

# BWT 4 IN 1 Handheld Welder Machine Manual



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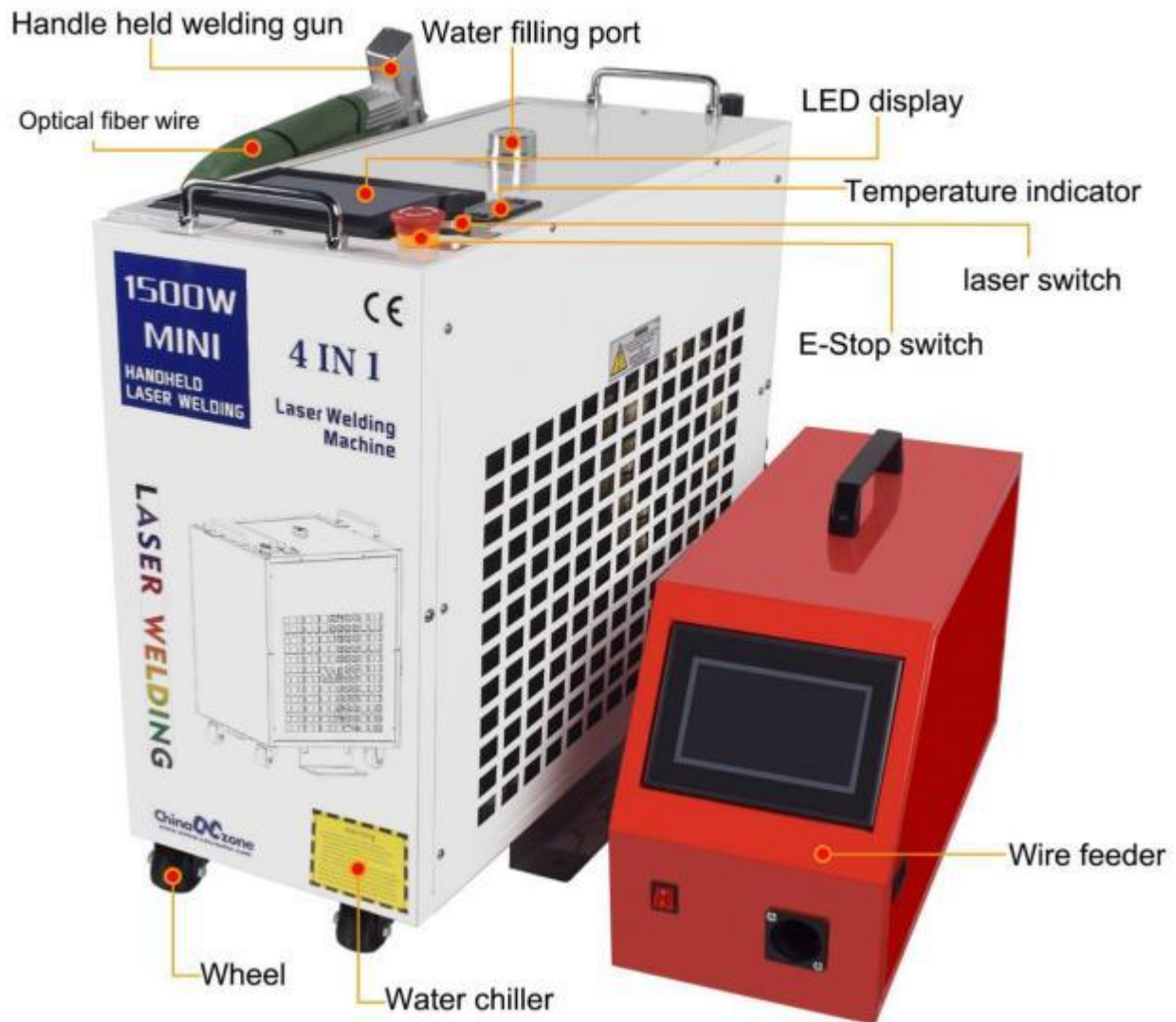
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# 1. Machine display

## 1.1 Overall display





## **1.2 Safety specification**

### **1.2.1 Safety Instructions for Optical Operation**

We strongly recommend that you read the following procedures before operating the fiber laser:

Never look directly into the optical output when Electrical switch is on.

Make sure that a pair of appropriate and approved laser safety protective glasses is worn all the time while the laser is operating.

No eyes are on the path of the laser beam (direct or reflected light, scatter light from high reflective material, etc.), at the same time, the direction of laser output must be Shelter by reliable objects.

Caution: Failure TO USE control or adjustment DEVICES or perform STEPS as described herein may result in HARMFUL radiation exposure

### **1.2.2 Safety Instructions for Electrical Operation**

We strongly recommend that you read the following procedures before operating the fiber laser:

Make sure the power source connected to the equipment is properly grounded with PE wire. At the same time the shell of this equipment must be properly grounded. Any interruption of the ground loop may result in personal injury.

Make sure that the input AC voltage and capacity meet the requirements of the very series of lasers.

If the air switch shut down frequently, please contact as soon manufacturer

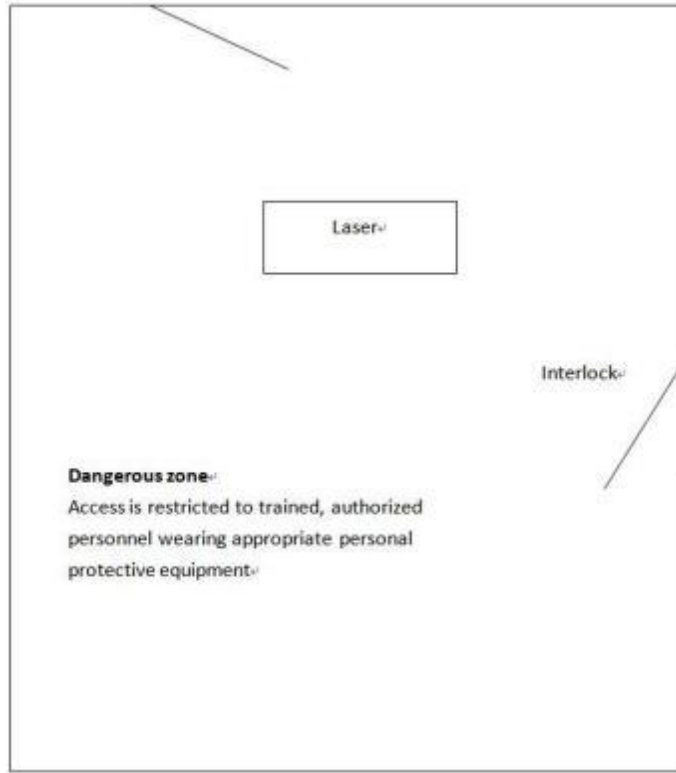
### 1.2.3 Other Safety Instructions

- (1) There are often numerous secondary laser beams produced at various angles in the output port of the laser. These divergent beams are produced when the primary beam of laser reflects off a smooth surface, and they are called secular reflections. Although these secondary beams may be less powerful than the total power emitted from the primary beam, the intensity may be great enough to cause damage to the eyes and skin as well as surface of materials.
- (2) Optical accessories relevant to the laser, such as light-sensitive elements that may be damaged from exposure to the laser light, video cameras, photo multipliers and photo diodes, need related protections.
- (3) Please do not operate laser in darkened environments.
- (4) Do not turn on the laser without an optical coupling fiber or the optical output connector.

### 1.3 Protective housing and interlocking system







- (1) The structure and layout of the shield should be designed to ensure that the human body cannot directly enter the dangerous area. Shields should be closed mechanisms, meeting specific safety distance and opening size requirements when a mesh structure is required.
- (2) For the installation of the laser room, should follow the guidance of the professional design, installation team, in accordance with the drawings.
- (3) The installation of the laser room also includes components such as the house body, internal frame, maintenance door, observation window, safety door, lighting, optical fiber hanging device, monitoring, dust removal, light source room, air conditioning, anti-collision fence.
- (4) The safety door of the laser room should be connected with the product remote control chain connector. When an external person intervenes and opens the door, the terminal of the connector opens and the laser machine stops launching. Prevent external personnel or unauthorized personnel from exposure to dangerous radiation.
- (5) Use of interlocking system:

In the laser control zone, walls and doors can limit the hazard of laser radiation. The interlocking system connected to the door can actually operate to restrict access when a hazard occurs, allowing only trained, authorized and appropriately protective equipment to enter.



## 1.4 Safety labels

As shown in the following table, all safety warning signs during the operation of the handheld laser cleaning machine (not limited to the signs on the laser body) include:

		
<p>Warning label – Hazard symbol</p>	<p>Explanatory label (Take 1000W as example)</p>	<p>Alternative label for laser aperture</p>
		
<p>Alternative label for Class 4</p>	<p>Must be grounded</p>	<p>Electrical Hazard</p>

## 1.5 EU Agency Information

E-CrossStu GmbH  
Felix-Dahn-Str 4  
Stuttgart 70597



E-CrossStu@web.de +49 71191222069



Product name : 4 IN 1 Laser Welding Machine

Model : LWM-YHY

Rated voltage :220V

Rated current : 15A

Manufacturer : Shenzhen Yuhaiyuan Technology Co., Ltd

Address: Longgang District Yayuan Road Chuangyiyuan

Y1-2-14 Shenzhen China

**Made in China**

## 1.6 Product nameplate

<b>huizhoushiyunshengshukongshebeiyouxiangongsi</b>	
<b>BWT 4 IN 1 Welder</b>	
<b>Product Name: BWT 1500W 4 in 1 Welder</b>	<b>Model NO: BFL-CW15</b>
<b>Rating Voltage : 220V</b>	<b>Rating Frequency: 50Hz</b>
<b>Laser Power:1500W</b>	<b>Rating Power: 4000W</b>
<b>Phase:L+N+PE</b>	<b>Class 4 Laser</b>
<b>Origin:China</b>	<b>Mfg year : 2024 . 9</b>
	
<b>Address :</b> <b>huizhoushihuiyangquqiuchangjiedaoxihucunweipangtianhaichuangxinke jiyuanAdong5lou 512200 China</b>	

## 1.7 Compliance to Standards for CE Marking

This product complies with the European Union Harmonized legislation, only complies with the above directives and standards when installed in accordance with the manufacturer's specifications.

The European Community requirements for product safety in the 2006/42/EC Machinery (MD)

This Directive requires that lasers comply with the standard:

EN ISO 12100:2010

EN 60204-1:2018

EN ISO 11553-1:2020/A11:2020

EN ISO 11553-2:2008

EN 60825-1:2014/A11:2021



## 2. Main configuration introduction

### 2.1 Laser Source introduction

In order to guarantee the fiber laser is operated safely (including personnel safety, equipment safety, production safety), ensure the product remain its best condition for a long time.

We compile this document with important safety, operating, maintaining and other information. Please take time to read and understand this User's Guide and familiarize yourself with the operating and maintenance instructions before using the product.

#### 2.1.1 Safety Conventions used in the User Guide:

SYMBOLS	DESCRIPTION
	<p><b>WARNING :</b></p> <p><i>Refers to a potential hazard that may leads to a personal injury or death.</i></p>
	<p><b>CAUTION :</b></p> <p><i>Refers to a potential hazard on product, or a potential physical injury on personnel</i></p>
<p><b>NO SYMBOL</b></p>	<p><b>IMPORTANT :</b></p> <p><i>Refers to any information regarding the operation of the product. Please do not overlook this information.</i></p>

## 2.1.2 Laser Classification


This series of lasers emit invisible laser radiation around a wavelength of  $1080 \pm 3\text{nm}$ .

The average power of the products is ranged from 10% to 100% at a maximum power range from 1000W to 4000W, which classifies the series of lasers Class 4 laser instrument.

Direct or indirect exposure of this level of light intensity may cause very serious damage to the eyes or skin.

In view of this, appropriate and approved laser safety protective glasses must be worn all the time while the laser is operating.

At the same time, no directly or reflectively emit on your skin.

	<p><b>WARNING :</b></p> <p><i>The laser safety protective glasses are selected according to the wavelengths of the output laser. The users must ensure that the laser safety protective glasses covered the entire range of wavelengths of the laser emission.</i></p>
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## 2.1.3 Operation Conditions

The basic operation conditions are listed in the table followed:

Item	Value
	BFL-CW1500 / BFL-CW2000
Supply Voltage(V)	220±10% VAC 50/60Hz
Placement	Flat, upright, no vibration and impact
Environment Temperature	5~40°C

Relative Humidity	30%RH~70%RH
Electromagnetic Environment	Avoid too strong electromagnetic interference, which may lead to false alarm of laser
Cooling water quality	QBH and even the whole machine need deionized water to prevent scaling. At the absence of deionized water, pure water for Drinking can be used. When the ambient temperature is lower than 0°C, antifreeze (30% volume ratio for alcohol) needs to be added to the cooling water.

Note:

- (1) Never use the tap water or other cooling water with high ion concentration.
- (2) The cooling water shall be replaced timely to prevent microorganism and ions growth.
- (3) It is very easy to be damaged when the QBH getting scaling, and there is no warranty in this case.
- (4) The output of the laser is connected with the cable. Please check the end surface of the quartz head carefully to prevent dust or other pollution. Lens-cleansing paper must be used when cleaning is necessary.
- (5) Never installing the laser output with the processing system when the equipment is power on.
- (6) The protective glasses should be worn all the time.



**CAUTION:**

*(1) Never make this product work in high humidity (> 95%) ,though the product have an excellent adaptability to the high humidity environment*

*(2) Never let this product work below the ambient dew point temperature(like the table 2.2)*


Maximum Relative humidity (%)	20	30	40	50	60	70	80	90	95
Room Temperature(°C)	Ambient Dew Point (Td-°C)								
10	-11.9	-7	-0.3	0	2.5	4.8	6.7	8.4	9.2
15	-7.9	-2.3	1.5	4.6	7.3	9.6	11.6	13.4	14.2
20	-3.5	2	6	9	12	14.5	16.5	18	19
25	0.5	6	10.5	14	16.5	19	21	23	24
30	4.6	10.5	15	18.5	21.5	24	26	28	29
35	8.5	15	19.5	23	26	28.5	31	33	34
40	13	20	24	27.5	31	33.5	36	38	39
Temperature range for laser operating									

NO SYMBOL	<p><b>IMPORTANT :</b></p> <p><i>The lifetime of the laser will be shortened and the output power will degrade while the cooling system working at a higher temperature for too long time. Please ensure the cooling system is enough and the temperature is suitable.</i></p>
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## 2.1.4 Characteristic Parameters

The characteristic parameters of the single module series fiber laser which the power is ranged from 1500W and 2000W are demonstrated in the table.

### Parameters of the single module series laser:

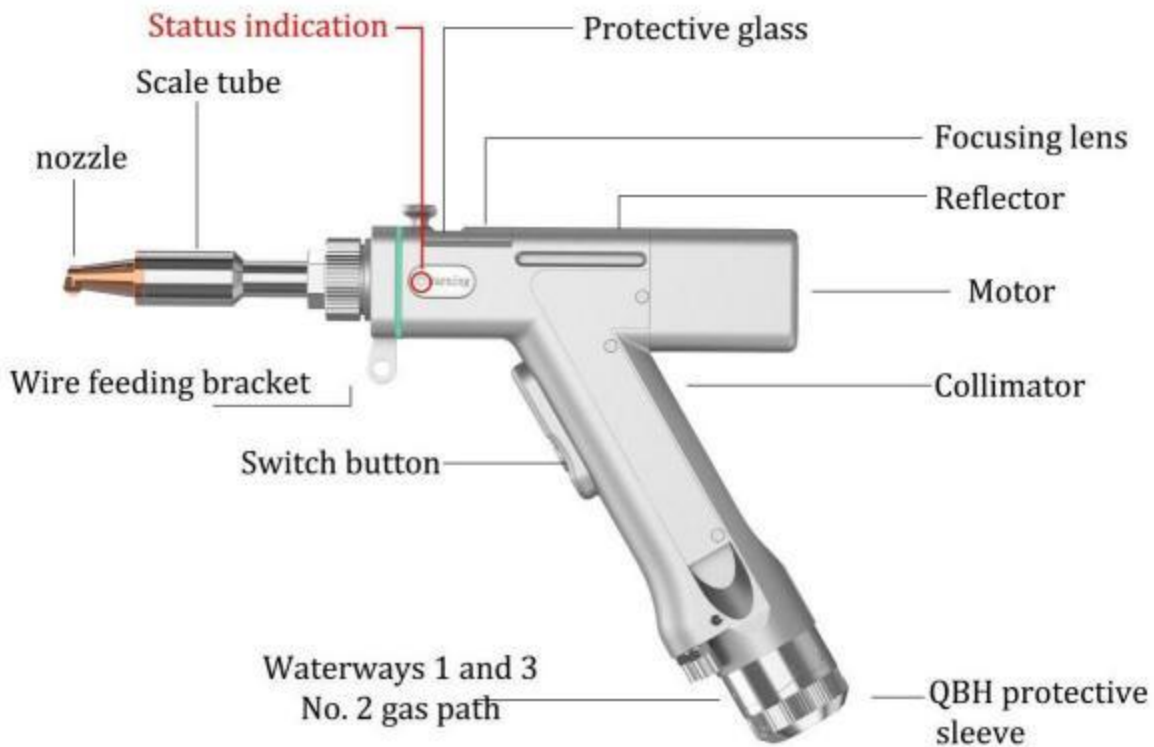
<b>BWT Laser Source</b>			
<b>1500W / 2000W</b>			
<b>Optical Character</b>			
Power	1500W	2000W	
Wavelength	1080±10 nm		
Output Fiber Core Diameter	34μm, 50μm or customized		
Output Cable Length	12m, 15m or customized		
Output Cable Connector	QBH		
Aiming Beam	Red		
Operation Mode	CW or modulation		
Polarization	Random		
Power Stability (25°C)	< ±1.5% (2h)		
Power Adjustment Scope	10%-100%		
Max Modulation Frequency	5kHz		
<b>Size and Weight</b>			
Physical Size (H×W×D)	80mm*402mm*296mm	80mm*402mm*346mm	
Weight	15kg	17 kg	
<b>Electronic Character</b>			
Power Supply	220±20 V, AC, PE, 50/60 Hz		
Power Consumption	4.5 kW	6.0 kW	

Control Interface	RS232/AD	
<b>Water Cooling Parameters</b>		
Minimum Water Cooling Capacity	3.0 kW	4.5 kW
Temperature Settings	22°C (Laser Module), 30°C (QBH)	25°C (Laser Module), 30°C (QBH)
Cooling Tubes Size	O.D. Φ12 mm	
Cooling Water Flow Rate (Laser)	>15 L/min	>18 L/min
Cooling Water Flow Rate (QBH)	1.5 ~2.0L/min	

## 2.2 Handheld gun introduction

For more information, please check the "manual for SUP 23T welding gun".

### 2.2.1 Handheld gun display



QBH connector	Complete the access and lock of the optical fiber connector
Collimating lens	Collimating lens: Complete the fiber collimation function and collimate the incident laser into a parallel beam.
Galvo-lens module	A component composed of a reflector and a motor is used to vibrate and reflect the collimated parallel laser at a certain angle, changing the direction of the original beam and the shape of the spot.
Focus lens	Focus the reflected beam into a convergent beam with high power density.
Protective glass	The protective glass can protect the focusing lens from the damage of returning slag and prolong the service life of the focus lens.
Copper nozzle/ Scale tube	Guide the focused beam to the work piece, and generate high-speed airflow to protect the molten pool from oxidation to achieve high-quality welding results. You can also adjust the focus distance by adjusting the Scale tube

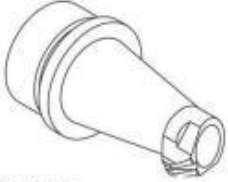
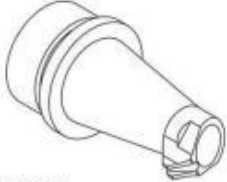



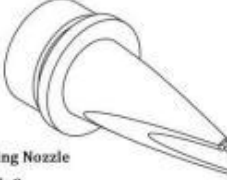
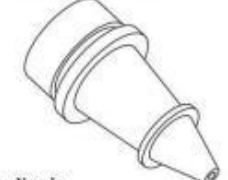

## 2.2.2 Configuration parameter

Parameter name	Technical index
Maximum applicable laser power	3000W
Input voltage	220V±10% AC 50/60Hz
Installation environment	Flat, no vibration and impact
Working environment temperature	10~40°C

Working environment humidity	< 70%
Cooling-down method	Hydro cooling
Applicable wavelength	1064nm ( $\pm 10$ nm)
Welding gas	Nitrogen. Argon. Helium
Alignment lens	D16*4.5/F60
Focus lens	D20*4.5/F150
Reflex	30x14xT2
Protection lens specifications	D18*T2
Maximum air pressure support	15Bar
Focus of vertical adjustment range	$\pm 10$ mm
Scan width--welding	0~8mm
Scan Width--cleaning	F150-0~30mm
	F800-0~120mm
The net weight of the welding gun	0.75kg

## 2.2.3 Welding head copper nozzle

### Handheld Laser Welding Head Copper Nozzle

 <p>Welding Nozzle Model: AS-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>	 <p>Welding Nozzle Model: BS-16 Wire Feeding: 1.6mm</p>	 <p>Welding Nozzle Model: CS-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>	 <p>Welding Nozzle Model: ES-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>
 <p>Welding Nozzle Model: FS-12 Wire Feeding: 1.6mm</p>	 <p>Welding Nozzle Model: C Wire Feeding: No Wire Feeding (For Weld Seam Cleaning Mode)</p>	 <p>Cutting Nozzle Single Layer 1.5mm For Cutting Mode</p>	 <p>Scale Tube For Adjust Focal Length</p>

Different copper nozzle applies to different materials welding.

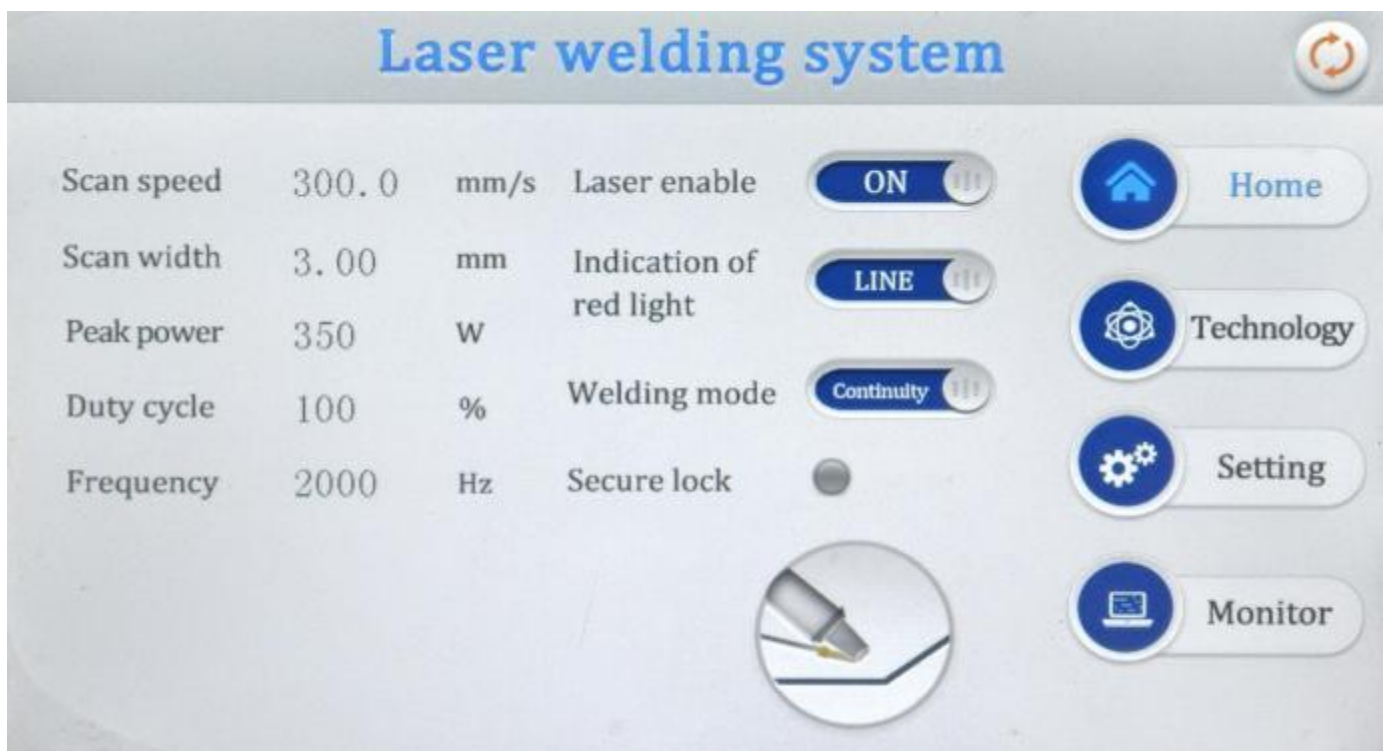
For example, AS-12 copper nozzle mainly used for welding wire 1.0 at inner Angle feed (AS-12 basic universal);

- AS-12: The filaments below 1.2mm are generally used for flat Angle, inner Angle and outer Angle welding;
- BS-16: The filaments below 1.6mm are generally used for flat Angle, inner Angle and outer Angle welding;
- CS-12: The filaments below 1.2mm are generally used for outer Angle welding;
- FS-16: The filaments below 1.6mm are generally used for outer Angle welding;
- C: For non-wire feeding, used for outer corner welding;
- ES-12: Filaments below 1.2mm are commonly used for outer corner sheet welding.



## 2.3 Screen control system introduction

### 2.3.1 Welding system homepage



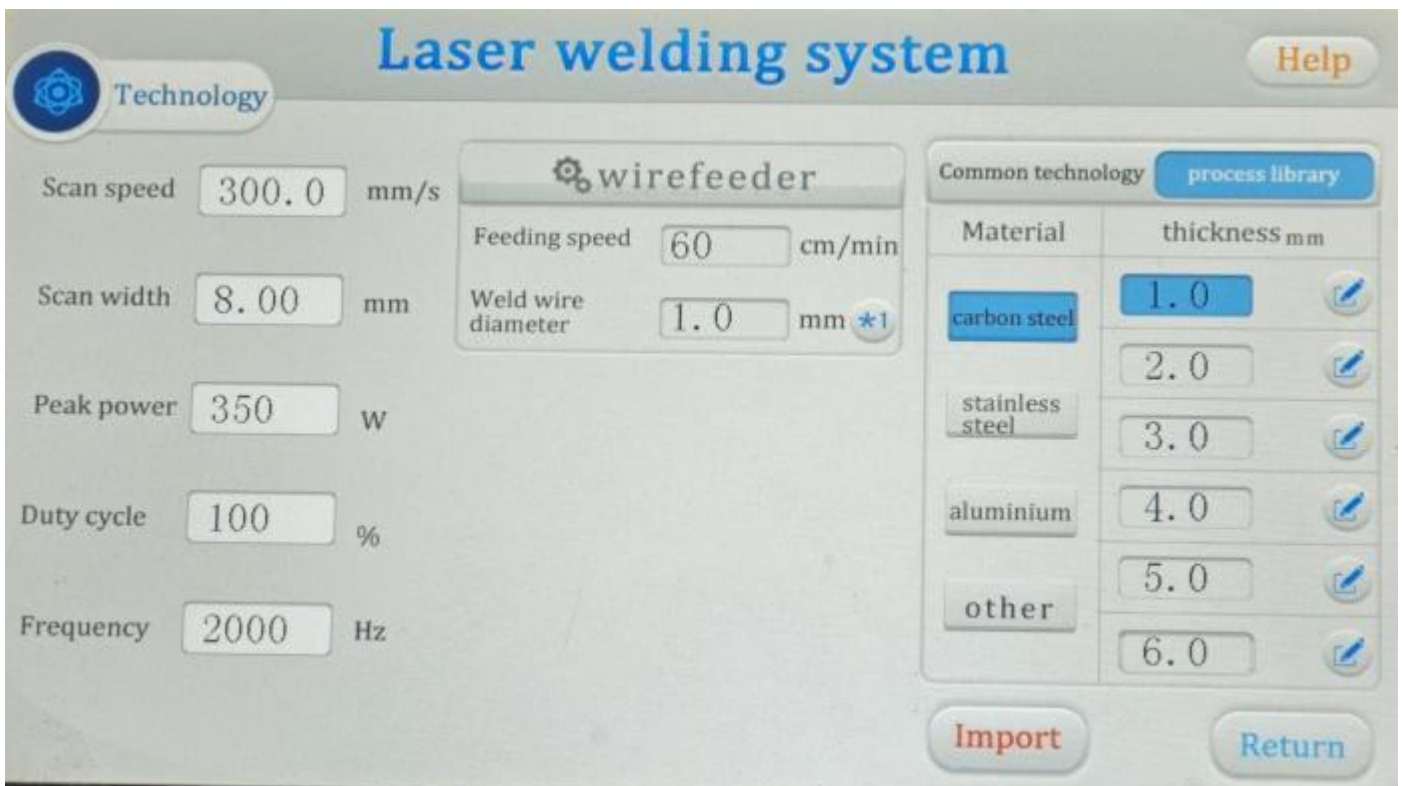
(1) This interface can see the current process parameters (this page can not be modified process) and real-time alarm information.

(2) The default is ON, the red light is LINE by default, and the welding mode is continuous.

When the enabling is turned off, the enabling signal will not be sent to the laser and can be used to test the outlet function. Close the red light indicator, the motor stops swinging, and the red light is a point to adjust the center position. The welding mode is divided into continuous and spot welding. When the spot welding is selected, the spot welding type needs to be set on the setting page.

- (3) The safety lock is divided into gray and green. When the metal clip is clamped on the processing piece and the copper nozzle of the gun contacts the processing piece, the 5 and 6 feet of the signal interface 1 are connected, and the safety lock indicator is displayed as green. At this time, the light can be realized according to the trigger.
- (4) Click on the upper right corner to switch to the cleaning mode.

### 2.3.2 Page in “Technology”



- (1) The process interface contains the process parameters of debugging, click the box (red) to modify, click OK, and then save in the quick process, click import (modify-save-import).

(2) The scan speed range is 2-6000mm / S, and the scan width range is 0 - 6mm. The scan speed is limited by the scan width, which is:

$$10 \leq \text{scan speed} / (\text{scan width} * 2) \leq 1000,$$

If the limit is exceeded, it automatically becomes the limit value. When the scan width is set to 0, it does not scan (it is a point light source)

(The most commonly used scanning speed: 300mm / S, width of 2.5-4mm).

(3) The peak power should be less than or equal to the laser power of the parameter page (if the laser power is 1500W, this value is not higher than 1500).

(4) Duty cycle range 0 to 100 (default 100, usually not changed).

(5) The pulse frequency range is recommended from 5-5000Hz (default 2000, usually no modification).

(6) Click the HELP button on the top right to get more relevant parameter explanations.

(7) After modifying the parameters, you can see whether the import is successful on the home page

(8) Reference process, can be used in the small program process reference matters need attention:

- Some lasers cannot emit light with less than 10% power. When the peak power of the process page is less than 10% of the maximum power of the laser on the set page, all output signals are normal, but they may not emit light.
- The duty cycle is 100%, usually does not need to change, when the pulse frequency does not work. If you need to use it, please adjust it according to the actual requirements. Example: Peak power of 300W, duty cycle of 50%, and pulse frequency of 1000Hz. At this time, the light cycle is 1mS, 0.5mS to 300W light, 0.5 mS does not light, the cycle, the air at the welding burst, abnormal sound is normal phenomenon. The actual situation is based to the laser parameters.
- Click on the Help button at the top right of the screen to get more relevant parameters.

### 2.3.3 Page in "Setting"



Click "Settings" on the home page, enter the password **123456** on the password input page of the pop-up window, and then enter the Settings page.

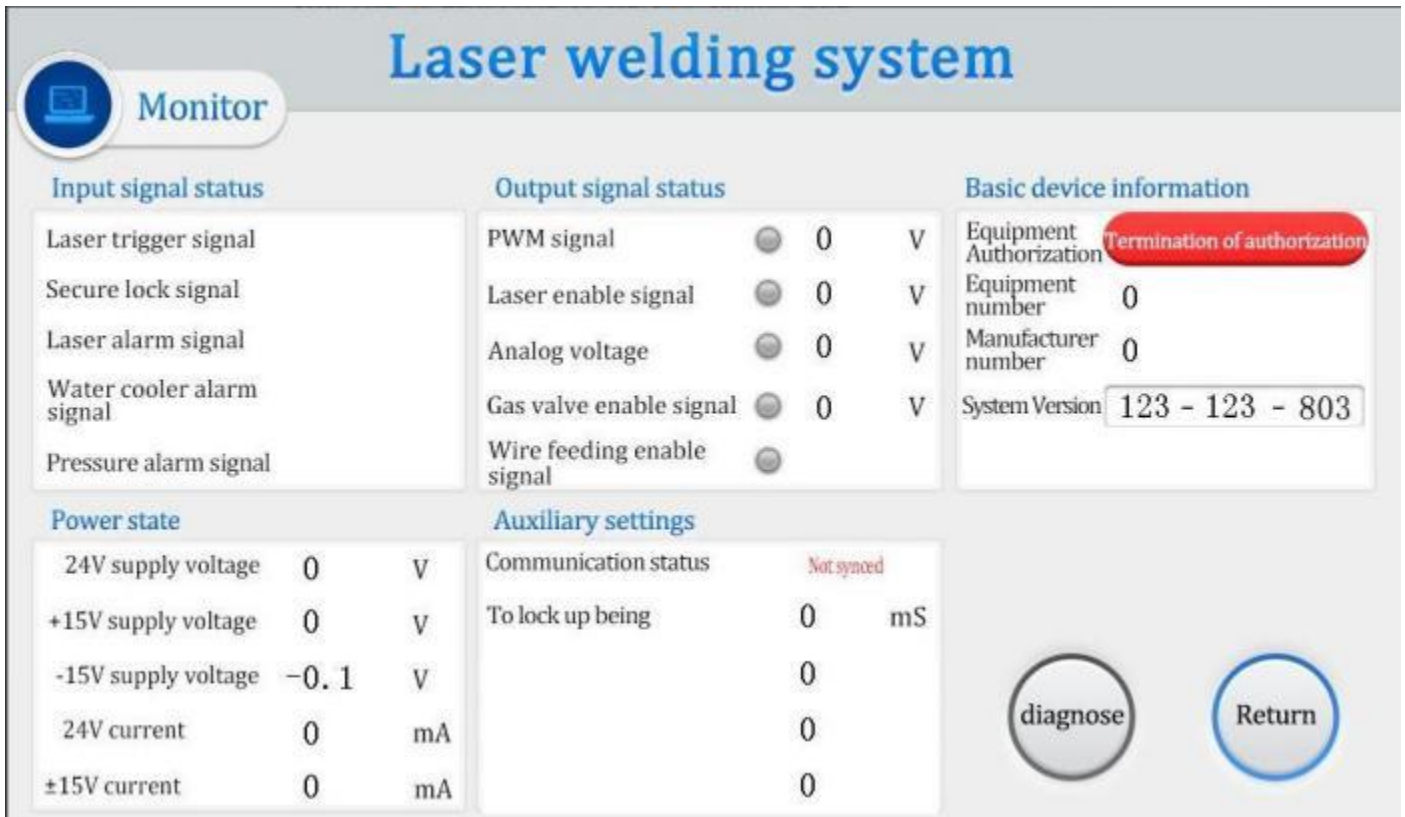
- (1) Click "Language", you can change the language you need.
- (2) The laser power is the power of the laser used, please fill in correctly.
- (3) The default air delay is 200ms, range 0 ms to 3000 ms.
- (4) From N1% of process power to 100%; from 100% of process power to N2; (as shown in the figure below):



Generally preset switch light power 20%, switch light step time 200ms;

- (5) Silk delay compensation is the advance time relative to the light signal, which can be used with the withdrawal function, not set by default;
- (6) The maximum value of the three temperature alarm valves is 70°C. When the value is set to 0, the temperature is not detected, and the buzzer alarms when the measured temperature is greater than the set value;
- (7) Scan correction coefficient = target line width / measured line width, range from 0.01 to 4. Generally set to 1;
- (8) Laser center offset-3~3mm, decrease to the left, increase to the right, applied to adjust the red axis light center;
- (9) Air pressure / water cooler / laser alarm level signal is low level, and when this alarm signal is used, the alarm level here should be set to the same with the alarm level of external equipment;
- (10) The spot welding duration is the light output time in each cycle in the spot welding mode, and the spot welding interval time is the light stop time in each cycle in the spot welding mode;
- (11) Click on the Help button at the top right to get more relevant parameter explanations.

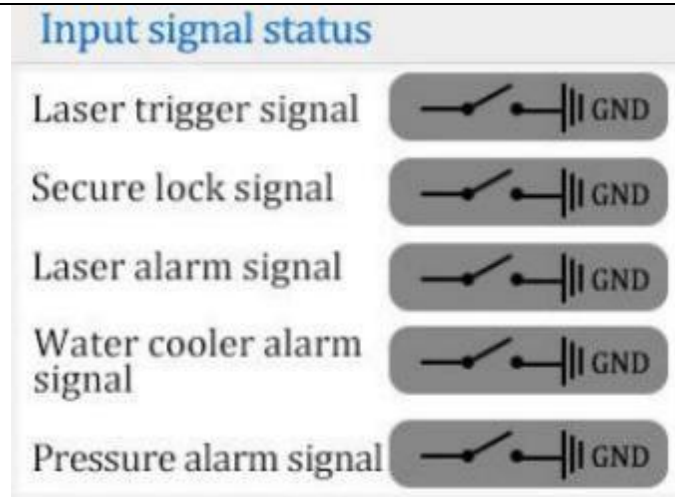
### 2.3.4 Page in “Monitor”



This page displays the status of each signal and the equipment information.

#### (1) Input signal status

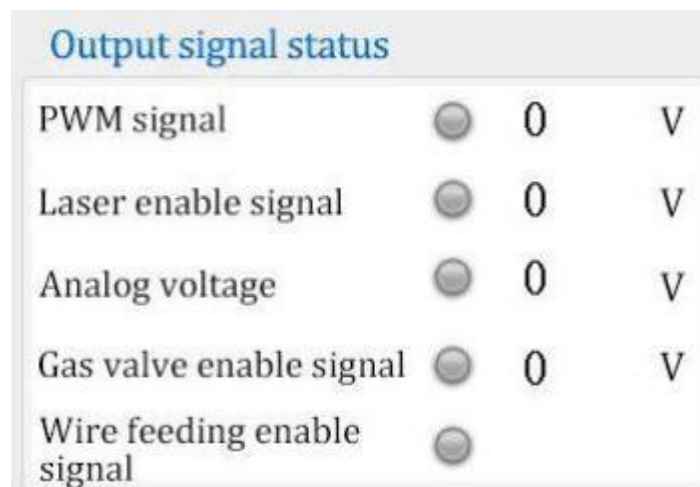
- Laser trigger signal: when the user externally controls the 7 and 8 feet of the signal interface 1, this state is changed from gray to green.
- Safety lock signal: normal short contact, this state changes from gray to green.
- Laser / water cooler / air pressure alarm signal: monitor the real-time level status of these interfaces.



## (2) Output signal status

When the signal is output, the signal in this area changes immediately and can be directly visualized.

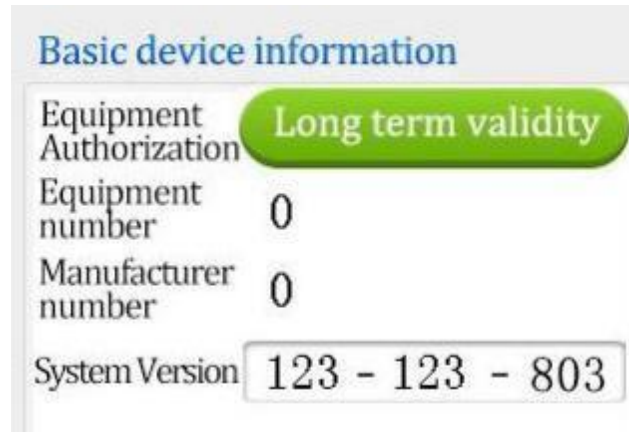
The monitoring signal is the circuit signal detected in real time, which will fluctuate in a certain range and have an error of less than 0.3V with the final output signal.



## (3) Basic information of the equipment

- Equipment authorization: click to encrypt the use time of the equipment, When the equipment is used for more than the set time, the authorization will be terminated and the system will stop working. Factory default is long term effective, if you need encryption and decryption, please contact us for inquiry.

- System version: three sets of numbers, the first group is the hardware version, the second group is the micro controller program version, the third group is the touch screen version.



#### (4) Power status

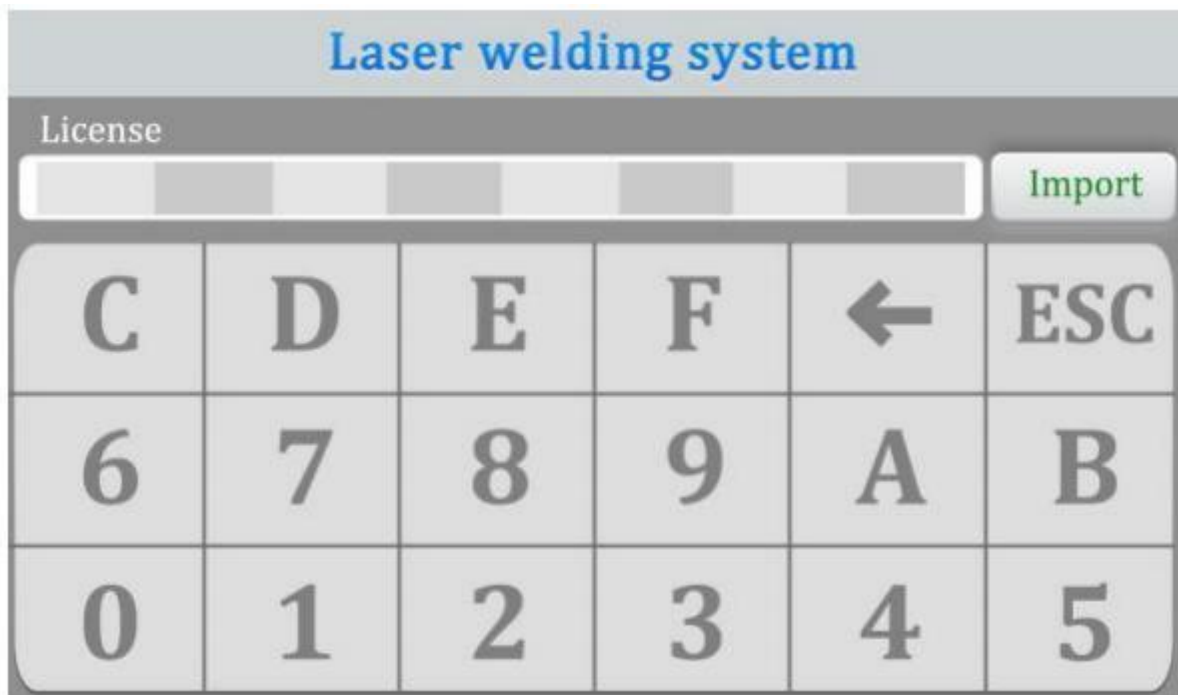
The real-time power supply voltage and current of the device are shown. Due to the update of the algorithm, the data accuracy continues to indicate that there will be some differences in different versions of different versions, which is a normal phenomenon. Mainly through the power supply voltage to help after sales power supply troubleshooting.

24V supply voltage	0	V
+15V supply voltage	0	V
-15V supply voltage	-0.1	V
24V current	0	mA
±15V current	0	mA

#### (5) Communication status

- "Communication status" indicates the communication between the touch screen and the motherboard, if not synchronized, check the screen cable.
- "Anti shake" is used to deal with poor contact with safe locks, which range from 0 to 300 ms. Click "Device authorization box" to set the parameter range on the password page.

The password is "ffffffaa300" where "ffffffaa" indicates the lock anti-shake parameter and cannot be changed. "300" means 300ms. The effect is that when the trigger signal is normal and the disconnection time of the safety lock signal is <300ms. Material welding used to deal with poor surface performance and unstable conductivity (e. g. rust) is usually set to 0. disconnection time of the safety lock signal is <300ms, Material welding used to deal with poor surface performance and unstable conductivity(e. g. rust) is usually set to 0.




- "Motor driver temperature" and "protective mirror temperature" represent the measured real-time temperature of the two parts.

"Motor driver temperature" affects the motor swing performance of the environment. If the environment is poor, it will lead to the abnormal temperature increase, affect the laser scanning speed, and then lead to the decrease of weld quality, The lens temperature reflects the working state of the lens to help determine whether the lens is damaged.

Auxiliary settings		
Communication status	Not synced	
To lock up being	0	mS
Motor drive temperature	0	°C
Protective lens temperature	0	°C

### (6) Diagnose

Click the diagnostic button to enter the diagnostic interface. Use to measure whether the signal port has an actual output, usually the output value is consistent with the detection value, When inconsistent, the load is abnormal, such as when the laser does not light, through the single port with the laser monitoring software or multi meter measurement, the real reaction signal is emitted




diagnose

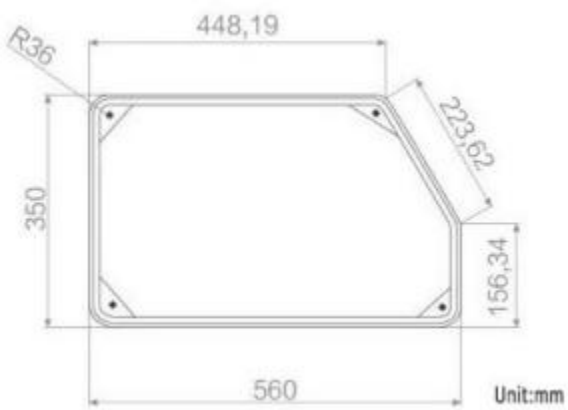
## Laser welding system

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



## 2.4 Wire feeder introduction



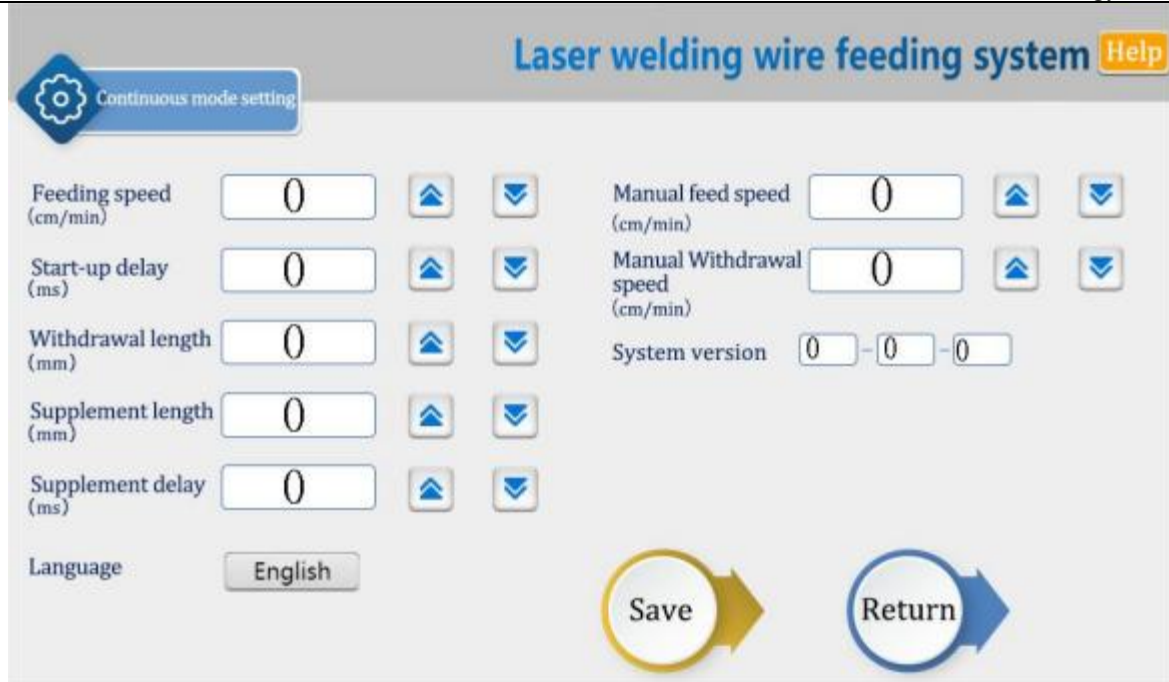
### 2.4.1 Technical Parameters:

Model	SUP-AMF-A
Rated input	220 ± 5% 50/60hz
Maximum power and current	60W/2.5A
Rated wire feed speed	15~600cm/min
Applicable welding wire	0.8/1.0/1.2/1.6mm
Suitable for welding wire disc	Shaft diameter: MIN50mm
	Outside diameter: MAX300mm
	Width:MAX105mm
	Weight :<20kg
Net weight	13.2kg
size	560mm*250mm*350mm

### 2.4.2 Software operation on wire feeder



Click "Setting" switch to the "Continuous Mode Settings Page".



- "Continuous mode setting" indicates that the setting page of the continuous mode of the wire feeder system is displayed on the current screen, and it is invalid to click.
- "Wire Feed Speed" is the same as the "Wire Feed Speed" on the first page. Control the speed of wire feeding during welding. The range is 15 ~ 600 cm/min, which can be directly input by the keyboard by clicking the "number", or can be quickly adjusted by the "arrow". Note: All parameters on this page can be adjusted by directly clicking the value or clicking the "arrow", the same below.
- "Start Delay" controls the amount of time the wire feeder delays starting after the gun trigger is pressed. Range 0 ~ 2000 ms, usually set to 0. For example, if the start delay is set to 1000ms, press the trigger of the welding gun and wait for 1s to start wire feeding.
- "Withdrawal Length" controls the length of broken wire that the wire feeder withdraws when the wire is broken, and is used to help break the wire. The range is 0 ~ 100mm, usually set to 10, which can be increased appropriately according to the thickness of the field welding wire and the length of the wire feeding pipe.
- 'wire supplement length' controls the length of the compensate wire fed after the wire feeder is drawn back when the wire is broken, and is used for compensate the influence of the 'drawn back length' so as to keep the consistency of joints during next welding. The range is 0 ~ 100mm, which is consistent with the "pullback length" in principle. If

the resistance of the wire feeding pipe on site is large, it can also be larger than the "pullback length" appropriately.

- "wire supplement delay" controls the interval time length between the wire feeder compensating the wire feeding and drawing back the broken wire when the wire is broken, which is used to prevent the welding wire from adhering to the welding seam for the second time due to too early compensation of wire feeding, so as to improve the effect of broken wire. Range 0 ~ 2000 ms. Usually set to 0.
- "Language" to display the language text of the current system. Click it to switch to other languages in the "Language Bar". Note: The standard language is simplified Chinese, traditional Chinese, English, Korean, Japanese, Russian, German, French and Latin. If you have other language requirements, please contact our company.
- "Manual Wire Feeding Speed" controls the speed of "Manual Wire Feeding" on the homepage, which is used for daily equipment debugging. Range 15 ~ 600 cm/min. Usually set to 300 cm/min.
- "Manual Withdrawal Speed" controls the speed of "Manual Withdrawal" on the homepage, which is used for daily equipment debugging. Range 15 ~ 600 cm/min. Usually set to 300 cm/min.
- "System Version" displays the version number of the control system of the wire feeder. Where, "220" indicates the system hardware partial version, "601" indicates the system software partial version, and "410" indicates system screen partial version. Note: The combination of each part of the version corresponds to each other, and the versions before and after the version shall be consistent in the process of after-sales maintenance, otherwise the display may be abnormal or some functions may be invalid.
- "Save" controls the storage action of the parameters of the wire feeder system, including all parameters on the "Home" and "Setup" pages except for "Language". Click "Hold" to turn from yellow to green, indicating that the hold is successful.

Note ①: The "language" of the system is automatically saved;

Note ②: After power failure and restart, the system displays the latest saved data, so please make good use of the save function to avoid the loss of process data.

- "Back" controls the wire feeder system to switch back to "Home".
- Help controls the display of the Parameter Description. Click to view "Parameter Description".

## 3. Laser installation guide

### 3.1 Remove the wood box :

Machines are packaged in wooden boxes, while wire feeders are packaged in cardboard boxes. If there are any signs of external damage to the packaging, please check if the unit is damaged and immediately notify the shipping agent Reason. When you remove the unit from the packaging box, please be particularly careful to ensure that the optical fiber is not broken or damaged. The system documentation includes a comprehensive packing list. After receiving the product, please check all items against this list.

If any items are lost or the unit is significantly damaged, please contact us immediately. If there is obvious damage or suspicion to the crew Seemingly damaged, do not attempt to install or operate the laser device under any circumstances.

Laser is a precision and valuable item. please follow the following steps to disassemble and assemble the packaging box:

- (1) Place the equipment of this product on a flat surface according to the packaging box label.
- (2) The top cover packing box shall be removed step by step according to the identification of the top cover packing box. After removal, the top foam baffle shall be removed.
- (3) The laser is connected to the fiber optic cable of the gun head, please be careful to

remove it and ensure the bending radius of the fiber optic cable armor  $>175\text{mm}$ .

(4) Remove the foam shield and take out the supporting items.

(5) Please check the accessories against the packing list.

(6) Please keep all items unpacked properly to prevent future transportation or storage needs.



Machine wooden box



Wire feeder carton box

### 3.1.1 Package list :

## PACKING LIST



### 3.1.2 Preparation work before startup

- (1) Fill the water tank with pure water until the water level gauge on the back of the machine reaches the green mark.

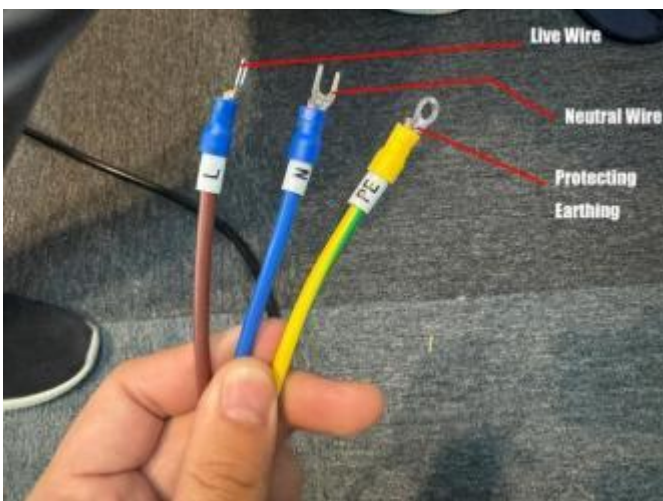


(2) Machine is 220V 50Hz Connect the power cord to the electrical box.

If you need to run it at 110V , please prepare a transformer.

Connect the power cord to the specified voltage and phase, L=220VAC, N=0VAC, PE=ground.

Ensure proper wiring



(3) Connecting the Argon gas / Nitrogen gas, The flow rate of the gas needs to reach 15L/min)

(Noticed: When using welding and cutting function, need to use with air pump. The air pump contains argon which can not be shipped with machine, so customer need to prepare themselves. Recommend use above 99.9% pure Argon 4.6, it will influence welding effect.)



- (4) Turn the knob on the air pressure gauge on the back of the machine so that the pressure index of the pressure reducing valve reaches 0.2Mpa.



### 3.1.3 Wire feeder connection:

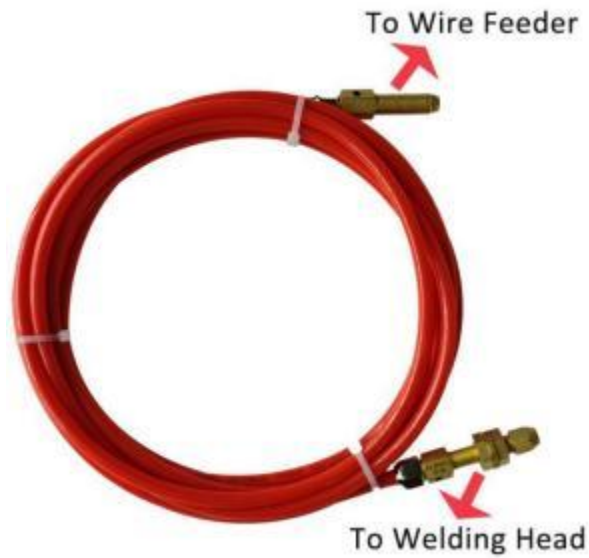
#### (1) Installation of the welding wire disc/wire feeding wheel

- It is forbidden to use flux-cored wire, and the selection of welding wire shall be consistent with the material to be welded.
- There are two wire feeding wheels in total. The two sides are of different models, corresponding to different core diameters. Please be sure to install them accordingly. If 1.2 welding wire is installed, the side of the wire feeding wheel marked with 1.2 is outside.

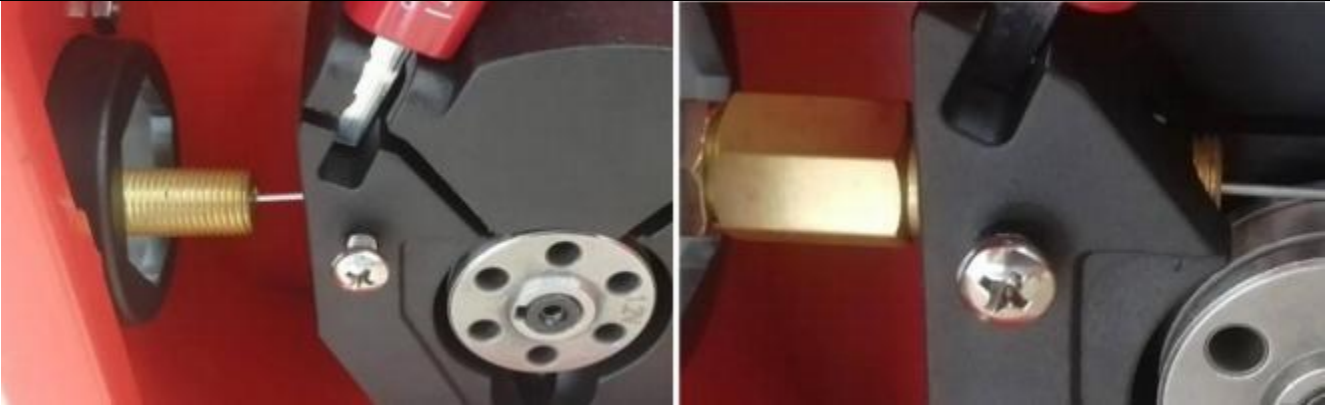
- During installation, be sure to clamp the welding wire in the slot and then clamp it.



(2) Installation of wire feed pipe



Loosen the locking screw of the wire feeding tube, insert it into the appropriate position and then lock it.



### (3) Gun head end

- After the above operations are linked, prepare the fittings at the nose end and assemble them
- Please note that [connection block] distinguishes models, that is, different models use different connection blocks, and other accessories are the same.

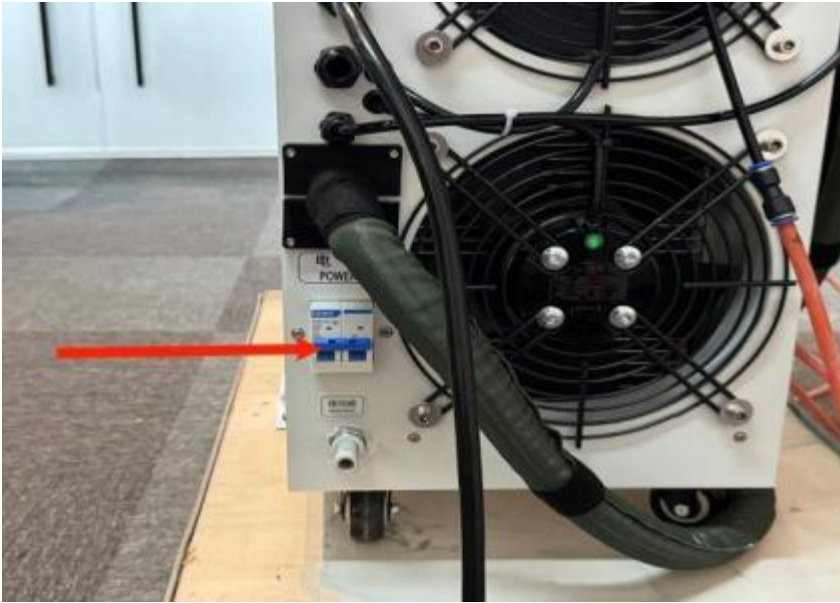


### (4) Connect the wire feeder to welding machine

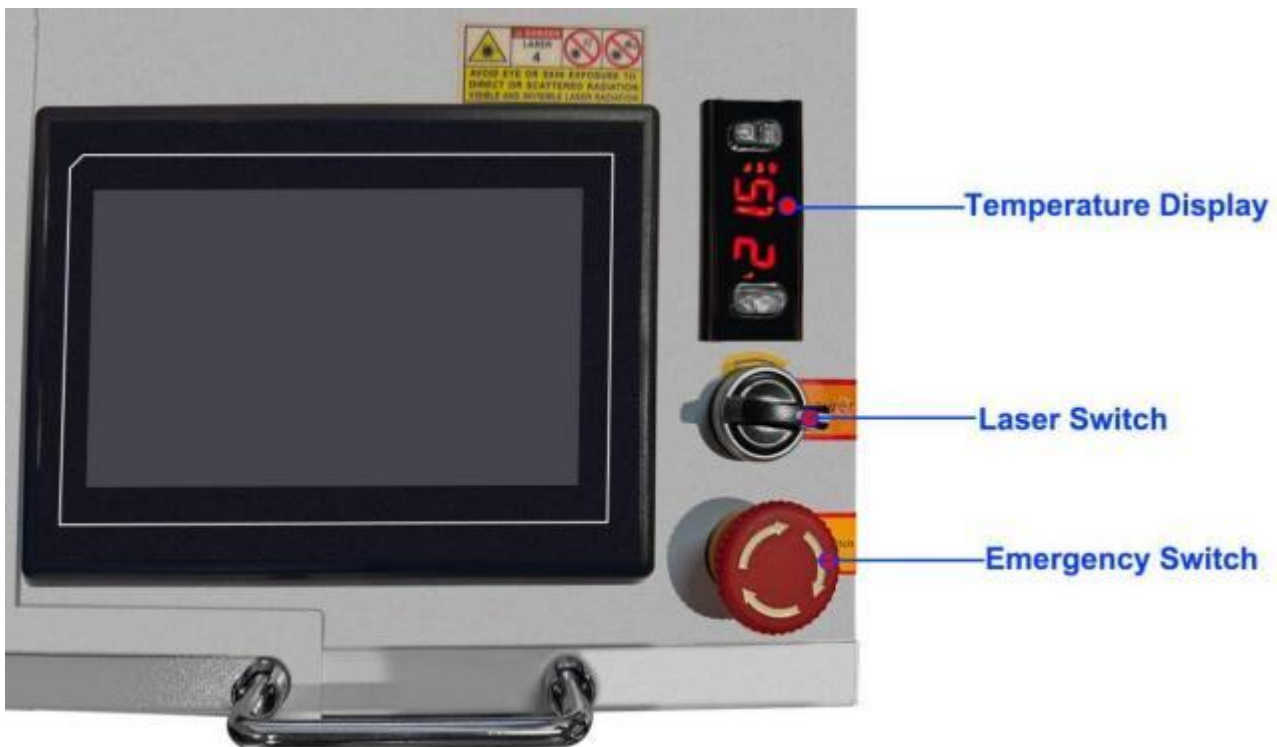


### 3.1.4 Power on

- (1) Toggle the air switch on the back of the machine up, then flip the switch on the machine's control panel, the screen lights up, and the machine starts to run.



- (2) Water chiller temperature can not be lower than 20 °C, if lower than 20 °C, wait for the machine to warm up to reach more than 20 °C before operation.



(3) **Safe clip**: Before turning on the laser, the safety clip must be clamped in the correct position to ensure that it forms a circuit with the welding head.

In welding mode, the safety clip is clamped on the welded work piece.



In cleaning and cutting mode, the safety clip is clamped on the welding gun.



## 4. User Guide

### Overview of 4 in 1 Laser Welding Machine:

- 1. Laser welding:** Supports the welding of various materials such as metal, carbon steel, stainless steel, aluminum alloy, etc. It adopts laser beam fusion technology, with high precision and small heat affected zone, and the weld seam is firm and beautiful.
- 2. Laser cleaning:** Quickly removes rust, oil stains, oxides and other pollutants from metal surfaces without touching the work piece, making it environmentally friendly and efficient.
- 3. Laser cutting:** Suitable for cutting metal sheets, with flexible operation and widely used in fields such as hardware and sheet metal manufacturing.
- 4. Weld cleaning:** After welding, rust removal and oxidation layer removal should be carried out on the weld to improve welding quality.

### 4.1.Welding Mode

#### 4.1.1:Select the cooper nozzle

Different copper nozzle applies to different materials welding.


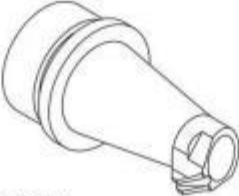



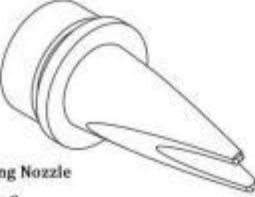
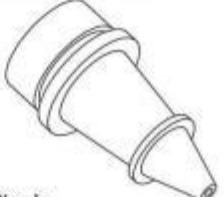

For example, AS-12 copper nozzle mainly used for welding wire 1.0mm at **inner** Angle feed (**AS-12 basic universal**);

- AS-12: The filaments below 1.2mm are generally used for flat Angle, inner Angle and outer Angle welding;
- BS-16: The filaments below 1.6mm are generally used for flat Angle, inner Angle and

outer Angle welding;

- CS-12: The filaments below 1.2mm are generally used for outer Angle welding;
- FS-16: The filaments below 1.6mm are generally used for outer Angle welding;
- C: For non-wire feeding, used for outer corner welding;
- ES-12: Filaments below 1.2mm are commonly used for outer corner sheet welding.

## Handheld Laser Welding Head Copper Nozzle

 <p>Welding Nozzle Model: AS-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>	 <p>Welding Nozzle Model: BS-16 Wire Feeding: 1.6mm</p>	 <p>Welding Nozzle Model: CS-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>	 <p>Welding Nozzle Model: ES-12 Wire Feeding: 0.8mm, 1.0mm, 1.2mm</p>
 <p>Welding Nozzle Model: FS-12 Wire Feeding: 1.6mm</p>	 <p>Welding Nozzle Model: C Wire Feeding: No Wire Feeding (For Weld Seam Cleaning Mode)</p>	 <p>Cutting Nozzle Single Layer 1.5mm For Cutting Mode</p>	 <p>Scale Tube For Adjust Focal Length</p>

### 4.1.2: Wire selection

(1) According to the width of the weld seam choose the diameter of the welding wire.

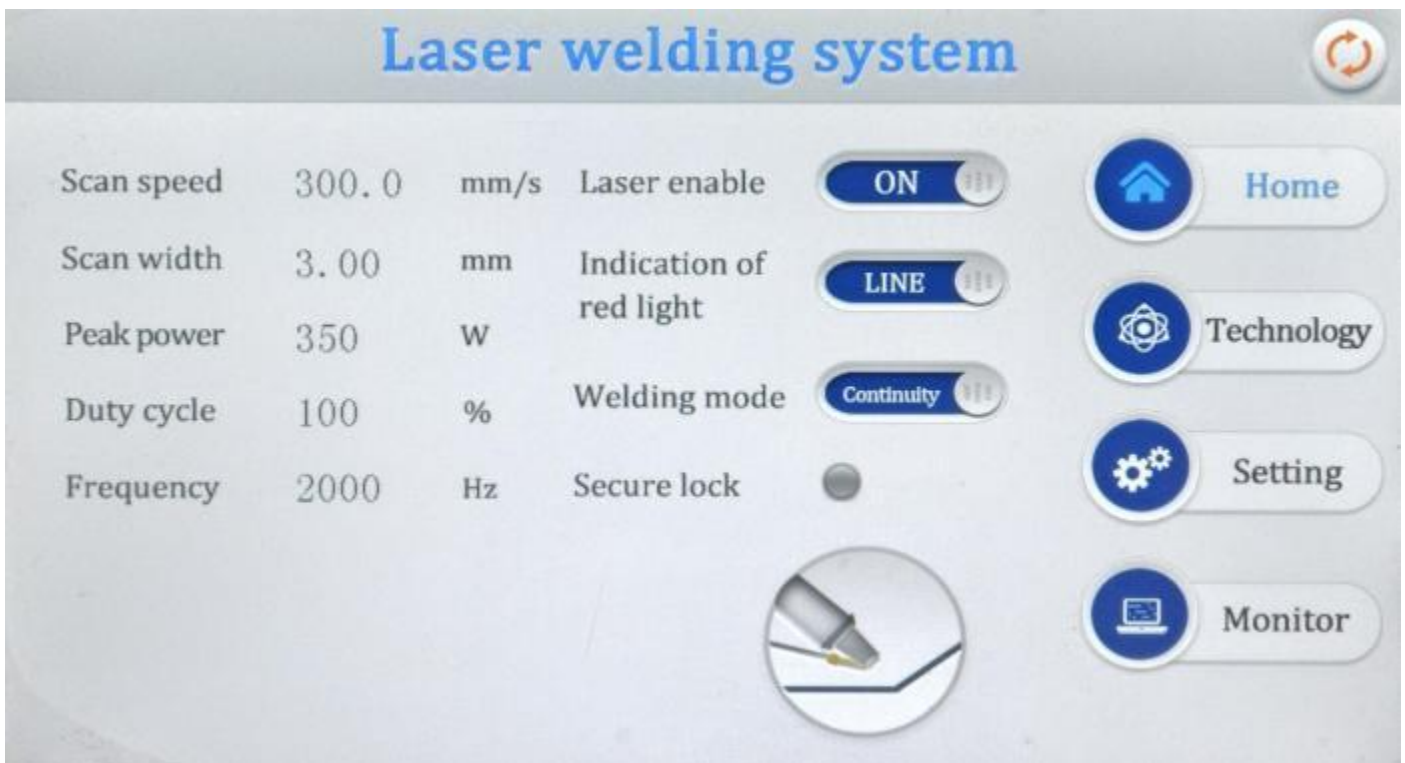
- Width of weld seam  $< 1.2\text{mm}$ , Recommend 0.8mm welding wire
- Width of weld seam  $< 1.5\text{mm}$ , Recommend 1.0mm welding wire
- Width of weld seam  $< 2.0\text{mm}$ , Recommend 1.2mm welding wire
- Width of weld seam  $< 3.0\text{mm}$ , Recommend 1.6mm welding wire

(2) According to the different welding plates, we need to use different welding wires (gas protected solid core wire).

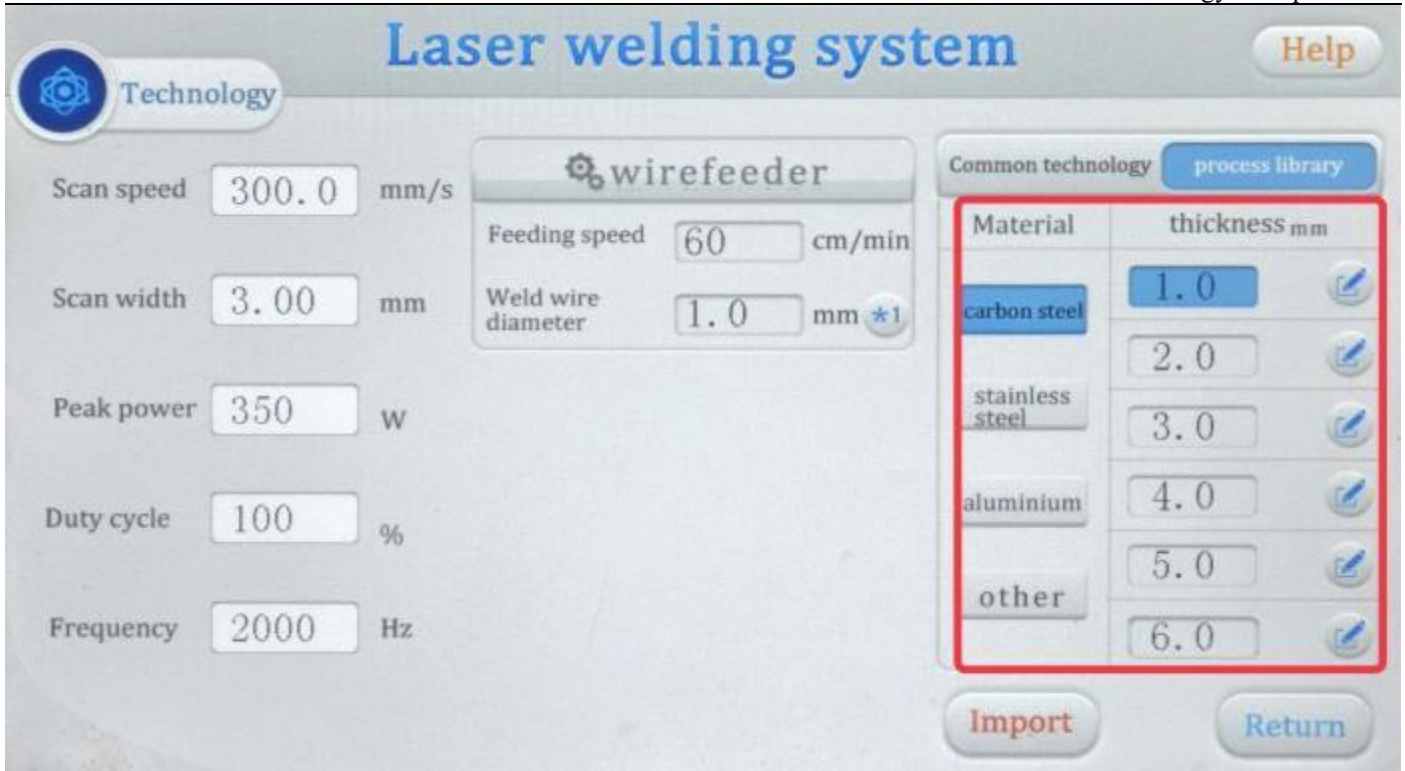
- Stainless steel = ER304 Stainless steel welding wire
- Carbon steel / Galvanized sheet = Iron wire
- Aluminum = Aluminum wire (Aluminum welding wire is recommended to use alloy aluminum of 5 series or above, which has high hardness and is not easy to get stuck)

#### 4.1.3: Setting welding parameter in control screen

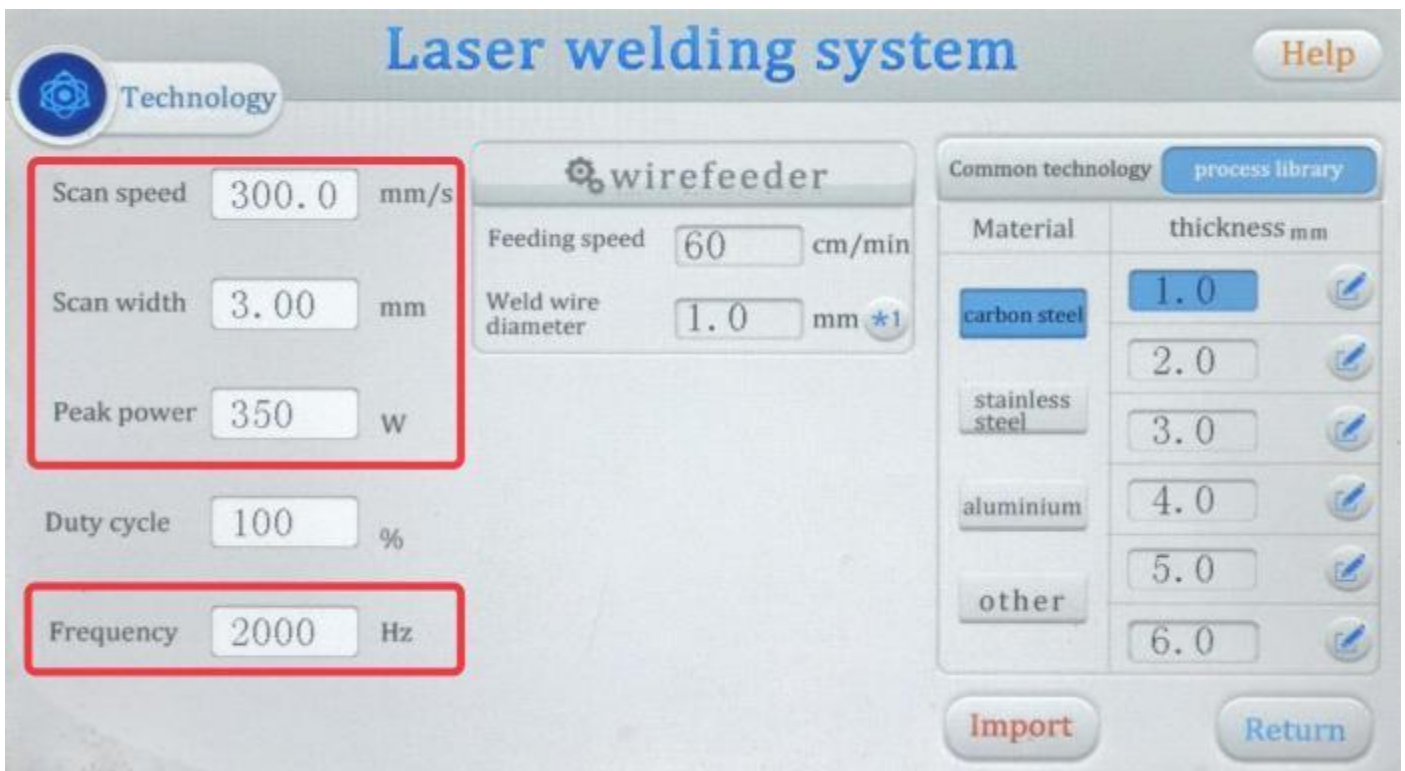
- Click “technology”, set up welding parameters



- According to your requirement to choose the parameters in process library



- If your needs are not met, you can adjust the “Scan speed” “Scan width” “Peak power” as your requirement.



#### 4.1.4 Welding Parameters

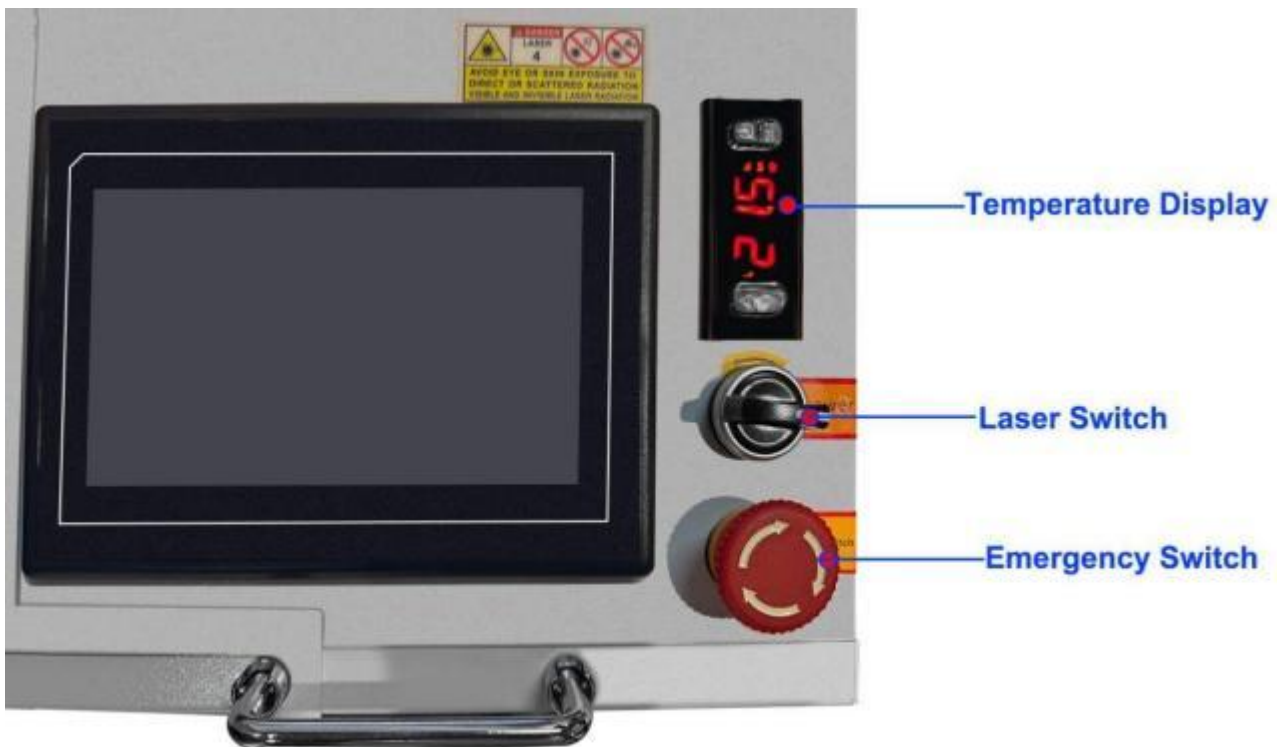
Laser Welding Parameter (reference)								
Materials	Thickness /mm	Scan Speed mm/s	Scan width/mm	Peak power/W	Duty cycle	Frequency/ Hz	Wire feed speed cm/s	Welding wire
Carbon steel	1	300	3	350	100	2000	60	1
	2	300	3	700	100	2000	60	1.2
	3	300	3	1100	100	2000	60	1.2
	4	300	3	1500	100	2000	60	1.6
	5	220	3	1800	100	2000	50	1.6
	6	220	3	2200	100	2000	50	1.6
	8	220	3	3000	100	2000	40	2
Aluminum	1	300	3	500	100	2000	60	ER5356 1.0
	2	300	3	800	100	2000	60	ER5356 1.2
	3	300	3	1400	100	2000	60	ER5356 1.2
	4	300	3	1800	100	2000	60	ER5356 1.6
	5	220	3	2000	100	2000	50	ER5356 1.6
Stainless steel	0.5	300	3	260	100	2000	80	ER304 0.8
	0.8	300	3	300	100	2000	80	ER304 0.8
	1	300	3	350	100	2000	60	ER304 1.0
	2	300	3	700	100	2000	60	ER304 1.0
	3	300	3	1100	100	2000	60	ER304 1.2
	4	300	3	1500	100	2000	60	ER304 1.2
	5	220	3	1800	100	2000	50	ER304 1.6
	6	220	3	2200	100	2000	50	ER304 1.6
8	220	3	3000	100	2000	40	ER304 2.0	

The following is laboratory data on welding and cutting, for reference only. Please refer to the actual situation for details

Continuous Laser	1500W	2000W
Welding thickness of carbon steel and stainless steel	0.35-4mm (MAX 4.5mm)	0.35-5.5mm(MAX 6mm)
Welding thickness of Aluminum	3mm (MAX 3.5mm)	4mm (MAX 4.5mm)

#### 4.1.5: Start Welding

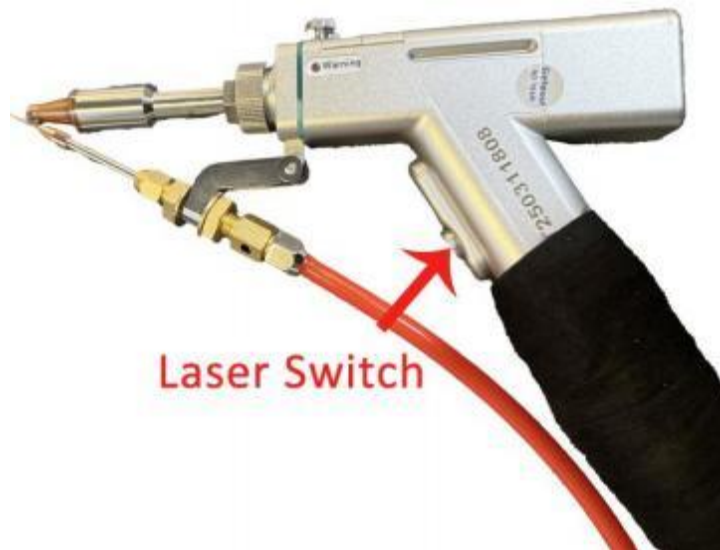
- (1) Turn on the “Laser Switch--Emergency switch (Keep the switch in a pop-up state)”.  
When you turn off the machine, “Emergency switch--Laser Switch”



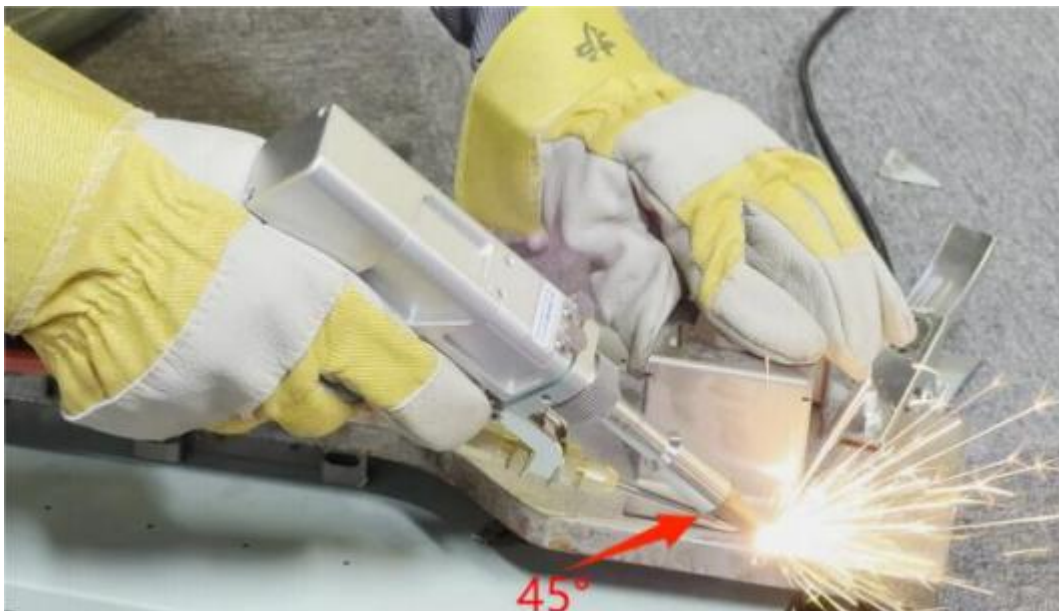
- (2) Adjust the scale tube with 0mm, which is the best focal length



(3) Double click laser switch on welding gun and keep click the button, start welding, and safety clip is clamp on the work piece.



(4) When welding, keep the welding head at a 45° with work piece you welding.



## 4.2 Cutting Mode

### 4.2.1 Change the cutting nozzle

- Please replace the cutting copper nozzle

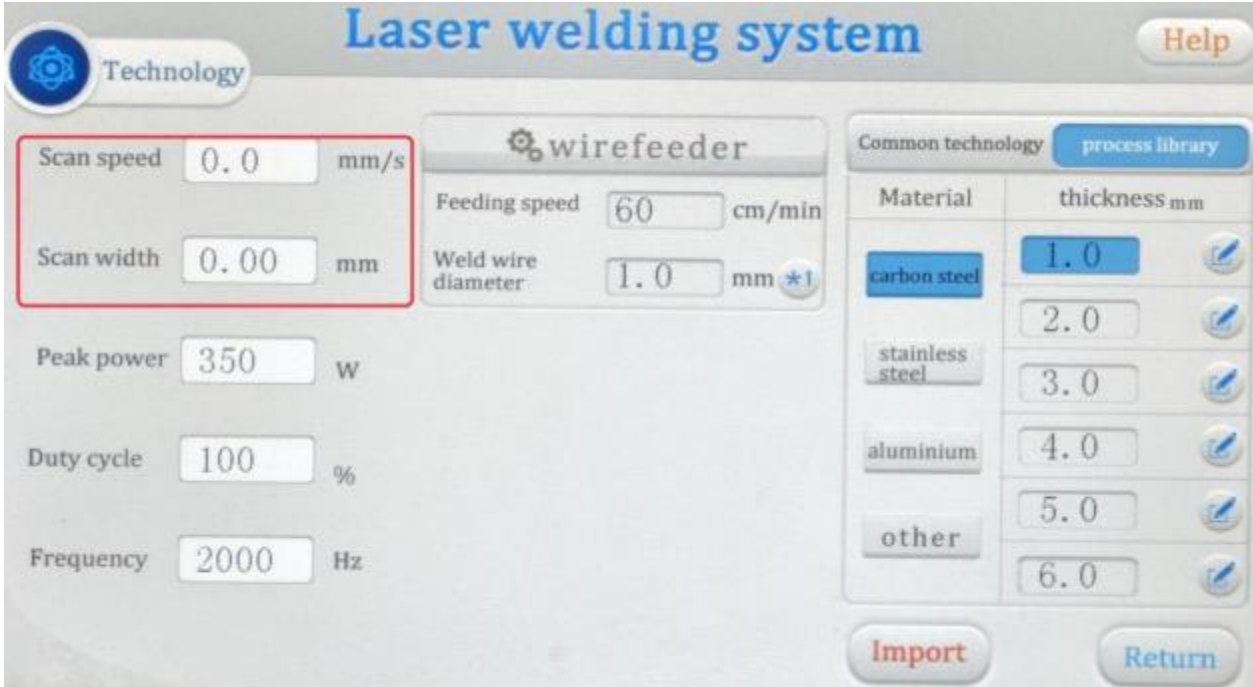


### 4.2.2 Parameter setting

- Set "Scan speed" and "Scan width" as 0mm, "Peak power" as your need, the max is the

machine power.

For example,if your machine is 1500W, the max peak power is 1500W.



The following is laboratory data on welding and cutting, for reference only. Please refer to the actual situation for details

Continuous Laser	1500W	2000W
Cutting thickness of carbon steel and stainless steel	0-5mm(MAX 8mm)	0-6.5mm (MAX 10mm)
Cutting thickness of Aluminum	0-2mm(MAX 2.5mm)	0-2.5mm(MAX 3mm)

### 4.2.3 Start Cutting

- Clamp the safety clip onto the welding gun
- Double click laser switch on welding gun and keep click the button, start cutting



## 4.3 Welding seam cleaning mode

### 4.3.1 Change the welding seam cleaning nozzle

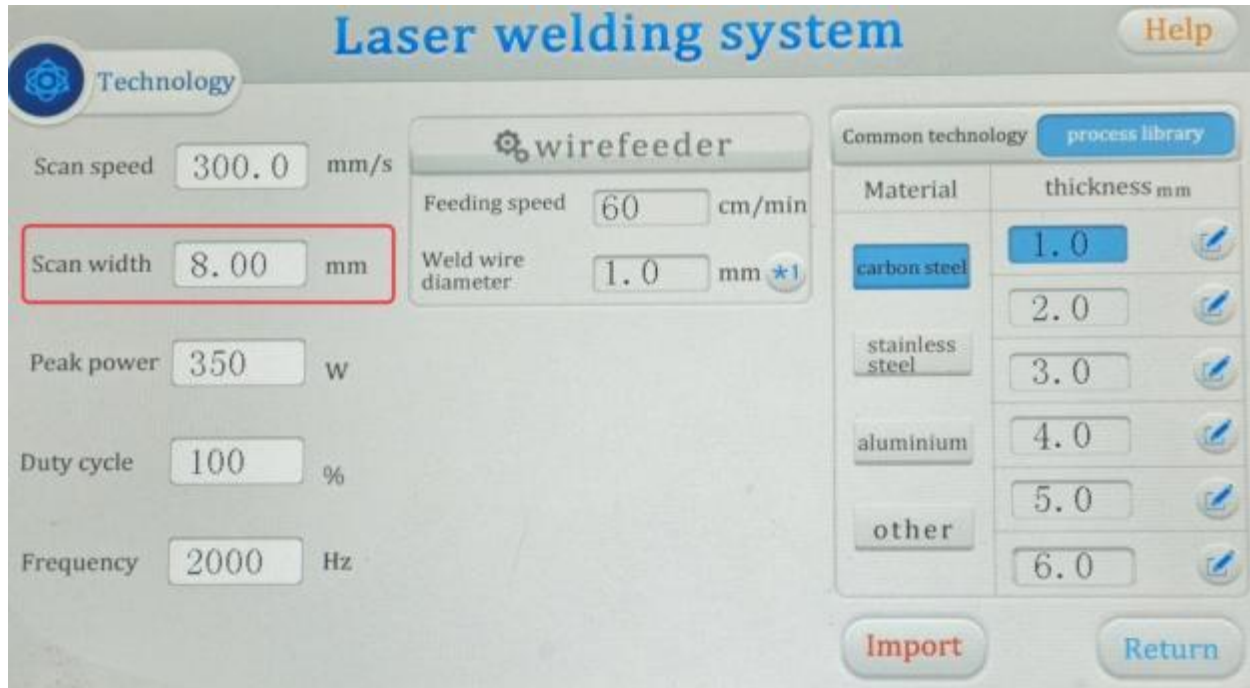
Please replace the welding seam cleaning nozzle, Nozzle model:C



### 4.3.2 Parameter setting

- Set “Scan width” according to the width of the weld seam that is oxidized or burnt during welding

Max “Scan width” should be 8mm.



### 4.3.2 Start weld seam cleaning

- Clamp the safety clip onto the welding gun
- Double click laser switch on welding gun and keep click the button, start weld seam cleaning

## 4.4 Cleaning mode

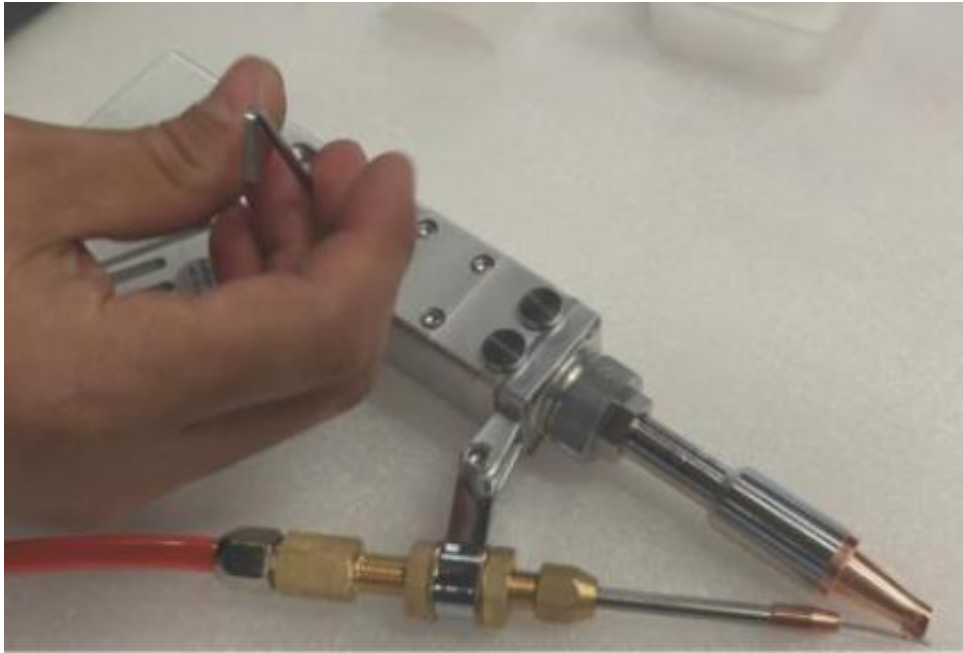
### 4.4.1 Remove the copper nozzle



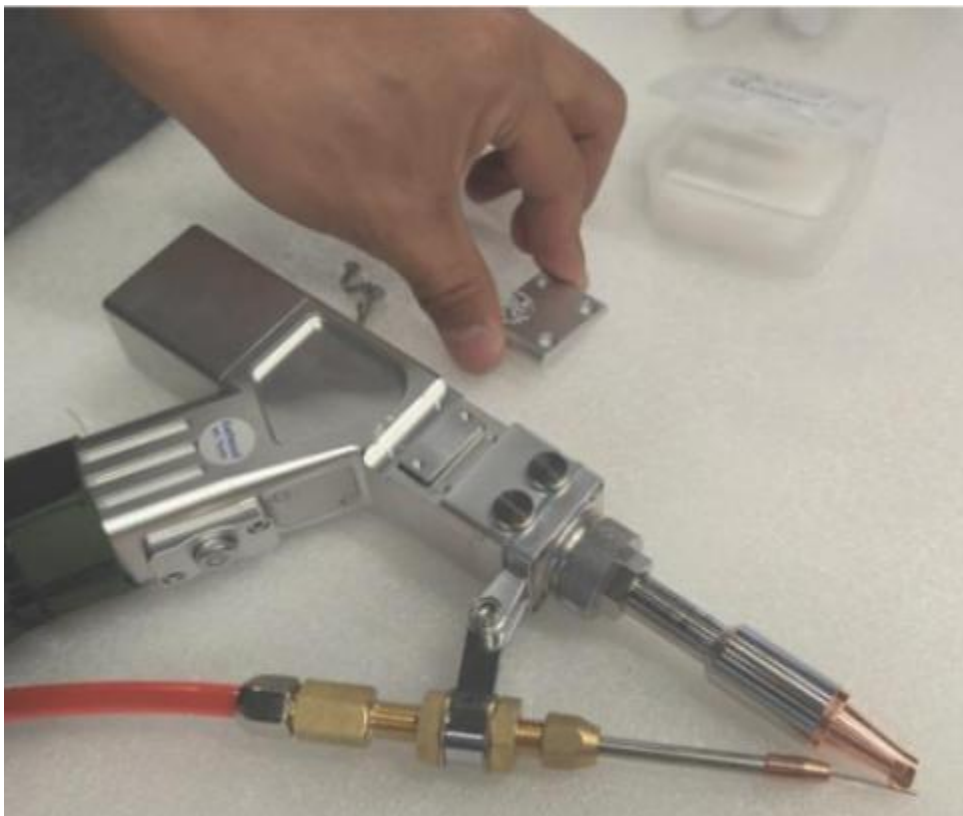
### 4.4.2 Replace the cleaning lens

- If the range of rust/Paint/Oil removal is relatively narrow, and there is no need to replace the lens. Use F150 focus lens directly.
- If the cleaning range is relatively large and more efficient cleaning is needed, please replace F800 focus lens(cleaning lens).
- At the focusing lens F800,the maximum cleaning width is130mm.
- At the focusing lens F150,the maximum cleaning width is 30mm.

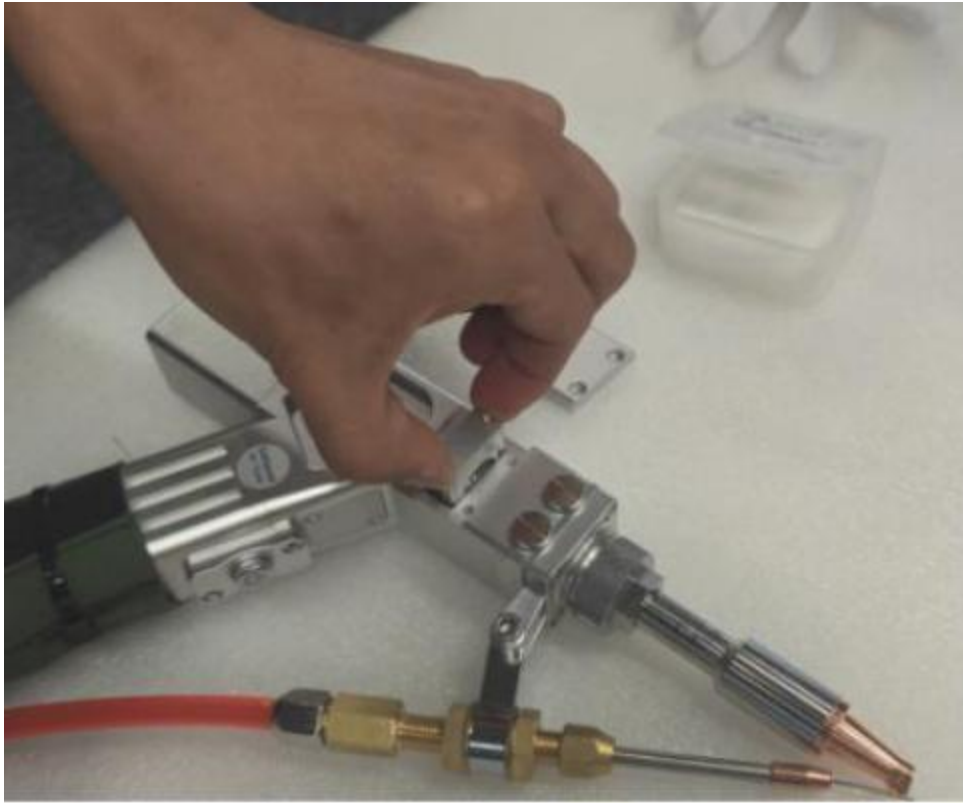
(1) Unscrew four screws



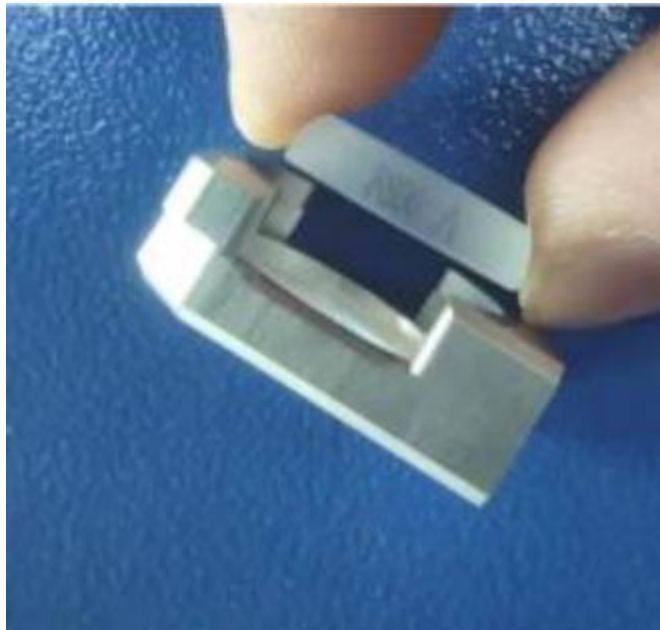
(2) Remove the lid



(3) Take out the lens

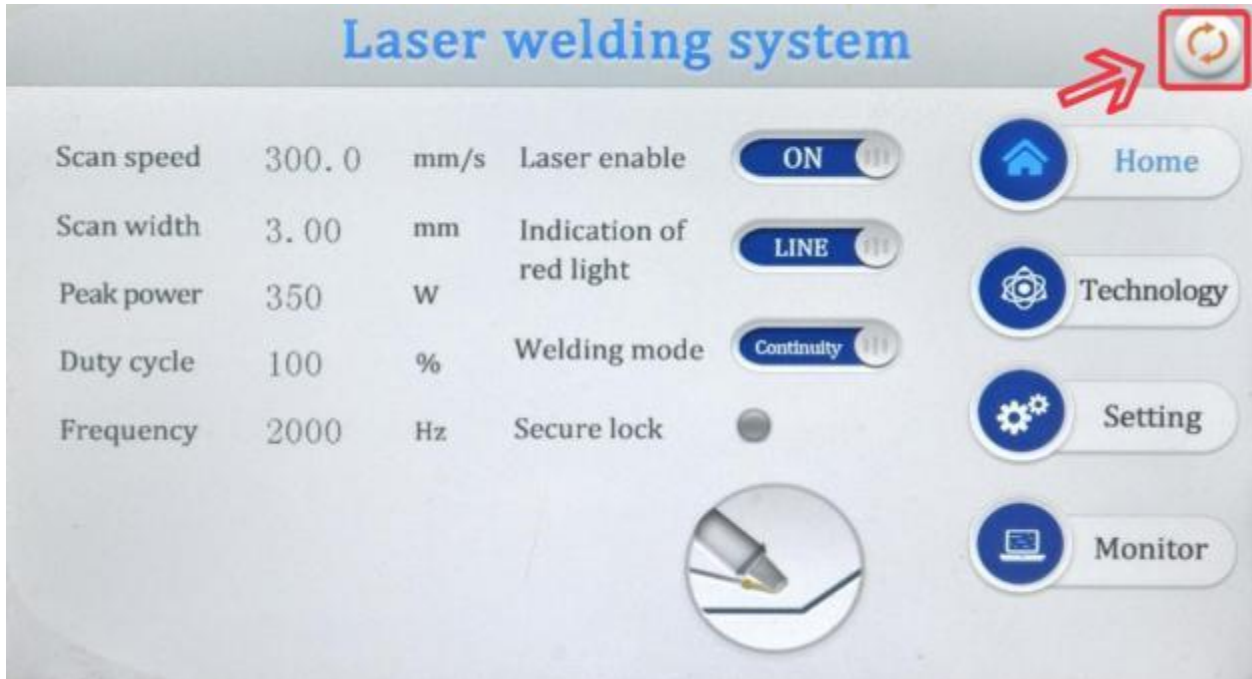


(4) Replace the F800 focus lens, the flat surface of the lens is facing upwards.

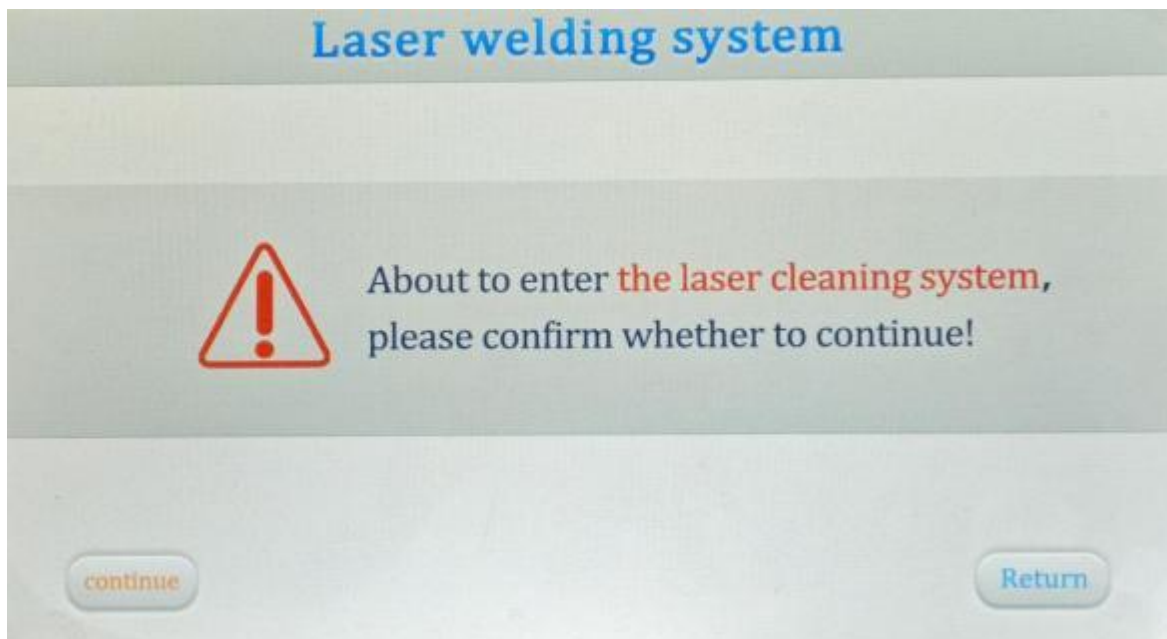


### 4.4.3 Mode switch in software and parameters setting

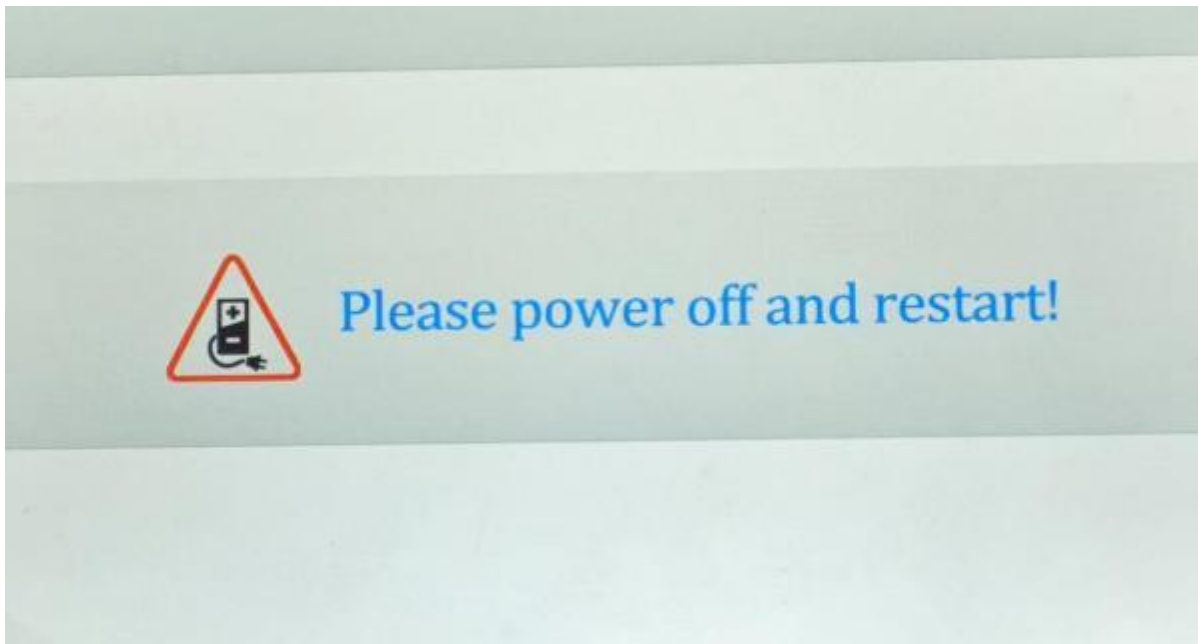
(1) Click switch button  in welding homepage



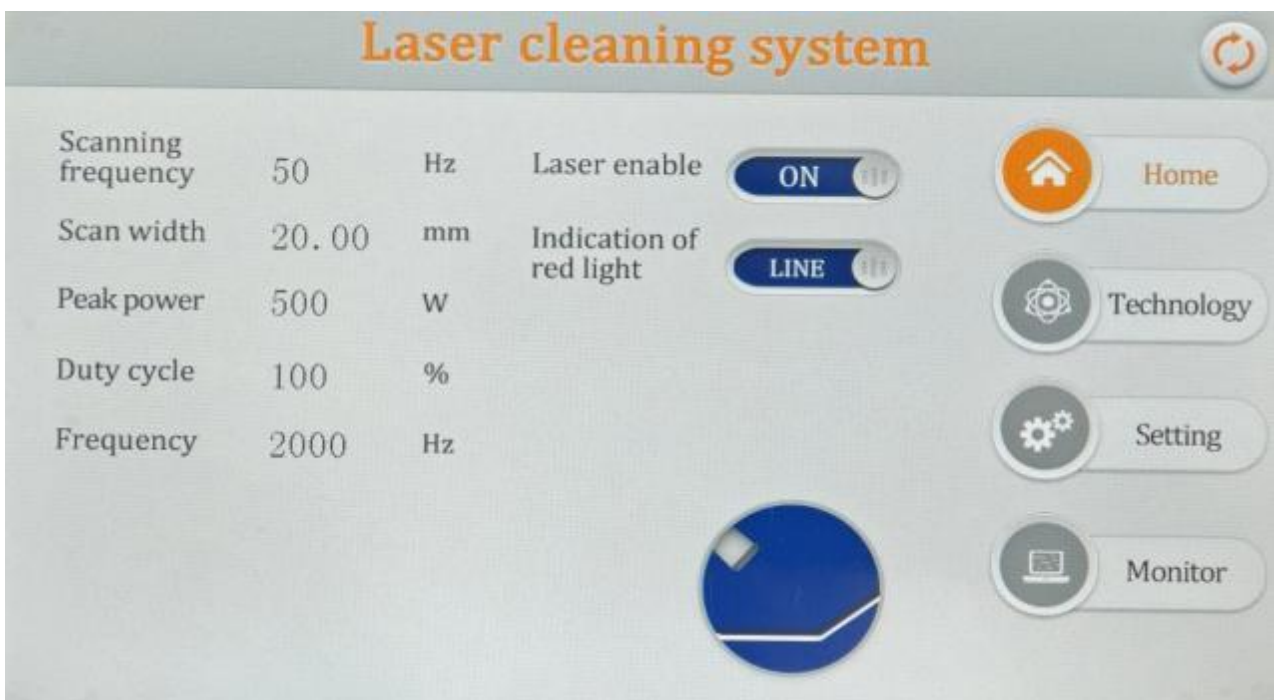
(2) Click "Continue"



(3) Restart the machine

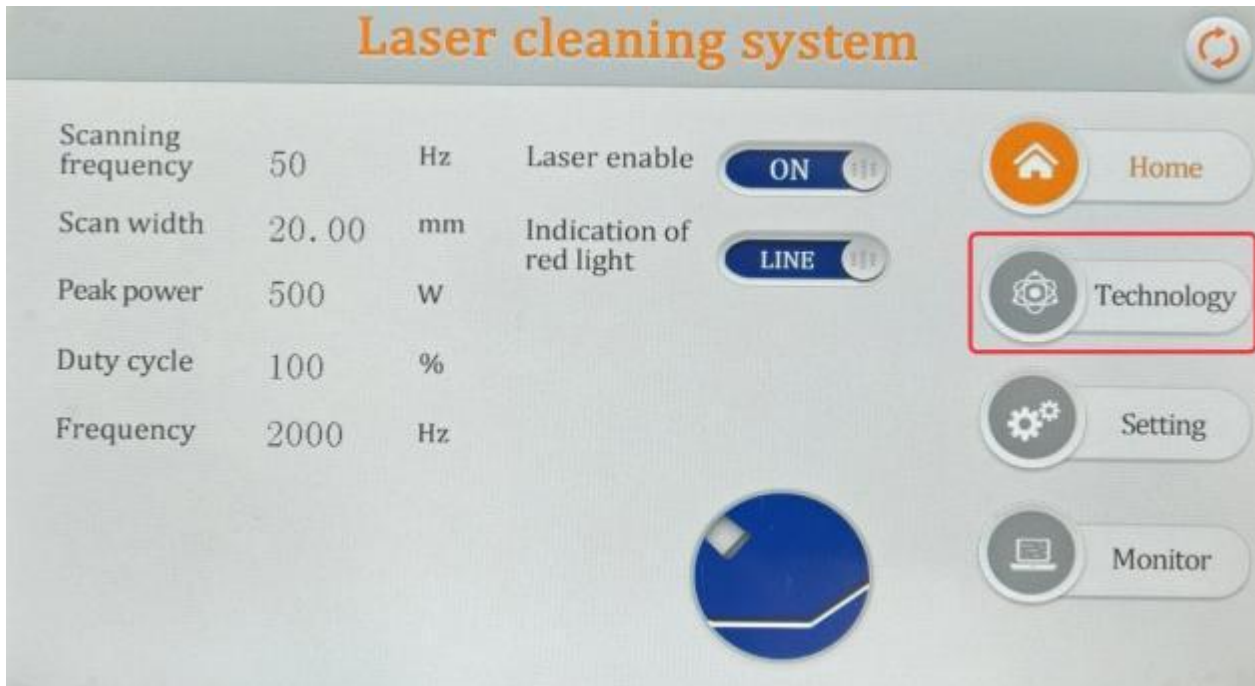


(4) Go to the cleaning mode homepage



When back to welding mode, it is the same operation as above.

(5) Click technology



(6) Test with parameters from the database



(7) If your needs are not met, you can adjust the “Scanning frequency” “Scan width” “Peak power” as your requirement.



**When use F150 focus lens, Scan width must  $\leq$  26mm.(It is important! ! ! )**

**When use F800 focus lens, Scan width must  $\leq$  20mm.**

**If the parameters are not set according to this, it will burn the welding head.**

When use cleaning function, peak power no more than 1200W.



#### 4.4.4 Start Cleaning

- Clamp the safety clip onto the welding gun
- Double click laser switch on welding gun and keep click the button, start cleaning
- **Focus adjustment:** Move the welding gun up and down, and when the laser is strongest, it is the optimal focal length.



## 5. Machine maintenance and upkeep

### 5.1 Maintenance for protective lens

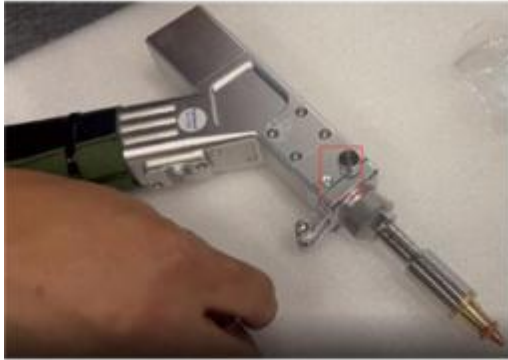
#### 5.1.1 When need replace protective lenses:

- Check the protective lens. If there is obvious burning on the surface of the protective lens, replace it directly.
- Check the white accumulating sealing ring under the protective lens. (If there is any scratch or deformation of the accumulating seal ring, it cannot be used and must be replaced immediately.)

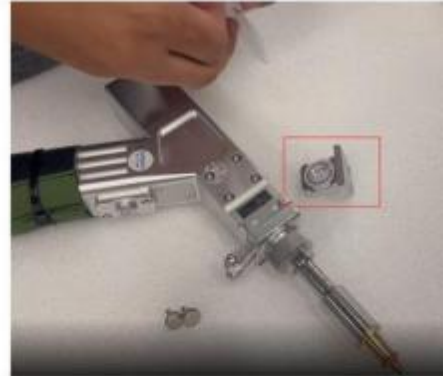
### **5.1.2 How to replace protective lenses:**

- Before operation, please clean your hands and wipe them dry, and then wipe your hands again with cotton dipped in alcohol.
- Remove the screws of the protective lens compartment cover in a relatively dust-free place, pull out the protective lens bracket, and protect it (covered by masking paper).
- Wipe the compartment opening and the inside of the compartment cover with a cotton ball dipped in alcohol, quickly insert the protective lens holder into the protective lens compartment, and tighten the screws.

## How to replace protective lenses



1. Unscrew two screws



2. Take out lenses



3. Replace protective lenses



4. Screw on the screws

### 5.2 When need add antifreeze

#### Cooling system water temperature setting:

Water cooler  $25 \pm 1$  °C (no need to change in summer)

#### Coolant requirements:

- Purified water is used as cooling water, and it is recommended to use purified drinking

water and replaced every month.

- To prevent mold growth in the water in the chiller from causing pipe blockage, it is recommended to add ethanol with a volume ratio of 10% when adding purified water.
- When the ambient temperature of the equipment is between  $-10\text{ }^{\circ}\text{C}$  and  $0\text{ }^{\circ}\text{C}$ , the ethanol solution with a volume ratio of 30% must be used and replaced every two months.
- When the ambient temperature of the equipment is lower than  $-10\text{ }^{\circ}\text{C}$ , the dual-system (with heating function at the same time) water chiller must be used, and the uninterrupted operation of the cooling system must be guaranteed.

**Other requirements for the cooling system:**

- When starting the cooling system for the first time, check the entire water system and connections for water leaks. The external water pipes must be installed and connected according to the water inlet (IN) and water outlet (OUT) marked by the laser. Otherwise, the laser may not work properly.
- If the laser is not used for a long time, the cooling water inside the cooling system and the laser should be drained, otherwise the laser will be irrecoverable damaged.

## Warning

- Set the water temperature of the cooling system correctly according to the ambient temperature.
- If the water temperature is set too high, the laser will not work properly.
- If the water temperature is set too low, condensed water will be generated inside the laser or in the laser output optical cable, which will cause irreparable damage to the laser.
- Before turning on the laser, it is necessary to ensure that the cooling system operates normally and that the water temperature reaches a suitable temperature.

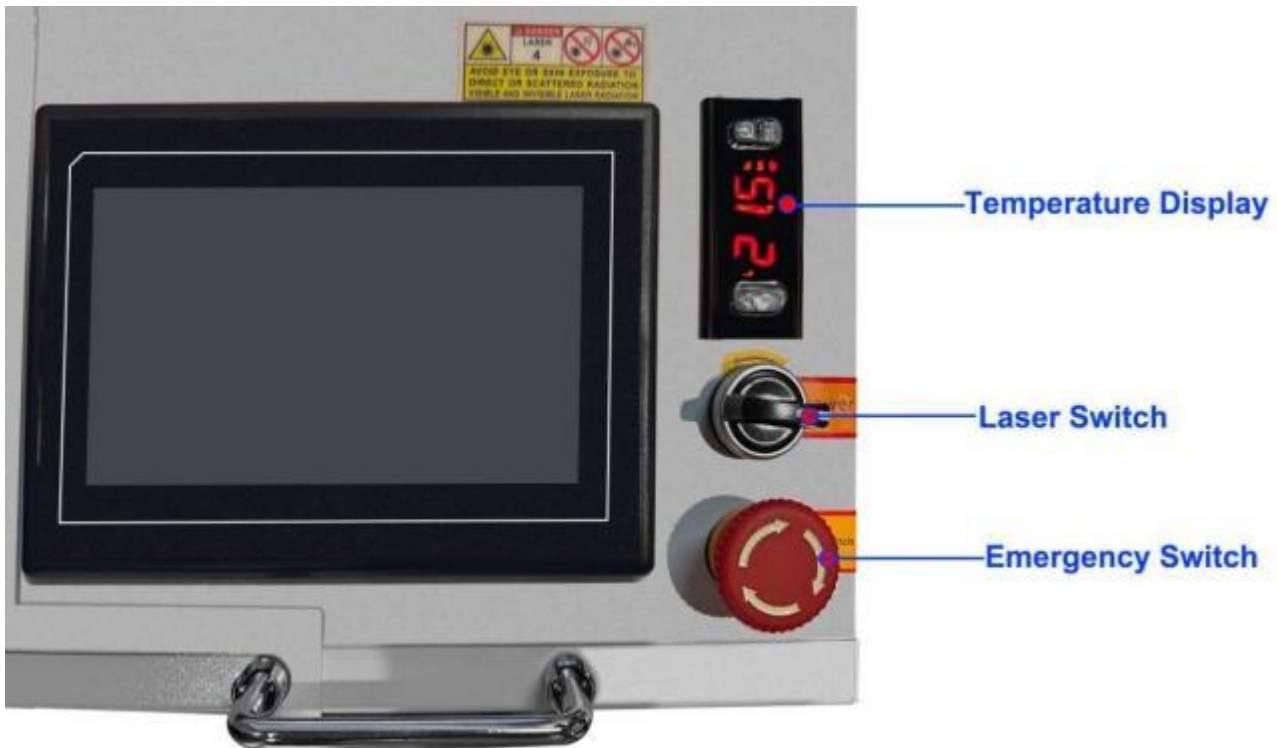
## 6. Q&A

### 6.1 No laser come out

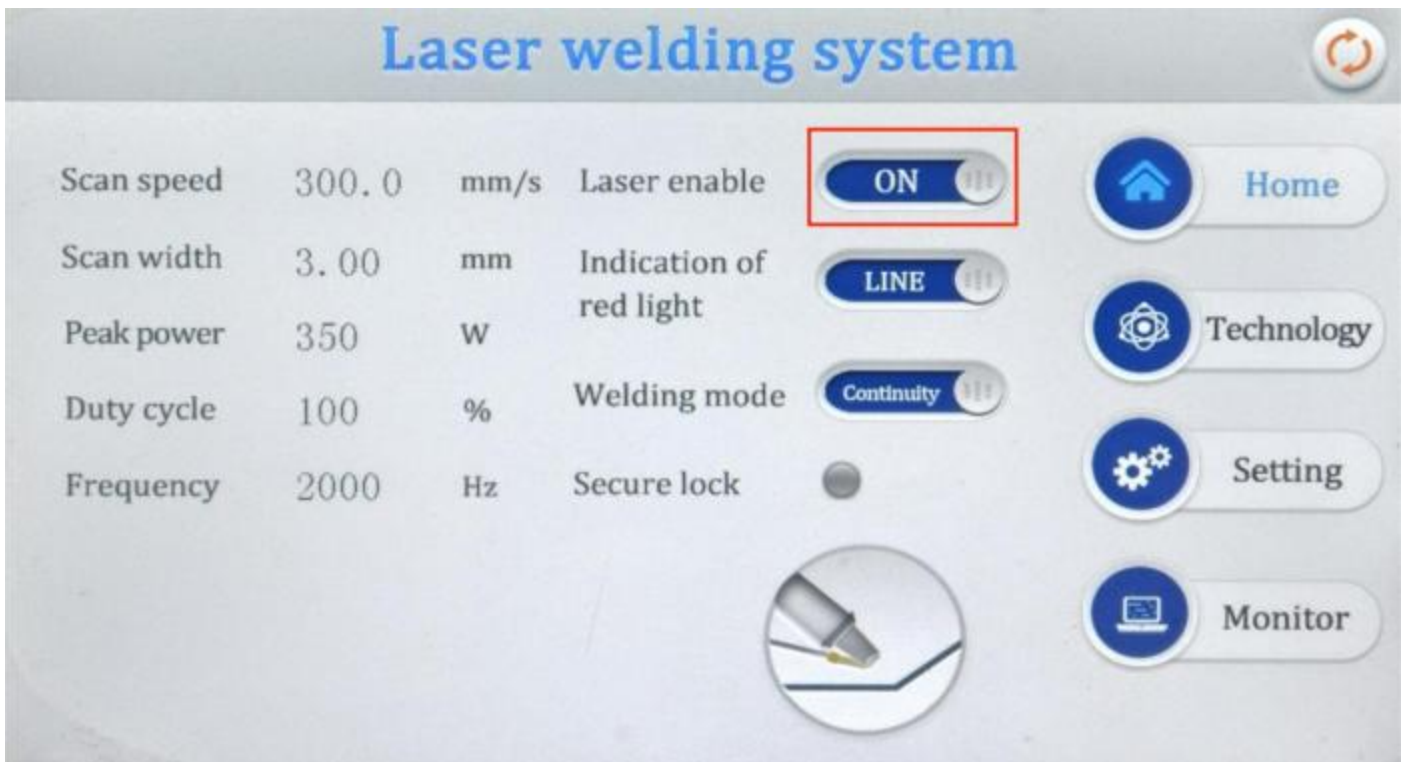
- (1) Check if gas supply is connected, and set pressure reducing valve reaches 0.2Mpa.



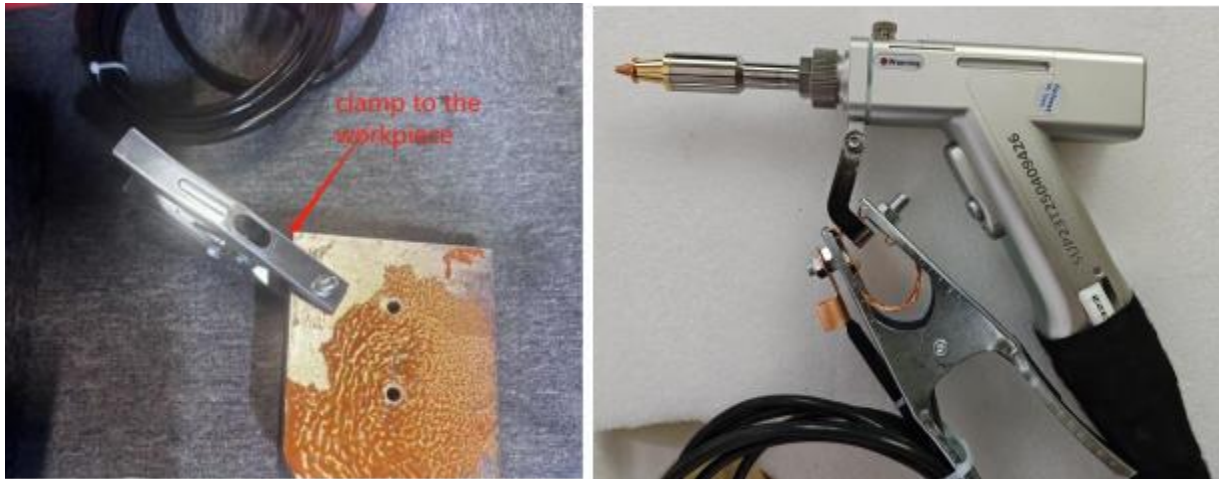
(2) Check if water temperature reaches 20°C via the temperature display



(3) Check if Laser enable is not turned on.



- (4) Check if grounding clamp properly attached (During welding, clamp to the work piece, during cleaning and cutting, clamp to the metal part of the gun.)



- (5) Laser malfunction (Green light = normal; Red/Yellow light = fault) – contact us to get the app to check the error code

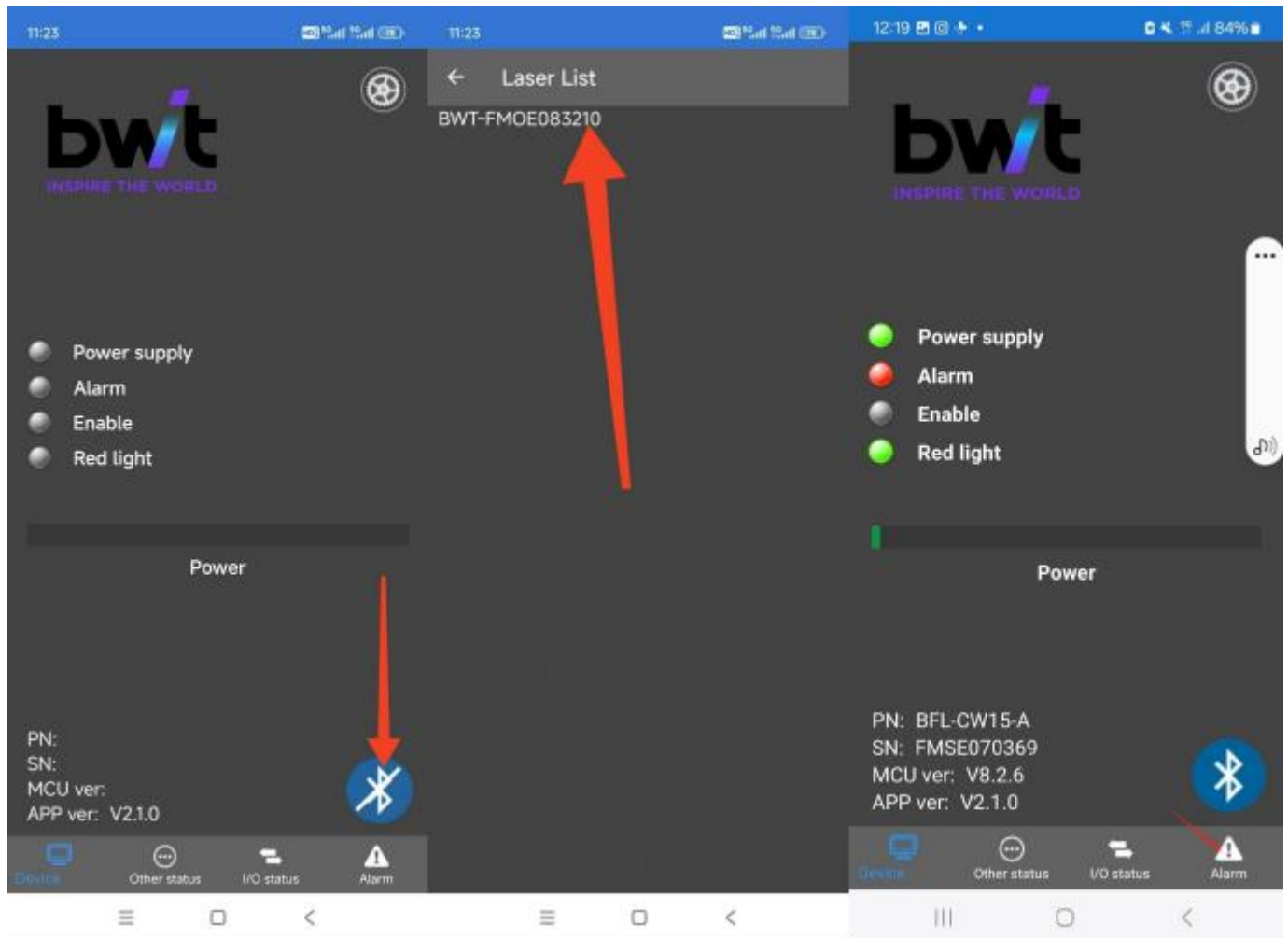


#### ❖ How to download APP

- (1) Scan the QR code with a browser, choose download Android version or IOS version.



(2) Connect the Bluetooth for laser source, connect Bluetooth. Click the alarm to check error code, then send result to us.



## 6.2 The welding machine can not continuously welding

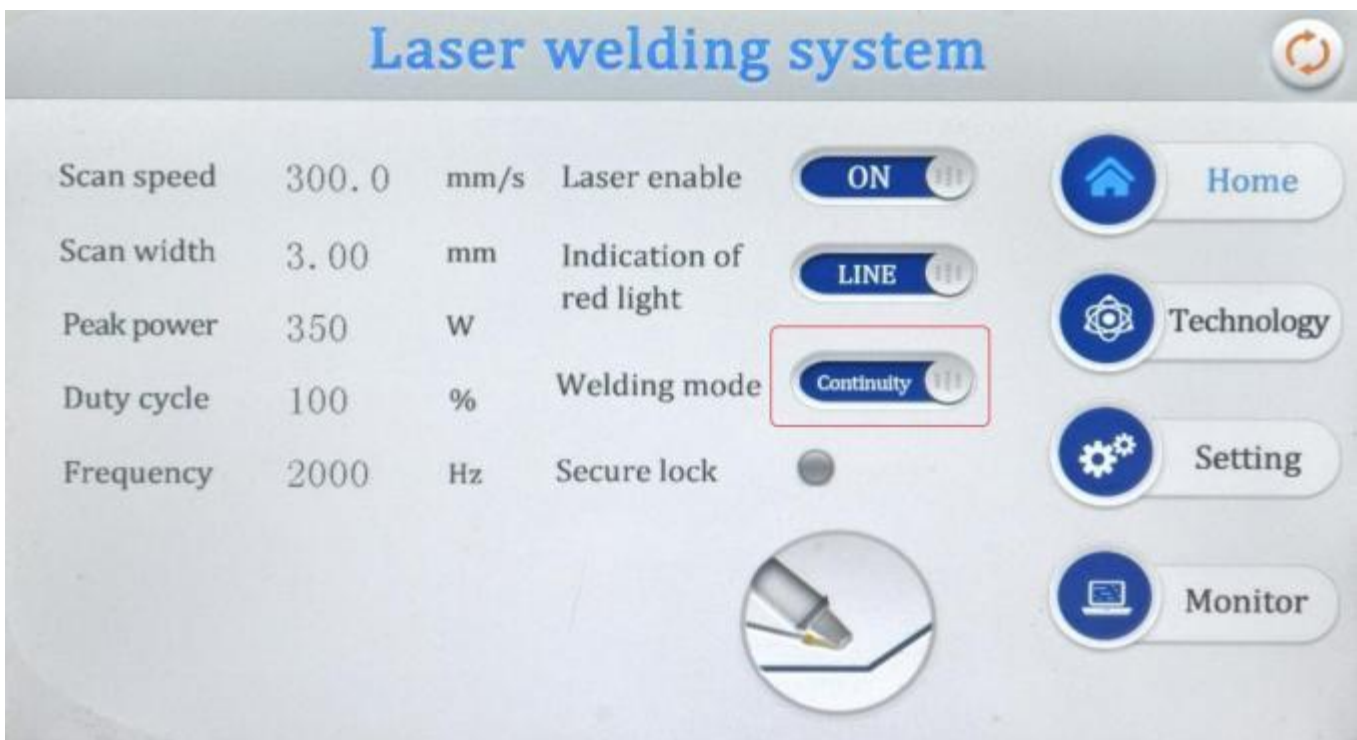
### (1) The welding material does not conduct electricity well

Solution: Clamp the safety clip to the metal position of the gun head to test whether the light can be emitted normally



(2) See if the system set to “spot welding” mode.

Solution: Change the welding mode to :Continuity



### 6.3 The welding is not firm or with ugly result.

(1) Check whether the gas is connected.

(2) Check whether the parameter settings are incorrect. If the welding is weak, then

increase the power or slow down the speed.

- (3) Check whether the welding material is selected correctly, such as welding object is steel 304, then choose the steel 304 welding wire.
- (4) Check whether the focal length is incorrect.
- (5) Check whether the protective lens is damaged.