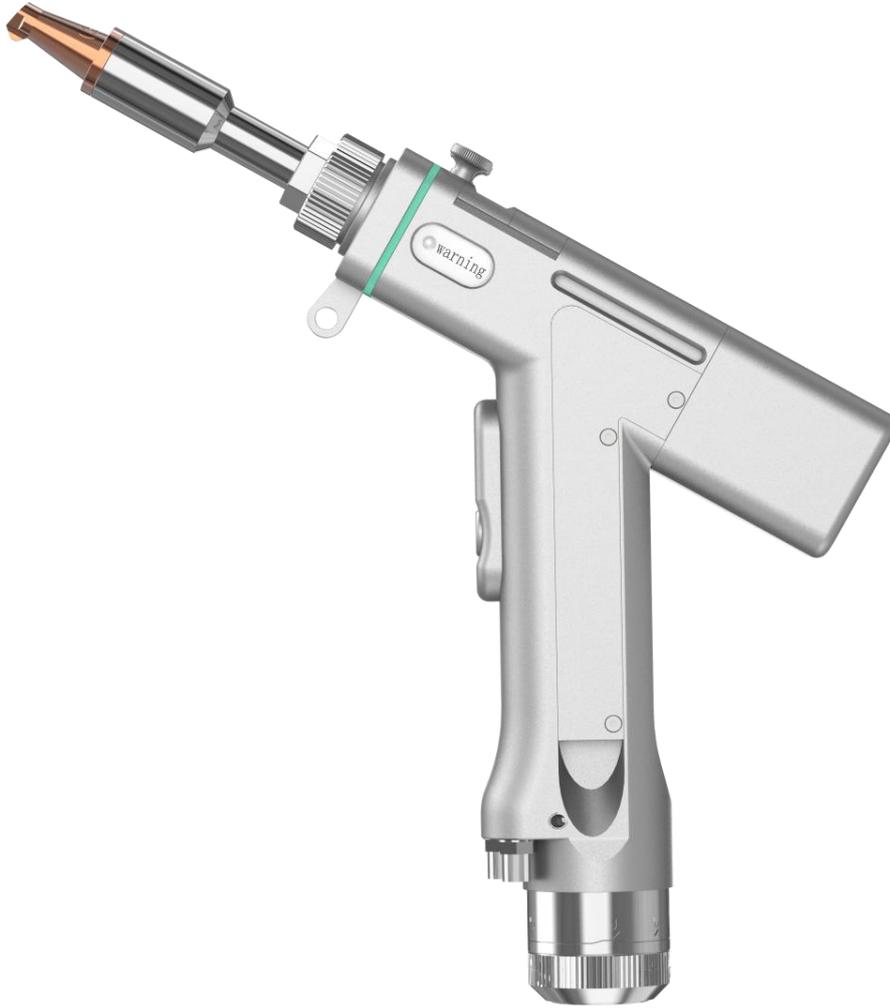


Product Description

SUP23S/T (versionV1.2)



Wuxi Super Laser Technology Co.Ltd

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Update Record

Version	Updates	Time	Editor
V1.1	Upgrade the main control board to V6.3	24.1.19	Liu Chen
V1.11	Wire feeder communication wiring	24.6.8	Liu Chen
V1.2	Upgrade the main control board to V6.4	25.6.10	Liu Chen

I. Notes

This product belongs to laser processing equipment accessories and is used in the field of metal material processing. According to the relevant regulations, this product meets the basic safety standards for all kinds of electrical products that are handheld, portable and fixed for indoor and outdoor use. According to actual requirements, it is recommended that each product have an operating area of 2 to 10 square meters (indoor height is recommended to be more than 3 meters).

Warnings! Please read all safety warnings, instructions, illustrations and specifications in this manual. Failure to follow all of the instructions below may result in electric shock, fire, or any other serious injury!! This product is only intended for use in professional industrial fields and must be used by professionals! No use by people without professional qualifications!

1.1 Transportation and Storage requirements

Handheld laser welders should be able to function properly under the following environmental conditions.

- (1) Ambient air temperature range:
During transport and storage: -25°C to $+55^{\circ}\text{C}$.
- (2) Air relative humidity:
Not more than 70 percent at 40°C ;
No more than 90 percent at 20°C .
- (3) Dust, acids, corrosive gases or substances in the surrounding air do not exceed normal levels, except for those produced during the welding process.
- (4) There is no noticeable vibration or shock.

1.2 Description of possible hazards

1.2.1 Machine hazards

- ① Pinching or other secondary hazards caused by fastening structures.
- ② Injury from falling equipment or other secondary hazards.

1.2.2 Electrical hazards

- ① Electric shock or other secondary hazards caused by leakage of the equipment power supply.
- ② Electric shock or other secondary hazards caused by static electricity generated during the operation of the equipment.

1.2.3 Heat hazards

- ① Heatstroke, dehydration or other secondary hazards caused by the large amount of heat generated by laser processing.
- ② Scalding of personnel, environmental fires or other secondary hazards caused by high-temperature materials, residues and splashes produced by laser processing.

1.2.4 Radiation hazards

- ① Skin damage, retinal damage or other secondary hazards caused by direct laser exposure or secondary exposure after reflection.
- ② Hazards of electrolytic plasma produced by laser energy or other secondary hazards.
- ③ Secondary radiation or other secondary hazards caused by material decomposition and stimulated radiation resulting from laser irradiation.

1.2.5 External interference hazards

Abnormal operation of the product caused by external factors may lead to equipment failure and dangerous conditions.

The external environment refers to:

- ① Temperature
- ② Humidity
- ③ External shock/vibration
- ④ Steam, dust or gases in the environment
- ⑤ Electromagnetic interference
- ⑥ Interruption/fluctuation of the original power supply
- ⑦ Lightning Strike
- ⑧ Insufficient hardware/software compatibility or completeness
- ⑨ External communications do not comply with the communication protocol.

1.2.6 Hazard of confined space

Hazards that may result from the use of handheld laser processing equipment in confined Spaces:

- ① An increase in the concentration of harmful substances in the space
- ② Excessive concentrations of process gases (argon, nitrogen, etc.) in the space
- ③ Hypoxia
- ④ Enhanced current
- ⑤ Temperature rise
- ⑥ Radiation hazards caused by direct or diffuse reflection of the laser.

1.2.7 Hazards from working at heights

- ① Hazards of falling objects.
- ② Hazards of personnel falling.

1.3 Precautions

In response to the above hazards, in order to ensure safe production and normal operation of the product, the following safety signs are posted on the complete machine product, clearly informing all personnel using, maintaining and approaching the product of the following safety matters and must take the following safety measures.

Warning! Please read all safety warnings, instructions, illustrations and specifications in this manual. Failure to follow all of the instructions below may result in electric shock, fire, or any other serious injury!!

1.3.1 Production operating environment

- ① Special laser welding areas should be demarcated for product use.
- ② Flammable and explosive items should not be placed around the product to avoid potential safety hazards.
- ③ The product should be kept away from bad weather conditions such as fog, strong wind, lightning, rain, snow and hail when working outdoors.
- ④ Good ventilation and visibility (sunlight or light) should be maintained when the product is working indoors.
- ⑤ Dust, acids, alkalis, corrosive gases in the working environment of the product should not exceed normal levels.
- ⑥ Temperature range of the product working environment: -10 to 50°C, humidity range $\leq 70\%$.
- ⑦ The working environment of the product should avoid obvious vibration and shock.

1.3.2 Engineering protection measures

- ① Isolation fences should be set up around the laser welding area. The fences should be able to withstand a certain amount of laser energy to prevent the laser from shining outside the area.
- ② No other person should enter the laser welding area without the operator's authorization.
- ③ This product is powered by 220V AC. The applicable range is 220V $\pm 5\%$ AC 50/60Hz. The supply voltage should be stable without shock. Please pay attention to electrical safety when using to avoid the risk of electric shock.
- ④ To ensure the normal operation of the product and to prevent static electricity damage and leakage of the product, the product should adopt safety grounding measures, that is, connect the easily conductive parts to the protective (grounding) wire in the fixed wiring of the product, so that the easily accessible conductive parts will not become live parts when the basic insulation fails; Additional safety measures (such as double insulation or reinforced insulation) may be added as appropriate, or separate grounding may be provided;
- ⑤ Within 2 meters of the operator's working area, there must be an emergency stop switch control device centered on the individual.

1.3.3 Personal protective measures

Warning! The operator must be a professional who, in addition to being familiar with the product and the associated welding system, must also be familiar with the properties of the material being processed, be familiar with possible side effects, be capable of assessing health risks, and ensure effective preventive measures.

- ① Individuals should wear professional laser protective clothing and protective gloves.
- ② Individuals should wear laser protective glasses and face masks corresponding to the power and wavelength.

1.3.4 Protective measures for product maintenance

- ① When replacing vulnerable parts, make sure the product is powered off to avoid light exposure.

② The control box of this product does not contain accessories that require user operation. Any installation, maintenance or disassembly of this product should be carried out at the designated repair point when the power is off. Please contact your local dealer.

1.3.5 Other precautions

① Warning! The product is compatible with lasers of wavelengths 1080nm and near, a band that is invisible and whose radiation is hard to detect before it has a direct effect, requiring special attention! Operators must wear all protective gear, work area must be protected as required, and no other personnel are allowed to enter the work area!

② The energy output of the laser is very high in an instant. Do not point the light outlet at people or other objects when it is working, placed or idle.

③ Even if the type 4 laser does not directly shine on the skin and eyes, it will indirectly shine on the skin and eyes due to the diffuse reflection of the material, which will still cause irreversible damage. Operators must wear protective equipment such as glasses and protective clothing.

④ When the laser shines on a smooth surface, it causes specular reflection, especially when processing high-reflectivity materials such as copper and aluminum. When processing materials, the Angle of reflection can also change due to the variation of the molten pool. Operators should be fully aware of the possible angles of reflection to avoid laser reflection from endangering personnel and equipment.

⑤ The gas around the molten pool, when exposed to the high-energy laser, forms electrolytic plasma. The splashing waste and exhaust gas produced by the laser on the material can also pose a threat to personnel. Operators must wear protective equipment such as face masks.

⑥ During work, the emergency stop switch control device should be placed within 2 meters of the operator's working area with the operator as the center.

⑦ When working at heights, the operator should wear a safety rope, helmet, etc. and take measures to secure the equipment to prevent it from falling.

⑧ When working indoors or in confined Spaces, adequate ventilation measures should be maintained to prevent the accumulation of harmful substances. Maintain adequate visibility and avoid exposure to strong light. Appropriate measures need to be provided to remove possible thick smoke, exhaust gases, etc. from the processing area, which need to be sufficiently purified before being discharged into the atmosphere far from people.

1.3.6 Safety signs

The following safety signs must be fully understood and used.

Signs	Name
	Movable fire zone
	Warning! Be safe
	Beware of hot surfaces
	Do not wear synthetic fiber clothing
	Flammable materials are prohibited
	Laser radiation avoid direct or scattered exposure to eyes and skin Category 4 laser products
	Laser window Avoid exposure to laser radiation coming out of the window
	Protective goggles must be worn

	Beware of lasers
	Beware of ionizing radiation
	Danger! High Voltage
	It must be grounded
	Must unplug
	Do not close the circuit

II. Product Overview

This product belongs to laser welding equipment accessories and is used in the field of metal material processing, including common metals such as carbon steel, stainless steel, aluminum, copper, and other metals that can absorb 1080-band laser. For continuous lasers with a laser power of 3000W and below and a wavelength of $1080\pm 10\text{nm}$.

Not for lasers with wavelengths beyond 3000W or beyond the applicable range.

Not for processing non-metallic materials such as wood, stone, plastic, composites, etc.

Not suitable for underwater work. For detailed operating conditions, see [Production Operating Environment].

This manual provides a general description of the basic functions, installation, operation, and maintenance of the SUP23S/T series of handheld laser welding heads. Among them, the SUP23S is equipped with dual protective mirrors and is specialized in the welding field; The SUP23T comes with a single protective lens for large-format handheld laser cleaning.

2.1 Gun body description

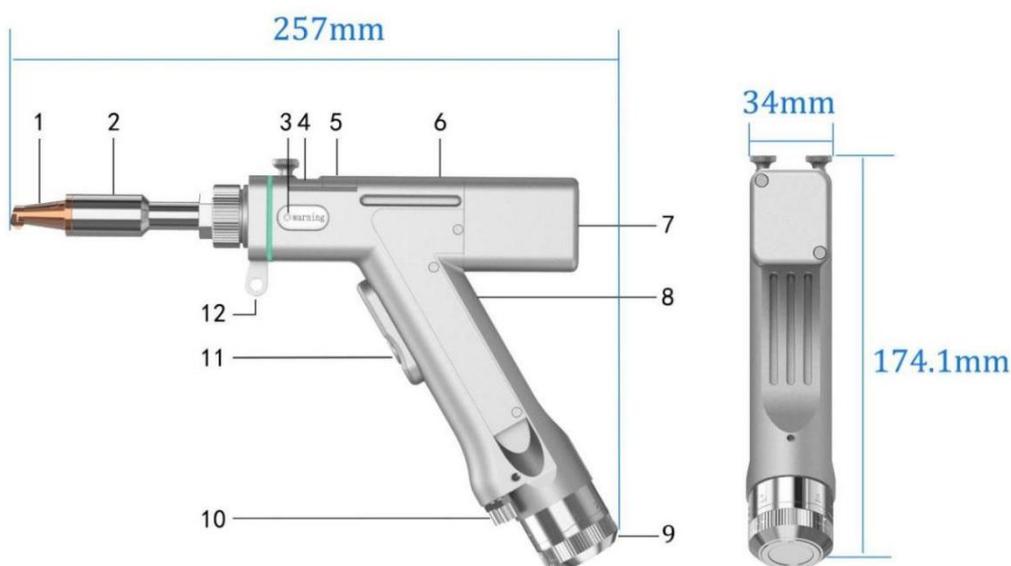


Figure 2.1 SUP23T gun body

1- Copper muzzle	2- Graduated tube	3- Status indication	4- Protective goggles
5- Focusing lens	6- Reflector	7- Motor	8- Collimating mirror
9-QBH case	10- Water on both sides, airway in the middle	11- Switch button	12- Wire feeding bracket

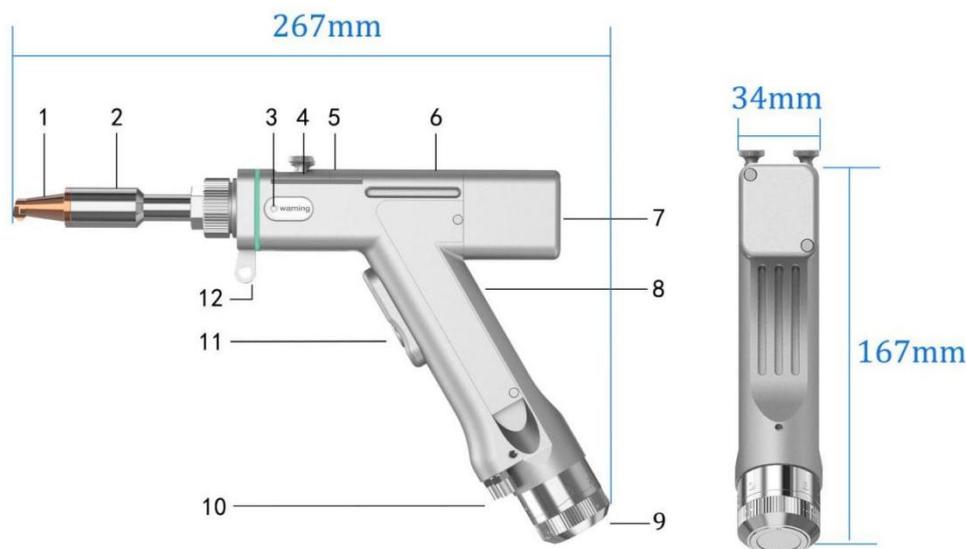


Figure 2.2 SUP23S gun body

1- Copper muzzle	2- Graduated tube	3- Status indication	4- Double protective lenses
5- Focusing lens	6- Reflector	7- Motor	8- Collimating mirror
9-QBH protective case	10- Water on both sides, airway in the middle	11- Switch button	12- Wire feeding bracket

2.2 Product Features

- Basic Features:

- ① QBH locking structure;
- ② Water-cooled structure;
- ③ Supports up to 3000W power;
- ④ Support a maximum weld width of 8mm.

- Basic Features

Serial Number	S type	T type
1	Supports dual protective lenses	Support laser long-range cleaning function
2	Supports laser cutting function	Support laser cutting function
3	Support weld cleaning function	Support weld cleaning function
4	Support lens temperature monitoring	Support lens temperature monitoring
5	Support system fault diagnosis	Support system fault diagnosis

2.3 Product Operating Environment and Basic parameters

The operating environment requirements and main parameters of the SUP23 handheld laser welding head are shown in Table 2.1:

Table 2.1 Operating Environment Requirements and Basic Parameters

Supply voltage (V)	220V±5% AC 50/60Hz
Operating ambient temperature (° C)	-10 to 50 ° C
Working environment humidity (%)	≤70
Cooling method	Water cooling/air cooling
Applicable wavelengths	1080nm (±10nm)
Applicable power	≤3000W
Collimating mirror	D16*T5-F60
Focusing lens	D20 * T4.5 - F150
Protective goggles	D18*T2
Recommended air flow rate	10 to 15L/min (0.15MPa at 20 ° C)
Focus vertical adjustment range	±10mm
Weight	About 0.7kg

III. Product accessories and installation

3.1 Unpacking list

Taking the standard version as an example, the product factory list is shown in Table 3.1. The actual product may differ from Figures 3.1, 3.2, 3.3, 3.4. Please refer to the specific order.

Table 3.1 Factory Configuration List of Products

SUP23ST packing list				
Serial Number	Category	Name	Specifications	Quantity
1	SUP23T welding head	Handheld laser welding head	SUP23T	1
2	Control system	Laser welding system	SUP-LWS-C V6.4	1
3	Display screen	Display screen	SUP-DW128 HJT	1
4	Switching power supply	Switching power supply	LM100-20B24 (JSY)	1
5	Accessory Package	Display 1 meter line	1M	1
6		Protective lenses	D18T2	5
7	Bronze nozzle box	Double wire feeding copper spout	AS-20D	1
8		Copper Guide Nozzle	AS-12	1
9		Copper Guide Nozzle	BS-16	1
10		Copper Guide Nozzle	CS-12	1
11		Copper Guide Nozzle	ES-12	1
12		Copper Guide Nozzle	FS-16	1
13		Copper Guide Nozzle	C	1
14		Cutout adapter	S	1
15		nozzle	1.5 Single-layer M8	1
16		Graduated tube	FT80	1
17		Copper spout packaging box		1
18	Ground clamp	Big Crocodile clip		1



Figure 3.1 Product Accessory 1



Figure 3.2 Product Accessories 2



Figure 3.3 Product Accessory 3

3.2 Control box wiring and interface definitions

SUP23S/T can be equipped with [V6.3] control system and [V6.4] control system. [V6.4] is more convenient to connect to the wire feeder system than [V6.3]. [AMF-AE]/[AMF-C] type wire feeders can be directly connected to [Signal Interface 2- Wire Feeding switch] of the [V6.4] control system. Operate the wire feeder via the display screen of the control system.

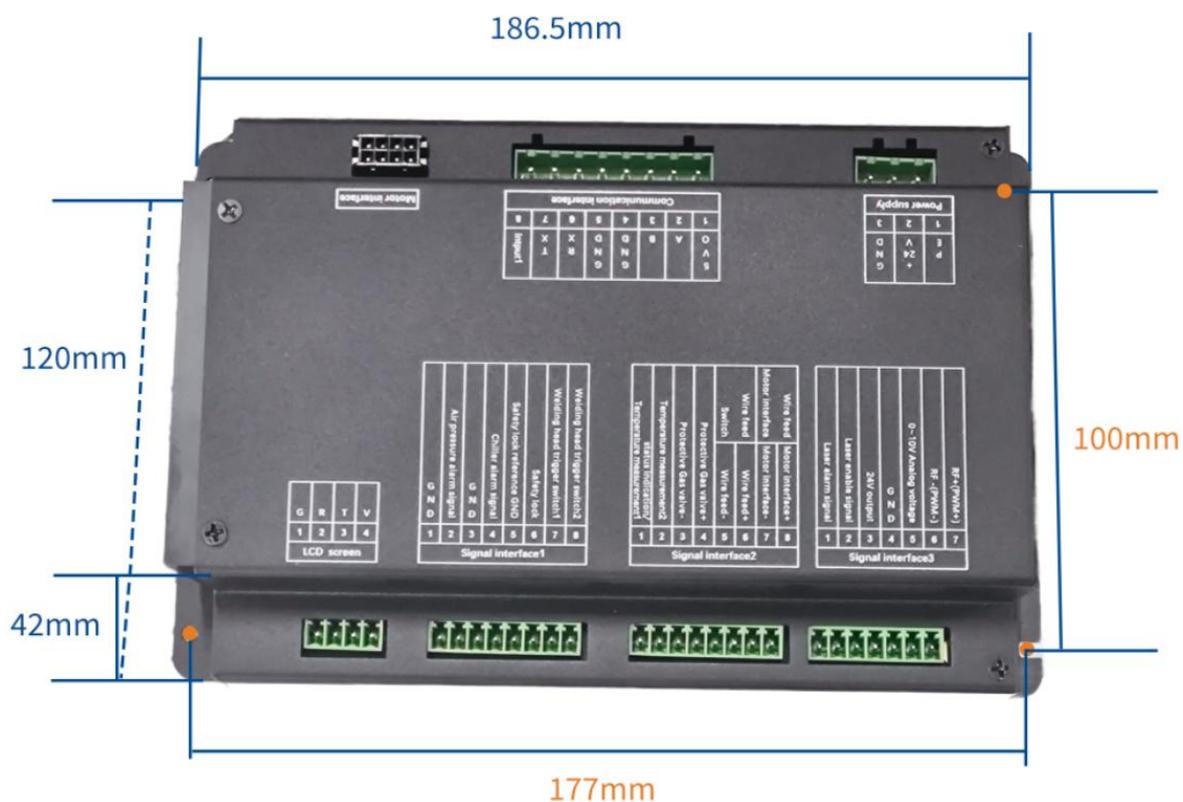


Figure 3.4 V6.4 Control box size diagram

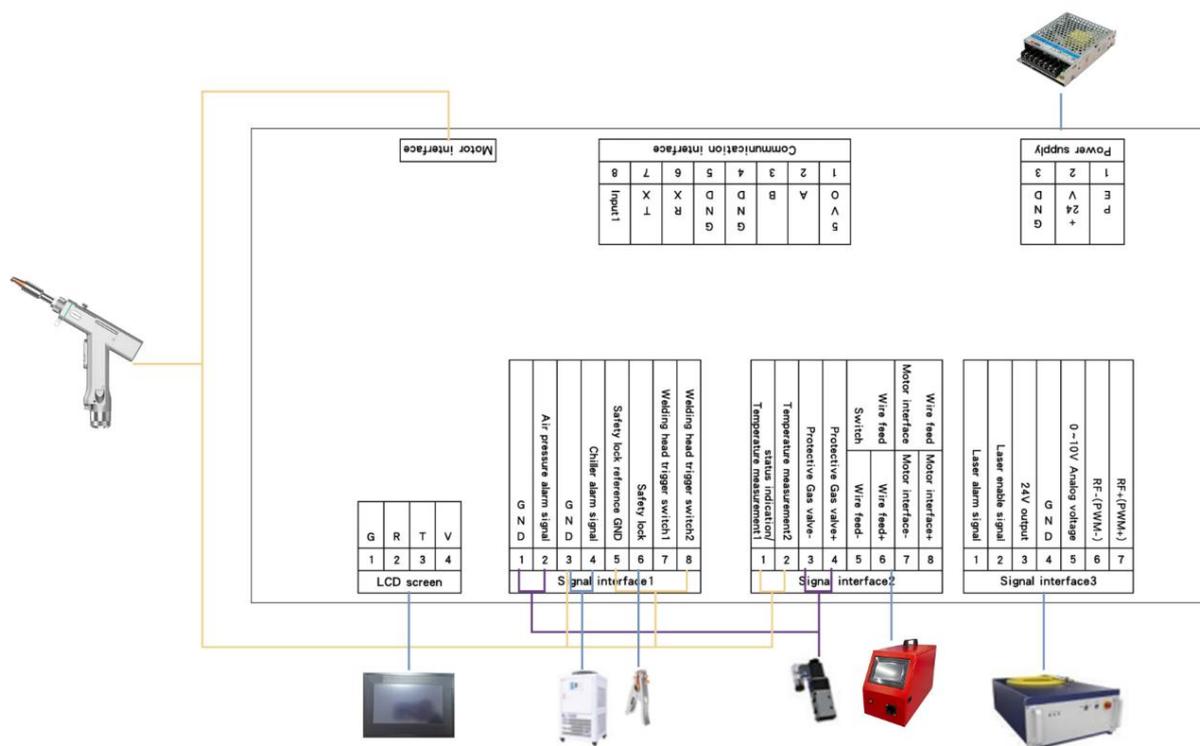


Figure 3.5 Wiring diagram

- ① To avoid abnormal power consumption of the product, the ground wire of the switching power supply must be effectively grounded! The product casing must be grounded!
- ② The icons used in Figure 3.5 refer only to a certain type of product and not specifically to the corresponding product.

3.2.1 Control Box - Power Supply

The Power Supply end uses a 3P interface (with terminals included randomly), please use the 24V switching power supply included randomly.

Note: The switching power supply must be grounded!

Power supply		
Pin Numbers	Signal Definition	Feature Description
1	PE	Grounding wire.
2	+24V	24V input, connect 24V switching power supply output positive, mark [+ V0].
3	GND	Common ground, 24V switching power supply output negative, marked [- V0].

Note: PE must be effectively grounded. 1. Make sure the ground wire is conducting, there are no loose connections or open circuits; 2. The ground wire itself is stable and not electrified (that is, the AC and DC voltages between the live wire and the neutral wire and the PE wire are both less than 10V, preferably maintained at 0V).

3.2.2 Control Box - LCD screen

The wiring of the LCD screen is included. Just plug it into the corresponding interface.

LCD screen		
Pin Numbers	Signal Definition	Feature Description
1	G	White wire, two terminals [4P-1] -- [6P-G], 24V power negative and cable shield.
2	R	Black wire, terminals [4P-2] -- [6P-R], 232 signal.
3	T	Brown wire, terminals [4P-3] -- [6P-T], 232 signal.
4	V	Blue wire, two terminals [4P-4] -- [6P-V], 24V power positive.

3.2.3 Control Box - Signal Interface 1

Control Box Signal Interface 1 is shown in Table 3.2.

Table 3.2 Function Description of Signal Interface 1

Signal Interface 1		
Pin Numbers	Signal Definition	Feature Description
1	GND	For the air pressure alarm signal input, please set the "Air Pressure Alarm level" on the display Settings page to be consistent with the actual air pressure alarm level in use.
2	Air pressure alarm signal	
3	GND	For the water chiller alarm signal input, please align the "Water chiller alarm level" on the display Settings page with the actual water chiller alarm level you are using.
4	Chiller alarm signal	
5	Safety lock reference GND	Attach one end of the [metal clamp] and clamp it onto the workbench so that the [workbench - metal clamp - pin 5] conducts.
6	Safety lock	Connect the [7-core wire - blue wire], mark [Safety Lock] so that the [guide wire copper tip - blue wire - pin 6] is conducting. When the welding head [copper tip] touches the worktable, pins 5 and 6 conduct, and the [safety lock signal] shows green conduction.
7	Welding head trigger switch 1	Connect [7-core wire - black wire] and mark [Welding head light switch 1].
8	Welding head trigger switch 2	Connect [7-core wire - brown wire] and mark [Welding Head Light switch 2]. Pins 7 and 8 are always open. Press the trigger of the welding head, pins 7 and 8 conduct, and the [laser trigger signal] shows green conduction.

Note: ① Welding mode. The subsequent output ports will have normal output signals only when there is no alarm, the trigger signal and the safety lock signal show green conduction. ② Clean mode. When there is no alarm and the switch signal shows green conduction, the subsequent output port will have a normal output signal. ③ Pins 5 and 6 are used as a [safety lock] on a single cleaning system and will not be elaborated here.

3.2.4 Control Box - Signal Interface 2

Control Box Signal Interface 2 is shown in Table 3.3.

Table 3.3 Function Description of Signal Interface 2

Signal Interface 2		
Pin Numbers	Signal Definition	Function Description
1	Status indication/Temperature measurement 1	Connect the [7-core wire - yellow wire] for [status indication] on the SUP23 system. [Pin 1 - yellow wire - status indicator - green wire -GND] form a loop to control the status of the status indicator light.
2	Temperature measurement 2	Connect the [7-core wire - red wire], [pin 2 - red wire - temperature sensor - white wire -GND] to form a loop to transmit the [protective mirror temperature] signal.
3	Protective Gas valve -	Air valve open: [Protective Gas valve +] output 24V; Valve closed: [Protective Gas valve +] No output.
4	Protective Gas valve +	
5	Wire feed switch	Wire feed enable signal, wire according to the wire gauge of the wire feeder signal line.
6		
7	Wire feed motor interface	Motor signal line, wire according to the wire gauge of the motor line
8		

3.2.5 Control Box - Signal Interface 3

The control box signal interface 3 is shown in Table 3.4.

Table 3.4 Function Description of Signal Interface 3

Signal Interface 3		
Pin Numbers	Signal Definition	Feature Description
1	Laser alarm signal	Please set the "Laser Alarm level" on the display Settings page to be consistent with the alarm level of the actual laser in use.
2	Laser enable signal	Enable +, connect the laser to enable +.
3	24V output	24V output: The product normally outputs 24V voltage after being powered on.

4	GND	For common ground (reference ground for pins 1/2/3/5)
5	0~10V analog voltage	Analog output (default 0 to 10V analog voltage).
6	RF- (PWM -)	PWM - Modulate the signal
7	RF+ (PWM+)	PWM+ Modulates the signal

3.2.6 Control Box - Communication Interface

The Communication Interface are reserved interfaces and usually do not require wiring, as shown in Table 3.5. It is used in the following situations:

- Use the host computer to communicate with the main control board;
- The custom process library system communicates with the wire feeder.

Table 3.5 Description of Communication Port Functions

Communication Interface		
Pin Numbers	Signal Definition	Feature Description
1	5VO	Normal 5V output, no need to connect.
2	A	RS485 signal A, used for communication with the host computer, is usually not connected.
3	B	RS485 signal B is used for communication with the host computer and is usually not connected.
4	GND	Signal ground
5	GND	Signal ground
6	RX	RS232_RXD. For wire feeder communication, connect [TXD].
7	TX	RS232_TXD. For wire feeder communication, connect [RXD].
8	Input 1	Reserve an input port

3.3 Gun Body Interface

The interface of the gun body is shown in Figure 3.6, mainly including the waterway and the airway.

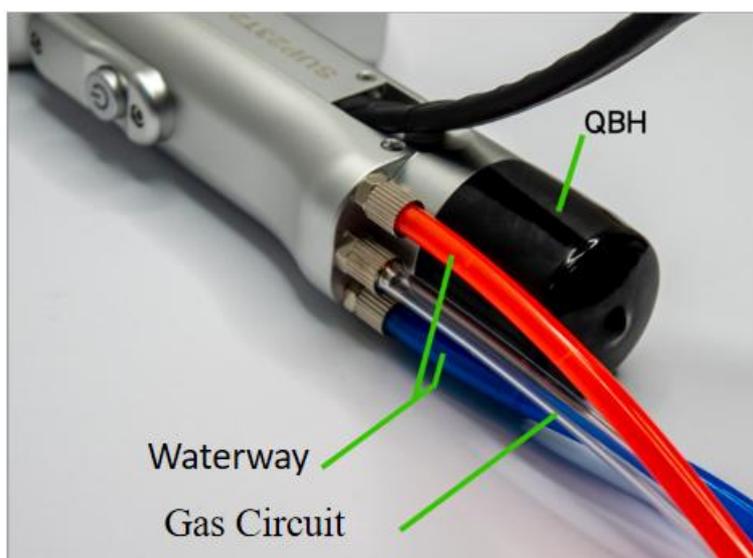


Figure 3.6 Welding head interface diagram

3.3.1 Fiber optic head connection

The product [QBH] interface is suitable for most industrial lasers, including IPG, Raycus Laser, Maxphotonics, Feibo Laser, Reci Laser, JPT Laser, BWT Beijing Ltd. and so on. Attention should be paid when installing:

- ① Keep the device clean;
- ② Install the fiber head horizontally with [QBH];
- ③ According to the [Lock] and [Unlock] marks in Figure 3.7, rotate and release QBH first, insert the fiber head and then lock it. After locking, the fiber head is placed inside the QBH without shaking.

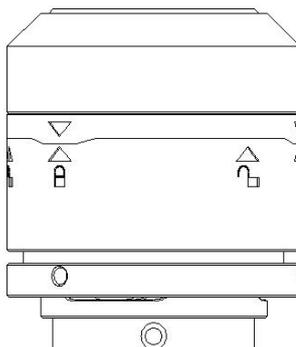


Figure 3.7 QBH locking device

3.3.2 Waterway and airway connections

[Waterway] and [airway] interfaces are equipped with plastic hose - ϕ 6mm quick couplings, red and green for waterway, transparent for airway, and can be inserted directly. The cooling system is divided into the waterway section of the welding head and the waterway section of the fiber optic head, which are connected in series, as shown in Figure 3.8.

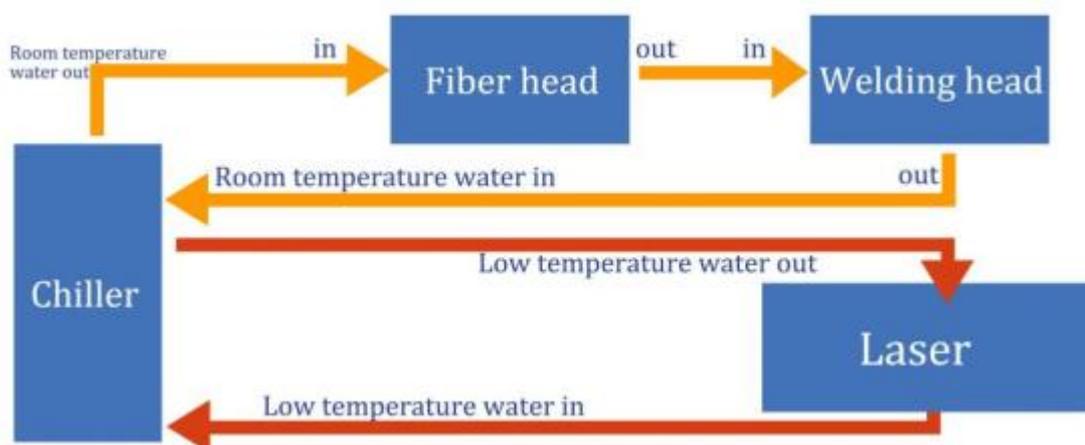


Figure 3.8 Schematic diagram of the waterway between the welding head and the fiber head

3.3.3 Control box connection

- ① The handheld laser welding head is connected to the control box via a [system connection line] with a threaded aviation plug. The wiring of the control box is defined in [Signal Interface 1, 2] above. After assembly is completed, wrap the air plug connector with tape to prevent loosening, as shown in Figure 3.9.



Figure 3.9 Threaded aviation plug connection

② The wiring definition of the control box through the [seven-core system terminal connection line] is shown above [Signal Interface 1, 2]. Wiring is shown in Figure 3.10



Figure 3.10 Seven-core terminal system connection wire

IV. Interface Operation and Function Switching

- ① Switch between [Welding system] and [Cleaning system] via the screen.
- ② When using the cutting function, under the welding system, set the scan width to 0. And replace the cutting copper nozzle, as shown in Figure 4.1.

Note: The SUP23S standard accessory does not include the "cutting copper spout", which can be purchased separately if needed.

- ③ When using the weld seam cleaning function, in Weld mode, slightly increase the scan width to the weld seam width. And replace the AS-20D type copper nozzle, AS shown in Figure 4.2.



Figure 4.1 Cutting the copper spout Figure



4.2 AS-20D Copper Guide Nozzle

4.1 Home Page

Switches used to display the current process, alarm information, and adjust the main output signal, as shown in Figures 4.3 and 4.4.

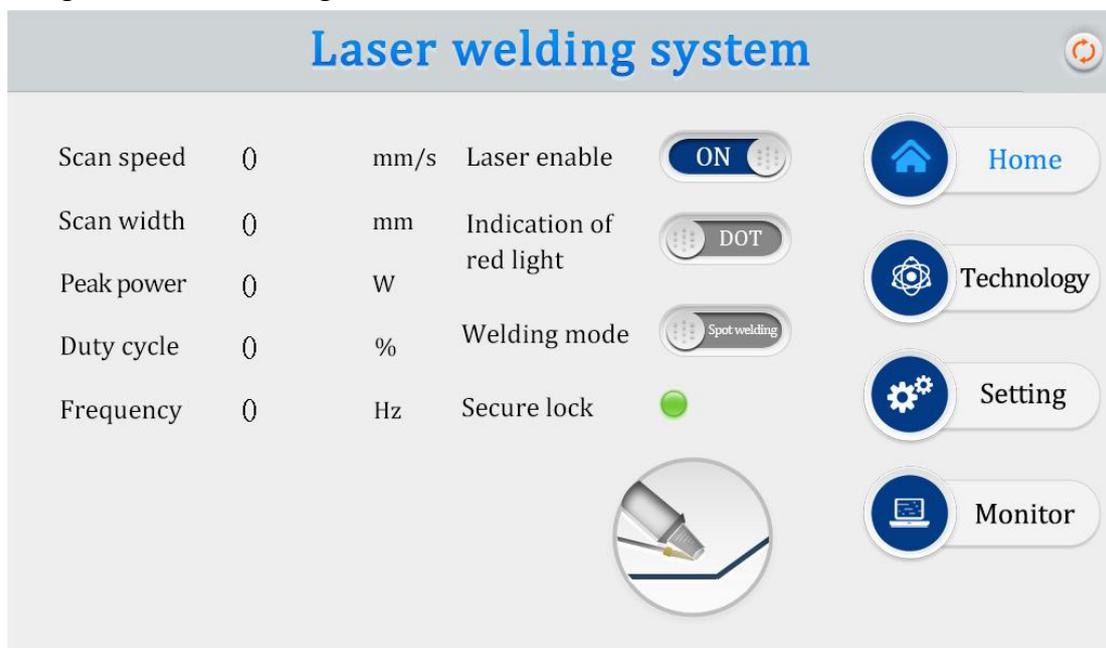


Figure 4.3 Laser Welding System Interface operation Home page

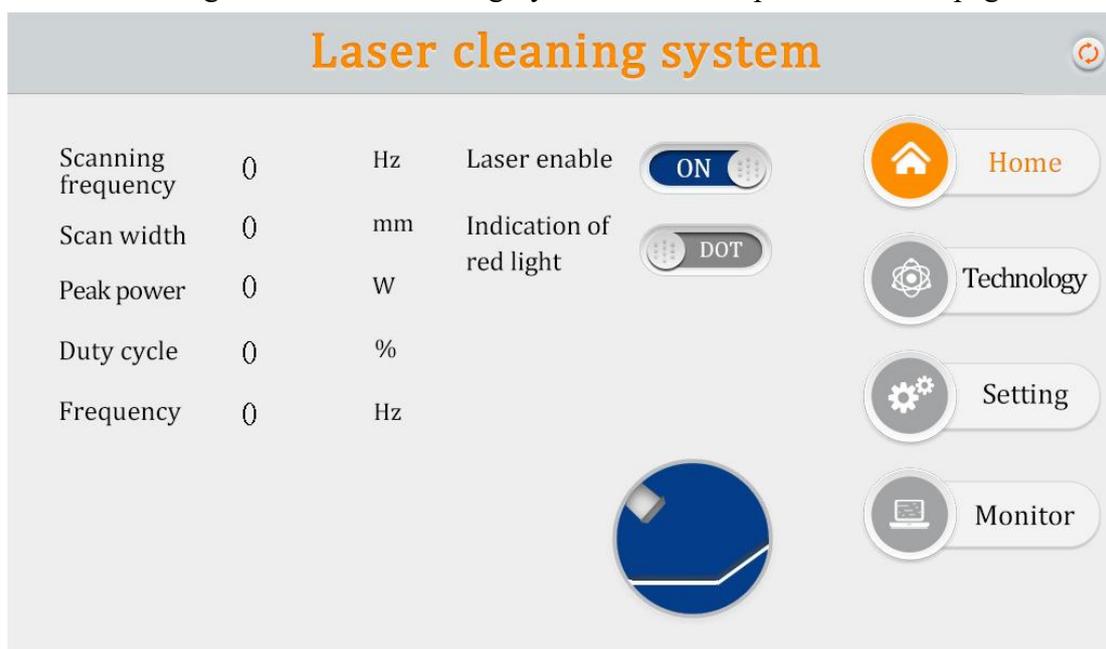


Figure 4.4 Laser Cleaning System Interface Operation Home page

- ① [Laser enable - On/Off] : Controls, indicates whether to output [Laser output enable signal].
- ② [Indicating of red light - DOT/Line] : Controls, indicates whether the galvanometer motor swings, adjusts the red light to [point] or [line] without affecting the presence or absence of the red light.
- ③ [Welding Mode - Spot Welding/Continuous] : Usually use [continuous], [spot welding] is intermittent light output according to the parameters on the setting page, used for fish-scale

welding.

④ [Switch Mode] : The switch button in the upper right corner is used to switch between [Welding Mode] or [Cleaning mode].

4.2 Process Page

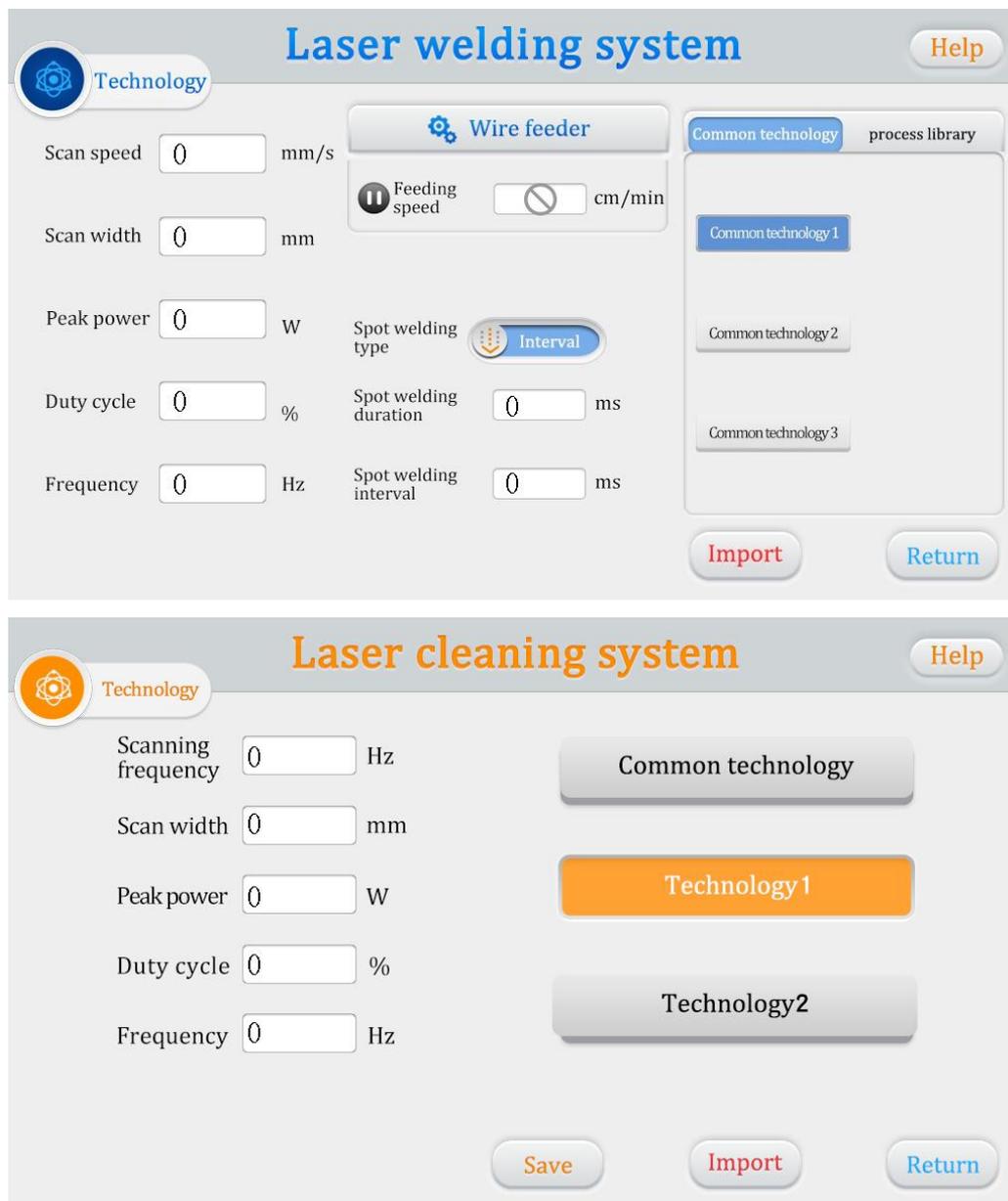


Figure 4.5 Laser Cleaning System Adjustment Parameters page

① [Scan Speed]: The linear speed of the focused spot's movement, which affects the welding quality. For example, for a scanning width of 3mm, it is usually set to 600-1200. [Welding speed] increases, [Scan speed] increases accordingly.

② [Frequency]: The number of cycles that the focused spot scans back and forth within one second, affecting the precision or fineness of the cleaned surface. It is usually set at 50 to 100Hz.

③ [Scan Width] : The theoretical width corresponding to the spot, controlling the spot size. Adjust according to the size of the weld.

④ [Peak power]: The maximum power output, also known as processing power or

welding power.

⑤ [Duty cycle, Frequency]: Usually set the duty cycle to 100% and the pulse frequency to 2000. The equivalent processing power can be changed by adjusting the duty cycle and pulse frequency according to the characteristics of the laser, but usually no adjustment is made.

⑥ [Common technology Technology 1] : Indicates the current process group number. The welding mode provides 10 sets of process parameters available for call, and the cleaning mode provides 3 sets.

4.3 Settings Page

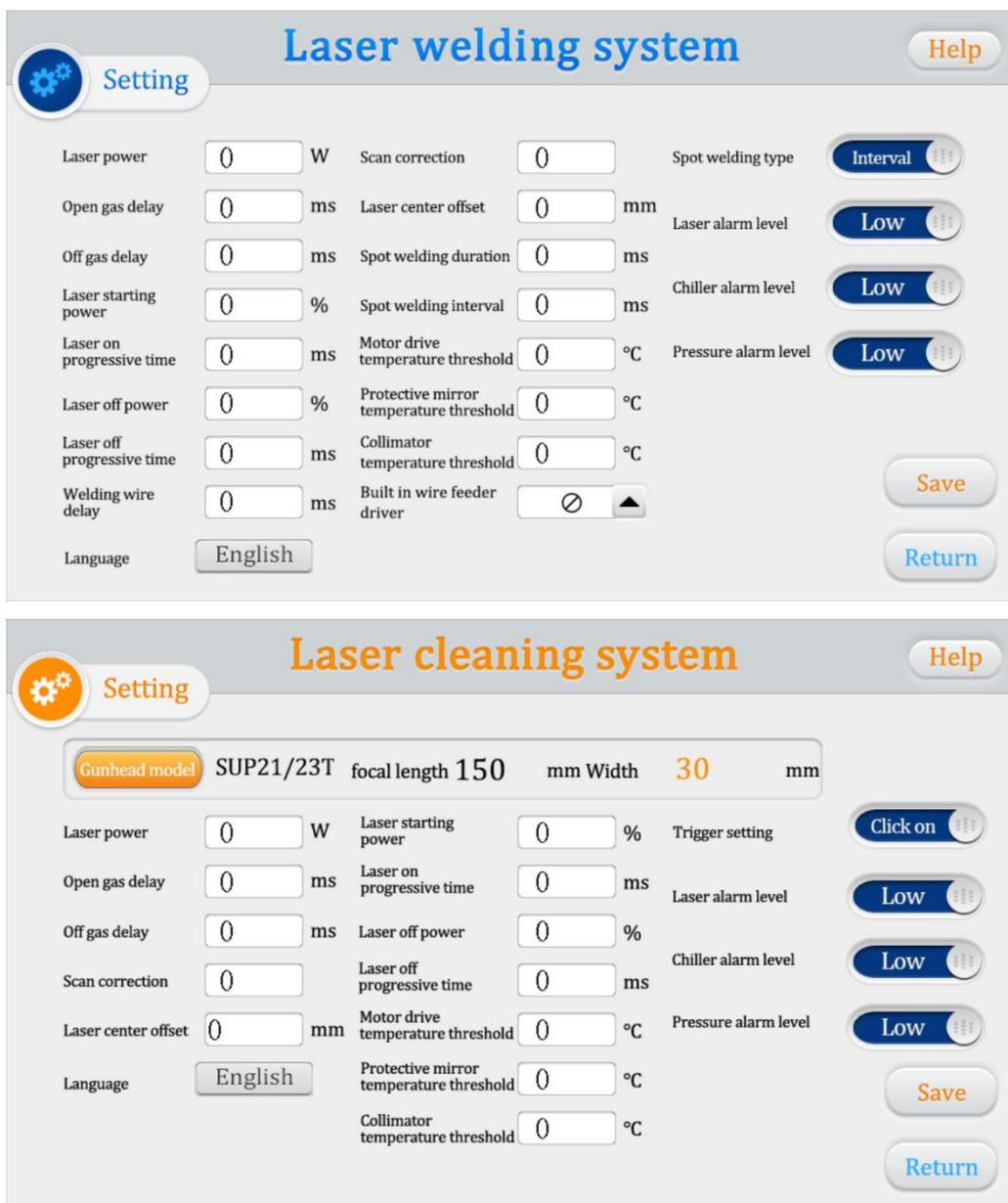


Figure 4.6 Factory Parameter Settings page for laser welding and cleaning systems

The page shown in Figure 4.6 is used to set the factory parameters, including the power and alarm level of the product.

- ① [Laser Power] : Based on the actual laser.
- ② [Wire wire delay]: Advance wire feeding. Example: Set 1000. After pressing the trigger, feed the wire for 1 second before the light comes out.

③ [Scan Correction] : Correction factor = target line width/measurement line width, used to adjust the actual spot size to be consistent with the system display.

④ [Laser Center offset] : [-] indicates left shift, and [+] indicates right shift. Used to adjust the spot to be centered.

⑤ [Open gas delay] : Release the air in advance before the light comes out.

⑥ [off gas delay]: After the light is turned off, the gas-off is delayed.

⑦ [Laser starting /laser off Power][Laser on /Laser off progressive time] : As shown in Figure 4.7, [Laser on progressive time T1] represents the time from [Laser starting power N1] to [peak power N3], and [laser off progressive T2] represents the time from [peak Power N3] to [laser off power N2].

[Gradual Light cut-off Time] Impact on Broken wires: When welding is completed, if the laser is directly and instantaneously turned off, the material may not be completely melted due to a sudden drop in energy, resulting in "broken wires" or burrs. It affects the effect of wire breakage. Set the [turn-off progressive time] so that the laser power decreases linearly at the end stage to ensure a bottom cut.

When the trigger or safety lock signal is disconnected, the peak power of the laser decreases linearly. To prevent the wire from sticking, the wire feeder activates the retraction by setting the [retraction length]. The power stops when the light is turned off. To counteract the [retraction length], the wire feeder begins to fill the wire by setting the [fill length]. To prevent the wire from sticking again, it is necessary to set the [fill delay] to ensure that the fill starts after the light is turned off.

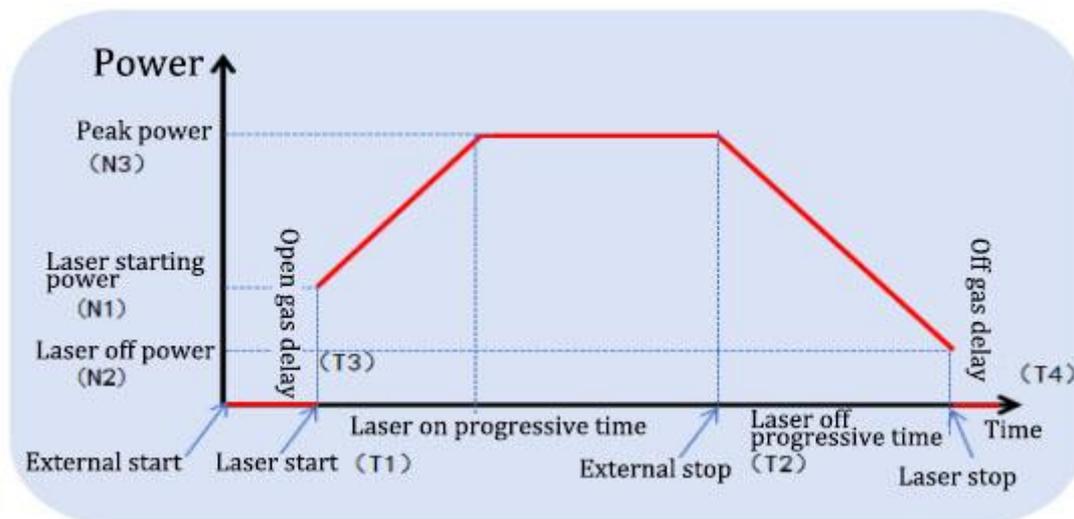


Figure 4.7 Relationship between the time of light out and gas out

⑧ [Built in wire feeder driver] : Select according to the actual wire feeder model as described on the process page. Select AE for AMF-AE, C for AMF-C, and other models.

⑨ [Temperature threshold] : Up to 70 °C. When this value is set to 0, no temperature alarm is detected.

⑩ [Alarm Level - High/Low]: Set to low when not in use, depending on the external product Settings.

⑪ [Sport welding type - Intermittent/fish-scale] : [fish-scale] for fish-scale pattern welding, [intermittent] for segmented welding.

⑫ [Spot welding duration][Spot welding interval]: As shown in Figure 4.8, [T1] does not

emit light,[T2]emits light.

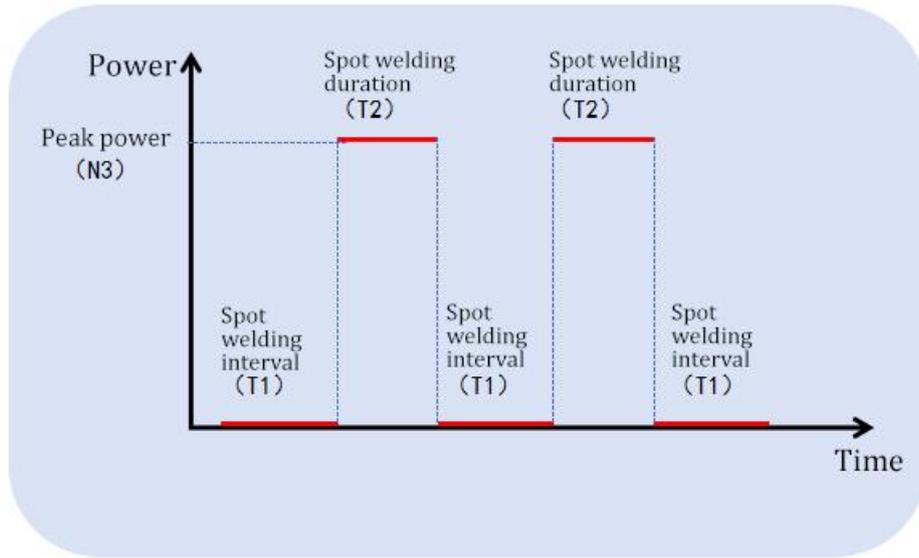


Figure 4.8 Power-time relationship

⑬ Youdaoplaceholder0 [trigger Settings - click/double-click] : In clean mode, control the trigger mode. It is usually set to [double-click].

⑭ [Gun size - focal length - Width] : Switch the maximum scan width when using different focusing lenses. The SUP23S correspond as shown in Table 4.1. The correspondence of SUP23T is shown in Table 4.2. Switch to SUP23S by entering [FFFFFF86230] under [Device Authorization] on the [Monitoring Page]; Type [FFFFFF86231] to switch to SUP23T.

Table 4.1 SUP23S Focused Scan Width

F150mm	25mm
F400mm	50mm
F800mm	100mm

Table 4.2 SUP23T Focused Scan Width

F150mm	30mm
F400mm	60mm
F800mm	120mm

4.4 Monitoring Pages



Figure 4.9 Monitoring Page for Laser welding and cleaning systems

The page shown in Figure 4.9 shows the actual machine information monitored.

① Among them, [Input signal status] [Output signal status] [Power status] are real-time monitoring signals used to determine whether the product is working properly. [Analog voltage] The power of the laser is regulated by the analog voltage. Considering that customers use different lasers, the analog input range can be switched on the system control motherboard via jumper caps. Switch between 0 to 4V and 0 to 10V. Insert the jumper caps into the corresponding positions as indicated on the system control panel in Figure 4.10.



Figure 4.10 System Control Motherboard

② [Basic Product Information] :

[Product Authorization] can be clicked for product encryption.

[Product Number][Manufacturer Number][System Version] are simple display information provided to technicians during after-sales work.

③ [Assisted status] :

[xx temperature] is the measured temperature. The system alarms when it exceeds the [xx temperature alarm threshold] corresponding to the Settings page.

[To lock up being] is the compatible interruption time for poor contact of the [safety lock] signal, ranging [0 to 300ms]. point [Equipment Authorization] type [FFFFFFAAXXX], and [xxx] indicates the time. Effective in welding mode.

4.5 Diagnostic Pages

diagnose

Laser welding system

Output signal	Theoretical output value	Detection value	Switch control
PWM (V)	0	0	<input type="checkbox"/> OFF
Laser enable (V)	0	0	<input type="checkbox"/> OFF
Gas valve enable (V)	0	0	<input type="checkbox"/> OFF
Analog voltage (V)	0	0	<input type="checkbox"/> OFF
Wire feeding enable	<input type="checkbox"/>	Observe the status of the wire feeder or measure with a multimeter	<input type="checkbox"/> OFF

diagnose

Laser cleaning system

Output signal	Theoretical output value	Detection value	Switch control
PWM (V)	0	0	<input type="checkbox"/> OFF
Laser enable (V)	0	0	<input type="checkbox"/> OFF
Gas valve enable (V)	0	0	<input type="checkbox"/> OFF
Analog voltage (V)	0	0	<input type="checkbox"/> OFF

Figure 4.11 Laser welding, Cleaning System Diagnostic Page

The page shown in Figure 4.11 is the laser welding and cleaning system diagnosis page. This mode can only perform single [output signal] output, which is used to determine whether the output signals of the main control board are normal in a safe situation. This mode cannot produce light.

4.6 Process Library Version

The process library version has built-in welding processes for a variety of materials, synchronized with the wire feeder parameters.

4.6.1 Process Library - Process Page

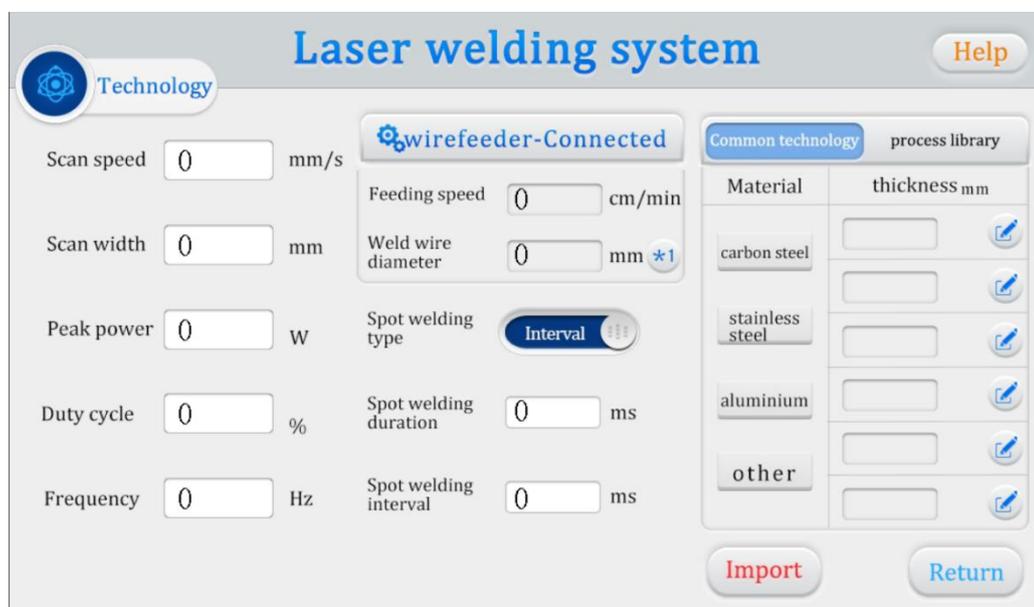


Figure 4.12 Laser Welding System Process Library - Process Page 1

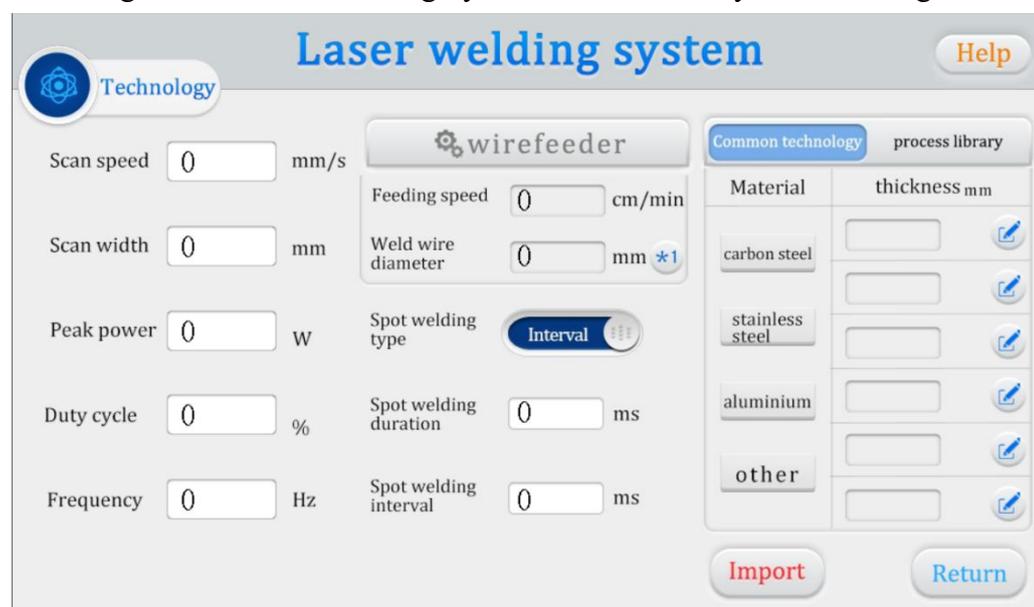


Figure 4.13 Laser Welding System Process Library - Process Page 2

① [Scan speed] [Scan width] [Peak power] [Duty cycle] [Frequency] are the same as on the process page.

② [Wirefeeder -connected] : When paired with [AMF-A] type wire feeder, the system control motherboard needs to be connected to the wire feeder motherboard via [232 communication], and the system interface shows as shown in Figure 4.12. Click on [Wire feeder - Connected] to enter the [Wirefeeder] interface. The communication status of the wire feeder interface is shown as external Control.

With the AMF-AE/AMF-C type wire feeder, the two-core motor wire of the wire feeder is connected to pins 7 and 8 of Signal Interface 2 on the system control board, and the system interface is displayed as shown in Figure 4.13. Click on [Wire Feeder] to enter the [Wirefeeder] interface and control the wire feeder through the system control main board. The communication status of the wire feeder interface is displayed as Internal Control.

③ [Spot welding type][Spot welding duration] [Spot welding interval] are on the Settings page, and these parameters are not available when [Continuous Mode] is selected. [Common Process][Process Library] Select to call the parameters in the [Process Library] or modify the [Common Process] parameters directly.

④ [Material][Thickness] Select according to the work piece, [Thickness] can be adjusted by yourself.

Note: [Process Library] does not require [save] confirmation. After modifying the process parameters, the original process parameters are directly overwritten. If the process library parameters are confused, they can be restored on the Help page.

⑤ [Material -xx thickness] Click on thickness, such as [1.0mm] - [carbon steel], and recommended process parameters will be displayed. Each material can be set to correspond to 6 thicknesses.

4.6.2 Process Library - Wire feeding page

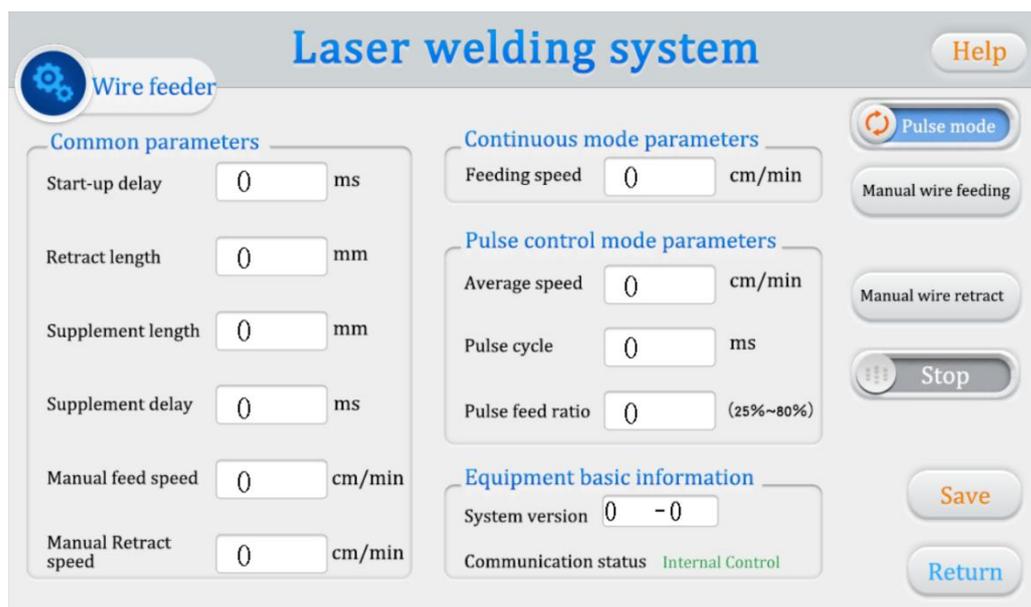


Figure 4.14 Laser Welding system Process Library - Wire feeder parameters

① When the [Communication Interface] is connected to the wire feeder, the wire feeding parameters can be adjusted. The parameters of the wire feeding page are the same as those of the original [wire feeder].

② [Continuous /Pulse mode] is used to switch the wire feeding state. [Continuous] is usually used, and [pulse mode] is used for fish-scale welding.

V. Daily Maintenance of Products

1. It is recommended that users change the water in the chiller once a month to prevent clogging of the water pipes inside the gun body. The water quality should be pure water or distilled water, and antifreeze should be added in low-temperature conditions.

2. Maintenance and replacement of the lenses should be carried out in a relatively clean on-site environment. When performing open operations such as opening the protective lens, focusing lens compartment cover, and pulling out the lens holder, protective measures should be taken (cover with masking tape). Check out the replacement methods for different lenses corresponding to all gun types in wechat Mini Program → Super Strong Great Cause → Lens Installation.

3 Handle with care when in use. For complex production environments, please clean the dust promptly.



VI. Common Product Issues and Solutions

Warnings! All power must be cut off before dealing with any problem to avoid any danger!!

Repair and maintenance of this product must be carried out by professionals! Do not operate without training! If you have any problems, contact your dealer and have a professional handle it!

Once there is any appearance damage to the product, it will no longer be repaired and will be scrapped directly.

Common alarm instructions and solutions to problems are as follows:

Problem items	Phenomena	Solutions
Temperature alarm, indicating that all kinds of temperatures are too high	The home page indicates that XXX is too hot	For general lens temperature alerts, usually first check if the lens is damaged and replace the damaged one. If the lens is normal, you need to directly block this alarm on the Settings page. Set the corresponding lens temperature alarm threshold to 0 on the Settings page and save it.
Chiller/laser/air pressure alarm	A pop-up window on the home page shows chiller/laser/air pressure alarm	Level alarm logic: The system will compare the wiring method of the corresponding product with the set level on the Settings page and alarm if they are different. Usually, an alarm occurs because the alarm level is set incorrectly. Just change the corresponding alarm level. If an alarm occurs when an alarm signal is connected and the alarm is triggered regardless of how it is set, unplug the alarm signal line and set it to low level.
Poor welding effect	It starts off very strong, then gradually weakens/weaken s, resulting in no fuse	It is usually due to damage to the lens of the welding gun, including but not limited to the protective lens, focusing, collimation, and reflection. Damage to any one or more of these can cause this situation. Replace the protective lens first and check the focus, then check the reflection and collimation, and replace the damaged lens. A spark at the copper tip may be a focus issue and should be ruled out first. Also check for dirt or damage on the laser fiber head section.
The motor does not swing	The spot is a point	1. Whether the software part is set up correctly Settings - Scan Correction: 1.0 or 1.25 Process - Scan width: greater than 0 Home Page - Indicating red light: Line 2. Hardware Part Inspection (First installation) 1. The swing motor is powered by a 15V power supply. We should first measure whether the 15V switching power supply is functioning properly. Also, the 15V switching power supply is divided into positive and

		<p>negative, and incorrect wiring can cause the motor not to work. Note that V1 is connected to 15V+, V2 to 15V-, and any COM on the 15V switching power supply is connected to pin 2 GND</p> <p>2. Check whether the two interfaces of the connection cable are properly inserted, whether their positions on the driver board are correct, and whether the rainbow connection cable between the motherboard and the driver is loose</p>
<p>Abnormal motor swing</p>	<p>① Whistling/abnormal red swing/overheating/inability to adjust swing width of the welding head and tail motor after power-on</p> <p>② The lens burns out directly, resulting in the sealing ring and the focusing lens burning out simultaneously</p>	<p>The driver in the control box controls the motor swing, connected through the motor wire, which may occur when there is a signal error (poor contact of the motor wire, open circuit), external interference, or a mismatch between the driver and the motor.</p> <p>If there is a problem with ②, it is recommended to check the surrounding interference source. If there is no interference source, it may be a motor wire fault and the motor wire can be replaced directly.</p>

For more solutions to the problem, please refer to the "Problem Handling" page of the wechat mini program



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电话: 0510-8538 8626

传真: 0510-8538 3850

地址: 无锡市新吴区鸿山街道锡协路201号

网址: WWW.SUPLASER.CN

WUXI SUPER LASER TECHNOLOGY CO., LTD

ADD: 201 Xixie Road, Hongshan Street, Xinwu District, Wuxi City, China

Emai: sale@suplaser.cn

Website: www.gefasstsuplaser.com