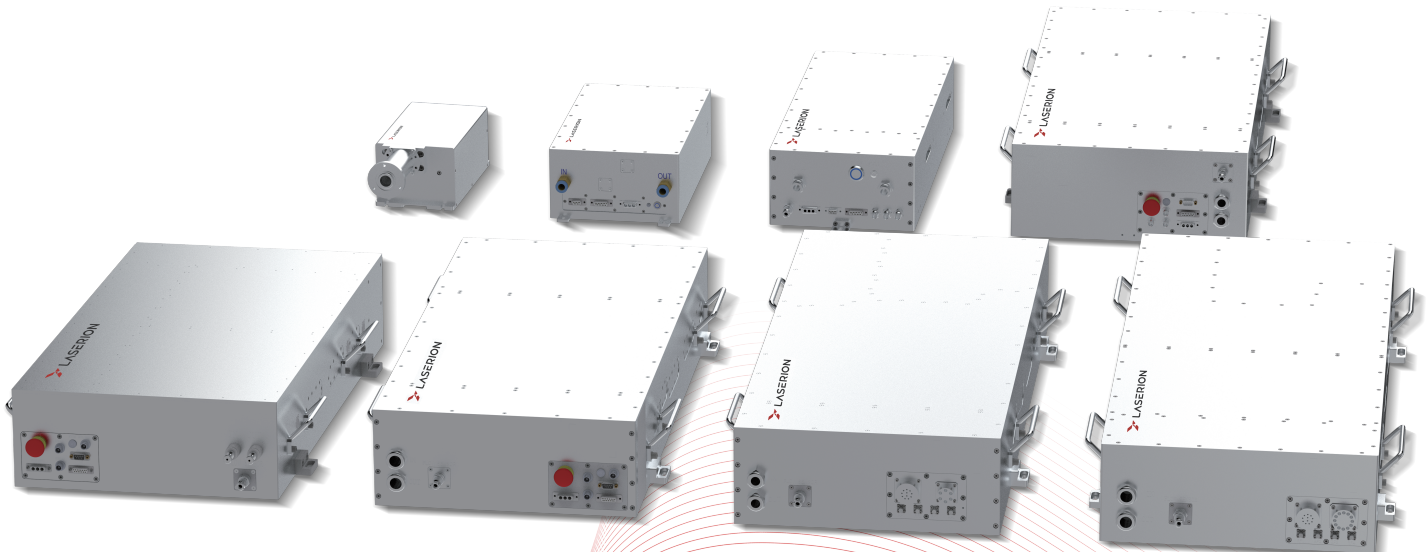
华创鸿度
LASERION

StarLight series

PICOSECOND LASER OPERATION GUIDE



CONTENTS

Precautions ATTENTIONS

* Please refer to the《 Detailed Specifications 》to select the appropriate power supply.

* Please refer to the《 General Safety Instructionsto》 check whether the peripheral working configuration environment of the laser meets the requirements.

* Do not crush or excessively bend the external water pipes and cables of the laser.

Power Connection POWER CONNECTION

The power supply voltage of the laser equipment is single-phase alternating current 220V AC. Ensure that the live wire, neutral wire and ground wire are correctly connected according to the wire labels. Poor contact of the ground wire may cause potential damage to the laser.

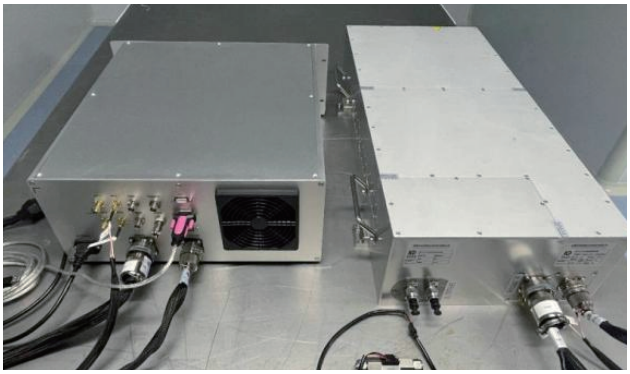
To ensure safety, it is strongly recommended that you connect a circuit breaker (air switch) and a voltage stabilizer in series between the power supply unit and the laser power socket. The circuit breaker facilitates wiring operations.

Device Composition EQUIPMENT COMPOSITION

The complete laser equipment is available in **split type** and **all-in-one type** depending on the product model.The split type consists of a laser, an electric control cabinet, and a water chiller.The all-in-one type consists of a laser, a power supply, and a water chiller.Under normal conditions, the laser, electric control cabinet, and power supply are provided by our company as follows:

* Split Structure

* Front view of the laser equipment



* Rear view of the laser equipment

* Front panel of the electric control cabinet

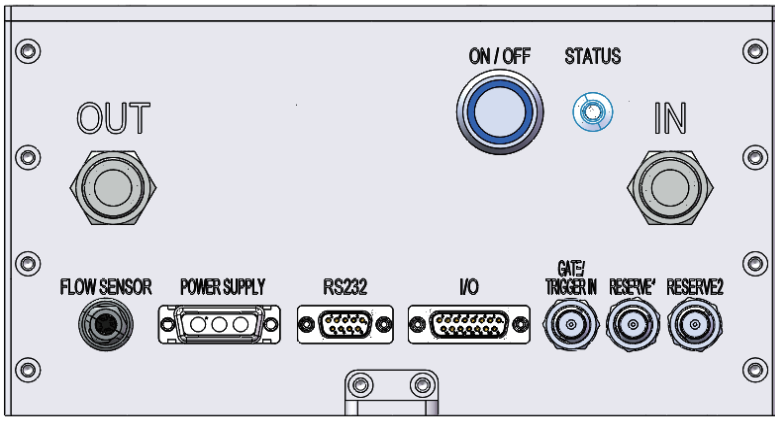
* Rear panel interfaces of the electric control cabinet

* Front panel of the laser

* Rear panel of the laser

* All-in-one structure

* Front view of the laser equipment



* Front appearance 1 of the laser

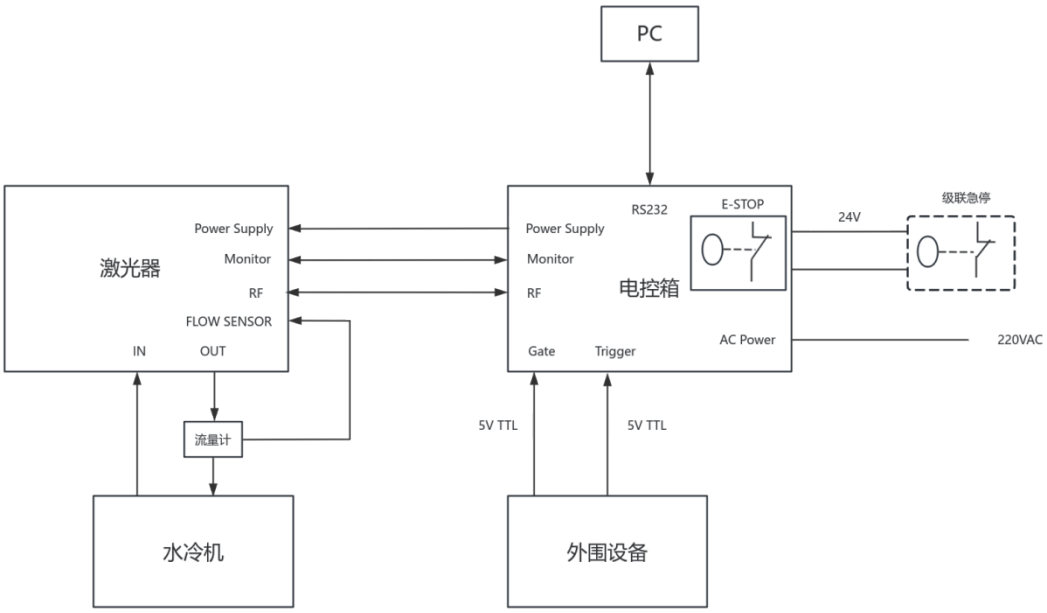
* Front appearance 2 of the laser

Power supply parameters and interfaces

COMPLETE MACHINE EQUIPMENT SIGNAL CONNECTION

Project		All-in-onemachine			Split machine	
		10V/20W Red Skin	30W UV, 60W Red Skin	90W Red Skin	90W Red Skin	
Electricalrequirements	Voltage	200-240VAC50-60Hz				
	Power	<800V	<1000V	<1200V		
Laser Interface	DB15 Female Connector (I/O)	Used for InterLock, controlling light output			DB9 Female Connector (RS232)	Top-level communicationinterface
	DB9 Female Connector (RS232)	Top-level communication interface			DB9 Female Connector (I/O)	Used for InterLock, controlling light output
	BNC Interface (RESERVE1)	External analog signal controls light output power, 0-10V /0-5V; upper computer selects input voltage range			BNC Interface (GATE)	Used for external Gate control
	BNC Interface (RESERVE2)	Reserved			BNC Interface (TRIGGER)	Used for external Trigger control
	BNC Interface (GATE/TRIGGER)	Used for external Gate/Trigger control, integrated interface Host machine selection mode			BNC Interface (RESERVE)	External analog control for laser output power, 0-10V/0-5V input voltage selectable via host computer
	D-SUB 3V3 Female Connector (POTER SUPPLY)	Laser power supply interface, DC36V			GX16-2 Pin Female Connector (E-STOP)	External cascade halted
	GX16-4-pin Female Connector (FLOT SENSOR)	Flow Meter Interface				

Signal connection of the complete equipment



*Schematic diagram of split-type connection

1.Connect the 55-pin and 6-pin / 12-pin aviation connectors between the laser and the electric control cabinet (interfaces vary slightly for different products). Connect the corresponding RF cables according to the instructions on the RF labels.

2. If the rear panel of the laser is equipped with a dedicated flow meter interface (FLOW SENSOR), please insert the flow meter plug.(The flow meter is enabled by default, and two are supplied as consumables with the equipment. If you need to disable the flow meter, please confirm with the sales personnel in advance. When connecting to the water chiller, ensure the arrow on the flow meter is consistent with the water flow direction.)

3. For models without a dedicated flow meter interface, connect the flow meter to the 3P connector from the 55-pin aviation plug.For this version of the laser, pay attention to the labels on the 55-pin aviation plug to distinguish the **laser side** from the **electric control cabinet side**.

4. Check that the E-STOP interface of the electric control cabinet remains short-circuited.For usage details, refer to the I/O interface chapter below.

5. For lasers with I/O functions, a DB9 male connector with INTERLOCK short-circuited is supplied with the equipment.Check that the DB9 male connector is inserted into the I/O interface of the electric control cabinet.For usage details, refer to the I/O interface chapter below.

6. Front appearance 1 of the laser* Front appearance 2 of the laser

7. According to process requirements, connect the machine's processing signal to the GATE or TRIGGER interface.

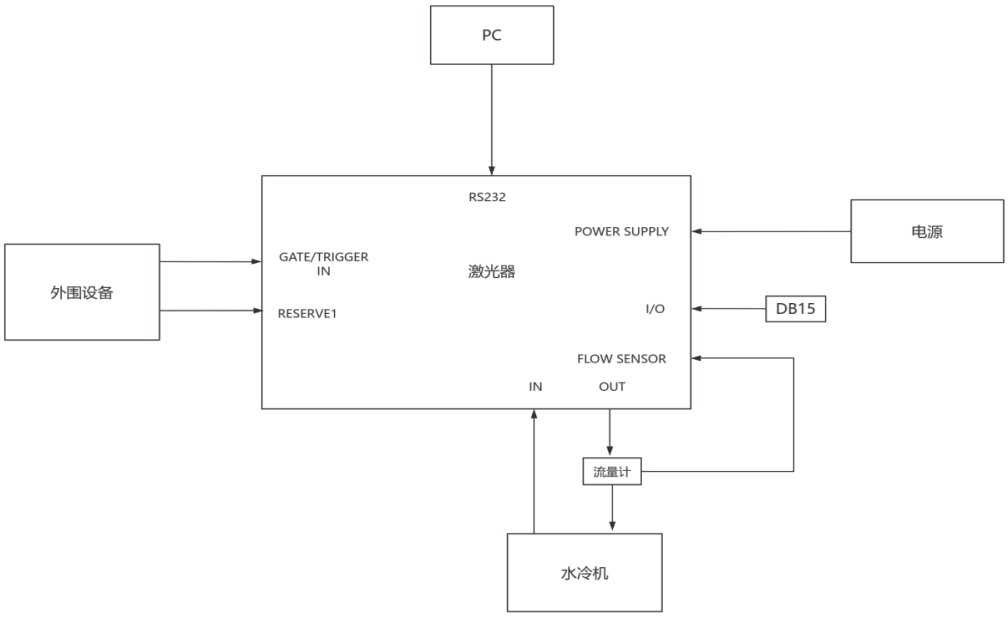
* Brief Description of External Signals

ACPower Laser power input: Connect to external 220V AC.A 0250V 10A AC fuse is already installed inside the electric control cabinet.We strongly recommend connecting a circuit breaker (air switch) and a voltage regulator in series between the power supply unit and the laser power socket for convenient wiring and operation.

GATE：External GATE signal connection to processing equipment: 5V TTL.

TRIGGER ：External trigger signals such as TRIGGER/PSO/POD connected to processing equipment: 5V TTL.The input signal frequency should be lower than the set repetition frequency of the laser.

RESERVE:This is a reserved interface for external power adjustment, supporting 0–10V or 0–5Vinput.Please contact our company for confirmation if you require this function.



*Schematic Diagram of All-in-One Connection

1. Connect the input terminal of the switching power supply to 220vAC, and connect the output terminal to the laser's POWERSUPPLY. The output cable label at the output termninal is marked as V+V- ground. To ensure good grounding for the laser, aground wire has been reserved at the power output end; it is recommended to extend and directly connect to ground.

2. Insert the flow meter plug into the FLOW SENSOR interface. (The flow meter is enabled by default and can beconsidered as an easily damaged part shipped with two units; if you have requirements for shielding the flowmeter function, please confirm with sales personnel in advance. When connecting to the water-cooled machine,ensure that the arrow direction of the flow meter aligns with the flow direction.)

3. Insert the included DB15 male connector; it is default short-circuited with cascade emergency stop andINTERLOCK; refer to the I/O interface section below for usage.

4. Insert the communication cable into the RS232 port and operate the control software.

5.According to process requirements, connect the machine's processing signal to the GATE/ TRIGGER IN and RESERVE1 interfaces.

* Brief Description of External Signals：

STATUS: When the status indicator light flashes yellow,it is preparing for output;flashing green indicates the process of turning on or offthe light constantly lit means currently emitting light; red steady-on or flashing indicates a fault. Please check the cause of the fault on theupper computer or contact our after-sales service.

GATE/TRIGGER：External signal connected to machining equipment. The Gate signal is 5V TTL; TRIGGER connects to trigger signals from machining equipment such as TRIGGERIPSo\POD, 5V TTL, and the input frequencyshould be lower than the set laser repetition rate. Processing mode must be selected and switched via the host computer.

RESERVE1: This interface is reserved and can be used for external power regulation with 0-10V or0-5V input. Please confirm with sales personnel if this function is required.

Expansion Interface EXPANSION INTERFACE

The Laser I/O interface is a high-quality, easy-wiring DIB9 (dual unit) /DB15 (single unit)interface that provides multiple signals for laser fun-ction control, as described below:

1.Split machine

DB9Number	Identifie	introducti
1	0V	Used for signal common ground; do not connect to any non-OV/GND pins.laseris alarming.
2	Laser Alarm StatusIndicator	SVNPN signaloutput (oV). Used to indicate whether the laseris alarming.
3	Laser emission statusindicator	5V NPN signaloutput (OV). Used to indicate whether the laser has been activated (on).
4	Motion Enable Status Indication	5V NPN signal output (0V). Used to indicate whether the laser is stable, so that the processing equipment can start moving and perform processing.
5	Interlock 1	Dry contact; when not in use, short-circuit with 'Interlock 2'; failure to short-circuit will lock the laser. Do not connect to other pins.
6	5V	Used for signal power supply; do not connect to any OVGND\PE pin.
7	Enable Light Gate	5V PNP signal input (5V) for turning on/off the light gate.
8	Turnon Laser	5V PNP signal input (5V), used for enabling/disabling laser.
9	Interlock2	Dry contact: When not in use, short-circuit with 'Interlock 1'; failure to do so willock the laser. Do not connect to other pins.

2.IntegratedMachine

DB15 Number	Identifer	Description
1	Interlock 1	Dry contact; when not used, short-circuit with 'Interlock 2'; failure to short-circuit will lock the laser. Do not connect to other pins.
2	Stop quickly1	Dry contact, short circuit to 'Emergency Stop 2' when not used; failure to short circuitwill trigger laser emergency stop. Do not connect to any other pin.
3	INTERLOCK status indicator	5VNPN signal output (oV). Used to indicate internal INTERLOCK status.
4	Motion Allowance StatusIndicator	5V NPN signal output (OV). Used to indicate whether the laser is stable,allowing the machining equipment to start moving and begin processing
5	Laser emission statusindicator	5V NPN signal output (OV). Used to indicate whether the laser has been activated (on).
6	Laser Alarm Status Indicator	5V NPN signal output (OV. Used to indicate whether the laser is alarming.
7	5V	Used for signal power supply; do not connect to any OWGND\PE pin.
8	5V	Used for signal power supply; do not connect to any OWGND\PE pin.
9	Interlock 2	Dry contact; when not used, short-circuit to 'Interlock 1'; failureto short-circuit will lock the laser. Do not connect to other pins.
10	Emergency stop 2	Dry contact; when not in use, short-circuit to 'Emergency Stop'; failure to short-circuitwill trigger the laser's emergency-stop. Do not connect to any other pin.
11	Backup Input	5V PNP signal input (5V).
12	Enable Laser	5V PNP signal input (5V), used for turning on/off laser.
13	Enable Light Gate	5V PNP signal input (5V), used for turning on/off the light gate.
14	0V	Used for signal common ground; do not connect to any non-OV/GND pins.
15	0V	Used for signal common ground; do not connect to any non-OV/GND pins.

3. Important Notes on I/O Interface

E-STOP:E-STOP: This interface can be used by users to connect additional cascaded emergency stop switches; when the circuit is closed, the lasercan operate normally; when the circuit is open, it triggers an emergency stop for the laser, stopping light output!

INTERLOCK:When short-circuited, normal laser emission is allowed; when disconnected, the laser will be locked and laser emission is prohibited!Note: When the INTERLOCK is disconnected, you can still operate to turn off the laser, but you cannot turn it on again.

Motion Enable Status Indicator: This pin can be used in conjunction with pin 6 (split machine), or pins 7 or 8 (all-in-one machine). When the laser is emitting light normally, 5V and oV can form a circuit with the external processing equipment'saction switch; when no light is emitted this signal disappears, and the processing equipment can use this signal to associatemotion and stop functions with the equipment

Enable Laser:: This pin can be used with pin 6 (separate unit) or pins 7 or 8 (built-in unit). When a switch device isadded between 5V and this pin, the laser will turn on when 5Vis connected to this pin without any fault.

Enable Light Valve:This pin can be usedin conjunction with pin6 (split unit and pin7or 8 (allin one unit).When an electronic switchisadded between SVand this pin, the laser willactivate the light valve and release laser when SV and this pin are connected.(This functionrequires the laser to have an internal light valve structure.)

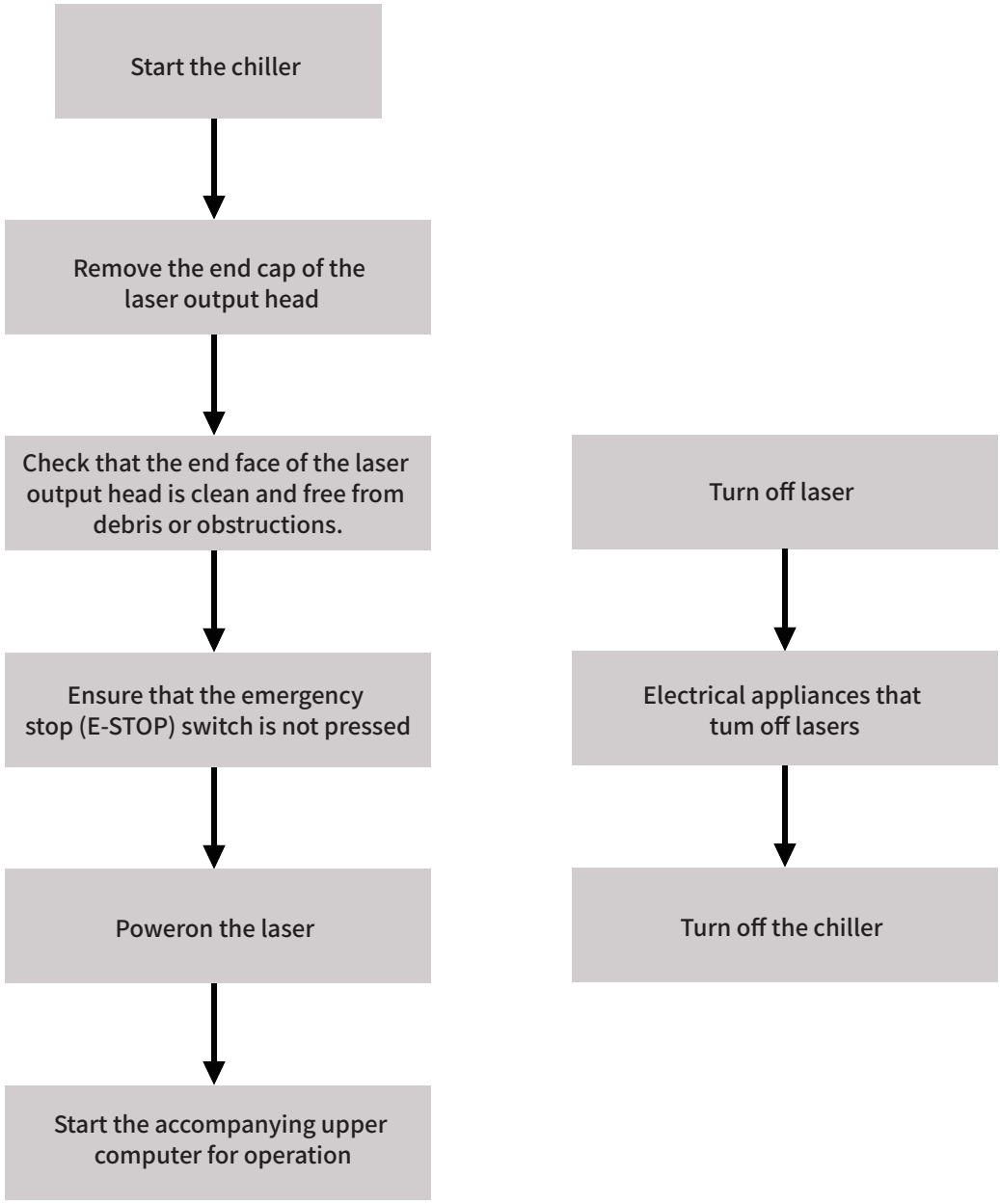
The above functions are by default enabled only for E-STOP and INTERLOCK.The remaining descriptions are customized for certaincustomers. Ifyou wish to enable these functions or customize other features, please confirm in advance with our sales personnel!

Startup Steps STARTUP STEPS

Warning:

* Before use, ensure all electrical connections (including water pipes) are connected. If conditionspermit, all connectors must be tightened and secured with screws.
* Do not look directly at the laser output port while operating the laser and wear safety goggles strictly.
* When performing wiring operations, please first turn offall power switches of the laser device.

The startup/shutdown procedure is as follows:



Mode Description STARTUP STEPS

The working modes of the laser are as follows:

1、Standby Mode: AOMis in standby mode and output signallis disabled

2、Intemal Control Mode: AOM outputs control signals based on intemal signal inputs to control laser output.

3、Gate Mode: When the Gate signal is high, AOM outputs control signals based on internal signals to control laser output.

4、,Trigger Normal Mode:After the rising edge of the Trigger signal,AOMoutputs control signals based on internal signalsto control laser output.

5、Trigger Average Mode: After the rising edge of the Trigger signal, AOM outputs control signals based on internal signals tocontrol laser output.

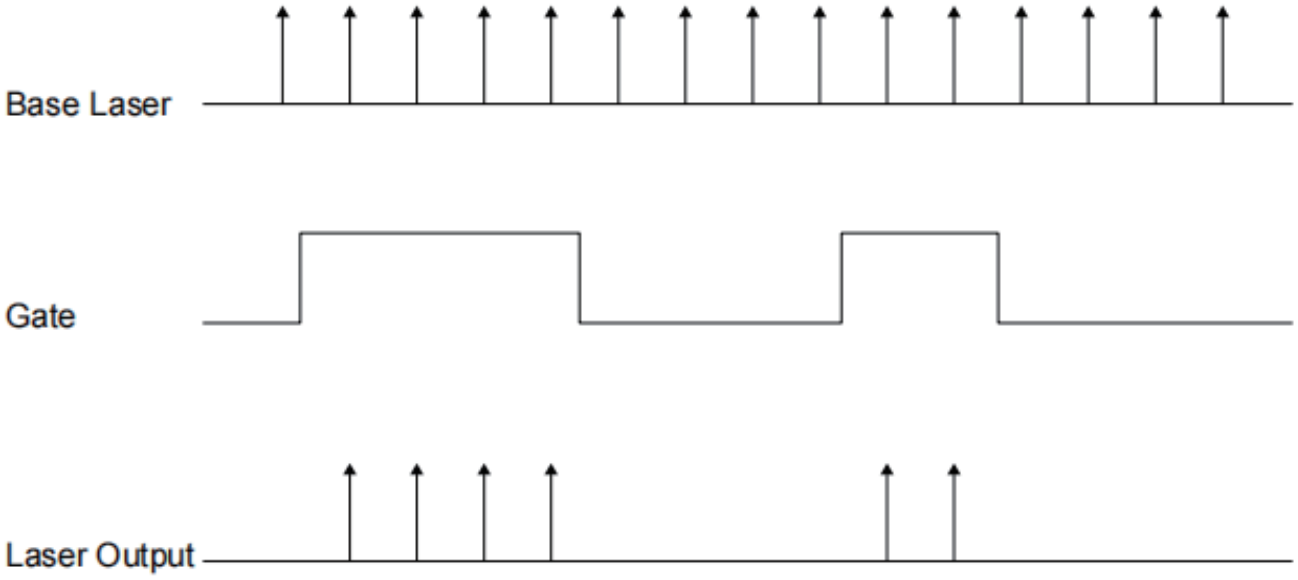
6、 Trigger Compensation Mode: After the rising edge of the Trigger signal AOM outputs control signals based on intemal signals to controllaser output

7、Forced Normlly Open Mode: AOM directly forces output signal regardless of presence or absence of exteral and intemal signals.

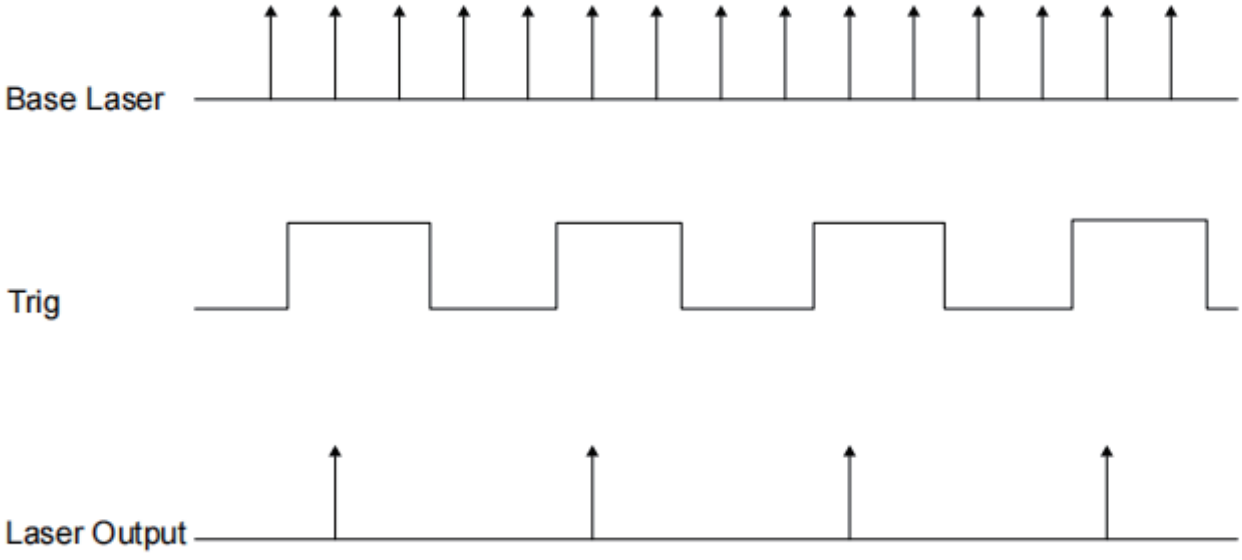
Note:

①Due to the asynchronous timing between external input signals and laser internal signals, there may be amaximum period of jitter between laser output pulses and input signals, corresponding to one laser frequency ycle.To eliminate this effect and match market drive boards, the internal algorithms for the three Trigger modes differ;please select based on actual performance.

②The frequency of the external Trigger signal must be less than the set laser frequency.



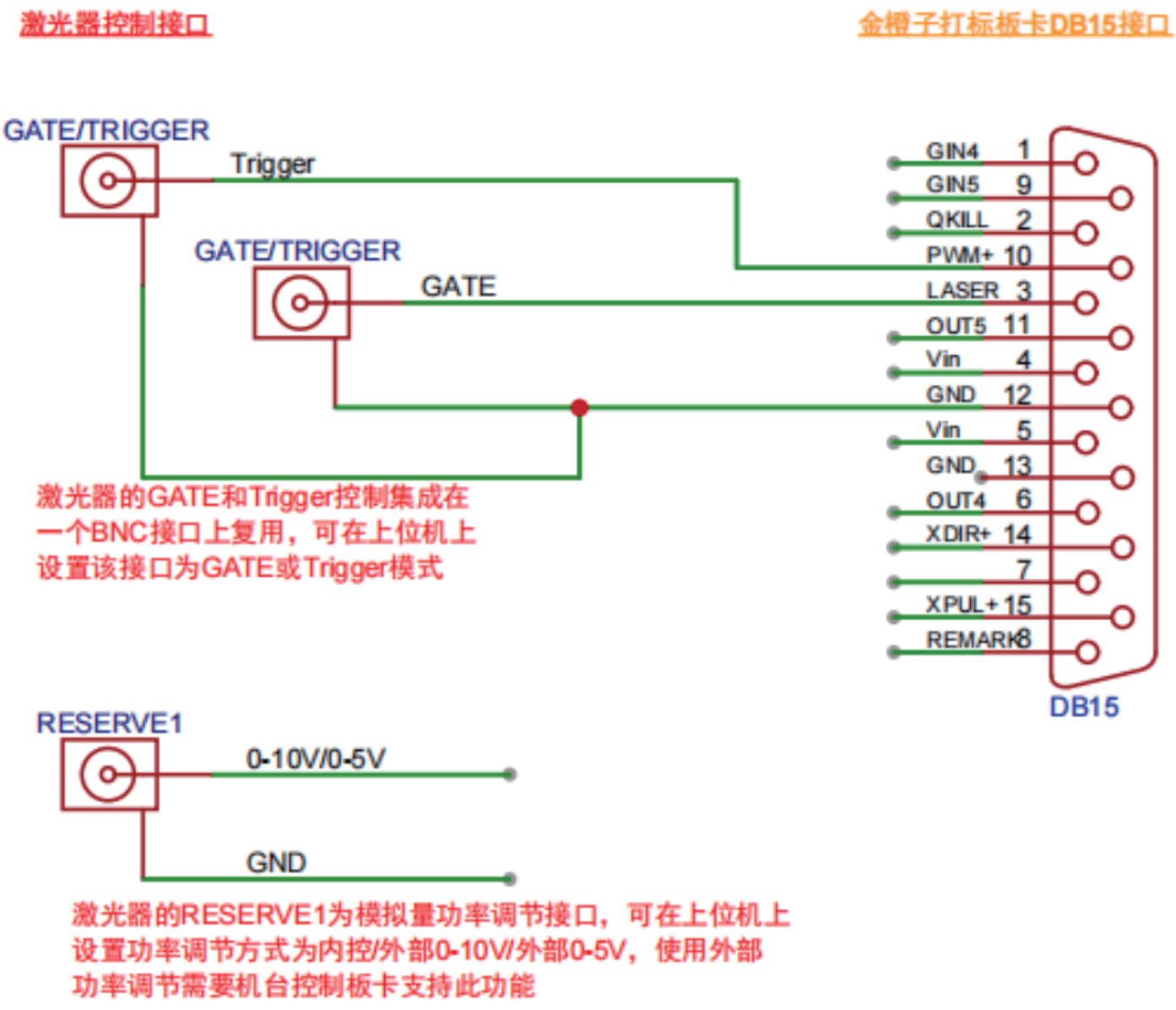
* Gate Timing Diagram



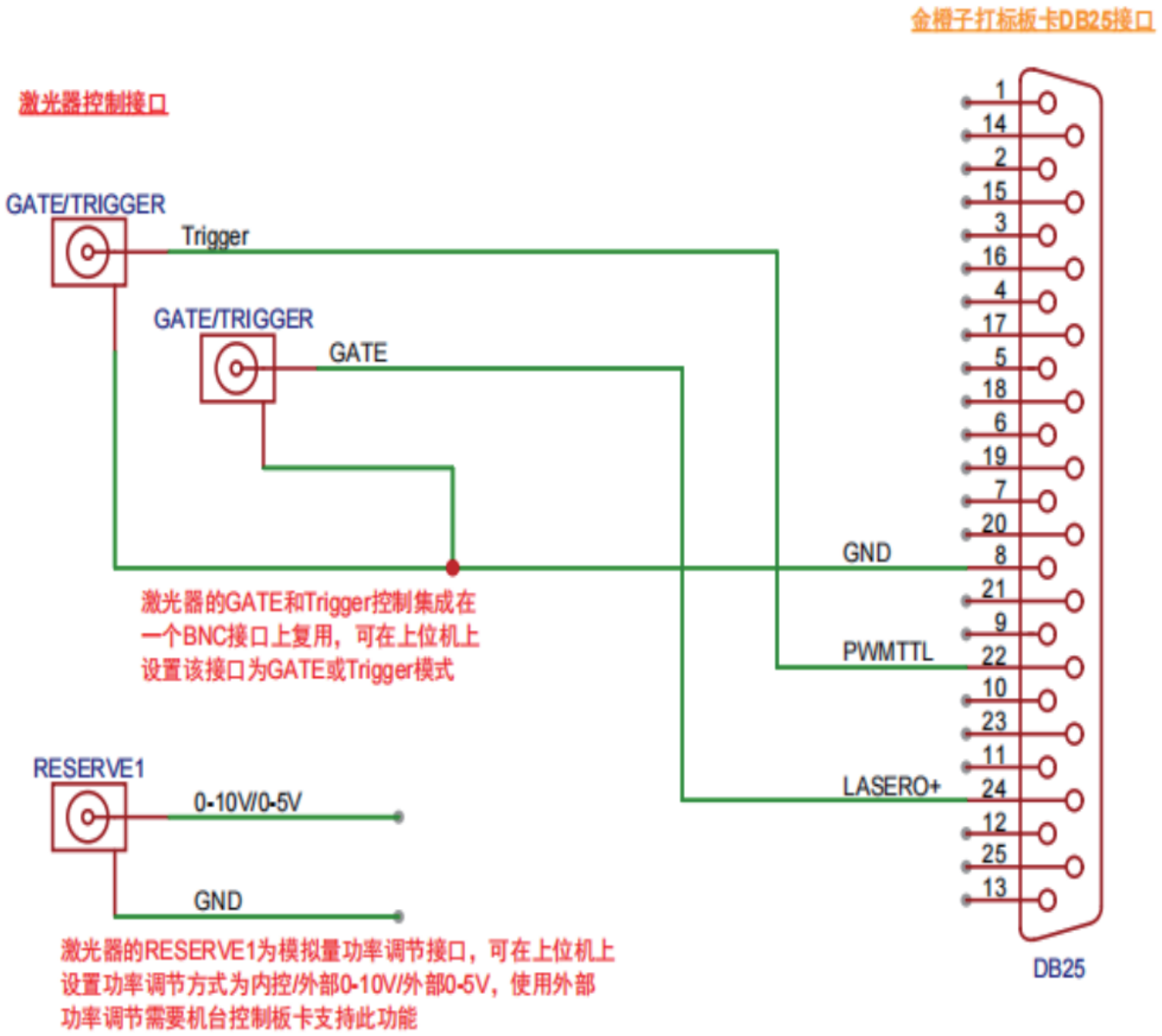
* Trigger Timing Diagram

Signal connection between laser and control card

1.All-in-one machine signal connection



*Example 1



*Example 2

2 Signal Connection for Split-type Machine

The GATE and TRIGGER of the modular machine are two independent BNC interfaces; when the upper stand selects processingmode as GATE or TRIGGER mode, the connected hardware interface must be consistent with the upper computer.

Simple Operation Instructions for Host Computer Software

1. The software program is stored ona random box U disk (the software has been developed with two versions: standard and simplified forcustomer needs; if the customer does not specify aversion, please use the version included with the shipment. Software versions are updatedirregularly; it is recommended to contact sales personnel for the latest version);

2. Due to incomplete system drivers and runtime libraries, some PCs cannot open software and displayinformation such as C++ runtime; it is recommended to update the system's C++ runtime library;

3.Use the built-in serial port cable to connect the laser and PC;

4. Double-click the software icon or right -dick to run the application as administrator, then enter the following connection interface.

(1) The software can automatically identify serial port numbers. If you encounter an error message indicating that a connection could not be established due to communication issues, please open the Control Panel, locate the port number under Device Manager, as shown in the diagram.

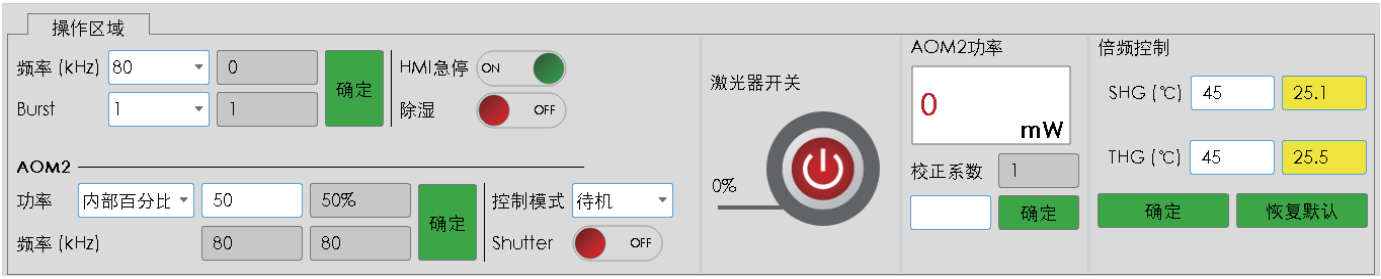
(2) Select the correct port number, connect the laser, and enter the user interface

Standard EditionSoftware

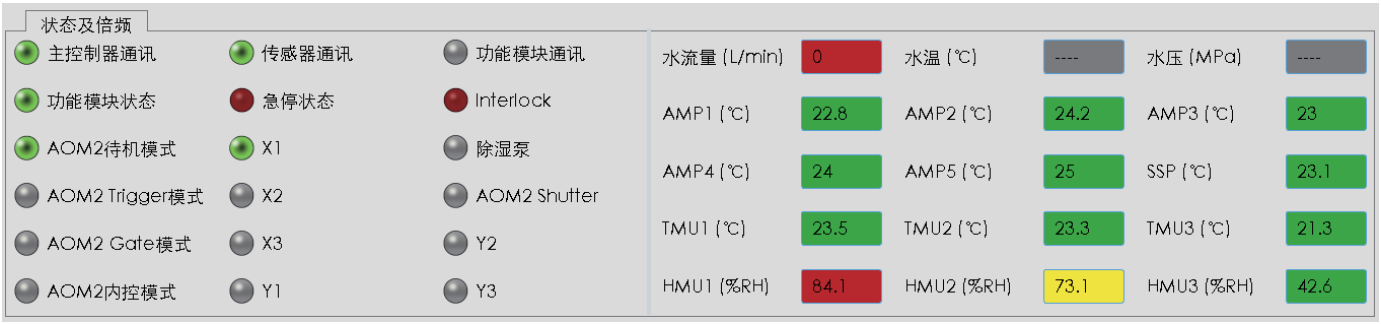
Note: The updated version of the upper computer has added new functions for power regulation, incuding "internalpercentage adjustment","external o-1oV", and "external 0-SV". These correspo-nd to the RESERVE interface on the abovesplit unit and the RESERVE1 interface on the integrated- unit.

The figure below shows the dual-laser head version; only AOM2 is operable for single-head laser.

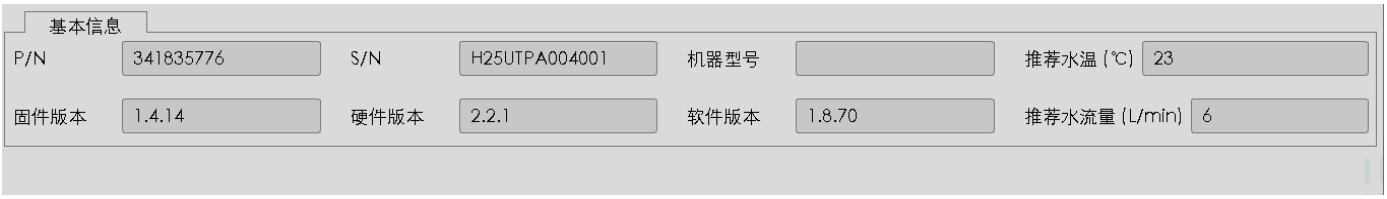
Operation Area: Mainly for setting and operating the laser device



Status Feedback Area: Mainly includes feedback data on laser unit status and sensor information



Basic Information Area: Mainly includes laser SN and version information

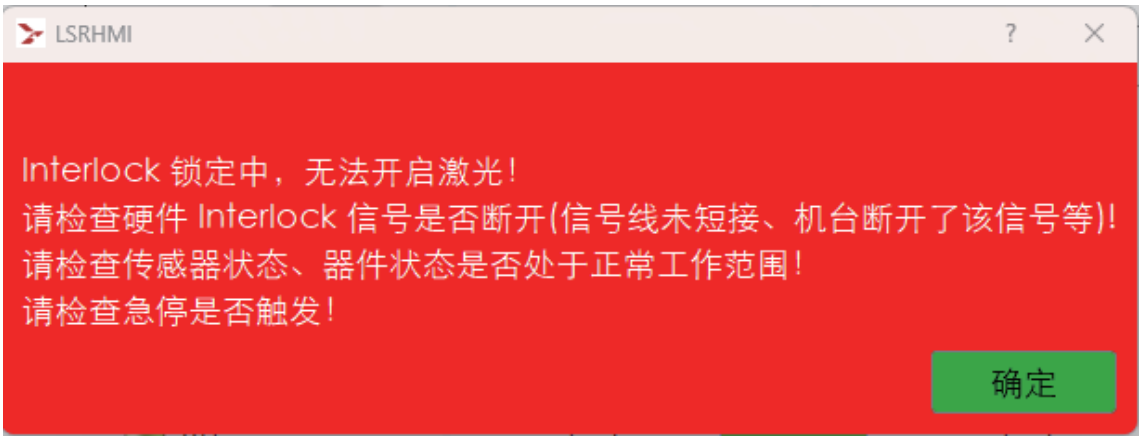


Information prompt area: mainly for operation prompts and alarm, prompt information

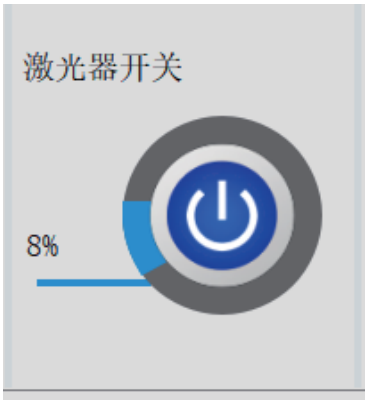
(3) Select laser repetition rate, Burst and set parameters

(4) Click the upper computer laser switch button

If the laser does not meet the activation conditions, the upper machine will pop up a prompt please troubleshoot based onactual conditions. After troubleshooting, click the upper machine's laser switch button again to activate the laser.



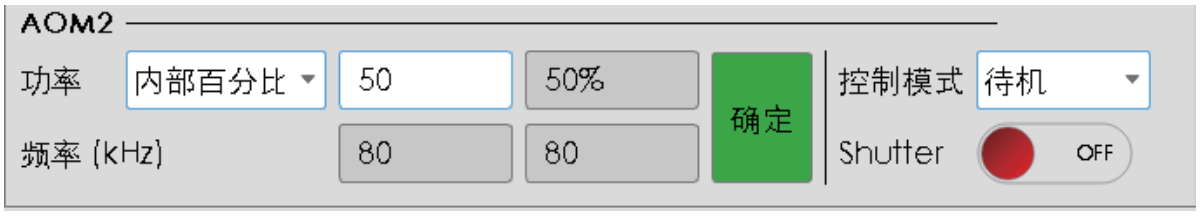
(5) Wait for the laser to be turned on; the progress bar will display the current activation progress



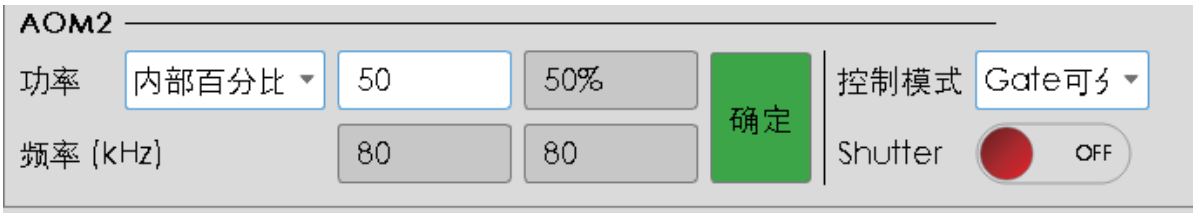
* Starting up

* After the laser isswitched on

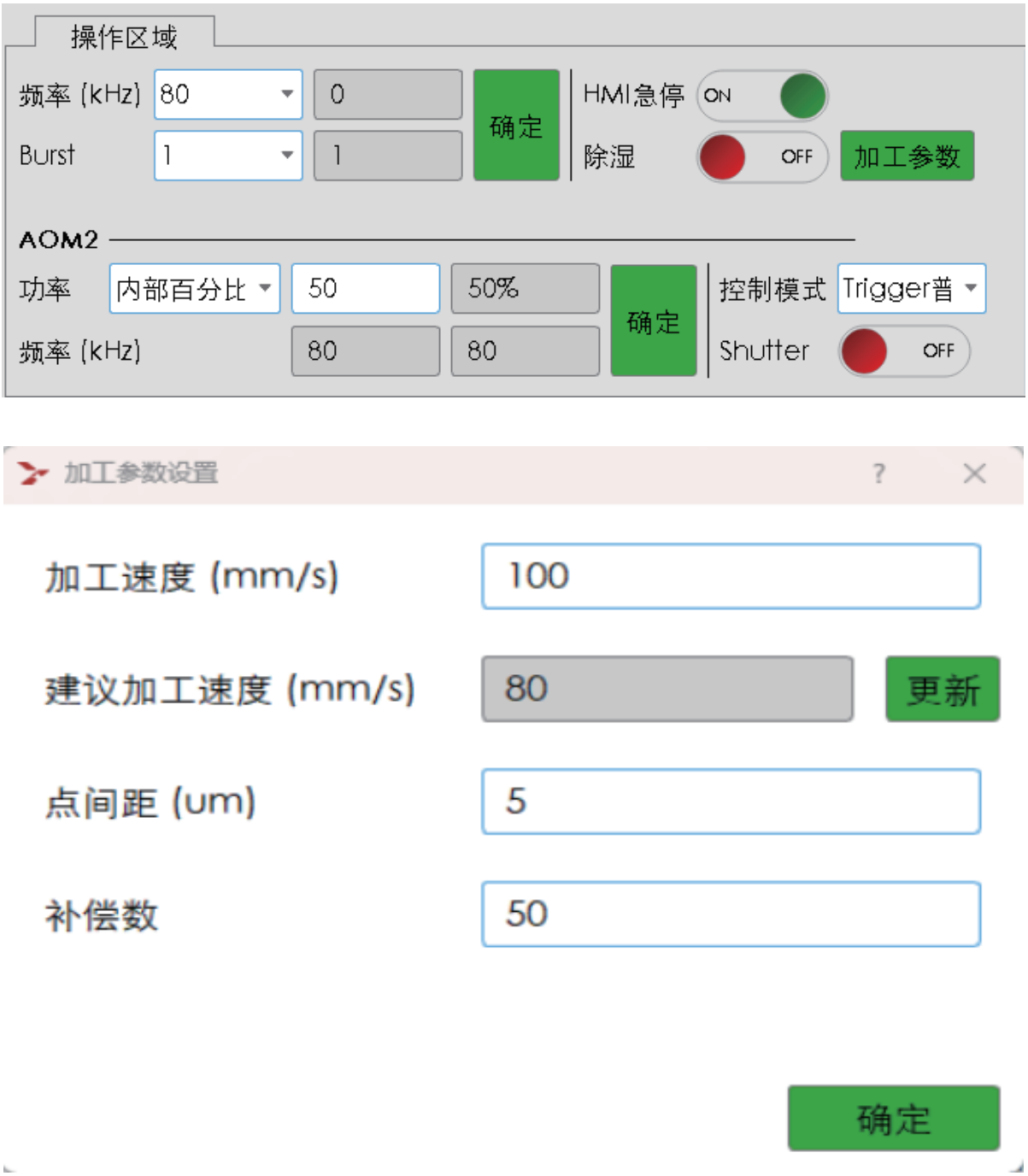
(6) Select AOM control mode



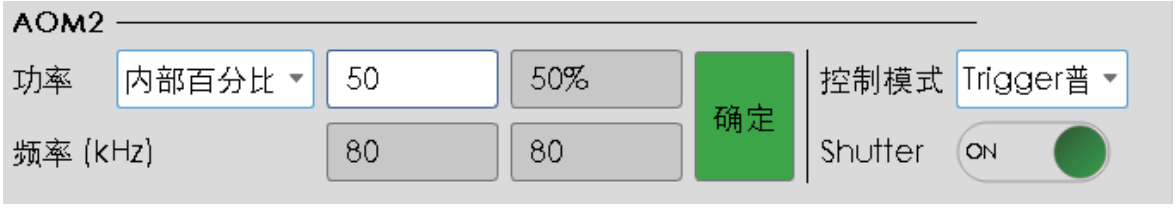
When selecting Gate mode, you can set the AOM frequency (dividing). The divided frequency must be less than the set laser frequency.



When selecting any Tigger mode, you can set processing parameters (processing speed, point spacing, compensation number). Therecommended processing speed is updated and it is suggested to use the recommended processing speed for machining.

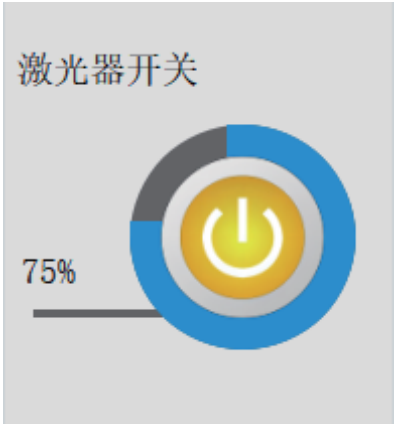


(7) Update the recommended machining speed; it is recommended to use the suggested machining speed forprocessing.



(8) Turn off laser

In the state where the laser is turned on, click the upper computer laser switch button to turn off the laser, and the progress bar will display the current closing progress (in reverse order).



(9) Frequency Doubling Control Description

The left side shows the set temperature, and the right side shows the current temperature.
The background color is orange when heating, and blue when cooling.

*** The multi-frequency temperature has been optimized before the laser leaves the factory, so do not change it at will.**

（10）Log Query

Alarm Record Inquiry: Can query current and historical alarm records

***Emergency alert.**

*** Current Alarm:**

* Operation Log :

序号	操作信息	操作时间
1	打开AOM2 Shutter开关	2023-08-30 13:56:34
2	设置功率为50%	2023-08-30 13:55:29
3	设置AOM2频率为50kHz	2023-08-30 13:55:29
4	设置加工速度为100mm/s	2023-08-30 13:53:38
5	设置点间距为5um	2023-08-30 13:53:38
6	设置加工速度为100mm/s	2023-08-30 13:53:34
7	设置点间距为5um	2023-08-30 13:53:34
8	设置补偿数为50	2023-08-30 13:53:34
9	设置AOM2控制模式为Trigger普通	2023-08-30 13:52:25
10	设置功率为0%	2023-08-30 13:52:19
11	设置AOM2频率为50kHz	2023-08-30 13:52:19
12	设置AOM2控制模式为Gate	2023-08-30 13:51:23
13	设置AOM2控制模式为待机	2023-08-30 13:50:31
14	设置AOM2控制模式为Trigger普通	2023-08-30 13:50:14
15	设置AOM2控制模式为待机	2023-08-30 13:49:06
16	设置AOM2控制模式为内控	2023-08-30 13:49:02
17	设置AOM2控制模式为Gate	2023-08-30 13:48:52
18	设置AOM2控制模式为待机	2023-08-30 13:48:50

* Operation Log: Currently, partial operation time records can be queried

A simple version ofthe software

The relevant operational logic is consistent withthe regular version

Select the corresponding COM port number to enter theinterface;

Check interlock and emergency stop indicators, check alarminformation prompts, contact our company ifthere is any fault;

Itis recommended to set the laser power to 1% and switch the light gate switch to OFF before irradiation;

Set the seed source frequency, Burst; please follow the factory report settings for allowable range and click OK;

One-click start the laser, wait for the laser progress to reach 100%;

Select the processing mode as internal control, and switch the light gate to ON under safe conditions;

The laser starts emitting light, check the spot at the emission port;

After debugging the optical path, select the processing mode GATE/TRIGGER as needed.

Common Fault Table

COMMON FAULTS TABLE

For any unlisted faults, please contact our after-sales service personnel or our customer serice hotine (Tel: 0551-65652939)

FaultCode	Fault Name	Possible Cause /Solution Method
None	Interrupted down streamcommunications	Possible Causes: PC and electrical control box connection interupted or data parsing error Solution: 1.Check if the connection cable and COM port are correct; 2.
9216	Update Host Computer Version HMI version	Update Host Computer Version Possible Causes: The top-level version is not supported Solution: 1.Restart the secondarymachine 2.Update the upper computerversion
10496	Hardware emergency stoptriggered	Possible Causes: The emergency switch is pressed or the external emergency signal is disconnected Solution: 1.Emergency stop switch has returned to normalstate
10497	HMIl software emergency stop triggered	Possible Causes: HMI software emergency stop is enabled Solution: 1.Close HMI software emergency stop

9730/10498	Abnormal seed sou-rcetemperature tri-ggers a pause	Possible Causes: Seed source temperature abnormal or sensor failure Solution: 1. Check the temperature value feedback from the software interface and contact after-sales personnel
9731/10499	An abnormal tem-perature of the pu-mpsource triggers- an emergencyStop	Possible Causes: Pump source temperature abnormal or sensor failure Solution: 1. Check the temperature value feedback from the software interface and contact after-sales personnel
9734/10502	Abnormal water flow triggers emergency-stop	Possible Causes: Abnormal water flow or sensor failure Solution: 1. Check if the water flow rate of the water-cooled m-achineis normal; 2. connections between the inlet and outlet pipes;Ch-eck whether the water pipes are properly connecte-d and whether there are any reverse 3.Check the temperature value feedback from the software interface and contact after-sales personnel
9736 - 9752	Monitoring system abnormal, sensor Device data is unre-liable	Possible Causes: Sensor Failure Solution: 1.Check the data feedback from the software interfa-ce and contact after-sales personnel.