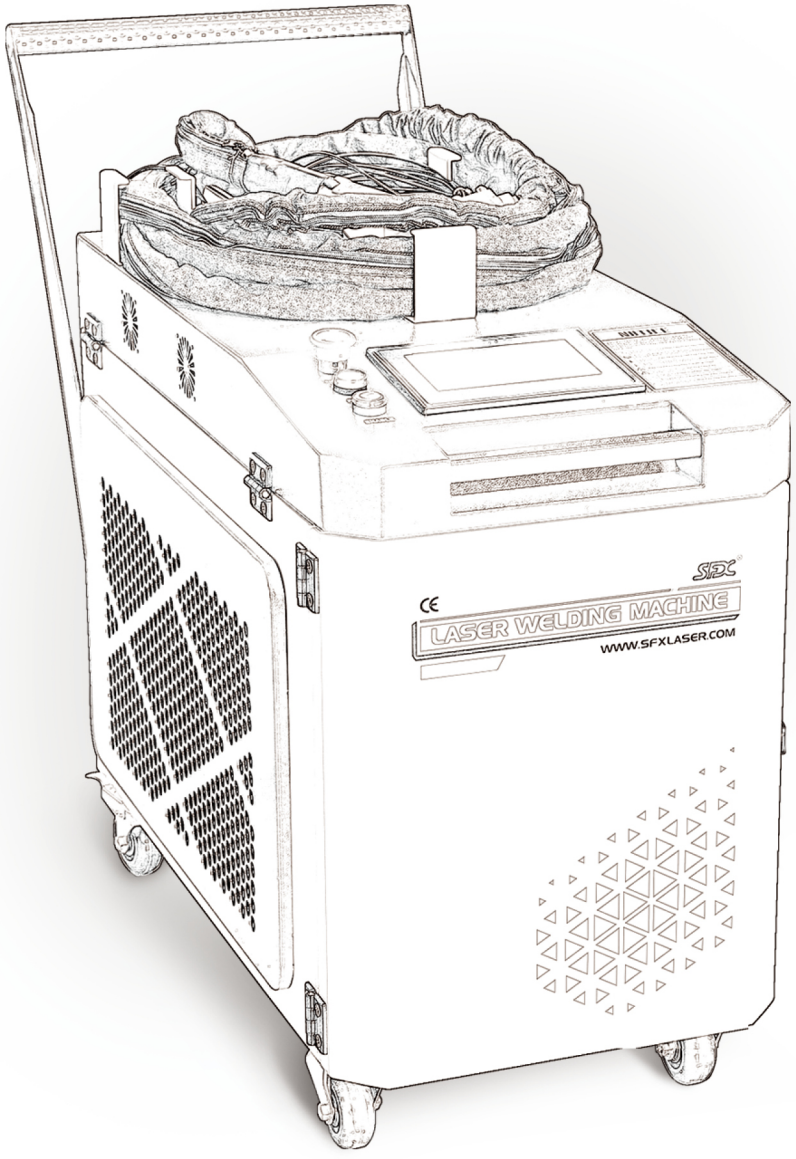
2-in-1 LASER WELDING MACHINE

BLW SERIES

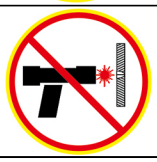
OPERATION MANUAL



LUOYANG XINCHENG PRECISION MACHINERY CO., LTD.

Notice

Before using this product, please ensure that the following items comply with the product safety operation requirements. Otherwise, it is forbidden to turn on the system and perform welding operations.

	**It is prohibited to use this product in places with flammable and explosive materials.**
	**When welding highly reflective materials (copper, aluminum, etc.), it is forbidden to have people stand around to avoid damage caused by reflected light.**
	**It is forbidden to aim the welding head at the human body to avoid injury.**
	**During the welding process, it is forbidden to weld with the welding head vertical to the seam.**
	Make sure that the equipment is reliably grounded.
	When welding, make sure that the safety clip is clamped to the workpiece being welded or the welding table to avoid failure of the protection function.
	When using for the first time, if the red light cannot completely come out of the copper nozzle of the welding head, be sure not to emit laser.
	This product is a Class IV radiation laser. Goggles must be worn.
	Protective gas pressure ≥0.15MPa
	The minimum bending radius of the integrated cable should be more than 200mm.
	**Laser-specific antifreeze must be used when the temperature is below 2°C. If the laser freezes, it will cause high maintenance fees.**

Content

I Scope of application

This product can be used for welding carbon steel, stainless steel, aluminum, copper and other materials. According to different welding process requirements, the copper nozzle of the welding head can be replaced for riveting welding, spot welding, tailor welding, stitch welding, etc.

II Product Description

1.Main technical parameters

Model	BLW-1000	BLW-1500	BLW-2000	BLW-3000
Laser Power(W)	1000	1500	2000	3000
Laser Wavelength(nm)	1080±10			
Operating Mode	Continuous or modulated			
Maximum Modulation Frequency(KHz)	20			
Scan Width(mm)	0-6			
Integrated Cable Length(m)	10-15（customizable）			20
Recommended Maximum Welding Thickness(mm)	3	4	5	8
Input Voltage	AC220V±10%			AC380V±7%
Input Power(KW)	6	8	10	14
Cooling Method	Water cooling (distilled water, deionized water or pure water as medium)			
water tank capacity(L)	16 (14-15 of water to be added)			
Protective Gas Pressure(MPa)	≥0.15			
Machine Size(mm)	845*460*605		905*480*630	1260*590*1190
Package Size(mm)	1270*580*1070			1350*705*1325
Gross Weight(kg)	155	160	185	277
Net Weight(kg)	105	110	135	229

2.Equipment structure diagram

Ⅲ Installation and use instructions

1.Installation and use requirements

Item	Requirements
Environment Temperature	2°C~35℃
Environment Humidity	40%-80%
Power Configuration	Refer to Ⅱ (1) technical parameters
Protective Gas Pressure	≥0.15MPa
Cooling Medium	Deionized, distilled water or pure water
Grid Ground	Comply with the national standard

1.1 Ensure that the equipment is installed and used steadily to avoid damage caused by falling or tipping.

1.2 Ensure good ventilation and keep at least 60cm of space around the equipment for heat dissipation to avoid affecting performance due to poor heat dissipation.

1.3 Check the protective lens before use. If it is dirty, please clean in time. (Use a cotton swab dipped in special cleaning solution and scrub the protective lens counterclockwise from the center to the edge.) When cleaning, pay attention to lens protection and avoid scratches.

1.4 The hand-held welding head should be handled with care.

2.Operation precautions

2.1 Please refer to the main technical parameter table for the operating voltage. If not, please use a transformer.

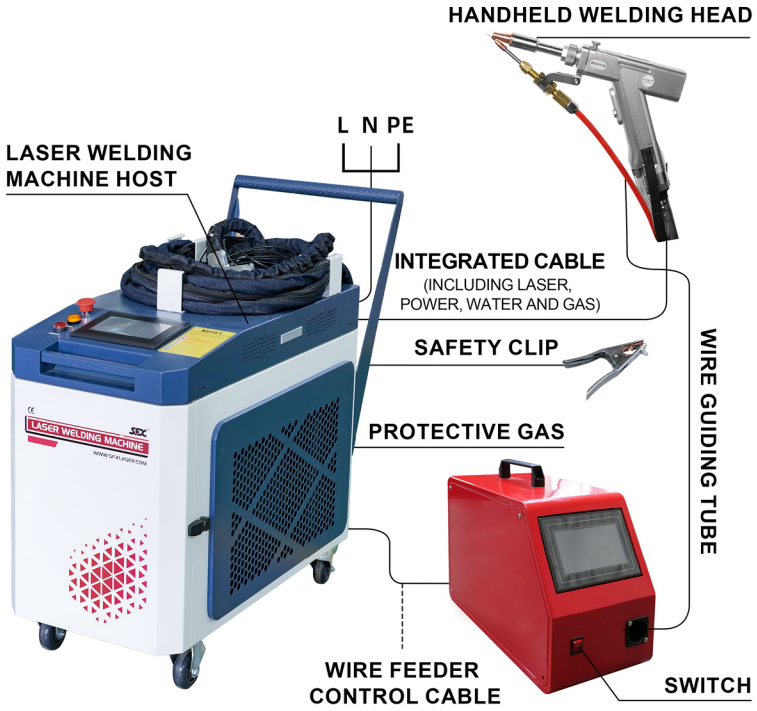
2.2 In the cold environment, please ensure that the cooling medium is not frozen. Please use special laser antifreeze when the temperature is below 2°C to avoid the abnormality of the cooling system.

2.3 Protect it from rain and water when outdoor use.

2.4 When the temperature of the water chiller is lower than 22°C, the laser low temperature alarm will occur, and it needs to be preheated. When the temperature reaches 22°C, please turn it off and then turn it on again to clear the alarm.

2.5 Avoid installation and use in places with a lot of dust, oil mist and high-frequency interference sources.

3.Installation steps



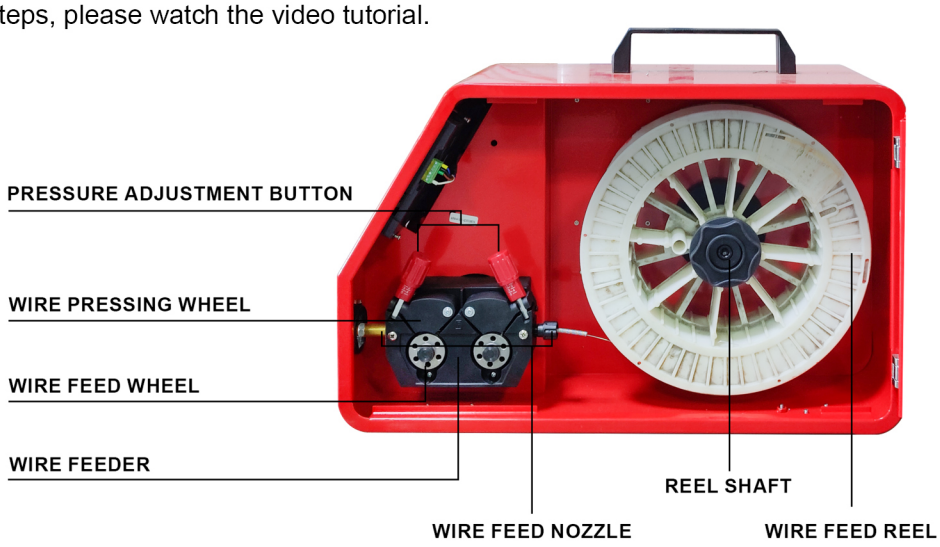
3.1 Connect the laser welding machine host power cord and wire feeder power cord.

3.2 Connect protective gas.

3.3 Connect the control cable between the laser welding machine host and wire feeder.

3.4 Connect the wire guiding tube.

3.5 Install the welding wire(Wire diameter: 0.8mm, 1.0mm, 1.2mm, 1.6mm)Put the wire feed reel into the reel shaft. Align the small hole of the wire feed reel with the positioning pin of the reel shaft. Open the pressure adjustment knob outward,open the wire pressing wheel, insert the welding wire from the right side of the wire feed nozzle, and pass through the two wire pressing wheels. Insert the welding wire into the wire guiding tube and ensure that the welding wire is exposed from the wire guiding nozzle of the hand-held welding head. Fasten the wire pressing wheels at both ends. Adjust the pressure adjustment knob to ensure the wire feeding force. For detailed steps, please watch the video tutorial.



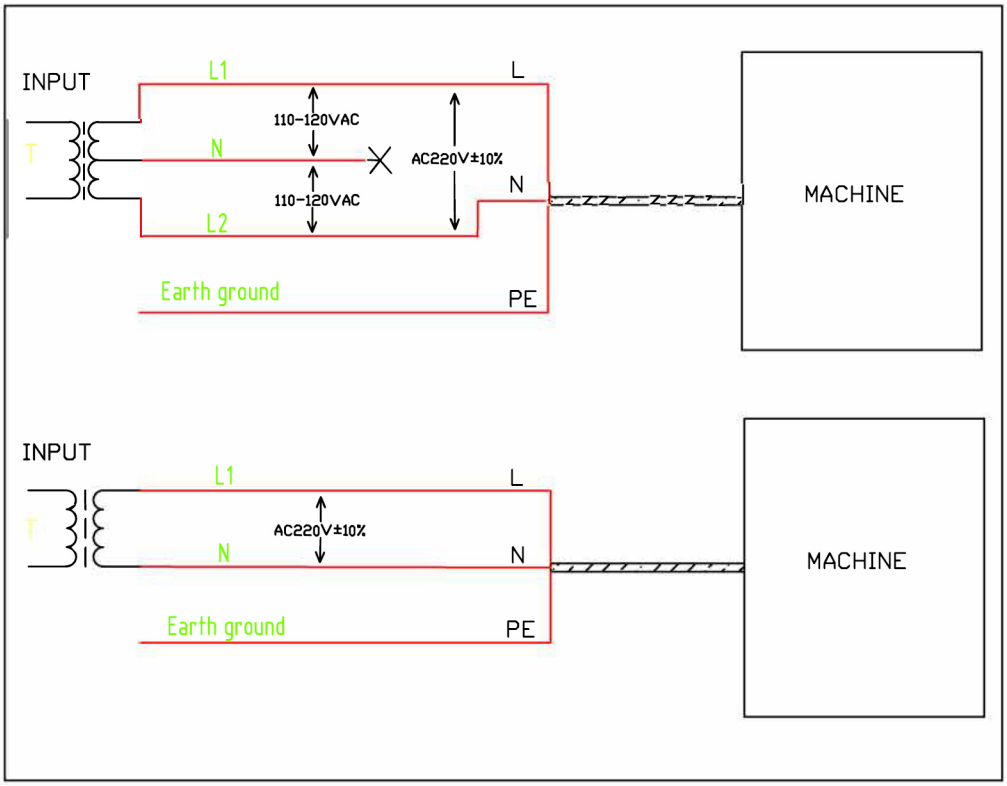
Ⅳ Operation Process

1.Start-up and preparation

1.1 Check the water level of the chiller to ensure that the water level is within the standard area.

1.2 Connect the power cord (pay attention to grounding).

220V Wiring Diagram



1.3 Turn on the emergency button.

1.4 Open the protective gas and adjust the pressure around 0.2Mpa.

1.5 Turn on the wire feeder and set the wire feeding parameters.

1.6 Clamp the safety clip to the welding workpiece or welding table.

1.7 Turn on the enable. Take out the hand-held welding head gun and ensure that the bending radius of the integrated cable shall not be less than 200mm.

2.Manual focus is required when using the device for the first time.

2.1 Loosen the fixing screws of the front and rear telescopic tubes of the handheld welding head, and insert all the telescopic tubes into the gun head until they cannot be inserted. Adjust the laser power to 30%.

2.2 Clamp the safety clip on the handheld welding head and stop the wire feeder. Trigger the laser against the iron plate or stainless-steel plate, find the point with the largest laser energy from far to near, where the sparks are scattered, which is the focus of the laser.

2.3 After finding the focus, pull the telescopic tube out to make the distance between the focus and the telescopic tube about 4mm, record the scale position on the telescopic tube,and lock the telescopic tube.

3.Adjust the wire feed nozzle to fit the copper nozzle so that the welding wire is in the middle of the copper nozzle.

4.Remove the safety clip and clamp it to the welding workpiece or welding table.

5.Set the welding parameters according to the requirements of the workpiece to be welded.

6.When the handheld welding head touches the surface of the workpiece, press the switch button of the handheld welding head to start welding.

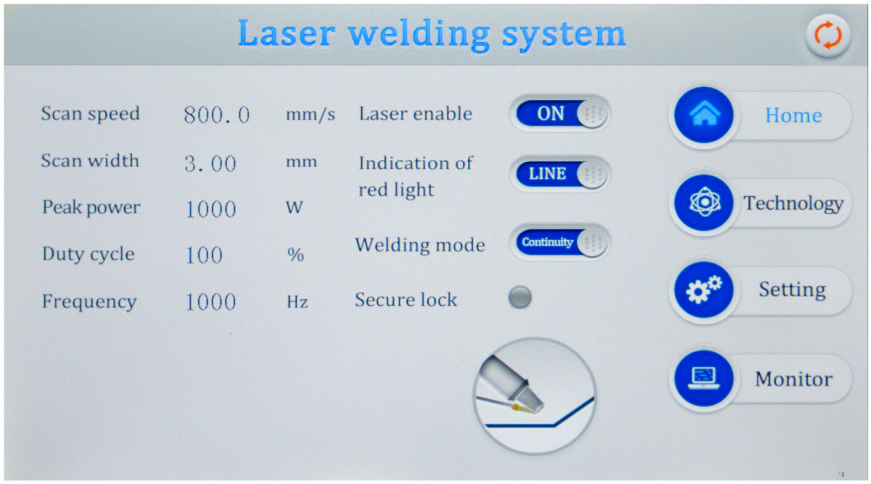
7.Shutdown: Turn off the wire feeder, turn off the enable,and press the emergency stop.

For detailed steps, please watch the video tutorial.

Ⅴ Laser Welding Controller Setting Instructions

After the power is turned on, the welding control screen of the laser welding controller will enter the main operation interface.

1.Main operation interface



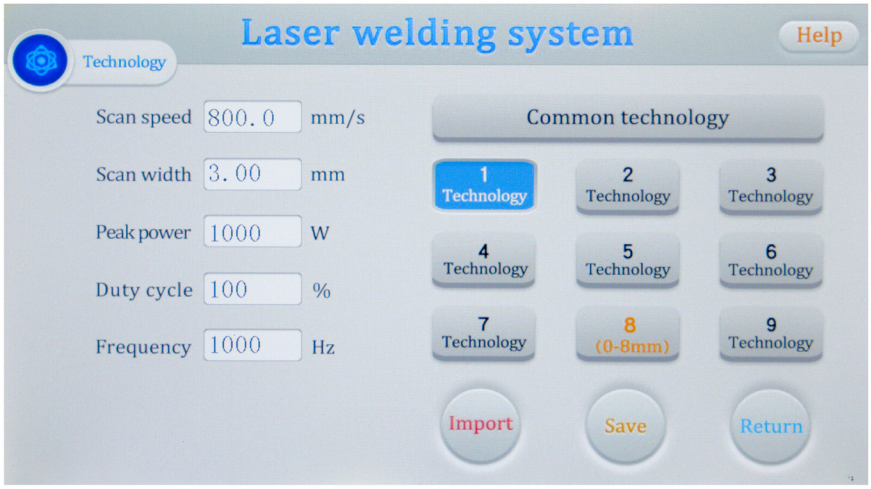
1.1 In this interface, you can see the current process parameters (the parameters cannot be modified on this page) and real-time alarm information.

1.2 When the machine is powered on, the laser enable is on by default, the indication of red light is line by default, and the welding mode is continuous. When the enable is turned off, the enable signal will not be sent to the laser source but you can test the auxiliary air outlet function. Turn off the indication of red light and the motor stops swinging. At this time, the red light is a point, which is used to adjust the center position.

1.3 Welding modes are divided into continuous and spot welding. Default is continuous. When set to spot welding, the spot welding type needs to be set on the settings page to achieve intermittent light emission for spot welding operations.

1.4 The default color of the secure lock is gray. When the metal clip is clamped on the workpiece and the copper nozzle of welding head contacts the workpiece, the secure lock indicator light turns green. At this time, the laser can be emitted by pressing the trigger.

2.Technology interface



The technology interface contains the set process parameters, which can be modified as needed. They can be saved in the quick process and clicked to import when using (modify-save-import).

Item	Function	Explanation
Scan speed(mm/s)	Set the laser scanning speed during welding	2-6000
Scan width(mm)	Set laser swing width during welding	0-6
Peak power(W)	Maximum power during operation, less than or equal to laser power	
Duty cycle(%)	Set the duty cycle of the modulation signal period, and the default is 100%.	0-100
Frequency(Hz)	Set the frequency of the modulating signal, and the default is 2000 Hz.	5-5000

2.1 The most commonly used scanning speed is 300mm/s and the width is 2.5mm. The scanning speed is limited by the scanning width: 10≤scanning speed/(scanning width*2) ≤1000. If it exceeds the limit, it will automatically become the limit value. When the scan width is set to 0, it will not scan (ie point laser).

2.2 The peak power should be less than or equal to the laser power (if the laser power is 1000W, the value should not be higher than 1000).

2.3 Process reference value (subject to actual conditions)

Material	Material Thickness mm	WireFeeding Speed mm/s	Scanning Speed mm/s	Scanning Width mm	Power W	Welding Wire mm	Recommended ProtectiveGas
Carbon Steel	1	60	300	3	350	1.0	Argon Helium
	2	60	300	3	700	1.2	
	3	60	300	3	1100	1.2	
	4	60	300	3	1500	1.6	
	5	50	220	3	1800	1.6	
	6	50	220	3	2200	1.6	
	8	40	220	3	3000	2	
Aluminum	1	60	300	3	500	1.0	
	2	60	300	3	800	1.2	
	3	60	300	3	1400	1.2	
	4	60	300	3	1800	1.6	
	5	50	220	3	2000	1.6	

Material	Material Thickness mm	WireFeeding Speed mm/s	Scanning Speed mm/s	Scanning Width mm	Power W	Welding Wire mm	Recommended ProtectiveGas
Stainless Steel	0.5	80	300	2	260	0.8	Argon
	0.8	80	300	2	300	0.8	
	1	60	300	2	350	1.0	
	2	60	300	3	700	1.0	
	3	60	300	3	1100	1.2	
	4	60	300	3	1500	1.2	
	5	50	220	3	1800	1.6	
	6	50	220	3	2200	1.6	
	8	40	220	3	3000	2.0	

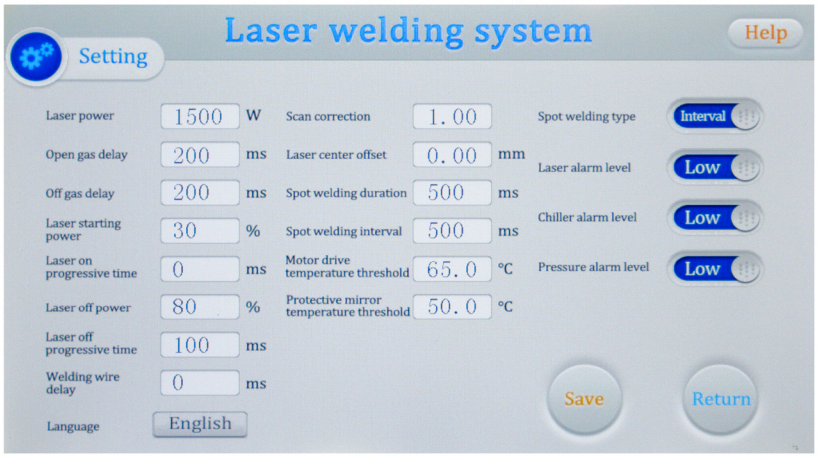
Precautions:

① Some laser source cannot emit laser at a power lower than 10%. When the peak power on the technology interface is less than 10% of the maximum laser power, all output signals are normal, but laser may not emit.

② The duty cycle defaults to 100% and usually does not need to be changed. At this time, the frequency doesn't work. If you need to use it, please adjust it according to actual needs. Example: Peak power 300W, duty cycle 50%, frequency 1000Hz. At this time, the laser emission period is 1mS. Emit laser for 0.5mS at 300W and stop for the other 0.5mS, and the cycle repeats. At this time, the air in the welding place explodes and produces abnormal noise, which is a normal phenomenon. The actual situation is subject to the laser parameters.

③ Click the help button on the upper right side of the screen to get more explanations of related parameters.

3.Setting Interface



3.1 The default password is 123456.

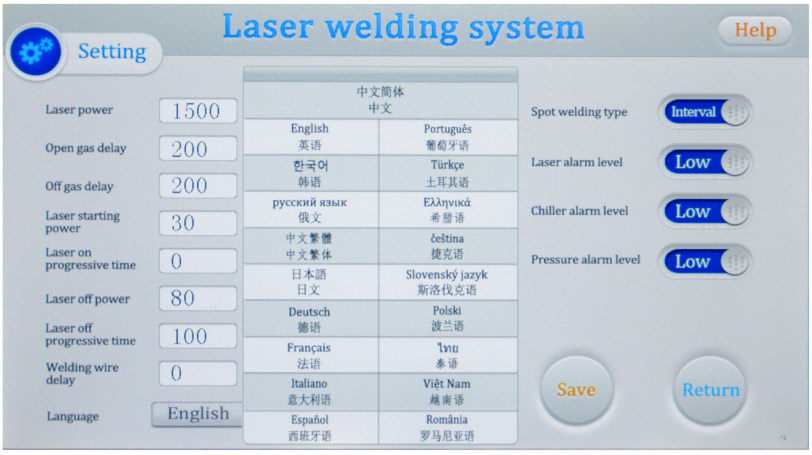
3.2 The laser power is the maximum power of the laser used.

3.3 Click the help at the top right, and long press "Restore Factory Settings" to restore the factory settings.

Item	Function	Explanation
Laser power (W)	The power of the laser used	
Open gas delay (ms)	Set the air blowing time in advance before welding starts	0-3000
Off gas delay (ms)	Set the time to keep blowing air after welding	0-3000
Laser starting power (%)	Laser power when laser is emitted	0-100
Laser on progressive time (ms)	The time required for the initial power to gradually increase to 100% when the light is emitted	
Laser off power (%)	Laser power when the light is off	
Laser off progressive time (ms)	Time required for gradual transition from 100% power to off optical power	
Welding wire delay (ms)	Wire feed advance time relative to the light signal	
Scan correction	Set scan correction for target line width/measure line width	0.01-4
Laser center offset (mm)	Set the center offset, decrease to move left, increase to move right	-3~3
Spot welding duration (ms)	Light emission time after pressing the welding head switch button	
Spot welding interval (ms)	Downtime between spot welds	
Motor drive temperature threshold(°C)	Set the motor drive temperature alarm value	0-70, when it is 0, no temperature alarm will be detected.
Protective mirror temperature threshold (°C)	Set the protective mirror temperature alarm value	
Collimator temperature threshold (°C)	Set the collimator temperature alarm value	
Laser alarm level	The alarm level signal defaults to low.When using this alarm signal, the alarm level here needs to be set to be consistent with the alarm level of the external device;	
Chiller alarm level		
Pressure alarm level		

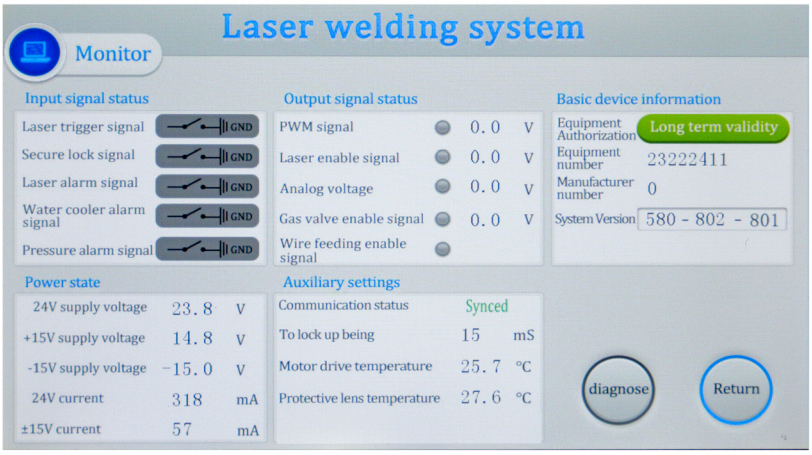
Note: Click Help in the upper right corner to get more explanations of related parameters.

3.4. Language: support 19 languages.



4.Monitor Interface

This interface displays the status of each detection signal and device information.



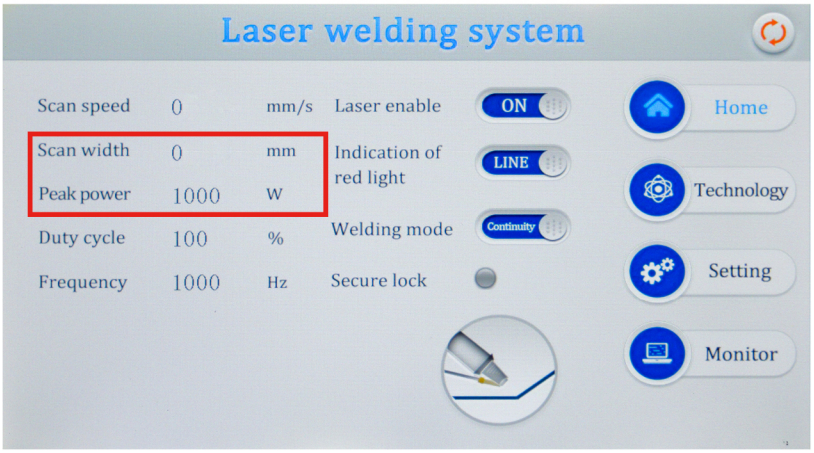
Item	Function	Explanation
Input signal status	Laser trigger signal	Take effect when changing from gray to green.
	Secure lock signal	Normal short circuit. Take effect when changing from gray to green.
	Laser alarm signal	Monitor the real-time level status of these interface inputs.
	Water cooler alarm signal	
	Pressure alarm signal	
Output signal status	PWM signal	When the signal is output, the status in this area changes immediately and can be visualized. The monitoring signal is a circuit signal detected in real time, which will fluctuate within a certain range and have a tolerance of less than 0.3V from the final output signal.
	Laser enable signal	
	Analog voltage	
	Gas valve enable signal	
	Wire feeding enable signal	

Item	Function	Explanation
Basic device information	Equipment authorization	Click to encrypt the usage time of the machine. When the machine is used beyond its set time, the authorization is terminated and the system stops working. The factory default is long-term validity. If you need encryption and decryption, please contact our company.
	System version	Three groups of numbers. The first group is the hardware version, the second group is the program version of the microcontroller, and the third group is the touch screen version.
Power state	24Vsupply voltage	Displays the real-time power supply voltage and current of the device. Due to the update of the algorithm and the continuous improvement of data accuracy, there will be some differences in the current status of different versions, which is normal. Power supply voltage helps after-sales troubleshooting power failure.
	+15Vsupply voltage	
	-15Vsupply voltage	
	24V current	
	±15Vcurrent	
Auxiliary settings	Communication status	Indicates the communication between the touch screen and the motherboard. If there is no synchronization, check the screen connection cable.
	To lock up being	Used to deal with poor contact of the secure lock. The range is 0~300ms. When the trigger signal is normal and the secure lock signal is disconnected for less than 300ms, it will continue to emit laser. Usually set to 0.
	Motor drive temperature	This temperature affects the swing performance of the motor. When the temperature rises abnormally, it will affect the laser scanning speed, which in turn leads to a decrease in weld quality.
	Protective lens temperature	Lens temperature can reflect the working status of the lens and help determine whether the lens is damaged.
Diagnose		Used to measure whether each signal port has actual output. Usually the output value is consistent with the detection value. When inconsistent, the load is abnormal. For example when it does not emit laser, by switching a single port and using laser monitoring software or a multimeter measurement, it can truly reflect whether the signal is sent.

5. Weld seam cleaning

Replace with the AS-20D nozzle and use the "Technology 8" parameter to remove the oxide layer on the surface of the weld seam.

6.Cutting mode



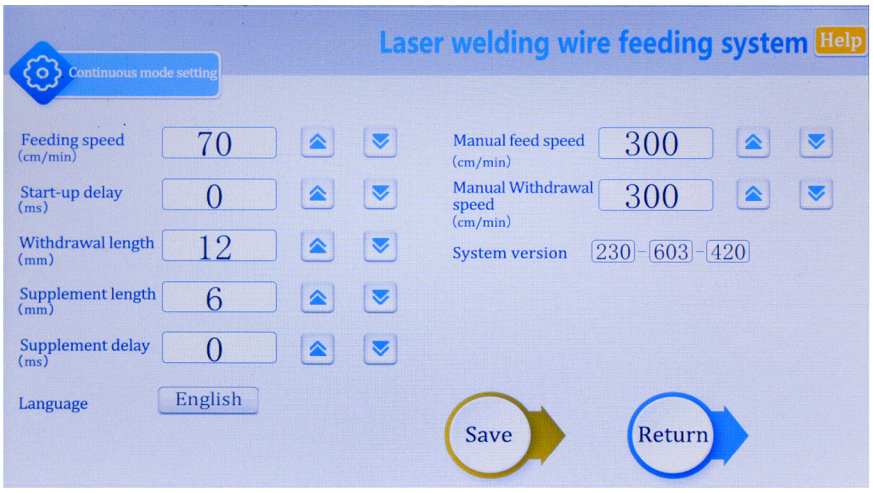
Set the [Scan width] to [0] and replace with the cutting nozzle. Then the cutting operation can be carried out. During laser cutting, it is necessary to ensure that the [Secure Lock] is turned on.

Ⅵ Wire Feeder Setting Instructions

1.Main operation interface: The control screen of the wire feeding will enter the main operation interface after turning on the power.

Item	Function
Feeding speed (cm/min)	It shows the wire feeding speed, and it can be adjustable by pressing the up and down button.
Manual wire feeding	Press them and wire feeding will begin feeding or drawing, and the speed of feeding or drawing depends on the background setting.
Manual withdrawing	

2.Setting interface: Click the Setting of the main operation interface.



2.1 The feeding speed is the default speed, and the default value will be restored after restarting.

2.2 The Start-up delay is not set by default.

2.3 Set the Withdrawal length and Supplement length as required.

2.4 When the wire feeding is stopped, the system will first withdraw a certain distance and then feed the wire for a certain distance. This function is mainly used for broken wires. When the wire is still outside at the beginning of each welding, please set the “withdrawal length” greater than “supplement length”.

Ⅶ Fault analysis and troubleshooting

Fault phenomenon	Cause Analysis	Troubleshooting method
The spot does not swing	1. The two-core wire connector of the welding head is loose. 2. The motor or the control card is damaged.	1. Tighten loose joints. 2. Contact us for after-sales service.
Sudden loss of energy during welding	1. There are foreign objects or damage to the optical lens. 2. The laser source is faulty.	1. If it is due to the protective lens, clean or replace it, and for other lenses, please contact us. 2. Contact us for after-sales service.
The welding head is hot	1. The optical lens are dirty or damaged. 2. Optical path deflection.	1. If it is due to the protective lens, clean or replace it, and for other lenses, please contact us. 2. Check whether the connection between the optical fiber and the welding head is loose.
Sudden stop of light emission during processing	1. The alarm was triggered. 2. The safety lock has poor contact.	1. Check if the temperature exceeds the temperature alarm threshold. 2. Check for the safety lock and other alarms on the monitoring interface.

Fault phenomenon	Cause Analysis	Troubleshooting method
The welding head motor whistles	1. The scanning width is narrow and the scanning speed is fast. 2. The galvanometer motor is damaged.	1. Refer to Chapter V 2.1 to set the parameters 2. Please contact us.
Chiller Alarm	1. Refer to the chiller code to determine the cause	1. Solve the problem accordingly. 2. Please contact us.
Red light is normal but no laser	1. The enable switch of the operation panel or the switch of the welding head is damaged. 2. Laser damage	1. Click the switch repeatedly to observe the response of the laser or controller. 2. Install the laser detection software on the computer to check the cause of the failure. 3. Please contact us.

Ⅷ Maintenance

Note: In order to avoid personal injury and man-made damage, the maintenance of the handheld laser welding machine must be carried out by professionals.

1.Handheld welding head

1.1 Daily inspection: Check the protective lens. If there is foreign matter, clean with a lint-free cotton swab or wiper dipped in absolute alcohol or isopropyl alcohol. If there is coating damage or lens damage, please replace the protective lens in time to avoid burning other optical lenses.

1.2 Regular inspection: When the machine is used or not used for some time, first check the laser module, and make sure that each optical component is free from dust pollution, mildew, and other abnormal phenomena before turning it on.

1.3 Observing the light spot: The operator should often check the laser output light spot with black image paper. Once the spot is found to be uneven or skewed, it should be repaired in time.

2.Water chiller

2.1 The dust on the condenser and the dust filter needs to be cleaned regularly.

2.2 When the machine is transported or not used for a long time, the coolant should be drained.

2.3 When the temperature is lower than 2°C, please use special laser antifreeze.Please check and ensure that the chiller is working properly before using the machine to avoid damaging the laser output head, welding head, and water chiller due to the solidification of the coolant.

2.4 The coolant must be replaced in the following cases

2.4.1 The filter element has been replaced.

2.4.2 After 3 months of use.

2.4.3 Use again after long-term non-use

Ⅸ Transportation and storage

1. Before moving the equipment, please remove the power cord and drain the coolant inside the system. Do not move or transport it with liquid inside.

2. When transporting or handling the equipment, please do not bump it up and down or excessively tilt it (not more than 45°) to avoid bumping, impacting and overturning.

3. During storage, drain the water in the water tank through the sewage outlet, and at the same time loosen the drain plug under the water pump to drain the remaining water in the water pump, and place it in a cool and ventilated place.

X Warranty terms

1. The warranty period of this product is one year for the whole machine, and the warranty period for the laser source is two years:

1.1 From the date of purchasing this product, our company provides free warranty within one year(excluding non-warranty item). If the machine need to be returned to the factory for repair, the user only needs to bear the cost of two-way transportation.

1.2 This product is repaired free of charge for life, and the user only needs to bear the cost of spare parts and two-way transportation.

2. The following scopes are not covered by warranty:

2.1 Damage caused by improper use such as violent bumping, bending, etc.

2.2 Human-caused damage.

2.3 Disassemble or assemble ,replace electrical accessories, or adjust electrical circuits without permission.

2.4 Laser source, chiller and other accessories are damaged by freezing (mainly manifested as water leakage).

2.5 Consumable items such as optical accessories are not covered by the warranty (optical parts such as collimating lenses, galvanometers, field lenses, optical fibers, etc. are not covered by the warranty).

※ The relevant technical parameters listed in this manual are for reference only. The relevant product information is subject to change without prior notice. All technical parameters and agreements are subject to the terms of the sales contract.

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