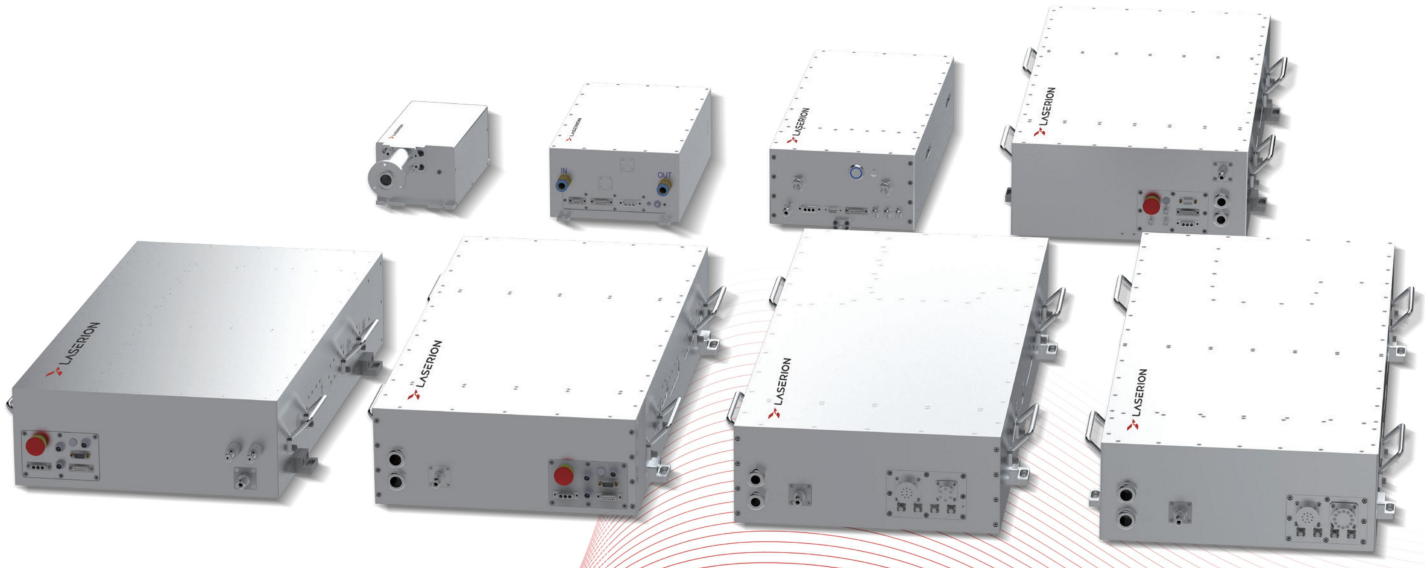
华创鸿度
LASERION

StarLight series

15W-25W NANOSECOND LASER USER GUIDE



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Safety Usage Statement and Precautions

1.1 Disclaimer for Safe Operation and Use of Laser Equipment

Before using the Starlight series laser, operators must carefully read this installation and operation manual toavoid any accidental injuries caused by the laser on the human body, If an operator fails to use the laser according toits normal operating specifications, our company shall not bear any legal responsibility for resulting personal injury.

1.2 Laser Safety Characteristics

(1)Laser Safety Marking

The laser side label indicates technical parameters such as output wavelength, power, and pulsewidth; a hazard warning sign is affixed on the front of the laser.The triangular label above shows thedirection of laser emission, while the striped window below displays the laser hazard warning, see Table 1.

Table 1: Hazard Warning Signs

Serial number	Label Image	Label Type	Labeling information
1		Optical radiation warning (exit position)	There is optical radiation at the mark. If the mark is not operated as required, accident or personal injury may occur. Especially during operation, the eyes and skin should be avoided from contacting the radiation directly emitted or scattered at the laser output port.
2		Laser safety warning	Please do not open the non-professional to avoid optical radiation.
3		Level 4 security warning	This laser is classified as Class 4.meaning it is hazardous both withinthe beam and under diffusereflection observation conditionspotentially causing skin injuries orother harm; operators should takepersonal protective measures.

(2) Laser Safety Class

StarLight's **full range of Class lV Laminators (greater than 500mw) are also classified asClass 4 in China according to the standard GB7247.1-2012.Take appropriate precautions toprevent the output beams or reflecting beams from being directly exposed to the humanbody, Scattered and reflected light will cause serious injury to the skin and eyes, so theoperator should always wear suitable protective qlasses during the operation.**

***Note:** Only personnel who are familiar with the safety protection measures listed in this manual may operate the laser system.*

Safety Instructions for Laser Operation with Radiation Intensity Level 4:

* Under no circumstancesisit allowed to open the housing ofthe laser cavity;
* For Class 4 laser products,identification signs should be placed near the operating area Equipment integrators should strive to make the optical path system closed;of the laser;
* Reflective and scattered light are equally harmful; avoid staring directly at the laser's output beam;
* Wear protective eye goggles during laser use (high reflectivity at 355 nm wavelength);
* Equipment integrators should strive to make the optical path system closed;
* During use, one principle must be followed: the optical path must not be at the same height as human eyes.

Due to the special nature of laser beams, compared with ordinary light sources, lasershave certain hazards. All laser operators and staff near laser systems must clearlyrecognize the dangers associated with laser use.

Only those who are familiar with laser equipment and fully understand the coherence andintensity of the laser beam can ensure the safety of laser operators.

Dangerl Laser output from a laser device can directly enter the human eye, causing severe damage and even leading to blindness

The most important thing to note during laser use is the safety of the eyes. In addition to the main beams, thereare also small beams of light at various angles near the laser system. These beams are formed by the mirrorreflection of the main beams on various polished surfaces such as lenses, mirrors, and other optical elements.Although these beams are very weak compared to the main beams, they can still cause greater damage to thehuman eye.The laser beams are so strong that they can burn human skin and damage clothes and surface paintand even when they travel a considerable distance, it can still ignite volatile substances such as organic solventsThe beam also destroys the photosensitive components of optical cameras and LEDs, as well as indirect contactfrom reflecting surfaces.

1.3 Precautions for Packaging and Transportation ofLaser Equipment

(1) All system components of the laser are placed in the same packaging box.

(2) The laser package box contains one laser, an AC power supply with plug connected,one USB-to-RS232 data cable, one DB15 male connector, and a laser test report.

(3) After unpacking, please retain the original packaging materials. If the laser needs to bereturned to the factory for repair, use the original packaging materials to avoid damageduring transportation.

(4) When transporting the laser equipment to another location, use the original packaging and payattention to the placement order; ensure that no foam leaks into the laser emission port.

(5) When transporting the laser, please attach the upward label shockproof label, and moisture-proof label.

(6) The normal operating environment for the laser is between 5-40°C, and please ensurethat the external environment remains clean.

Laser Interface and Related Instructions

LASER INTERFACE AND RELATED INSTRUCTIONS

2.1Laser Power Supply Interface

The laser is equipped with power supply and power interface as shown in Figure 2

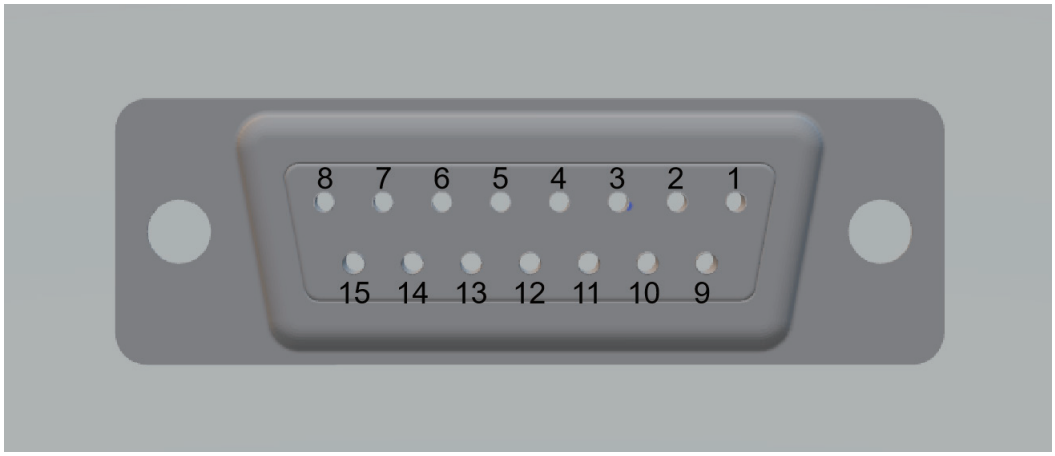
Figure 1 Power and Laser interface

The laser equipment is powered by single-phase AC 220V; ensure that live wire and ground wire are correctlyconnected according to the wiring labels, as poor contact with the ground wire may cause potential damage to thelaser.

To ensure safety, we strongly recommend that you connect a circuit breaker (air switch) and voltage stabilizer in seriesbetween the power supply unit and the laser's power socket; the circuit breaker facilitates wiring operations.

2.2 Introduction to Laser Control Interface and Operating Modes

The laser control interface is a high-quality, easy-wiring DB15 connector that providesmultiple signals for functional control of the laser; detailed description follows:



Pin Number	Name	Defin ition
1	GATE	Input for external GATE mode signal from Mode 1 and Mode 0,TTLinput.
2	GND	Internal Digital Signal Reference Ground
4	5V OUT	5V 100mA Output
8	Emission_OUT	The output of the light indication is a 5V TTL signal with a high-level output.
9	Trigger	The Trigger mode (Mode 13) is used. The external control signal for output power and frequency is a trigger signal, with TTL input.
10	Interlock	"Connect GND indicates locking. When it is disconnected, an error will occur.Generally,it is used to detect the working status of the water-cooling machine. When the water-cooling machine is not working, the laser can easily be damaged, so this point should be noted."
12	SYNC-OUT	Trigger synchronization signal output
13	GND	Internal digital signal reference point
15	Alarm_OUT	Alarm output, 5V TTL signal, high-level alarm triggered
3,5,6,7,11,14	NC	Standby

Part Description:

Note: Please use coaxial cable as the signal line connecting the laser DB interface and the device platform!

To use the laser normally, pin 10 of DB (Interlock pin) must be connected to pin 13 ofDB (GND pin); otherwise, the laser will report an error.

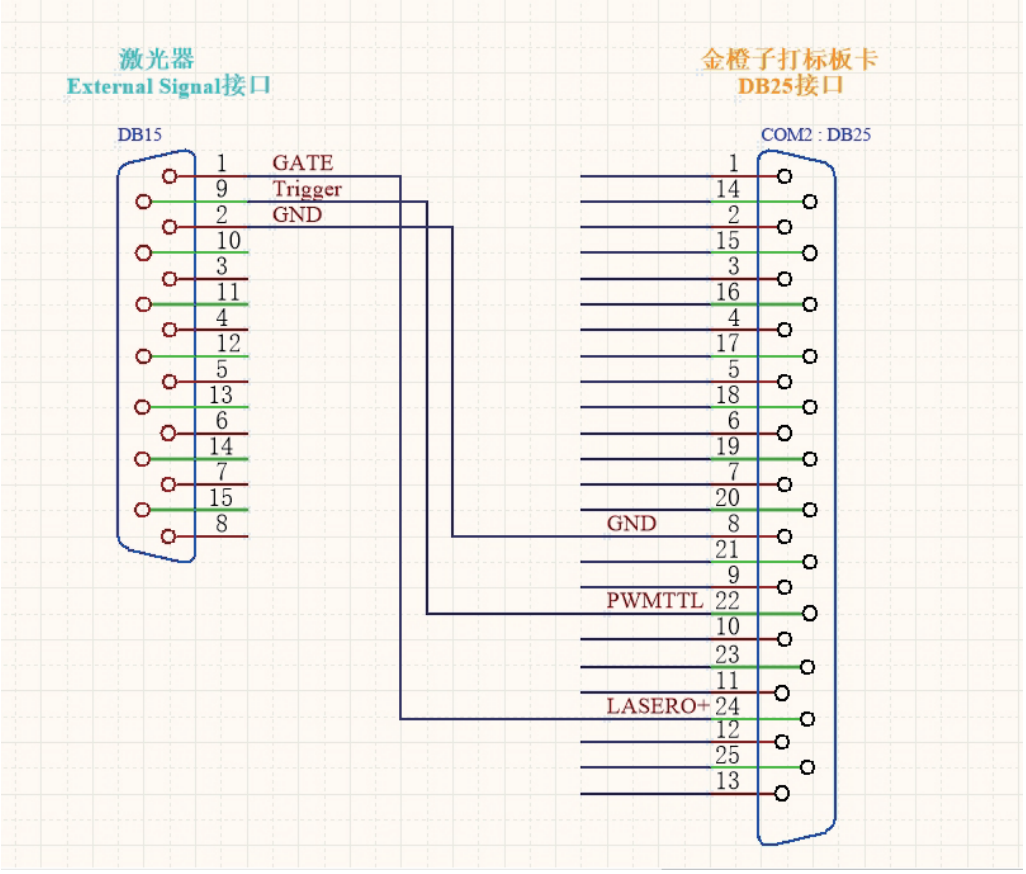
When using external control mode (Mode 1) and G-FPS (Mode 0), to enable laseroutput, connect the external GATE input signal to DB pin 1 (GATE pin) and pin 2 (GNDpin). When the GATE input polarity is positive, output laser when the GATE signal is high;when the GATE input polarity is negative, output laser when the GATE signal is low.

When using Trigger mode (mode 13), in order for the laser to output laser, the external Trigger input signal mustbe connected to DB tubule 9 (Trigger tubule), and 2 (GND tubule) to control the output power size and output. Theinput polarity of the trigger is positive, the larger the positive occupation ratio is, the wider the signal pulse width isthe higher the output power is. When the trigger input polarity is negative, the larger the positive occupation raticis, the wider the signal pulse width is, the lower the output power is. At this time, the laser output power and heavyfrequency are not related to the laser's own top-level software heavy phase and empty ratio parameter settings.

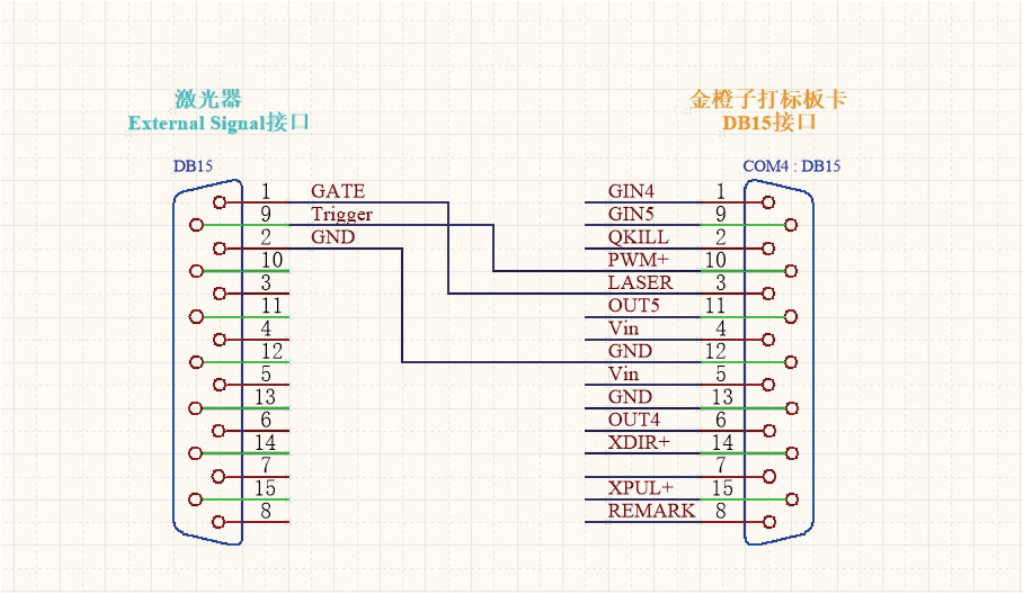
Note: The minimum positive or negative pulse width of the trigger signal must be greater than 300 ns, otherwise laser output may not occur.

2.3 Typical Marking Card Wiring Description

(1) Golden Orange DB25 Marking Card



(2)Golden Orange DB15 Marking card



Laser Usage Requirements and Precautions

LASER USAGE REQUIREMENTS AND PRECAUTIONS

3.1 Laser Usage Requirements

(1) Electric request: The suggestion uses the own voltage stabilized power source

Parameter	Technical requirements
Voltage	DC-24V
Power Con sumption	400W

(2) Working Environment Requirements

Parameter	Technical requirements
Ambient Temperature	5°C-40°C
Relative Ambient Temperature	5 - 80%(no condensation)
Vibration	lsolate VibrationSource
Altitude	Poster below 3000 meters

(3)Water Cooling Machine Requirements

Paramete	Technical requirements	Paramete	Technical requirements
Amount of refrigeration	300W	Pump Head	10m-20m
Water Flow Rate	6L/min	Temperature controlaccuracy	±0.1°C

3.2 Precautions for Using Laser Equipment

* Before use, ensure that all electrical connections (including water pipes) have been made. If condi tions permit, all connection heads must be tightened and fixed with screws.

* When operating a laser, never look directly at the output port and always wear safety goggles strictly.

* When performing wiring operations, please turn off all power switches of the laser first.

* The normal operating temperature range for the laser is between 5 and 40 degrees Celsius. Addition ally, please ensure that the surrounding environment remains clean.

* Before starting the machine, please set the water flow and temperature of the water cooling system according to the laser test report.

* The main switch has been powered off for a long time. Please be aware that it will take 20 minutes for the system to warm up after restarting.

* The system parameters cannot be changed at will.

* The laser should be installed horizontally on the platform. If installation in other directions is required, please consult the technical support staff.

* Do not squeeze or overly bend the external water pipes and cables of the laser device.

4.1 Operation of Laser Switching On and Off

Power up:

(1) Connect the water-cooling machine and start it. Set the water temperature to 23°C and the flow rate to 6L/min.

(2) Connect the DB15 port, RS232 port and DC power supply according to the required control method.

(3) When the water temperature reaches the set temperature, turn on the laser. Press the power switch button on the rear panel of the control box and the control power switch button on the front panel of the electrical control box. Observe whether the buttons and the working indicator lights are illuminated. Both being illuminated indicates a normal power-on state.

(4) Wait for 2 to 3 minutes for the laser to initialize. At this point, the laser has been fully activated and the output operation can be performed.

Power off:

(5) It is strongly recommended that the laser should not be turned off for a short period of time. This keeps the laser in a sleep standby mode, maintains the temperature of the frequency doubling crystal, is beneficial for the storage of the crystal, and can also extend its service life.

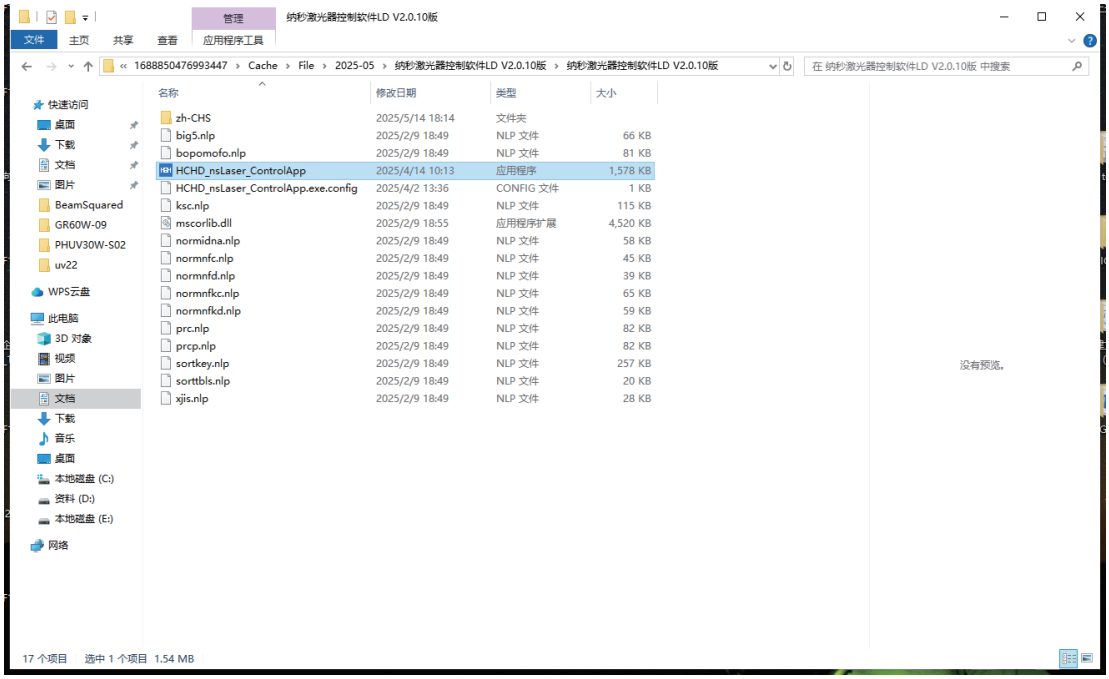
(6) If you don't use the light switch for a long time, simply turn off the power supply to deactivate it.

4.2 Instructions for Using the Host Computer Software of the Laser Device

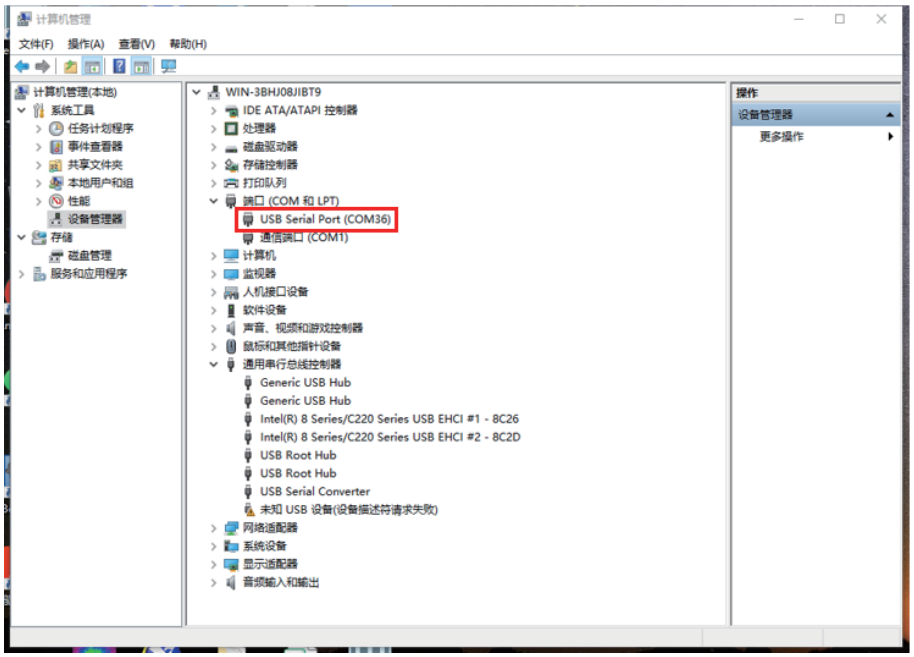
(1) The software program is stored in a randomly packed USB drive (the software version is updated irregularly. It is recommended to contact the sales staff to obtain the latest version).

(2) Connect the laser and the PC using an RS232 serial port cable.

(3) Double-click the software icon or right-click to run the application as an administrator, and then enter the following connection interface.

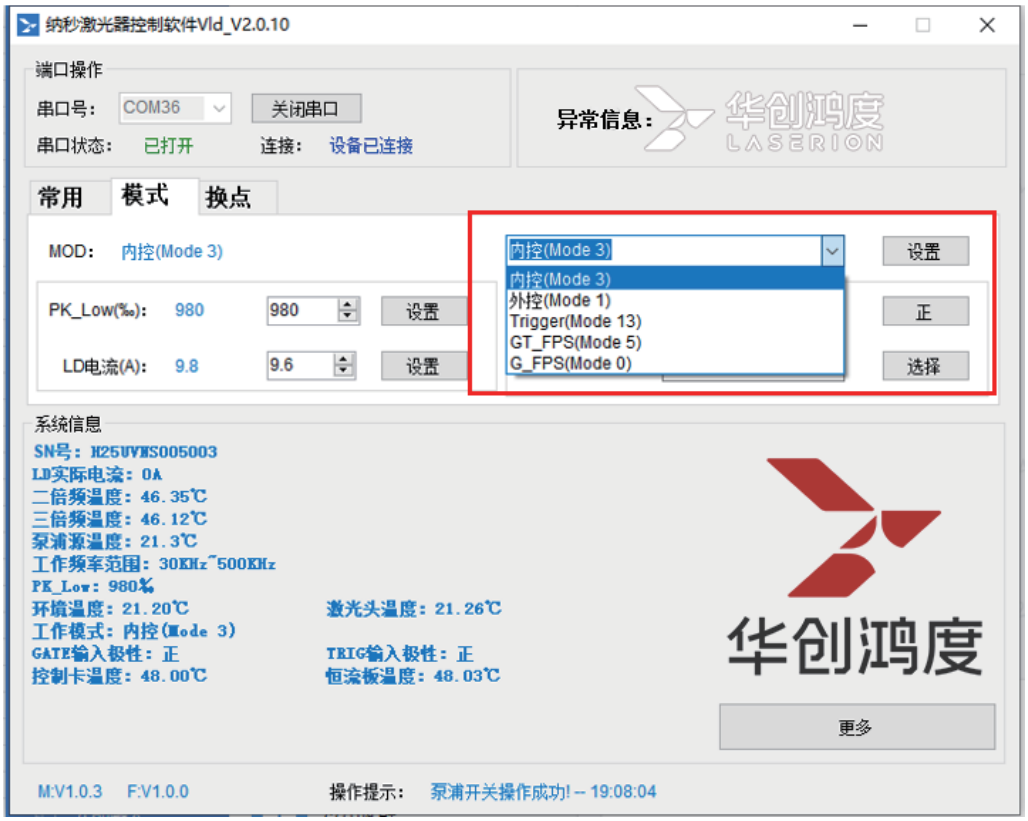


(4) The software can automatically identify the serial port. If there is a prompt indicating that communication errors prevent the connection from being established, please open the Control Panel and find the port number under the Device Manager, as shown in the figure.



(5) Select the correct port number, connect the laser, and enter the user interface. A normal connection should look like this. At this point, you can operate the laser normally.

(6) Work mode selection: Click the more button at the bottom right corner and enter password**Z-KYY123** to view the mode interface; before selecting a mode, **please turn off Q drive first,otherwise abnormal mode switching may occur, For introduction to common work modes, see4.3.**



7) Select the required mode and turn on the pump source and Q drive to use. Adjust the frequency andbower percentage to control the desired repetition rate and power. **(Note: Before switching frequenciesolease disable the Q drive first; only 50k/80k/100k/120k/150k repetition rates can be selected via dropdownnenu. For other repetition requirements, contact after-sales service.)**

(8) For lasers with point swapping function, you can enter the point swapping interface to view relevant information.

(9) For abnormal read operations and system normal errors,you can view them through exception information reading; most exceptionscan be handled based on this prompt. After an error occurs, power must be cut off and restarted for operation recovery.

4.3 Introduction to Common Working Modes

(1) Internal control (Mode 3), the laser can emit light without an external signal.

When the pump source button is pressed, there will be a weak light output. Set the desired frequency and power percentage, and then press the Q drive button to get a strong light output.

If there is no output, you can try to first click the Q drive off button and then click the Q drive on button. To turn off the light, first turn off the pump source and then turn off the Q drive.

(2) External Control Mode (Mode 1), in this mode, the light emission is controlled by an external GATE independently.

Set the desired frequency and power. Before processing, turn on the pump source and the Q driver. Finally, give a trigger signal to the GATE pin.

If there is no output, you can try first clicking to turn off the Q driver, then click to turn it on again. To turn off the light, first turn off the pump source, and then turn off the driver.

(3) G-FPS (Mode 0) is the first pulse suppression mode of the GATE mode.

For some fragile materials, there may be burst points at the starting position of sample processing. It is recommended to use this mode, with the control method being the same as the external control (mode 1). However, the delay for light emission needs to be adjusted to a negative value so that the machine emits light earlier (generally around -160us, which can be adjusted according to the printing effect).

(4) Trigger mode (Mode 13), in this mode, the light emission is controlled solely by an external PWM signal.

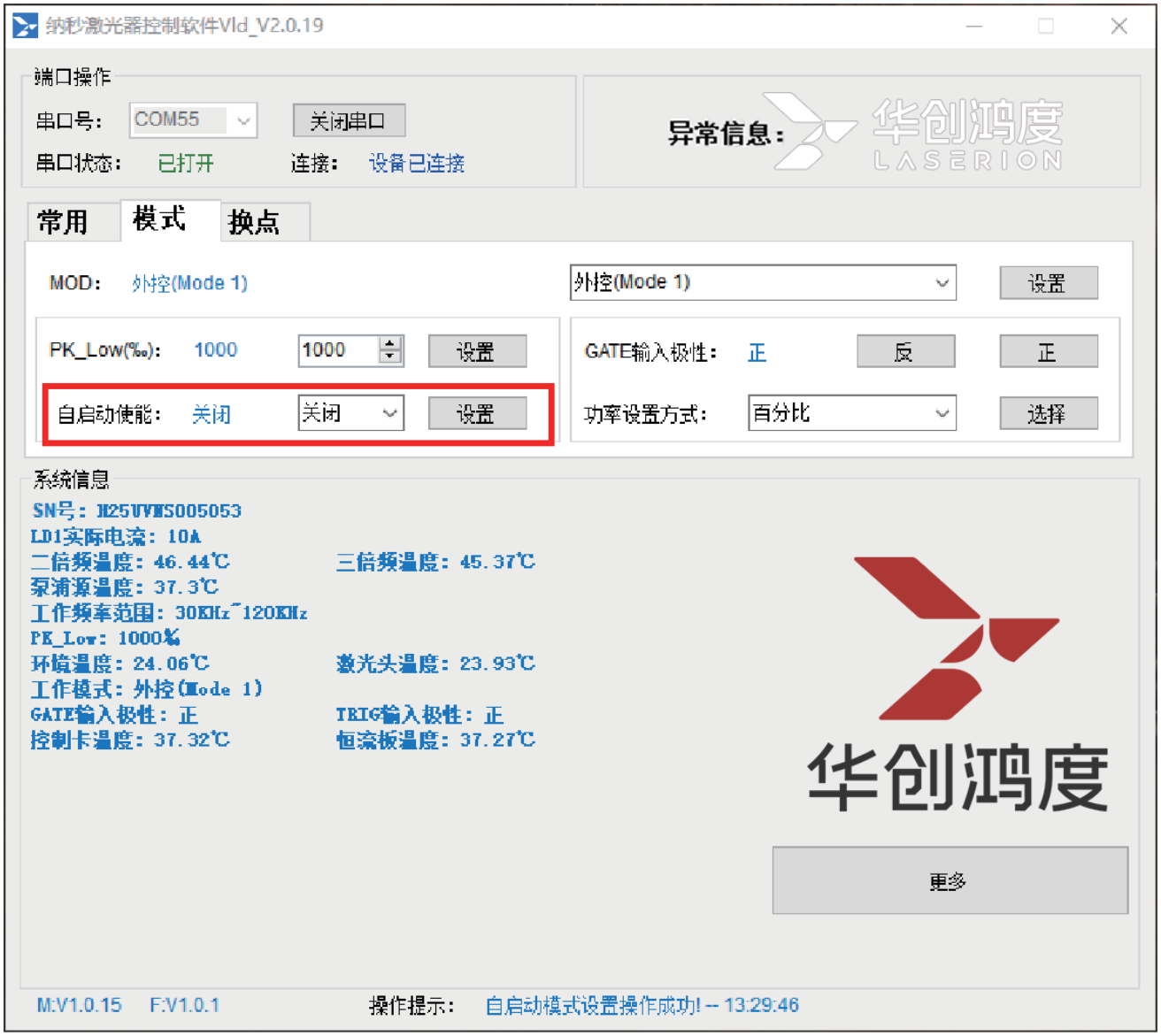
Finally, the Trigger pin sends the trigger signal. If there is no output, first check whether the frequency and pulse width of the Trigger signal meet the requirements. Then, you can try to first turn off the Q driver and then click to turn it on. To turn off the light, first turn off the pump source, and then turn off the Q driver.

Self-starting function

AUTO-START FUNCTION

Some models are compatible with the auto-start function. To enable this feature, simply power on the device and press the button. The operation is as follows:

Enter the password: **ZKYY1213**, then enter the mode interface and turn on the auto-start enable function.



Note:

(1) The self-starting function is only supported in the external control mode (Mode 1, Mode 13, Mode 0).

(2) If there are no special requirements, the auto-start function is set to be disabled by default.