

# Product Description

## SUP25AM (version V1.0)



**Wuxi Super Laser Technology Co.Ltd**

# Catalogue

Update record	1st
I. Matters needing attention	2nd
1.1 welding safety	2nd
1.2 laser safety	3rd
1.3 electrical safety	4th
II. The product overview	5th
2.1 Description of gun body	5th
2.2 Product functions	6th
2.3 Product operating environment and basic parameters	7th
III. Product installation and wiring	8th
3.1 Unpacking list	8th
3.2 Control box wiring and interface definition	10th
3.2.1 Control Box-Power Supply	11th
3.2.2 Control Box-LCD screen	11th
3.2.3 Control Box-Signal Interface 1	12th
3.2.4 Control Box-Signal Interface 2	13th
3.2.5 Control Box-Signal Interface 3	13th
3.2.6 Control Box-Communication Interface	14th
3.2.7 Control Box-Drive Interface	14th
3.2.8 Control Box-Reserved Interface	15th
3.3 Gun body Interface	15th
3.3.1 Optical fiber head connection	16th
3.3.2 Waterway and gas connection	16th
3.3.3 Control box connection	16th
3.3.4 CCD module connection	17th
IV. The product operation interface	19th
4.1 Home Page	19th
4.2 Process page	20th
4.3 Settings page	21st
4.4 Monitoring page	23rd
4.5 Diagnostic Page	23rd
4.6 Silk feeding page	24th
V. Daily maintenance of products	25th
VI. Frequently asked questions of products and treatment measures	26th

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## Update record

version	Update content	Hardware version	software release	Interface version	time	Compiler
V1.0	first edition	V1.2	382/350	582/105	25.7.14	Liu Chen

## I. Matters needing attention

This product belongs to laser welding equipment, which relates to the assembly and use of laser products. It is applicable to the basic safety standards of handheld, movable and fixed electrical equipment with rated AC voltage of 110 V ~ 220 V for indoor and outdoor use.

In order to ensure safe production and normal operation of the equipment, users are advised to post the following safety signs on the whole equipment to inform all personnel who use, maintain and approach the equipment to pay attention to the following safety matters.

### 1.1 welding safety

This product belongs to laser welding equipment, and shall comply with the safety protection standards of welding equipment.

- ① Special hot work areas should be divided.
- ② Inflammable and explosive articles should be prohibited around the equipment to avoid potential safety hazards.
- ③ Operators should pay attention to avoid high temperature injury caused by welding.

Mark	Nominal name
	Hot work area
	caution
	Beware of high temperature surface
	No chemical fiber clothes.
	It is forbidden to place flammable materials.

## 1.2 laser safety

① The laser matched with this product emits laser radiation with a wavelength of 1080nm or around 1080nm, which is invisible light. The laser classification shall be subject to the laser manufacturer.

② High-power laser should not be treated as a common light source, and direct exposure to people or inflammable and explosive articles should be avoided at the light outlet of laser welding head.

③ Direct or indirect exposure to such light intensity will cause harm to eyes and skin. Although the beam is invisible, it will still cause irreversible damage to the retina or cornea. When the laser is running, the relevant personnel should wear laser protective glasses in the corresponding band that meet the standards.

④ High-power laser will electrolyze gas and produce ionizing radiation, and relevant personnel should pay attention to protection.

Mark	Nominal name
	<p>Laser radiation protects eyes and skin from direct or scattered radiation. Four types of laser products</p>
	<p>Laser window Avoid being irradiated by the laser radiation emitted from the window.</p>
	<p>Safety goggles must be worn.</p>
	<p>Beware of laser</p>
	<p>Beware of ionizing radiation</p>

### 1.3 electrical safety

① This equipment adopts 110 V ~ 220 V AC Power Supply, users should pay attention to electricity safety, to avoid electric shock.

② In order to ensure the normal operation of the equipment, avoid electrostatic injury and equipment leakage, the equipment should adopt safety grounding measures, that is, connect the easily conductive part to the protective (grounding) conductor in the fixed wiring of the product, so that the easily accessible conductive part will not become a live part when the basic insulation fails. Depending on the situation, additional safety measures (such as double insulation or reinforced insulation) can be attached.

③ The control box of this product does not contain accessories that need user's operation. Any installation, maintenance and disassembly of this product should be carried out when the gate is opened and the power is cut off.

Mark	Nominal name
	Beware of electric shock
	Must be grounded
	The plug must be pulled out.
	No closing

## II. The product overview

This manual includes a general description of the basic functions, installation, operation, use and maintenance of SUP25AM optical fiber swing welding head products.

### 2.1 Description of gun body

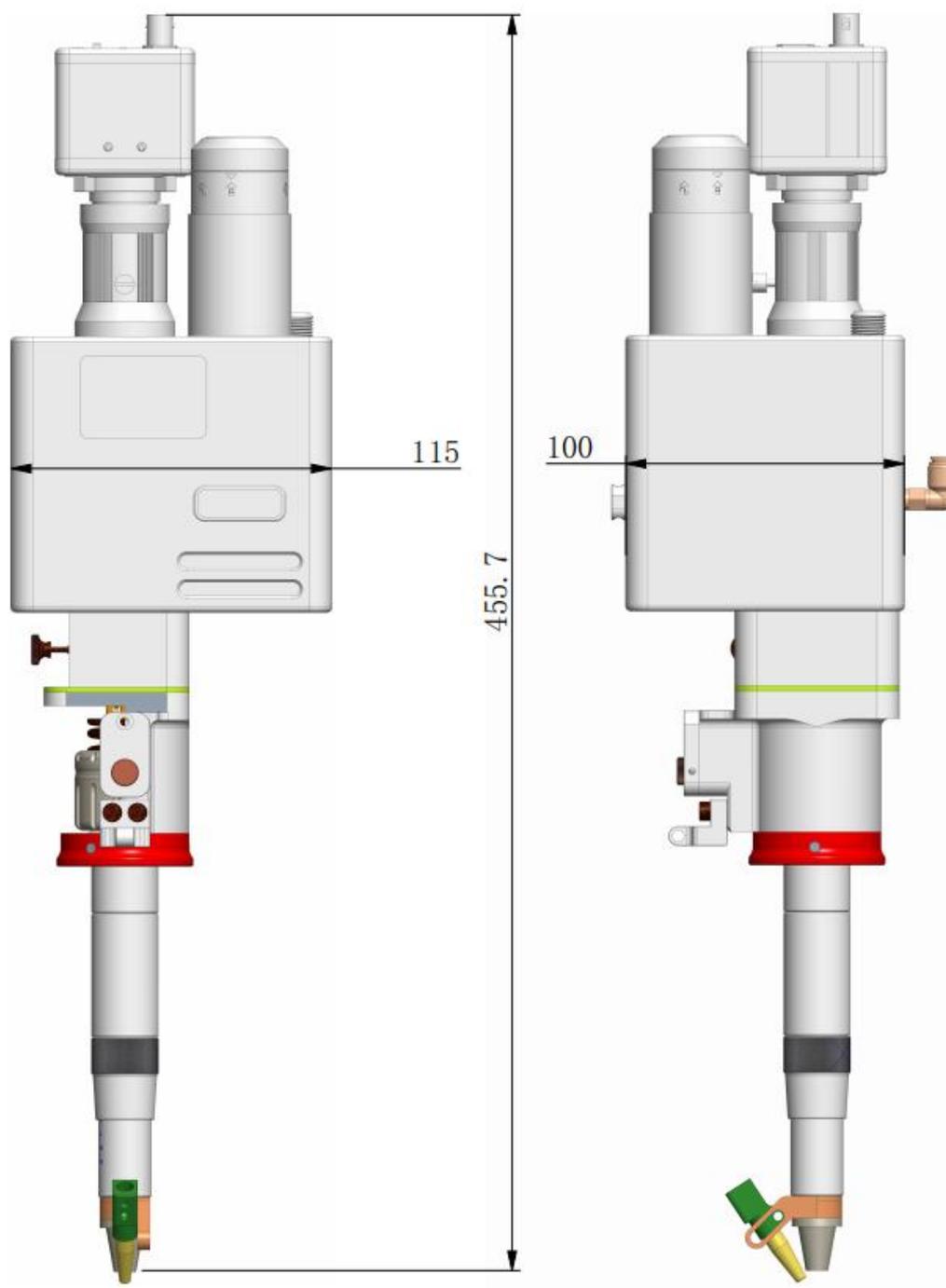


Figure 2.1.1 Gun Body Dimension Diagram

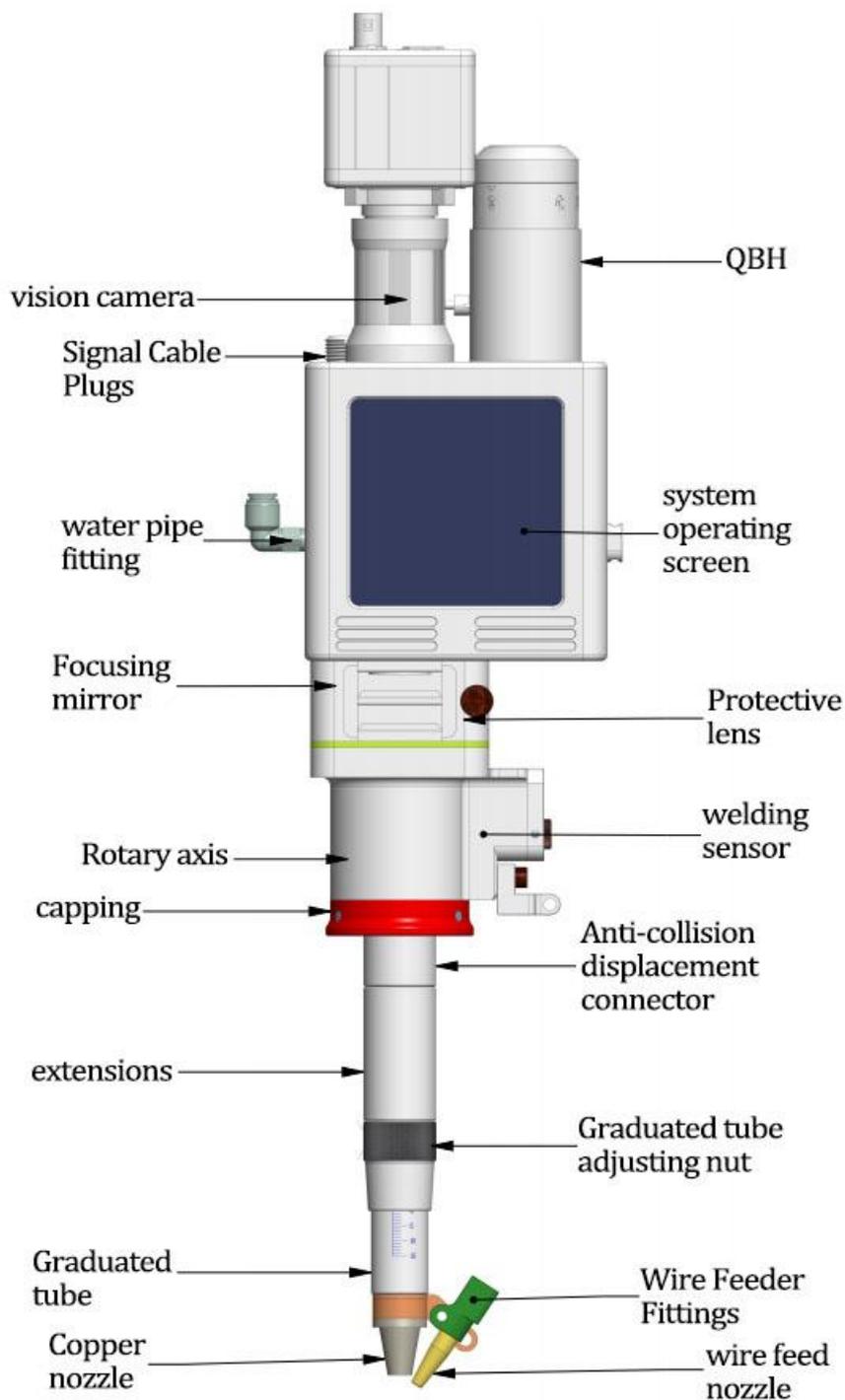


Figure 2.1.2 Gun Body Component Diagram

## 2.2 Product functions

### ● Basic functions:

- ① QBH locking structure;
- ② Support CCD system;
- ③ Water cooling structure;
- ④ Support welding with the highest power of 3000W;
- ⑤ Six process patterns can be selected.

● Advanced functions:

- ① Support gun body screen adjustment parameters;
- ② Support parameter synchronization of gun body screen, control box screen and wire feeder screen;
- ③ Open communication protocol, which can be programmed to adjust process parameters in uninterrupted welding;
- ④ provide a broken wire detection signal.
- ⑤ Increase anti-collision detection.

### 2.3 Product operating environment and basic parameters

As shown in Table 2.1, the operating environment requirements and main parameters of double pendulum welding head are as follows:

Table 2.1 Operating Environment Requirements and Basic Parameters

Supply voltage (v)	220V ± 10% AC 50/60Hz
Placement environment	No vibration and impact
Working environment temperature (°C)	-10~50°C
Humidity of working environment (%)	≤70
Cooling mode	water-cooling
Suitable wavelength	1080nm(± 10nm)
Applicable power	≤3000W
Collimator	D30*4.5 F75
focusing mirror	D30*4 F200
Protective mirror	D30*3
Recommended gas flow rate	10~15L/min(20°C 0.15MPa)
Vertical adjustment range of focus	± 15mm
weight	2.5kg

### III. Product installation and wiring

#### 3.1 Unpacking list

The ex-factory list of products is shown in Table 3.1. If the physical object is different from the schematic diagram, please refer to the specific order.

Table 3.1 Unpacking List

SUP25AM packing list				
serial number	Material number	name	specifications	quantity
1	A02010010	Optical fiber swing welding head	SUP25AM	1
2	A05010008	Optical fiber swing welding system	SUP-ALWS-B	1
3	K01090004	Connecting wire of seven-core aerial insertion system	Collision avoidance 25a-10m	1
4	C04010006	monitor	SUP-DW128 HJT	1
5	C03010005	Switching power supply	LM90-12A15(JSY)	1
6	C03020002	Switching power supply	LM100-20B24(JSY)	1
7	K04020001	Display line (vertical side out)	1m	1
8	D01020008	Protective lens	D30T3	5
9	C06010002	CCD- camera	NS-700L	1
10	C06010004	CCD- lens	NS-100MM	1
11	C06010019	CCD- screen	QPT-MONITOR8HD	1
12	C06010007	CCD- power supply extension line	NS-DC1.5m	1
13	C06010015	CCD- power cord	8.5m	1
14	C06010016	CCD- BNC signal line	5m	1
15	B03260590	Spotlight pressing block	25A-214	1
16	C06010018	CCD- focusing spotlight	QPT-470PLUS hose is 45cm long.	1
17	C03030001	Switching power supply	LM25-23B12	1
18	F01020031	Screw attachment	M5*10	4



Figure 3.1 Product unpacking 1



Figure 3.2 Product unpacking 2

### 3.2 Control box wiring and interface definition

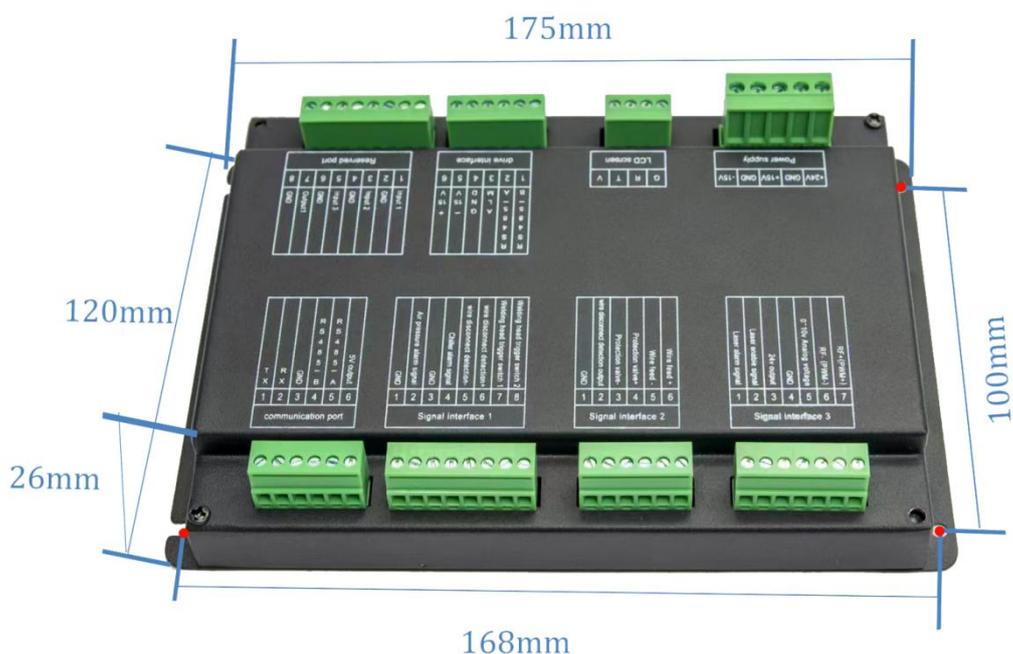


Figure 3.3 Dimension Diagram of Control Box

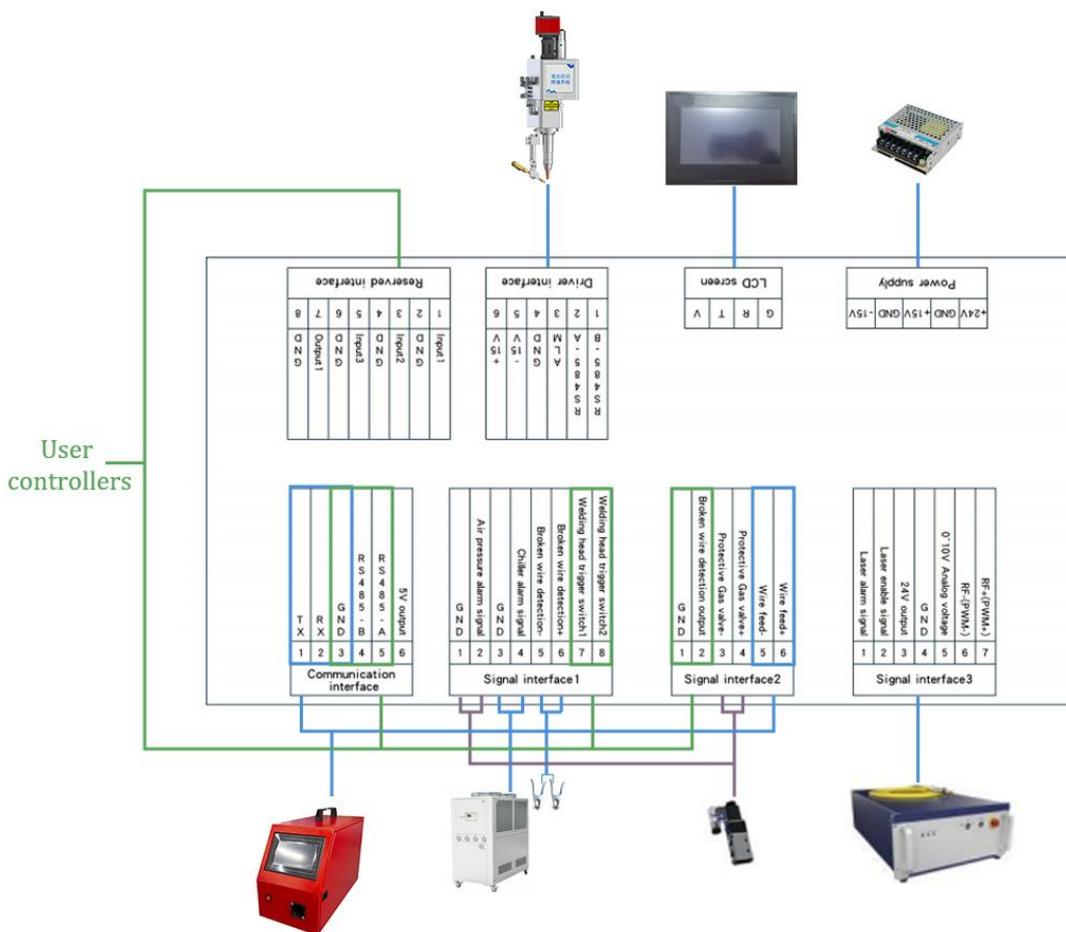


Figure 3.4 Wiring Diagram

① [Broken Wire Detection]: [Broken Wire Detection-] Connect a metal clip. The metal clip is clamped on the workbench. [Broken wire detection] Connected to the welding gun through the connecting wire of the seven-core aerial insertion system. It is considered that the welding wire is not broken when both ends are connected. 24V voltage can be detected in [Control Box-Signal Interface 2]-[Broken Wire Detection Output].

② [Anti-collision detection]: There is [anti-collision signal line]inside the welding gun. When the anti-collision signal line is turned on, it is judged that the welding torch collides with an obstacle. A sensor is arranged inside the gun body. When the gun body-[anti-collision displacement connector] and the following parts collide with obstacles, an alarm signal is triggered. 24V voltage can be detected in [control box-reserved port]-[output 1].

③ When wiring the upper computer, keep the connection between [welding head light switch 1] [welding head light switch 2] and [RS485-A][RS485-B][GND] to control the equipment welding. [Reserved port] and [Broken wire detection output] are extended functions, and whether they are connected or not will not affect the welding function of the equipment. Please connect the wires selectively according to the use requirements and the actual interface of the upper computer.

④ In order to avoid abnormal power consumption of equipment, the ground wire of switching power supply must be effectively grounded! The switch power supply housing must be grounded!

⑤ The icons used in Figure 3.1 only refer to a certain type of equipment, not the corresponding products.

### 3.2.1 Control Box-Power Supply

The power Supply terminal uses 5P interface (included), and uses the 24V switching power supply and  $\pm 15V$  switching power supply included.

When installing, please pay attention to the positive and negative poles of the 15V switching power supply. V1 is connected to +15V, V2 is connected to -15V, and any COM on the 15V switching power supply is connected to pin GND!

The switching power supply must be grounded!

### 3.2.2 Control Box-LCD screen

The LCD screen wiring comes with it, just plug in the corresponding interface directly.

### 3.2.3 Control Box-Signal Interface 1

Table 3.2 Function Description of Signal Interface 1

Signal Interface 1		
Pin Number	Signal definition	function declaration
1	GND	For the air pressure alarm signal input port, please set the "air pressure alarm level" on the setting page of the display screen to be consistent with the actually used air valve alarm level.
2	Air pressure alarm signal	
3	GND	For the water cooler alarm signal input port, please set the "water cooler alarm level" on the display screen setting page to be consistent with the actual water cooler alarm level.
4	Chiller alarm signal	
5	Broken wire detection -	The wire end of the metal clip is connected to the control box, and the metal clip is clamped on the workbench. When [Broken wire detection - ] and [Broken wire detection + ] are turned on, the [Broken Wire Detection Output] signal outputs 24V voltage. [Optional]
6	Broken wire detection +	Connect the connecting wire of the seven-core aerial insertion system with the line label [Broken Wire Detection]. When [Broken Wire Detection-] and [Broken Wire Detection] are turned on, the [Broken Wire Detection Output] signal outputs 24V voltage. [Optional]
7	Welding head light switch 1	External switch, normally open circuit. When pins 7 and 8 are turned on, it means that the optical switch is turned on.
8	Welding head light switch 2	
Note: Only when there is no alarm and the switch signal is green, the subsequent output ports will have normal output signals.		

### 3.2.4 Control Box-Signal Interface 2

Table 3.3 Function Description of Signal Interface 2

Signal Interface 2		
Pin Number	Signal definition	function declaration
1	GND	"Broken wire detection" is not broken when the two feet are connected. 2-pin output 24V. 1 foot is zero.
2	Broken wire detection output	
3	Protective gas valve -	Air valve opening: protect air valve+output 24V; ; Air valve closed: protection air valve+no output.
4	Protective gas valve +	
5	Wire feed -	The wire feeding switch signal of the wire feeder is connected with the signal line of the corresponding line mark. <b>Pay attention to distinguish between positive and negative.</b>
6	Wire feed +	

### 3.2.5 Control Box-Signal Interface 3

Table 3.4 Function Description of Signal Interface 3

Signal Interface 3		
Pin Number	Signal definition	function declaration
1	Laser alarm signal	Please set the "laser alarm level" on the display screen setting page to be consistent with the alarm level of the actually used laser.
2	Laser enable signal	Enable+,connect the enable+of the laser.
3	24V output	24V output, normally output 24V voltage after power-on.
4	GND	It is the common ground (the reference ground of feet 1/2/3/5).
5	0~10V analog	Analog output (0 ~ 10V analog voltage by default).
6	RF - (PWM - )	PWM - modulated signal
7	RF + (PWM + )	PWM + modulation signal

### 3.2.6 Control Box-Communication Interface

Table 3.5 Communication Interface

Communication Interface		
Pin Number	Signal definition	function declaration
1	TX	232 communication interface, wire feeder, wire label [TX]
2	RX	232 communication interface, wire feeder, line label [RX]
3	GND	Signal reference ground
4	RS485-B	485 communication interface, connected to the upper computer 485B.
5	RS485-A	485 communication interface, connected to the upper computer 485A.
6	5V output	Reserved port, normal output 5V.

### 3.2.7 Control Box-Drive Interface

Table 3.6 Function Description of Drive Interface

Driver Interface		
Pin Number	Signal definition	function declaration
1	RS485-B	Connect the connecting wire of 7-core aerial insertion system with the line label [RS485-B]
2	RS485-A	Connect the connecting wire of 7-core aerial insertion system with the line label [RS485-A]
3	ALM	Connect the connecting wire of 7-core aerial insertion system, with the line mark [ALM]
4	GND	Connect the connecting wire of 7-core aerial insertion system, with the line mark [GND]
5	-15V	Connect the connecting wire of 7-core aerial insertion system, with the line mark [-15V]
6	+15V	Connect the connecting cable of 7-core aerial insertion system, with the line mark [+15V]

### 3.2.8 Control Box-Reserved Interface

Table 3.7 Function Description of Reserved Interface

Reserved Interface		
Pin Number	Signal definition	function declaration
1	Input 1	Reserved mouth, suspended.
2	GND	
3	Input 2	
4	GND	
5	Input 3	
6	GND	
7	Output 1	Alarm output. When the system triggers any alarm signal such as "air pressure", "temperature" and "water cooler", it will output 24V voltage.
8	GND	

### 3.3 Gun body Interface

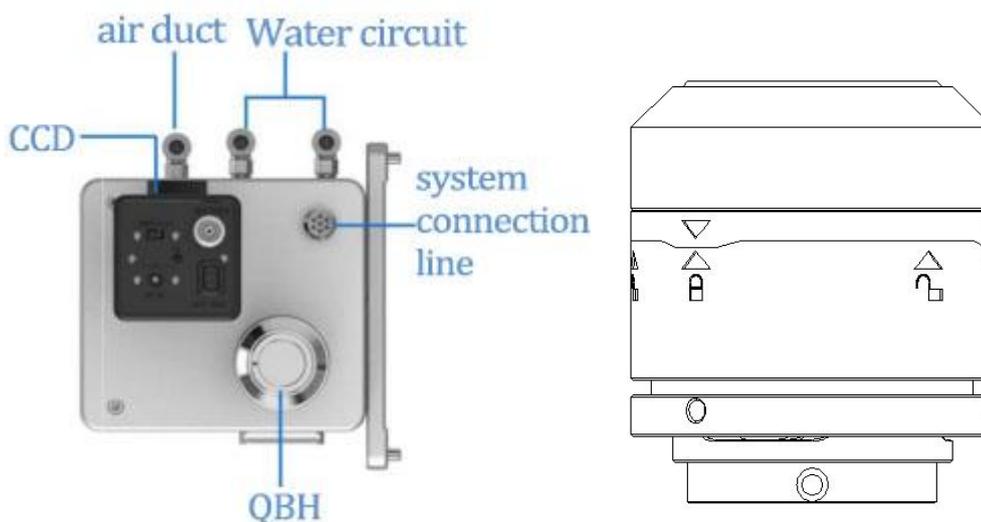


Figure 3.5 Gun Body Interface Figure 3.6 QBH Partial

### 3.3.1 Optical fiber 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 inside and outside;
- ② During installation, the optical fiber head is placed horizontally with [QBH];
- ③ According to the scales of [Locking] and [Unlocking] in Figure 3.4, rotate and loosen QBH first, and then lock it after inserting the optical fiber head. After locking, the optical fiber head is placed in [QBH] without shaking.

### 3.3.2 Waterway and gas connection

The [Waterway] and [Gas Road] interfaces are provided with  $\phi 6\text{mm}$  quick connectors, which can be inserted directly. The cooling system is divided into the waterway part of the welding head and the waterway part of the optical fiber head, which are connected in series, as shown in the following figure:

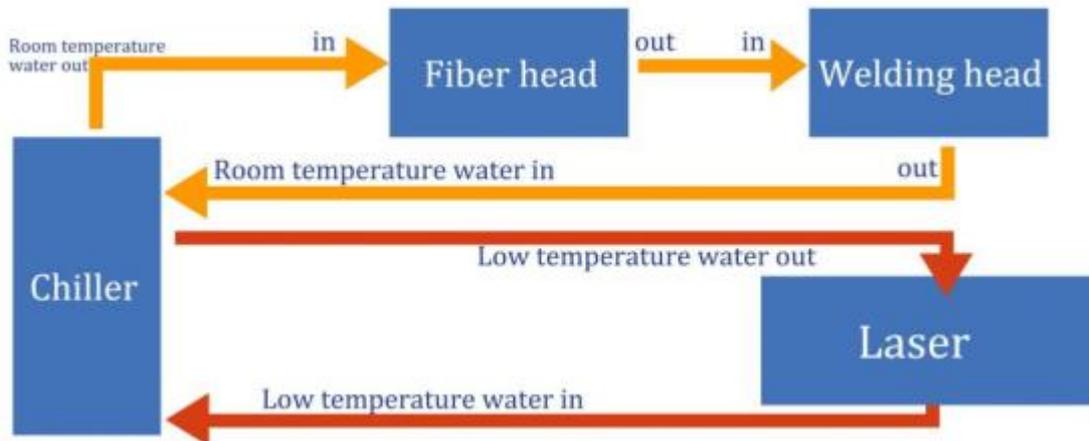


Fig. 3.7 schematic diagram of welding head and optical fiber head waterway

### 3.3.3 Control box connection

The double pendulum welding head is connected with the control box through the attached [7-core aerial insertion system connecting line]. See [Driver Interface] for the definition of control box wiring.

### 3.3.4 CCD module connection

See the demo video for detailed installation and use of CCD.

① The main components are shown in Figure 3.8 below:



Figure 3.8 CCD module

serial number	name	remarks
1	screen	8 inch, 800x600 resolution
2	Support base	
3	Multi-directional chuck	
4	camera lens	Installed on the welding head

② CCD display screen size and buttons as shown in figure 3.9:



Figure 3.9 CCD screen

The screen size is 161mmX196mm, the screw hole with M4x4 at the back is more than 75mmx75mm, and there is a slot in the middle to fix the[multi-purpose chuck].

Screen key	function
1	Vertical line moving to the left
2	The vertical line moves to the right
3	Vertical upward movement
4	Vertical downward movement
5	Large cross switch
6	Small cross switch
7	power switch

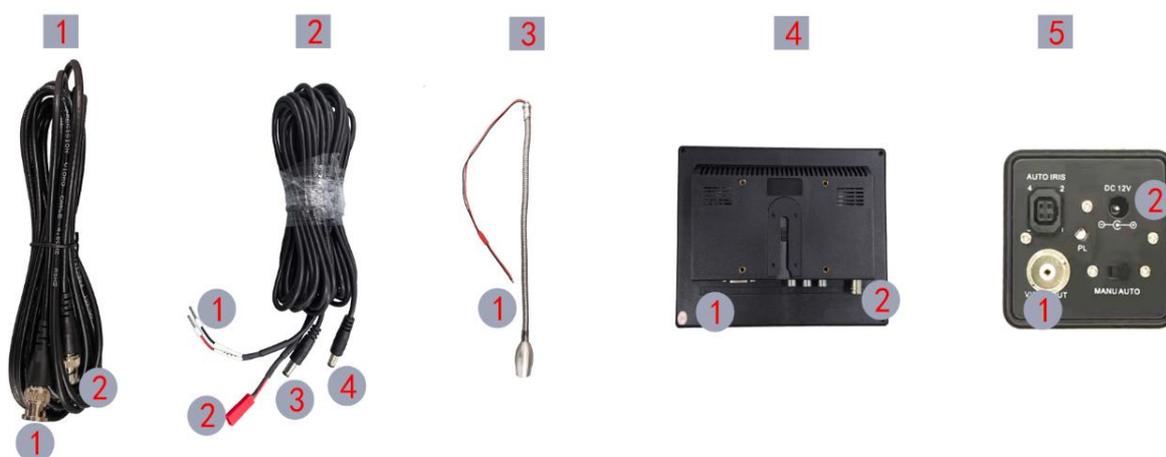


Figure 3.10 CCD wiring

③ wiring and connection as shown in figure 3.10:

Pin Number	name	Interface serial number	wiring	remarks
1	CCD- BNC signal line	①	Connect the camera ① interface	Video signal input
		②	Connect the display ② interface.	Video signal output
2	CCD- power cord	①	Connect switching power supply	12V input
		②	Connect focusing spotlight	12V output
		③	Connect the display ① interface.	12V output
		④	Connect the camera ② interface	12V output
3	CCD- focusing spotlight	①	Connect the power cord ②	12V input
4	CCD- screen	①	Connect the power cord ③ interface.	12V input
		②	Connect signal line ② interface	Video signal output

5	CCD-camera	①	Connect signal line ① interface	Video signal output
		②	Connect the power cord ④	12V input

Unmarked or reserved ports do not affect the use, and no wiring is needed.

## IV. The product operation interface

This chapter will introduce the interface of the 4-inch screen of the fuselage and the 7-inch screen connected with the main control board.

### 4.1 Home Page

Switches for displaying current process, alarm information and adjusting main output signals.



Figure 4.1 Interface-Home Page

① [Laser enable-On/Off]: controls and indicates whether to output [Laser Light Enable Signal ].

② [Indicating red light-Dot/line]: It controls and indicates whether the galvanometer motor swings, and adjusts the red light to[point] or [line], which does not affect the presence or absence of red light.

③ [Welding Mode-Spot Welding/Continuous]: Usually[Continuous] is used, and[Spot Welding] refers to intermittent lighting according to the set page parameters, which is used for fish-scale welding.

④ [Wire feed-run/stop]: It is used to switch the wire feeding state after communicating with the wire feeder through the communication port, and it can be switched to [Stop] without additional debugging of the wire feeder when wire feeding is not needed. [Not connected] has no effect.

⑤ [Process graph]: Scan graphics corresponding to the current process.

## 4.2 Process page

Used to select process graphics and adjust process parameters.



Figure 4.2 Interface-Process

- ① [Scan speed]: The linear speed of moving the focused light spot affects the welding quality. Take [circle] [diameter] 3mm as an example, which is usually set to 200~600. When the welding speed increases, the scanning speed correspondingly increases.
- ② [Peak power]: the maximum power when the light comes out, or machining power and welding power.
- ③ [Duty cycle, Frequency]: Generally [Duty ratio 100%] [pulse frequency 2000] is set. The equivalent machining power can be changed by adjusting the duty ratio and pulse frequency according to the characteristics of the laser, usually without adjustment.
- ④ [Diameter, width and height]: Control the spot size according to the geometric size of the spot. Adjust according to weld size.
- ⑤ [Rotation Angle]: Control the light spot to rotate around the geometric center. Usually not adjusted.
- ⑥ [Silk feeder-connected/not connected]: indicates the communication state between the welding plate and the wire feeder, and the main control board is connected with the wire feeder through the [communication port]. Click [Connected] to enter the parameter page of wire feeder. [Not connected] has no effect.
- ⑦ [Process pattern]: Six process patterns are provided, and click to switch.

### 4.3 Settings page

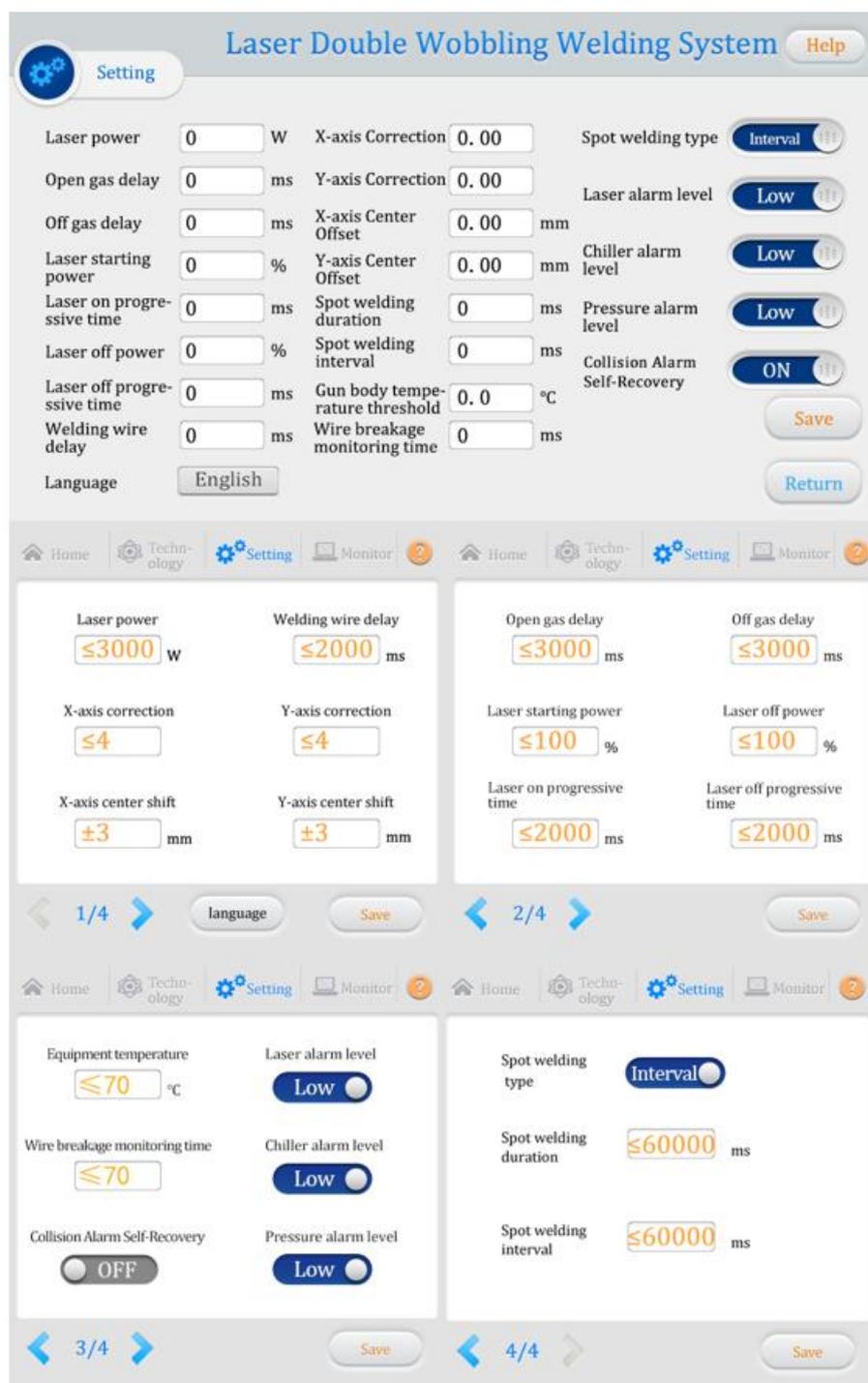


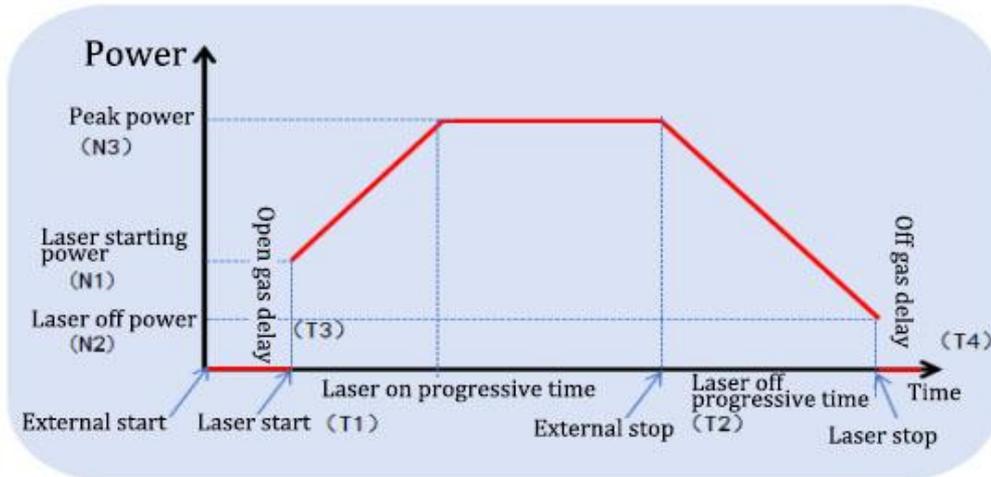
Figure 4.3 Interface-Settings

Used to set factory parameters, including power and alarm level of equipment.

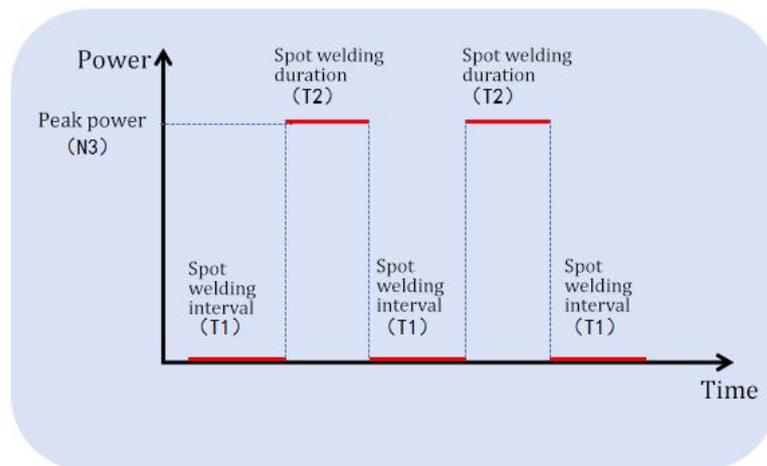
- ① [Laser power]: It is subject to the actual laser.
- ② [Welding wire delay]: wire feeding in advance. Example: If it is set to 1000, press the trigger, feed the wire for 1s before the light comes out.
- ③ [X/Y correction]: correction coefficient = target line width/measured line width, which is used to adjust the actual spot size to make it consistent with the system display.
- ④ [X/Y axis center offset]: [ - ] means left shift, [ + ] means right shift. Used to adjust

the spot to center.

- ⑤ [Open gas delay]: Vent air in advance before the light comes out.
- ⑥ [Off gas delay]: After the light is turned off, the gas closing is delayed.
- ⑦ [Laser starting /Laser off Power] [Laser on/Laser off progressive time]: As shown in the figure, [Laser on power T1] indicates the time from [Laser starting power N1] to [ Peak Power N3], and [Off Progressive Time T2] indicates the time from [Peak Power N3] to [Off Power N2].



- ⑧ [Temperature Threshold]: The maximum temperature is 70°C. When this value is set to 0, no temperature alarm will be detected.
- ⑨ [Alarm Level-High/Low]: Set it to low level when not in use, and set it according to external equipment.
- ⑩ Attending [spot welding type-discontinuity/fish scale]:[fish scale] is suitable for fish scale welding, and[discontinuity] is suitable for sectional welding.
- ⑪ [Spot welding duration] [Spot welding interval]: As shown in the figure, [T1] does not emit light, [T2] emits light.



- ⑫ [Collision Alarm Self-recovery-On/Off]: When a collision occurs, an alarm pop-up window pops up on the home page. When opening, the gun head leaves the collision position, the system alarm is automatically eliminated, and the pop-up window is automatically eliminated (the minimum alarm maintenance time is 300 ms); When it is closed, even if the gun head leaves the collision position, the alarm state of the system will not be eliminated. You need to click "OK" on the pop-up window to eliminate the alarm.

### 4.4 Monitoring page

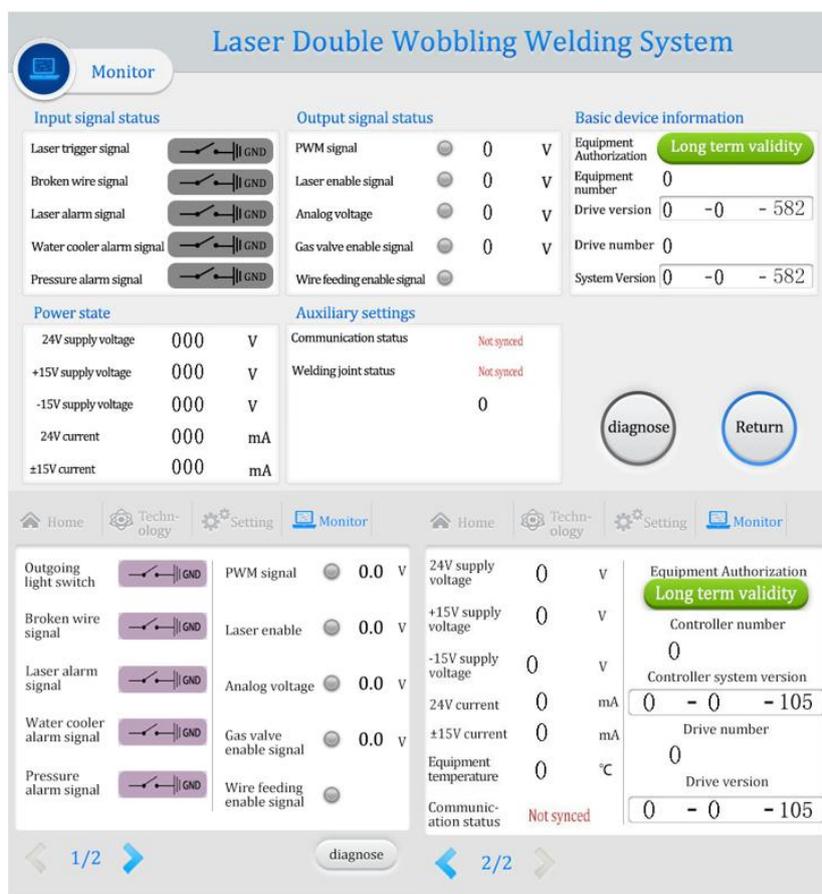


Figure 4.4 Welding torch interface-monitoring

Display the monitored real machine information.

- ① The [controller system] on the [480 x 480 small interface] refers to the [main control board] and [driver] in the control box refers to the [driving board] in the gun body.
- ② [equipment authorization] is used for equipment encryption.

### 4.5 Diagnostic Page

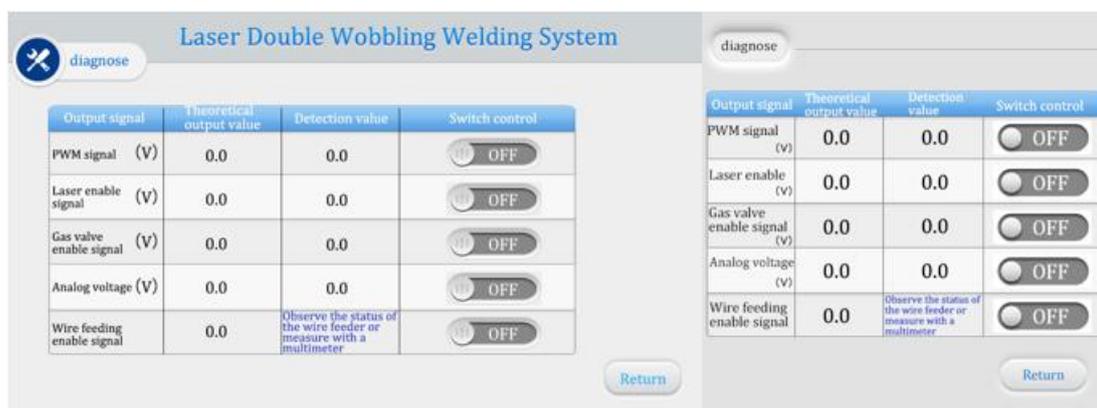


Figure 4.5 Welding torch interface-diagnosis

This mode can only be used for single [output signal] output, which is used to judge whether the output signals of the main control board are normal under safe conditions, and this mode cannot emit light.

## 4.6 Silk feeding page

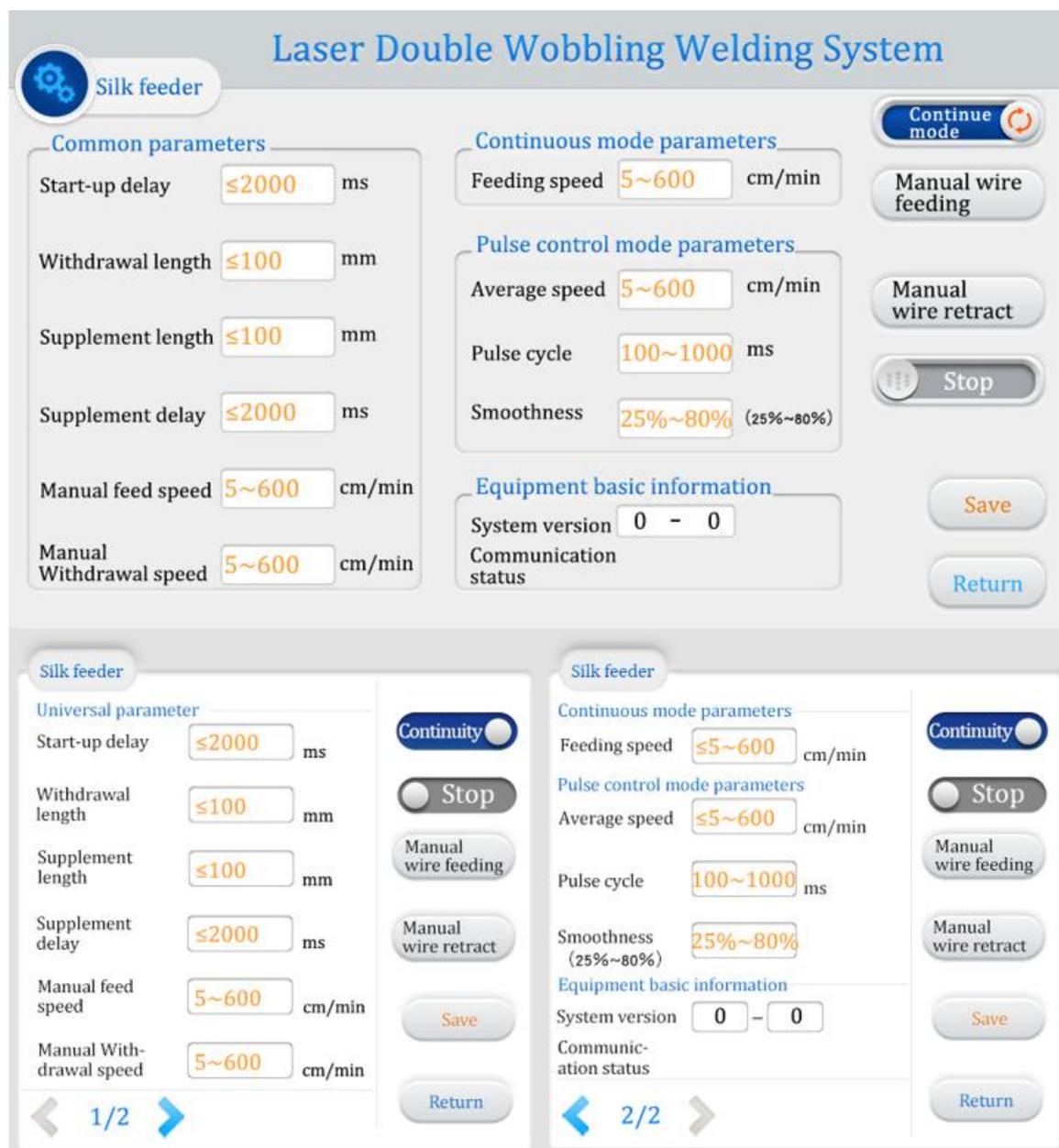


Figure 4.6 Welding torch interface-wire feeding

When the equipment communicates with the wire feeder, it can enter the Wire Feeder Interface to quickly adjust the wire feeding parameters. When there is no communication, you cannot enter this interface, and this function will not take effect.

① [Continuous Mode Parameter] only takes effect in [Continuous Mode], and the same is true for [Pulse Mode Parameter].

② [general parameters] global effect.

## V. Daily maintenance of products

1. Users are advised to change the water in the water cooler once a month to effectively prevent the water pipes inside the gun body from being blocked. The water quality should be pure water or distilled water, and antifreeze should be added at low temperature.

2. The lens maintenance and replacement should be carried out in a relatively clean field environment. When opening the protective lens, focusing the lens cover, pulling out the lens bracket and other open operations, it should be well protected (covered with masking paper). The replacement methods of different lenses corresponding to all gun types can be found in WeChat applet → Super Weiye → Lens Installation.

3. Please handle with care when using. For complex production environment, please clean the ash in time.



## VI. Frequently asked questions of products and treatment measures

Description of common alarms and solutions to problems are as follows:

Problem item	phenomenon	solution
Temperature alarm, indicating that all kinds of temperatures are too high.	Home page prompt XXX temperature is too high	<p>General lens temperature alarm, usually check whether the lens is damaged first, and replace the damaged lens.</p> <p>If the lens is normal, you need to directly shield this alarm on the setting page, and set the corresponding lens temperature alarm threshold to 0 on the setting page to save it.</p>
Chiller/laser/air pressure alarm	The pop-up window on the home page shows the chiller/laser/air pressure alarm.	<p>Alarm logic of level: the system will compare the setting level on the setting page according to the wiring mode of the corresponding equipment, and alarm if it is different.</p> <p>Usually, the alarm is an alarm level setting error, so just change the corresponding alarm level.</p> <p>If there is an alarm when there is an alarm signal, please unplug the alarm signal line and set it to low level.</p>
Poor welding effect	At first, the light is very strong, and it gradually weakens/the light is weak, resulting in failure to fuse.	<p>Usually, the welding gun lens is damaged, including but not limited to protective mirror, focusing, collimation and reflection, any one or more of which may cause this situation. Replace the protective mirror and look at the focus first, then check the reflection and collimation, and replace the damaged lens. Spark at the copper nozzle may be the focus problem, which should be ruled out first. In addition, check whether the laser fiber head part is dirty or damaged.</p>
The motor does not swing.	The light spot is a point.	<ol style="list-style-type: none"> <li>1. Is the software part set correctly?               <ul style="list-style-type: none"> <li>Setup-Scan Correction: 1.0 or 1.25</li> <li>Process-scan width: greater than 0</li> <li>Home-indicates red light: line</li> </ul> </li> <li>2. Hardware inspection (first installation)               <ol style="list-style-type: none"> <li>1. The power supply of the swing motor is 15V power supply. We should first measure whether the power supply of the 15V switching power supply is normal. In addition, the 15V switching power supply is divided into positive and negative, and the wrong wiring will also cause the motor not to work. Please note that V1 is connected to 15V+, V2 is connected to 15V-, and any COM on the 15V switching power supply is connected to the 2nd pin GND.</li> <li>2. Check whether the two interfaces of the connecting</li> </ol> </li> </ol>

		<p>cable are inserted in place, whether the position on the driver board is correct, and whether the rainbow link line between the motherboard and the driver is loose.</p>
<p>Abnormal motor swing</p>	<p>① After electrifying, the motor at the tail of welding head appears howling/abnormal red light swing/fever/unable to adjust swing width.</p> <p>② Directly burn out the lens, and the sealing ring and focusing lens burn out at the same time.</p>	<p>The driver in the control box controls the motor to swing. Through the motor wire link, when there is a signal error (poor contact of the motor wire, open circuit), external interference, or mismatch between the driver and the motor, the problem ① may occur.</p> <p>If there is a problem in ②, it is suggested to check the surrounding interference sources. If there is no interference source, it may be a motor line fault, so just replace the motor line directly.</p>

For more problem solving schemes, please refer to the [Problem Solving] page of WeChat applet.



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