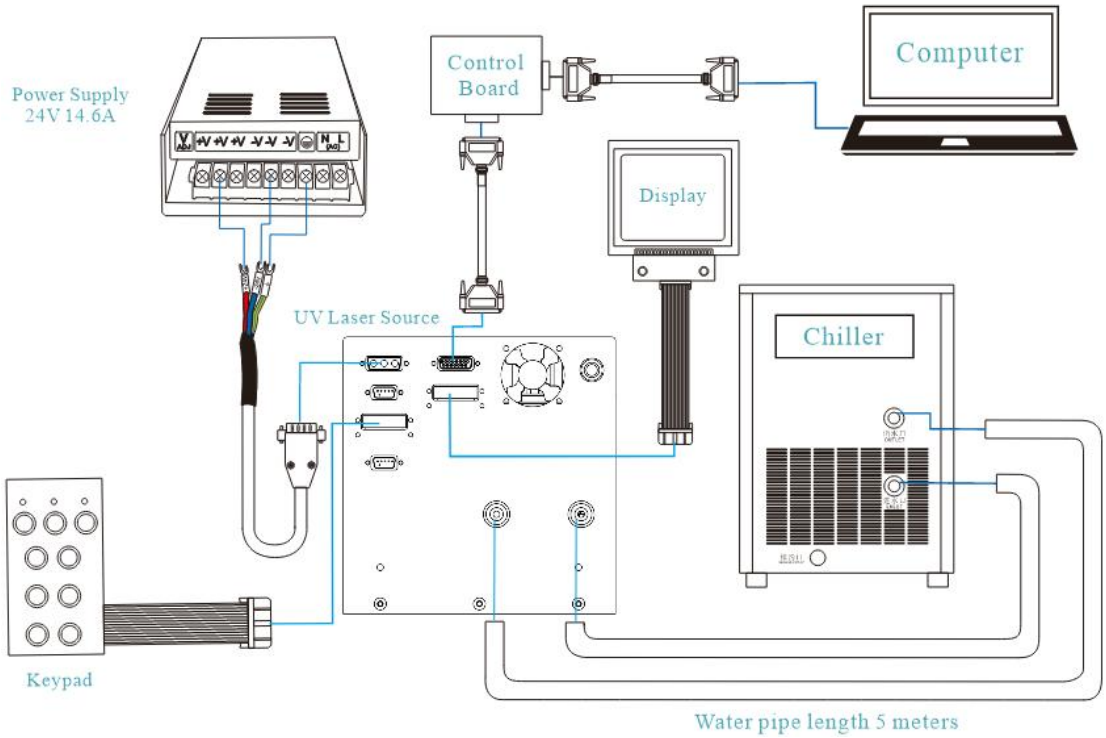


➢ **Yianrui control card wiring diagram:**



Chapter 3: Product Installation Instructions

3.1 General connection diagram



Note: When installing the water pipe, it is necessary to wrap the waterproof tape and insert it firmly to prevent water leakage.

3.2 Laser installation requirements

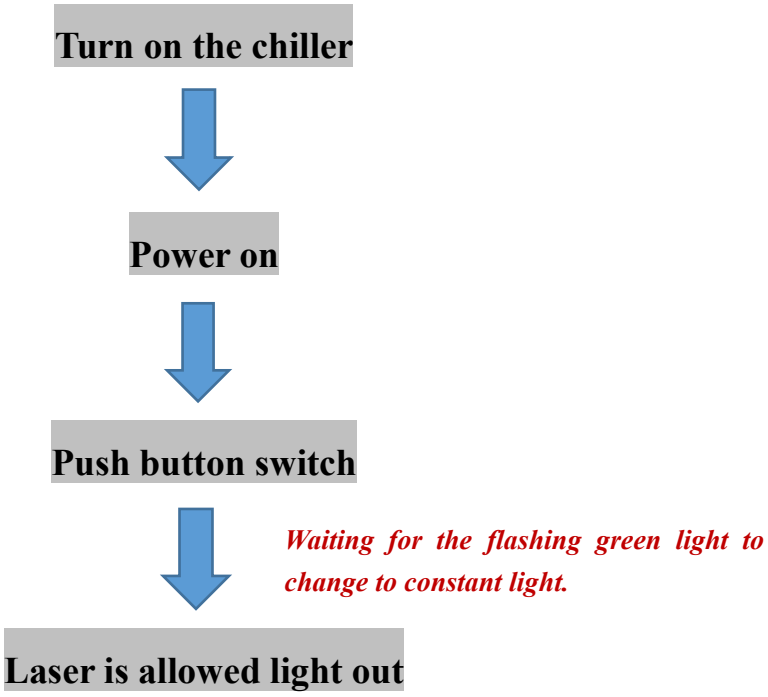
project	installation conditions
Ambient temperature	15℃-35℃
Storage temperature	0-50℃
Environment humidity	30-90%
Dust	Less than 0.2mg/m³
Oil mist	Not allowed
Power supply	AC220V (±10%)/50Hz (±1H)
Cooling water	Deionized water or purified water
Electromagnetic environment	National Standard Grade II

3.3 Chiller installation requirements

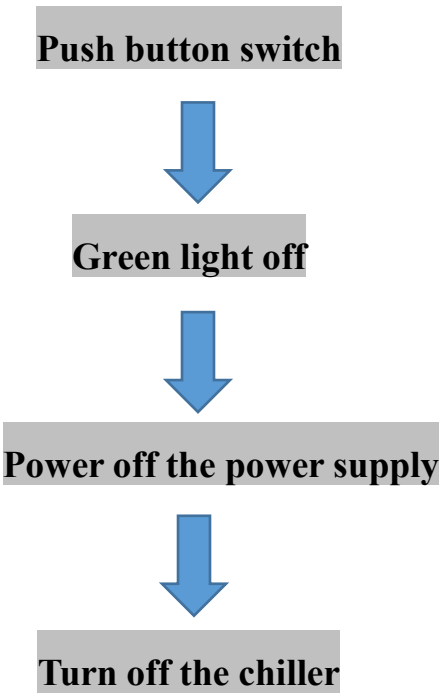
Project	Require
Power supply	AC220V (±10%)/50Hz (±1H)
Cooling capacity	0.37kW
Applicable cooling medium	Deionized water, purified water or tap water with 10% alcohol
Water flow	13L/min
Pump head	10-20M
Temperature control accuracy	±0.1℃
Water temperature setting	25°C

Chapter 4: Product Operation Instructions

4.1 Laser start-up step



4.2 Laser shutdown step



Note: Do not turn off the chiller until the power is turned off.

Chapter 5: Laser Troubleshooting Issues

5.1 Laser alarm prompt and processing method

Use the RS232 to USB serial cable to connect the laser to the computer, and install the LASERMATE software to determine the cause of the alarm.

Display alarm content	Meaning	Approach
ERROR: BITO	No definition	
ERROR: BIT1	No definition	

ERROR: BIT2	No definition	
ERROR: TEMP LD	Abnormal temperature control of LD	· Check whether the chiller pressure is normal and the pressure of the entire waterway · Check whether the chiller is cooling · Confirm whether the chiller is turned on for enough time · Check whether the current temperature of the chiller is normal
ERROR: TEMP C1	Abnormal temperature control of crystal 1	Contact after-sales staff
ERROR: TEMP C2	Abnormal temperature control of crystal 2	Contact after-sales staff
ERROR: TEMP NOT READY	Power-on temperature is not ready	Check whether the chiller is running normally, and check whether the TSW1 interface is connected
ERROR: TEMP BS	BS port probe over temperature	· Check whether the chiller pressure is normal and the pressure of the entire waterway · Check whether the chiller is cooling · Confirm whether the chiller is turned on for enough time · Check whether the current temperature of the chiller is normal · If the room temperature is too low, please turn on the air conditioner
ERROR: BIT8	No definition	
ERROR: TSW1	TSW1 port open	Check whether the TSW1 plug is loose Check the short circuit of the plug (15 pin short circuit 10, 11)
ERROR: OVER Ia	Current output overcurrent	Contact after-sales staff

5.2 Common troubleshooting methods for lasers

5.2.1 No light

Look at the indicator light status:

(1) **If the green light is always on**, it means that the laser is ready and can be used normally. If there is an indication of light but marking no strong light (no energy, no response to hit the product, no trace), most of the marking signal problems, need to further measure whether there is a marking signal output. If there is no indication of light, marking also no light, or light weak, this situation to consider the laser failure.

(2) **Flashing green light** means that the laser is not ready and that a certain temperature has not reached the laser set temperature. First check whether the laser is encrypted, then check whether the button switch behind the laser is on, whether the water flow signal is normal, check the water tank and measure the power supply to the laser. The above check is no problem to consider the laser failure.

(3) **The red light is on**, same method as above, laser encryption not to be considered.

5.2.2 Weak light

(1) Check the software settings, select the YAG mode, the analogue output should not be ticked, otherwise it will result in a weak light.

(2) Look at the light spot. Remove the field mirror, out of the strong light, with white A4 paper placed below the vibrating mirror, blue spot for the solid circle for normal, spot around the star light, may be the expansion of the beam mirror failure, spot scattered, not round, there is a black circle, consider the laser failure. If the spot is good, check the beam expander mirror, vibrating mirror and field mirror to see if they are damaged or dirty, and then consider the laser failure.

(3) Look at the indication light, compared to the previous indication light is obviously much weaker or on the white paper basically invisible, consider the laser failure.

Note: The above is for reference only, and the specific problems should be properly handled according to the on-site usage.