Hand-held Fiber Laser Welding Machine

User Manual

Version: V1.1
Code: R33010983

Shenzhen Megmeet Welding Technology Co., Ltd. can provide customers with a comprehensive technical support. Users can contact with local distributors or company headquarters.

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Preface

Thank you for buying the hand-held fiber laser welding machine (hereinafter referred to as the welding machine) made in our company.

This manual provides the users with the precautions of installation and debugging, function setting, operation specifications, fault diagnosis, and device maintenance. Please read this user manual carefully before installing, so as to ensure correct installation and operation of welding machine, and give full play to its superior performance. Please keep properly and send the manual to the user.

This company conducts product development and innovation continuously. If the contents, parameters and pictures in this user manual are inconsistent with the real object, the actual product shall prevail. It is subject to change without prior notice. The Company has the right of final interpretation of the user manual.

Safety Precautions

Safety definition

In order to use the hand-held laser welding machine safely and correctly, and prevent harm to you or others and property damage, this manual adopts various warning signs for instructions. Please follow strictly after full understanding.

Please operate as required, otherwise it may result in death or serious injury.

Please operate as required, otherwise it may result in moderate or minor injury or damage to property.

This sign represents laser radiation. Please do a good job in laser protection.

Laser precautions

- This series of equipment output 1080±10nm wave band of laser;
- The output laser power density is large, resulting in the local high temperature to the irradiation site.Improper use may cause fire or personal injury;
- During laser welding, part of the laser energy is reflected, resulting in the damage to the reflection area and human eyes;
- Laser light on the skin can cause burning, erythema, blister, pigmentation, and even completely destroy the subcutaneous tissue;
- When operating laser equipment, select laser safety glasses according to the laser wavelength output of the laser device, and ensure that the operator always wears them;
- The higher the optical density value, the stronger the protective capability of laser protective glasses;
- It is forbidden to look straight at the welding head or align at others with the tip of welding gun. Wear qualified and safe laser protective glasses before laser operations;
- The visible light transmittance of laser protective glasses is less than 20%, so they must be used in the environment with good lighting;
- It is necessary to use the welding gun when operating.Ensure that the laser can only be output when the welding gun touches the plate;

•Set up a laser processing room, light barrier screen and curtain in the safety working area;
•The relevant operators shall be trained and assessed, familiar with and grasp the conventional safety specifications of laser operation;
•Strictly control the areas involving laser radiation, and formulate the guidelines for laser safe operation.

Installation precautions

危险

• During the installation, repair and maintenance of the welding machine, it is necessary to turn off the main power. Installation, repair and maintenance when the welding machine is powered on can have fatal consequences. For example, the high-voltage electric shock can result in cardiac arrest, burn, or other serious injuries;
• Please install it on an incombustible object otherwise it may result in fire disaster;
• Do not place near combustible materials, otherwise it may result in fire disaster;
• Ensure that the area around the equipment is clean, orderly and free of oil, and pile up workpieces, tools and wastes according to regulations;
• It is forbidden to install in an environment with explosive gases, otherwise it may result in explosion;
• Wiring must be done by professionals, otherwise it may result in electric;
• The power supply of this device is 220 Vac. Please ensure that the input power is earthed safely, otherwise it may cause equipment damage and personal injury.
• Ensure that input power is completely disconnected before wiring. Otherwise it may result in electric shock;
• Install the shell before powering on the device. Do not touch the terminal with hands, otherwise it may result in electric shock;
• Parts be replaced by a professional. Do not leave thread ends or metal objects in the machine. Otherwise it may result in fire disaster;
• After replacing the control panel, it is necessary to set the parameters correctly before running. Otherwise it may result in the damage of property;
• Cables must be wrapped with insulating tapes and aren't allowed to expose. Otherwise it may result in electric shock;
• Keep the lighting in the operating room in good condition, and ensure no strong vibration, strong electromagnetic field equipment interference within 20m around the equipment.

⚠注意

- When handling, moving and maintaining this series of equipment,do a good job of safety protection. For some parts with large weight and sharp edges and corners, pay attention to the risk of smashing or cutting caused by falling heavy objects;
- To ensure the security of laser welding, it is necessary to use proper external warnings, including but not limited to laser safety signs and interlocking devices;
- Do not install near places where water droplets may splash. Otherwise it may result in property damage;
- Do not drop foreign matters such as screws, gaskets and metal rods into the welding machine. Otherwise it may result in fire disaster and property damage;
- Keep the working environment bright, turn on the light to prevent pupil dilation and avoid the risk of eye damage;
- The ambient temperature shall be between -10 and 40℃ to ensure that the equipment is in the best working condition. Keep the room temperature stable, install air conditioning. The relative humidity should be below 70%, dry;
- To ensure the clean air of the equipment operating room,the customer shall install the ventilation and smoke exhaust system according to the site conditions after installation and debugging of equipment.

Precautions for use

⚠危险

·Operators must get pre-job training, grasp the structure and performance of equipment, be familiar with the operation procedures and obtain the license qualification, and understand the knowledge of safe operation and welding skills before welding;

·Wear labor protection articles according to regulations. Wear labor protective glasses when operating. Laser emission on non-processed products and human body isn't allowed. When the equipment is turned on,the operator shall not leave the post without authorization or entrust someone with custody. If necessary, stop the machine;

·Before starting the machine for the first time, check the water cooler for water; check whether temperature and water pressure are abnormal.When the water amount is not enough, water should be added to the scale of the standard area of the water level line before it can be turned on to avoid the damage of the relevant equipment;

·It is prohibited to place paper, cloth or other flammable materials near unprotected laser beams.

Please put fire extinguishers near the workbench;

·When any abnormality is found during the operation of equipment, it is necessary to immediately stop the laser emission and operation of the equipment to minimize abnormal damage.Do not disassemble the laser, water cooler without the communication with the manufacturer;

·Operators must pay attention during the operation of equipment.it is strictly prohibited to chat, play, listen to music and other activities unrelated to work;

·If the equipment is not used for more than 30 minutes, please turn off the power supply of the laser equipment according to requirements;

·Do not touch live parts, otherwise there is a risk of electric shock. Do not adopt the cables with insufficient sectional area, exposed conductors, or damaged cables;

·Do not remove the machine casing or cover plate during use to prevent electric shock or equipment abnormalities;

·Please use undamaged gloves with good insulation and use the sound insulation equipment to avoid noise;

·Pay attention to safety protection in high-place operation;

·When welding in a narrow or confined space, the welding personnel must accept the supervision of the inspectors and fully ventilate or use respiratory protection appliance, otherwise it may result in asphyxia due to lack of oxygen;

·Do not weld pressure vessels such as gas pipes with gas,sealed tanks with gas. Do not weld near or in the vicinity of combustible materials;

·Emergency stop takes precedence over any other control operation, disabling laser, starting power, stopping the power supply of all system control and potentially dangerous functional components;

·In case of operational error, release the light release button of the hand-held welding gun immediately and press the emergency stop button immediately.

⚠注意

The requirements of operational environment are as follows:

Installation environment: smooth, no vibration and impact;

Working environment temperature: -10 ~ 40℃;

Transport and storage temperature: -20 ~ 60℃;

Working humidity: <70%RH;

The dust, metallic dust and corrosive gases in ambient air don’t exceed normal content;

Keep the working environment bright, turn on the light to prevent pupil dilation and avoid the risk of eye damage.

Contents

Chapter I Product Overview

1.1 Introduction of welding machine system

The Megmeet hand-held fiber laser welding machine has integrated high-power fiber laser, dual temperature and dual control cooling module, laser welding gun head and control system, with the stable output of 1080±10nm band laser. It applies to welding between metal materials, including carbon steel, stainless steel, high strength steel, galvanized sheet, corrugated plate, aluminum alloy, magnesium alloy, titanium alloy, etc. It applied to sheet metal processing, auto parts, two/three wheelers, house appliances, hardware cabinets, handrails, doors and windows, tableware, kitchenware, lamps and other industries.

1.2 The characteristics of welding machine

1.2.1 Unique advantages

1. Stability
   - The electric control solution of super-stable laser can bring super-stable laser power output with the jitter rate of less than 1.5%.
   - With the electronic control design of industrial laser, laser attenuation is less than 4% per year.
2. Conformity
   - It still ensures consistent performance for each device in the case of large changes of the use environment (such as power grid fluctuations, temperature changes),
   - Unique hardware design and software control ensure that the output parameters are still accurate after the equipment has serviced for a long time.

1.2.2 Product performance

1. Superior performance
   - With continuous, pulse two modes, it is suitable for the heat conduction welding of sheet, the deep fusion welding of medium and thick plate, with a large depth-to-width ratio.
   - With high efficiency, it saves time and labor, and the efficiency of one laser welding machine is equivalent to the efficiency of four argon arc welding machines.
2. Simple operation
   - Industrial LCD screen, simple operation of touch screen,simple and efficient human-computer interaction.

- Support 10 groups of parameter storage, support user-defined, suitable for hand-held welding and robot welding.

1.3 Diagram of welding machine

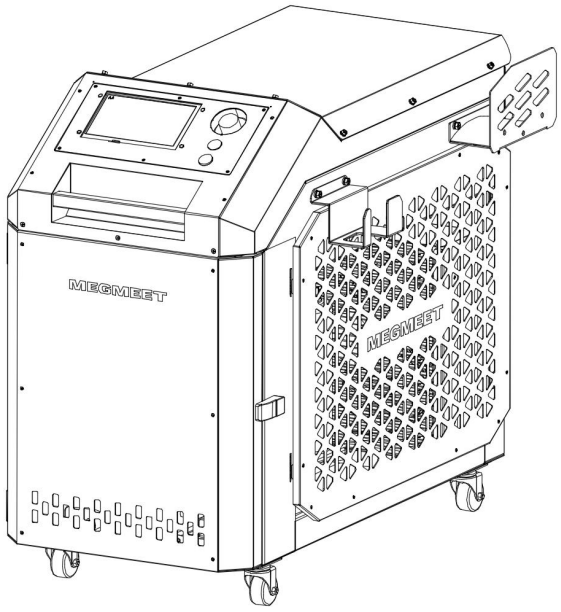


Figure 1-1 Diagram of welding machine

1.4 System composition

The welding machine system consists of welding power supply host, wire feeder, gas supply system, safety ground lock signal line, wire feeding signal control cable, wire feeding hose, welding gun and combined control cable. As shown in figure 1-2.

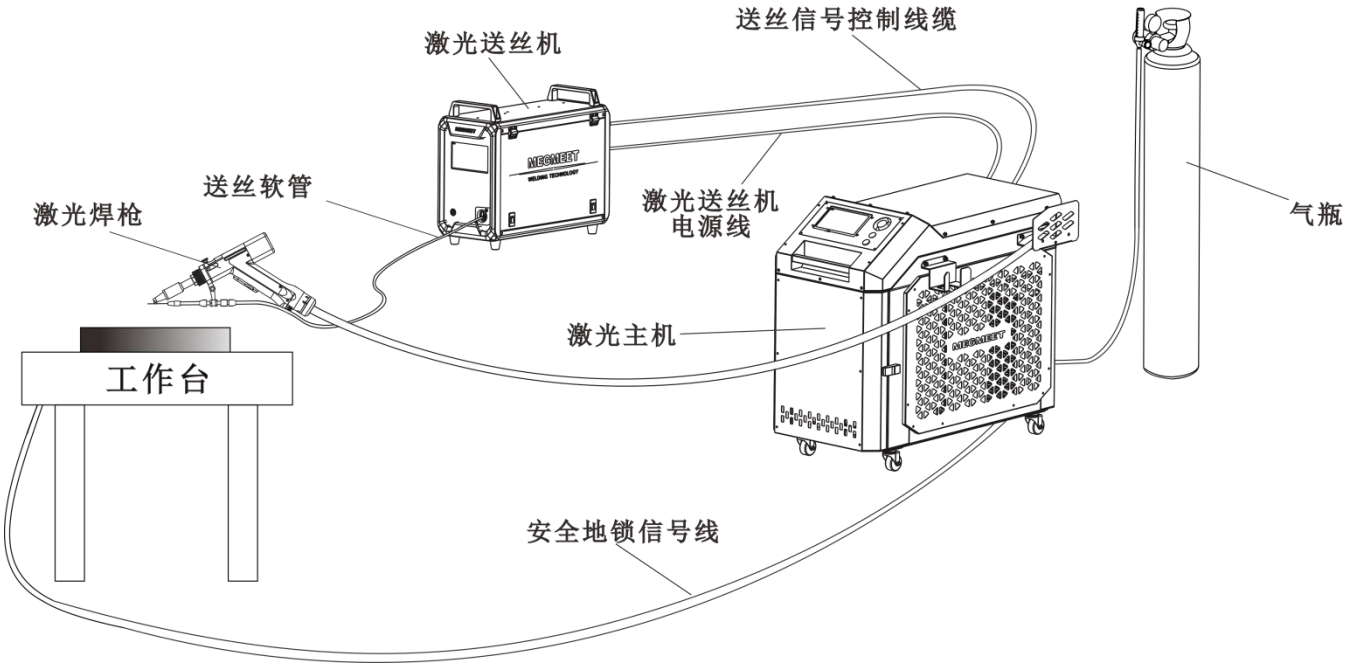


Figure 1-2 Connection diagram of hand-held fiber laser welding system configuration

1.5 Model explanation

The models of welding power are shown in Figure 1-3.

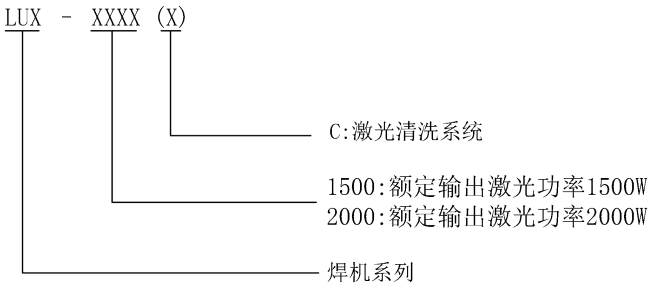


Figure 1-3 Diagram of welding power models

* Note: The symbol in "( )" is optional, indicating different types of welding power.

1.6 Configuration description

Refer to ☞Appendix I System Configuration Table

1.7 Specification and boundary dimension

Specification and boundary dimension of welding machine are shown in Table 1-1:

Table 1-1 Welding machine models and boundary dimensions

Name	Model	Boundary dimension (Length	Net weight (kg)

		x width x height) mm	
Hand-held fiber laser welding machine	LUX-1500	889*543*791	88.5
	LUX-2000	889*543*791	98

The boundary dimensions of welding power are shown in Figure 1-3.

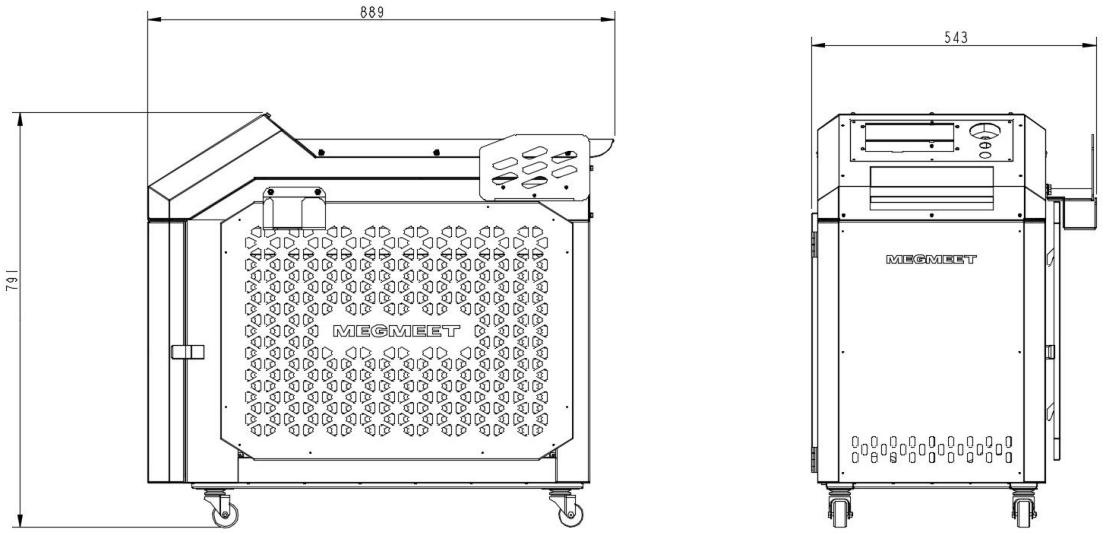


Figure 1-3 The boundary dimensions of welding power

1.8 Electric parameters

Electric parameters of welding machine are shown in Table 1-2:

Table 1-2 Electric parameters of welding machine

Model	LUX-1500	LUX-2000
Rated input voltage/phase number	Single phase 220Vac	Single phase 220Vac
Input power frequency	50/60Hz	50/60Hz
Rated input power	6.6KW	9.5KW
Rated input current	32A	40A
Rated output laser power	1500W	2000W
Output laser wavelength	1080± 10nm	1080± 10nm
Operating ambient temperature	-10~40℃	-10~40℃
Operating ambient humidity	<70% no condensation	<70% no condensation
Storage temperature	-20~60℃	-20~60℃

Chapter II Installation and wiring

The requirements, operation procedures, and precautions for the wire feeder installation are described in this chapter.

2.1 Unpack for inspection

1．Before unpacking, please confirm whether the outer packing is intact.

2．After unpacking, please confirm whether all components of welding machine are complete and their models are consistent with the order form.

3．In case of missing or wrong parts, please contact with the supplier in time.

2.2 Installation requirements

1．Site requirements：

The equipment must be installed in an independent space of no less than 15m2 (according to the actual configuration). The ground is horizontal, hard, anti-vibration, and laser protection signs are pasted on the door.

2．Environmental requirements

① Keep the lighting in the operating room in good condition, and ensure no strong vibration, strong electromagnetic field equipment interference within 20m around the equipment.

② The ambient temperature shall be between - 10 and 40℃ to ensure that the equipment is in the best working condition. Keep the room temperature stable, install air conditioning.

③ The relative humidity should be below 70%, dry;

④ To ensure the clean air of the equipment operating room,the customer shall install the ventilation and smoke exhaust system according to the site conditions after installation and debugging of equipment.

3．Power demand:

① The power supply is single phase 220V AC.

② The input current is 32A for LUX-1500 and 40A for LUX-2000.

③ The LN+PE input power cable shall be more than 3x6mm^2.

2.3 Electrical connection step

Step

1．Welding gun installation (Refer to ☞2.3.1 Welding gun Installation)

2．The control cable connection of wire feeder (Refer to ☞2.3.2 The complete cable connection of wire feeder control line)

3．Safety ground lock line connection (Refer to ☞2.3.3 Safety ground lock line connection)

4．Protective gas connection (Refer to ☞2.3.4 Protective gas connection)

5．Connection of power input cable (Refer to ☞2.3.5 Connection of power input cable)

2.3.1 Installation of welding gun

Step

1．Pull out the black rubber plug of welding head,loosen the round nut, insert the graduated tube and tighten the round nut.

2．Align the copper welding tip with the graduated tube and tighten it.

3．Align the wire feeding bracket with the screw hole under the torch head, and use the hex screws to tighten.

4．Take out a nut and a patch at the outlet of the wire feeding hose,and place the end of the wire outlet into the wire feeding bracket, and fasten with the newly removed patch and nut.

5．Tighten the conductive nozzle and the straight tube of the guide wire, string the lock nut and the straight pipe of the wire guide into the end of the wire outlet,tighten the nut with a wrench until the straight pipe of the guide wire does not shake. As shown in figure 2-1.

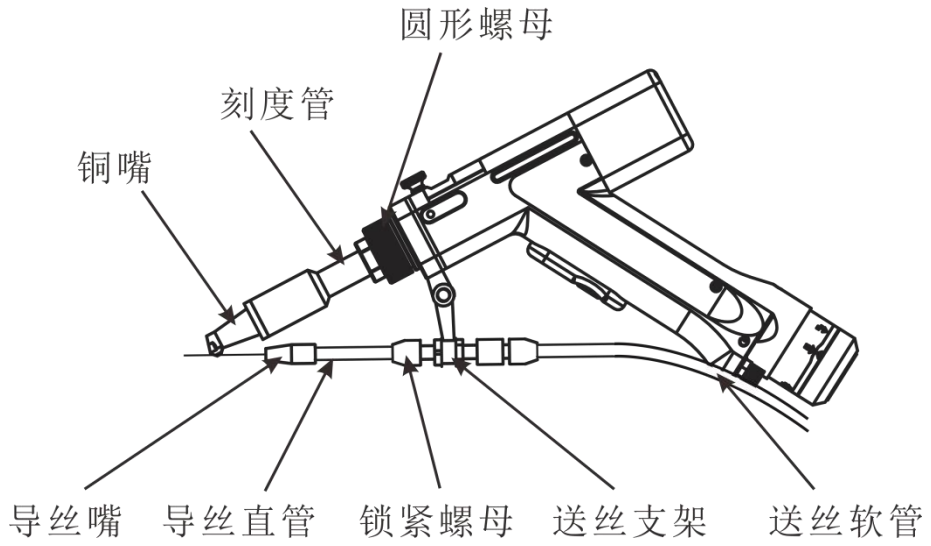


Figure 2-1 Installation diagram of welding gun

Notes

1. When using or storing the welding gun, the welding gun must be handled gently to avoid impact and fall, causing damage to vulnerable parts such as motors and lenses.

2. Since the combination control cable of welding gun has optical fiber, it is necessary to avoid tying, bending, twisting, improperly pulling, or stepping on the cable. Otherwise, it will cause the damage of optical fiber.

3. If the welding gun is not used for more than 4 hours, the copper welding tip should be sealed with tape.

2.3.2 Control line connection of wire feeding signal

Step

1．Connect the wire feeder control cable to the control cable connector of wire feeding signal and tighten it, as shown in figure 2-2.

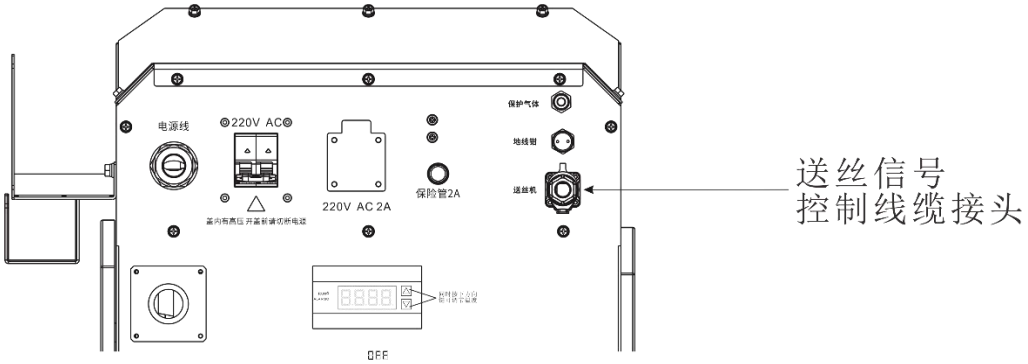


Figure 2-2 Control cable connector diagram of wire feeding signal

2．Insert the other end into the rear socket of the wire feeder and tighten it. The wire feeder control cable is connected, as shown in figure 2-3.

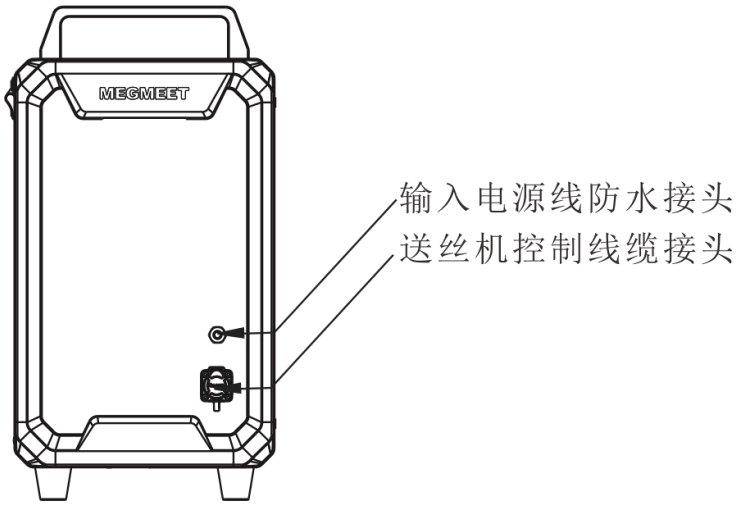


Figure 2-3Diagram of the rear joint of the wire feeder

2.3.3 Connection of safety ground lock line

Step

Fix one end of the safety ground lock line to the safety ground lock line joint of the welding machine, and connect the other end to the workpiece to complete the connection of the safety ground lock line. As shown in figure 2-4.

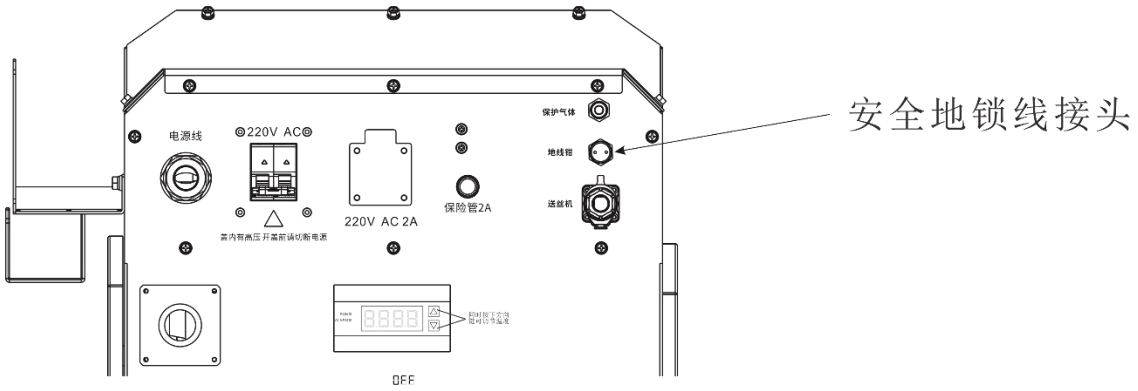


Figure 2-4 Diagram of safety ground lock line joint

2.3.4 Protective gas connection

Step

Connect one end of the air pipe to the air pipe joint on the fixed plate of welding machine, connect the other end to the air pipe interface of the gas meter end, and tighten the hose clamp of air pipe to complete the connection of air pipe. As shown in figure 2-5.

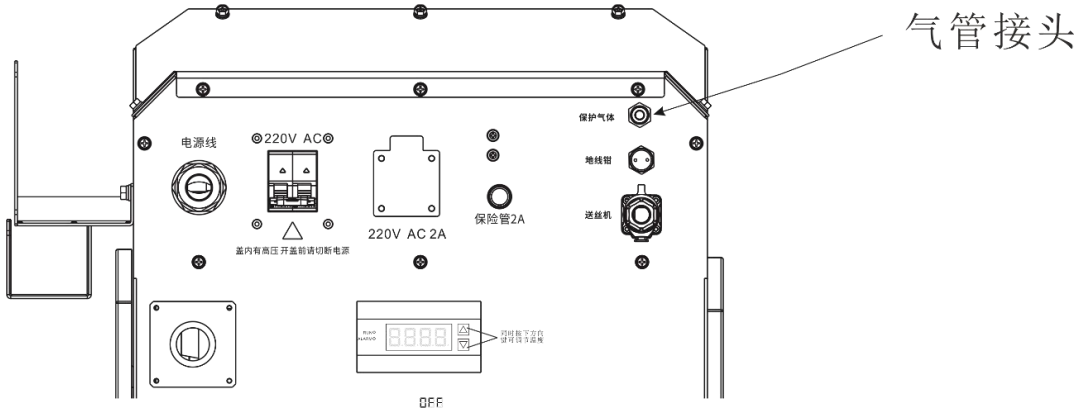


Figure 2-5 Diagram of air pipe joint

Notes

1. Welding of carbon steel and stainless steel by nitrogen is better than argon (Do not use 100% CO_2 or 80% Ar+20% CO_2). Welding of aluminum alloy by pure argon is better than nitrogen.
2. The air pipes at the end of the welding machine and the gas meter must be tightened to avoid air leakage.

2.3.5 Connection of power input cable (220VAC)

1. The two-phase input cables of this product are live wire and neutral wire, and the 5m power cable is configured by default, as shown in Figure 2-6.

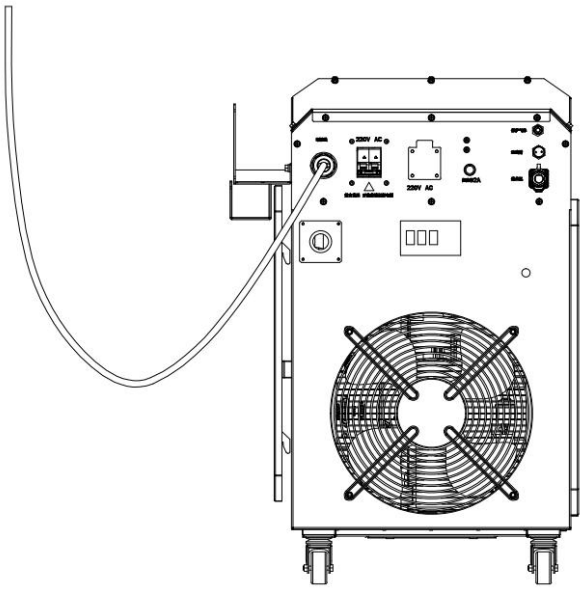


Figure 2-6 Power input connection diagram

2．Connect the input power cable at the back of the wire feeder to the power connector of the laser wire feeder of the welding machine, and check whether it is stable, as shown in Figure 2-7.

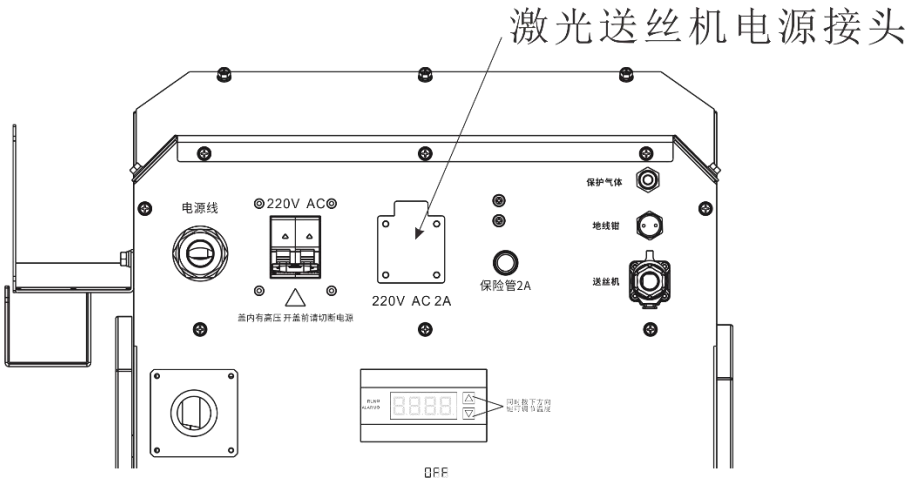


Figure 2-7 Diagram of the power connector of the laser wire feeder

Chapter III Function description and operation

3.1 Laser welding system

3.1.1 Interface description of home page

The home page functions of the welding system control panel are shown in Figure 3-1 and Table 3-1.

Figure 3-1 Home page on the control panel

Table3-1 Description on the home page functions of control panel

Name	Parameter description	Notes	Default value
Scanning speed	The number of laser beam scanning on weld joints per second	Range: 2-6000mm/s	300mm/s
Scanning width	The width scope covered by the laser beam in the welding process	Range is 0-6mm, commonly used for 2.5-4mm. If scanning width is set to 0, the machine will not scan (that is, point light source)	2.5mm
Peak power	The maximum instantaneous output power of the laser pulse	The peak power shall be smaller than the laser power on the setting interface	/
Duty ratio	In a certain period of time, the time proportion of the enabled state of laser welding machine	Range 0-100%	100%
Pulse frequency	The frequency of laser pulse repetition per second	Range 5-100000Hz, recommended for 5-5000Hz	2000Hz
Laser is enabled.	Laser light is enabled.	After turning off enabling, no enable signal is sent to the laser, which can be used in the test of exhaust function.	/
Red	Indicate the red light shape from the copper	When turning off the red indicating light,	/

indicating light	welding tip, which is divided into points and lines.	the motor stops swinging, and the red light is a point for adjusting the center position.	
Welding mode	It indicates the type of welding, which is divided into spot welding and continuous welding.	If you select spot welding, you must set the spot welding type on the setting screen.	/
Safety ground lock	It is a safety device that plays a protective role when the ground wire of laser welding machine is damaged or improperly grounded.	It is used to indicate whether light is output. The light is output when green light is on. The light cannot be output when gray light is on.	/

Note: The current process parameters (the process cannot be modified on this interface) and real-time alarm information are displayed on this interface

3.1.2 Process interface description

Presently, the process interface provides independent process parameters for users to save and call parameters.

Figure 3-2 Process interface on the control panel

Click [Value] to change the process parameters. After modification, click [Save] in the shortcut [Process], a total of 10 groups, click [Import] when using. (Modify - Save - Import)

Welding process reference (scanning speed of 300mm/s, duty ratio of 100%, pulse frequency of 2000Hz) :

Welding parameters reference of Ø1.0 carbon steel & stainless steel welding wire				**Welding parameters reference of Ø1.0 aluminum alloy welding wire**			
Thickness of material mm	**Wire feeding speed mm/s**	**Scanning speed mm**	**Peak power W**	**Thickness of material mm**	**Wire feeding speed mm/s**	**Scanning speed mm**	**Peak power W**
1	80-250	2	300-500	1	80-180	2	500-800
2	80-200	3	400-800	2	80-160	3	600-1000

3	80-150	3.5	800-1300	3	80-120	3.5	1000-1500
4	80-120	4	1200-1500	4	80-100	4	1300-1500
Welding parameters reference of Ø1.2 carbon steel & stainless steel welding wire				**Welding parameters reference of Ø1.2 aluminum alloy welding wire**			
1	80-250	2	400-500	1	80-180	2	500-800
2	80-200	3	500-800	2	80-160	3	600-1000
3	80-150	3.5	800-1300	3	80-120	3.5	1000-1500
4	80-120	4	1200-1500	4	80-100	4	1300-1500
Welding parameters reference of Ø1.6 carbon steel & stainless steel welding wire				**Welding parameters reference of Ø1.6 aluminum alloy welding wire**			
1	80-250	2	600-700	1	80-180	2	500-800
2	80-200	3	500-800	2	80-160	3	600-1000
3	80-150	3.5	800-1300	3	80-120	3.5	1000-1500
4	80-120	4	1200-1500	4	80-100	4	1300-1500

3.1.3 Setting interface description

On the home page, click [Settings]. On the password input page, click anywhere in the box to trigger the keyboard, and input the password 123456 to enter the setting interface. If the keyboard has been triggered, you must enter the password, whether the password is right or wrong, otherwise click [Return], no response. Figure 3-3 and 3-4, the description of functions are shown in Table 3-2 and 3-3

Figure 3-3 Control panel setting interface -1

Table3-2 Setting interface function description -1

Name	Parameter description	Notes	Default value
Scanning correction	Adjust the scanning system of the laser welding machine to achieve accurate welding path and scanning speed results.	Range 0.01-4	1
Laser center bias	Deviation of laser center position	The range is -3 ~ 3mm, the negative value moves to the left, and the positive value moves to the right,	/

		which is used to adjust the shaft red light center.	
Spot welding duration	Welding time per cycle	Used for spot welding mode	/
Interval time of spot welding	Dwell time per cycle	Used for spot welding mode	/
Type of spot welding	It shows the type of welding in spot welding mode.	Used for switching between "fish scale welding" and "intermittent welding" in spot welding mode.	/
Laser power	Maximum power of laser	Enter the actual laser power here	/
Language	Show the language of the current system	Click to switch to another language	/
Laser alarm	During use, the laser automatically triggers the alarm under abnormal circumstances.	High settings of laser power, high laser temperature, and abnormal fiber connection can lead to laser alarm.	/
Water-cooling machine alarm	During use, the water-cooling machine automatically triggers the alarm under abnormal circumstances.	The damaged fan, too high water temperature, insufficient water flow, bent water pipe, and water leakage at the water pipe junction cause the alarm of water-cooling machine.	/
Barometric alarm level	During use, the air supply equipment automatically triggers under the alarm abnormal circumstances.	Insufficient gas cylinder pressure, and gas pipe leakage will cause air pressure alarm.	/

Figure 3-4 Control panel setting interface -2

Table3-3 Setting interface function description -2

Name	Parameter description	Notes	Default value

Advance air supply	Time of advance air supply	Range 0-3000ms, recommendation for 200-500ms	200ms
Delayed air supply	Lag air supply time	Range 0-3000ms, recommendation for 200-500ms	200ms
Turn-on optical power	Initial optical output power	/	20%
Turn-off optical power	End optical output power	/	20%
Turn-on optical progressive time	It indicates the time required from the turn-on optical power to the welding power.	/	200ms
Turn-off optical progressive time	It indicates the time required from the welding power to turn-off optical power	/	200ms
Wire feeding delay compensation	It refers to the wire feeding advance time relative to the optical output signal.	It can be used with the pull-back function.	0
Motor driver temperature threshold	It shows that the motor drive temperature has reached its maximum temperature.	Give an alarm when the measured temperature exceeds 70℃. When the threshold is set to 0, no temperature alarm is detected.	70℃
Temperature threshold of the protective lens	It shows that the temperature of protective lens has reached its maximum temperature.		
Temperature threshold of collimator lens	It shows that the temperature of collimator lens has reached its maximum temperature.		

Notes: At the time of optical output, the optical output power is progressive to the welding power. At the time of optical turn-off, the welding power is progressive to the turn-off optical power, as shown in Figure 3-5.

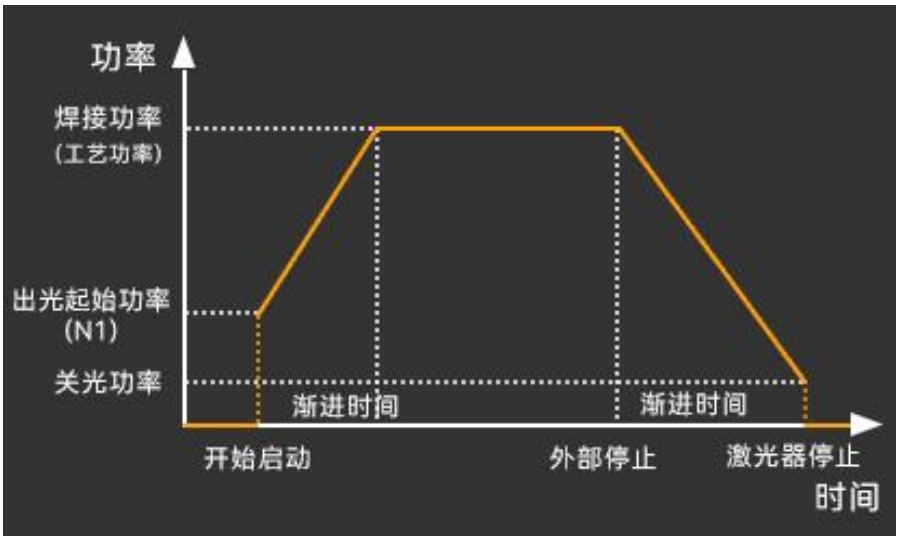


Figure 3-5 Sequence diagram of optical output control

3.1.4 Monitoring interface description

The status and device information of each signal are displayed on this interface, as shown in Figure 3-6.

Figure 3-6 Monitoring interface on the control panel

Table3-4 Status function description

Name	Parameter description	Notes
Laser trigger signal	Switch button signal on the welding gun	After pressing the welding gun switch, the signal closes, and the state changes from dark to bright. Releasing the welding gun switch, the signal is disconnected, and the state changes from high light to dark.
PWM	Pulse width modulation	24V output when working. If the output value is inconsistent with the test value, the load is abnormal.
Analog quantity	A quantity that varies continuously within a range	Output of the rated voltage control signal when working, 10V output at full power. If the output value is inconsistent with the test value, the load is abnormal.
The air valve is enabled.	It means that the air value is opened for air supply.	If the output value is inconsistent with the test value, air leakage may occur.
Wire feeding is enabled.	It means that the wire feeder is allowed to feed wires.	Observe the status of the wire feeder to check whether wire feeding is normal.
Communication status	It shows the communication between the touch screen and the main board.	If they are not synchronized, check the screen connection cable.
Ground lock anti-shake	When the trigger signal is normal and the disconnection time of the safety ground lock signal is less than “n”, the light is	It is used to handle the poor contact of safety ground lock, and the range is 0-300ms.

	emitted continuously.	
Motor driver temperature	Measuring the real-time temperature of the motor driver	This temperature affects the motor swing performance.If the temperature rises abnormally, it will affect the laser scanning speed, resulting in the decrease of weld joint quality.
Temperature of protective lens	Measuring the real-time temperature of protective lens	The temperature of lens reflects the working status of lens. According to the temperature of lens, determine if the lens are damaged.
Temperature of collimator lens	Measuring the real-time temperature of collimator lens	

Introduction on ground lock anti-shake:

① Click “Device Authorization”and set the parameter range on the password page. For example, set the password “ffffffaa300” on the password page. Among them, “ffffffaa” indicates the ground lock anti-shake parameter, and “300” indicates 300ms. As shown in Figure 3-7.

② This effect is normal in the laser trigger signal. When the disconnection time of the safety ground lock signal is less than 300ms, the light is emitted continuously.

③ When it is used to handle the materials with poor surface properties, resulting in unstable electrical conductivity (such as corrosion), the time is usually set to 0.

Figure 3-7 Monitoring interface - Auxiliary status bar - Ground lock anti-shake password

3.2 Laser cleaning system

3.2.1 Interface description of home page

Click  on the home page of welding system control panel, power off and restart according to the prompt, and switch to laser cleaning system. The home page of the laser cleaning system panel displays the current process parameters (the parameters cannot be modified directly on this page); click  again to switch to laser welding system. As shown in Figure 3-8.

Figure 3-8 The home page of laser cleaning system

Table 3-5 Description on the home page functions of laser cleaning system

Name	Parameter description	Notes	Default value
Scanning frequency	The number of laser beam scanning on the workpiece per second	Range: 10-100Hz	50
Scanning width	The width scope covered by the light spot in the scanning process	For SUP23T focusing mirror, the width of F150 ranges from 0 to 30mm, and the width of F800 ranges from 0 to 130mm. Different types of welding guns and focusing mirrors correspond to different width ranges, and you can view them on the settings page.	/
Peak power	The maximum instantaneous output power of the laser pulse	The peak power shall be smaller than the laser power on the setting interface	/
Duty ratio	The ratio of the laser welding machine pulse duration to the pulse period in a certain amount of time	Range 0-100%	100%
Pulse frequency	The frequency of laser pulse repetition per second	Range 5- 5000Hz	2000Hz
Laser is enabled.	Laser light is enabled.	After turning off enabling, no enable signal is sent to the laser, which can be used in the	/

		test of exhaust function.	
Red indicating light	The red light shapes from the welding gun are divided into points and lines.	When turning off the red indicating light, the motor stops swinging, and the red light is a point for adjusting the center position.	/

3.2.2 Process interface description

On the home page of the laser cleaning system, click the "Process" button to enter the process interface. The process interface provides self-editable process parameters for users to save and call. As shown in figure 3-9.

Figure 3-9 The process interface of cleaning system

Click [Value] to modify the process parameters. After modification, click [Save] in the shortcut [Process], a total of 3 groups, click [Import] when using.

3.2.3 Setting interface description

On the home page of home page, click [Settings]. On the password input page, click anywhere in the box to trigger the keyboard, and input the password 123456 to enter the setting interface. Notes: If the keyboard has been triggered, you must enter the password, otherwise click [Return], no response. Figure 3-10 and 3-11, the description of functions are shown in Table 3-6 and 3-7.

Figure 3-10 The setting interface of cleaning system - 1

Table 3-6 The setting description of cleaning system -1

Name	Parameter description	Notes	Default value
Scanning correction	Adjust the scanning system of the laser welding machine to achieve accurate welding path and scanning speed results.	Scope 0.01-4	1
Laser center bias	Deviation length of laser center position	The value ranges from -3 mm to 3mm. Negative values shift left, positive values shift right, which are used to adjust the axis red light center. Cleaning mode displays only the current offset. If you want to adjust, it is necessary to switch to welding mode and replace with F150 focusing mirror.	/
Advance air supply	Time of advance air supply	Range 200-3000ms	200ms
Delayed air supply	Lag air supply time	Range 200-3000ms	200ms
Laser power	Maximum power of laser	Enter the actual laser power here	/
Laser alarm level	During use, the laser automatically triggers the alarm under abnormal circumstances.	High settings of laser power, high laser temperature, and abnormal fiber connection can lead to laser alarm.	/
Alarm level of water-cooling machine	During use, the water-cooling machine automatically triggers the alarm under abnormal circumstances.	The damaged fan, too high water temperature, insufficient water flow, bent water pipe, and water leakage at the water pipe junction cause the alarm of water-cooling machine.	/

Barometric alarm level	During use, the air supply equipment automatically triggers the alarm under the abnormal circumstances.	Insufficient gas cylinder pressure, and gas pipe leakage will cause air pressure alarm.	/

Figure 3-11 The setting interface of cleaning system 2

Table 3-7 The setting description of cleaning system 2

Name	Parameter description	Notes	Default value
Turn-on optical power	Initial optical output power	The higher the power of laser, the lower the recommended turn-on optical power. The turn-on optical power should not exceed 50%. High turn-on optical power will greatly reduce the service life of lens.	20%
Turn-on optical progressive time	It indicates the time required from the turn-on optical power to the welding power.	/	200ms
Turn-off optical power	End optical output power	/	20%
Turn-off optical progressive time	It indicates the time required from the welding power to turn-off optical power	/	200ms
Trigger setting	Trigger conditions for optical output	Click to switch to double click optical output or single click optical output.	Double click
Motor driver temperature threshold	It shows that the motor drive temperature has reached its maximum temperature.	Give an alarm when the measured temperature exceeds the set value. When the threshold is set to 0, no temperature alarm is detected.	65℃

Temperature threshold of the protective lens	It shows that the temperature of protective lens has reached its maximum temperature.		
Temperature threshold of collimator lens	It shows that the temperature of collimator lens has reached its maximum temperature.		
Language	Show the language of the current system	Click to switch to another language	/

After entering the setting interface, click 枪头型号 to enter the focus lens selection interface. Different focal lengths of lens cleaning amplitude aren't the same, please select them according to actual situations. For example, for 150mm focal length - 30mm width, you must replace the focus lens of welding gun with the lens of **150mm** focal length. At this time, the maximum scanning width of light spot 30mm. Please set the proper scanning width according to the actual focus lens model. As shown in figure 3-12.

Figure 3-12 Focus lens selection interface

3.2.4 Monitoring interface description

click [Monitor] on the home page of the cleaning system to enter the cleaning mode monitoring interface. The status of each signal and device information are displayed on the interface. Laser/water-cooling machine/air pressure alarm signal detects its set high and low level.The authorization status of the current device is displayed

by device authorization. When the device is used beyond its set time, the authorization termination is displayed; the system version is three groups of numbers, and the meaning is hardware version - single-chip microcomputer program version - touch screen version. As shown in figure 3-13.

Figure 3-13 The monitoring interface of laser cleaning system

Table 3-8 Description on the cleaning system monitoring interface

Name	Parameter description	Notes
Laser trigger signal	Switch button signal on the welding gun	After pressing the welding gun switch, the signal closes, and the state changes from dark to bright. Releasing the welding gun switch, the signal is disconnected, and the state changes from high light to dark.
Power status	The current supply voltage and current value of the device	The supply voltage helps you troubleshoot power failures.
PWM	Pulse width modulation	The output is 24V when working. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
Laser is enabled.	Control the working and non-working status of laser.	The output is 24V when working. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
Analog quantity	A quantity that varies continuously within a range	Output rated voltage control signal when working, 10V output at full power. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
The air valve is enabled.	Control the working and non-working status of air valve.	This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less

		than 0.3V.
Communication status	It shows the communication between the touch screen and the main board.	If they are not synchronized, check the screen connection cable.
Motor driver temperature	Measuring the real-time temperature of the motor driver	This temperature affects the motor swing performance.If the temperature rises abnormally, it will affect the laser scanning speed, resulting in the decrease of weld joint quality.
Temperature of protective lens	Measuring the real-time temperature of protective lens	The temperature of lens reflects the working status of lens. According to the temperature of lens, determine if the lens are damaged.
Temperature of collimator lens	Measuring the real-time temperature of collimator lens	

On the monitoring page, Click [Diagnosis] to enter the diagnosis page. The laser does not emit light on this page. PWM, laser enabling, air valve enabling and analog quantity is controlled by the button [Switch Control]. The test value is compared with the theoretical value to determine whether the function of the control box is normal. As shown in figure 3-14.

Figure 3-14 The diagnosis interface of laser cleaning system

3.2. 5 Preparation before cleaning

For SUP20T welding gun, the operator shall directly loosen the round nut, take out the chuck, and replace it with a clear dust cover; for SUP23T welding gun, the operator shall loosen the right lock nut, remove the chuck, and replace it with a clear dust cover. As shown in figure 3-15.

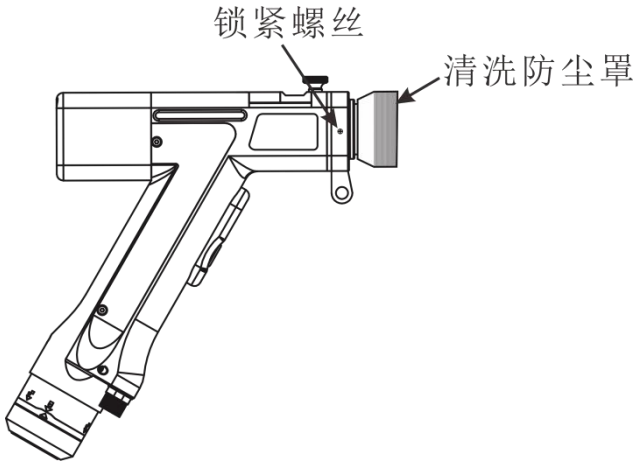


Figure 3-15 Diagram of cleaning SUP23T dust cover

Confirm the focus point before cleaning. Method: Through moving the welding gun back and forth to the workpiece, the point where the noise is loudest and the spark is strongest is the focus point. At this time, clean according to this distance. Oil-free, water-free compressed air or other inert gases above 3KG are used to clean.

3.3 Professional cleaning system

3.3.1 Instructions for the use of cleaning head

SUP22C hand-held laser cleaning head supports up to 800mm focusing mirror, with the scanning width range of up to 300m. The body of welding gun adopts the safety lock design, and the safety lock should be closed when isn't in use. The structure of the SUP22C hand-held laser cleaning head is shown in Figure 3-16.

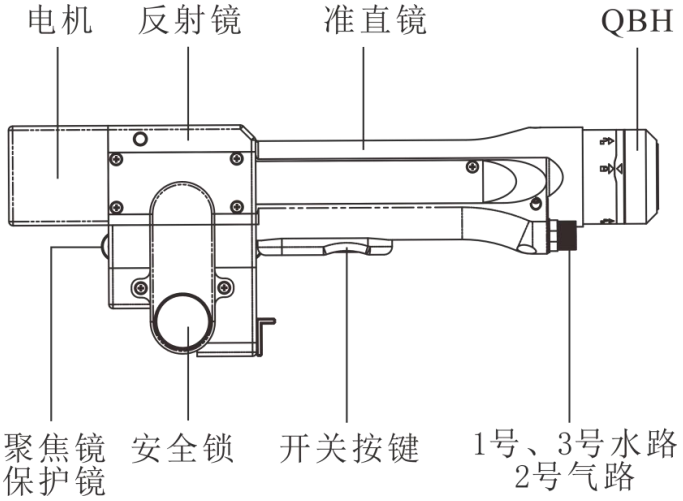


Figure 3-16 SUP22C hand-held laser cleaning head

Confirm the focus point before cleaning. Method: Through moving the welding gun back and forth to the workpiece, the point where the noise is loudest and the spark is strongest is the focus point. At this time, clean according to this distance. Oil-free, water-free compressed air or other inert gases above 5KG are used to clean.

3.3.2 Interface description of home page

The SUP22C hand-held Laser cleaning head is a single-motor swing scanning laser head for hand-held cleaning applications, which is matched with a professional laser cleaning system. Its scanning width is up to 300mm. The home page of the professional cleaning system is shown in Figure 3-17.

Figure 3-17 The home page of professional cleaning system

SUP22C is equipped with safety lock function. When the gun body safety lock is opened, the safety lock of system home page is displayed as orange (on), and light can be output normally at this time. When the gun body safety lock is closed, the safety lock of system home page is displayed as red (off), and the light cannot be output normally at this time. Turn-off optical mode is shown in figure 3-18.

Figure 3-18 The home page of professional cleaning system- Turn-off optical mode

3.3.3 Process interface description

On the home page of the laser cleaning system, click the [Process] button to enter the process interface. The process interface provides self-editable process parameters for users to save and call. Click [Value] to modify the process parameters. After modification, click [Save] in the shortcut [Process], a total of 3 groups, click [Import] when using. As shown in Figure 3-19. The function description is shown in Table 3-9.

Figure 3-19 The process interface of professional cleaning system

Table 3-9 Description on the process interface functions of professional cleaning system

Name	Parameter description	Notes	Default value
Scanning frequency	The number of laser beam scanning on the workpiece per second	Range: 10-100Hz	50
Scanning width	The width scope covered by the light spot in the scanning process	SUP22C focusing mirror F400 corresponding width range is 0-150mm, F600 corresponding width range is 0-225mm, and F800 corresponding width range is 0-300mm.	/
Peak power	The maximum instantaneous output power of the laser pulse	The peak power shall be smaller than the laser power on the setting interface	/
Duty ratio	The ratio of the laser welding machine pulse duration to the pulse period in a certain amount of time	Range 0-100%	100%
Pulse frequency	The frequency of laser pulse repetition per second	Range 5- 5000Hz	2000Hz
Endpoint optimization	Remove uneven light output at two ends of the cleaning track	Range: -20 ～ 20. According to the specific condition, a decrease in the value may make the endpoint energy larger or smaller, and the same can be said for an increase in the value. Adjust	0

		to the ideal situation according to the actual condition.	

3.3.4 Setting interface description

On the home page of home page, click [Settings]. On the password input page, click anywhere in the box to trigger the keyboard, and input the password 123456 to enter the setting interface. Notes: If the keyboard has been triggered, you must enter the password, otherwise click [Return], no response. Figure 3-20 and 3-21, the description of functions are shown in Table 3-10 and 3-11.

Figure 3-20 The professional cleaning system setting interface -1

Table 3-10 Description on the functions of professional cleaning system setting interface -1

Name	Parameter description	Notes	Default value
Scanning correction	Adjust the scanning system of the laser welding machine to achieve accurate welding path and scanning speed results.	Scope 0.01-4	1
Laser center bias	Deviation length of laser center position	The range: -75～75mm. The negative value moves to the left, and the positive value moves to the right, which is used to adjust the shaft red light center.	/
Advance air supply	Time of advance air supply	Range 200-3000ms	200ms
Delayed air supply	Lag air supply time	Range 200-3000ms	200ms
Laser power	Maximum power of laser	Enter the actual laser power here	/

Laser alarm level	During use, the laser automatically triggers the alarm under abnormal circumstances.	High settings of laser power, high laser temperature, and abnormal fiber connection can lead to laser alarm.	/
Alarm level of water-cooling machine	During use, the water-cooling machine automatically triggers the alarm under abnormal circumstances.	The damaged fan, too high water temperature, insufficient water flow, bent water pipe, and water leakage at the water pipe junction cause the alarm of water-cooling machine.	/
Barometric alarm level	During use, the air supply equipment automatically triggers under the alarm abnormal circumstances.	Insufficient gas cylinder pressure, and gas pipe leakage will cause air pressure alarm.	/

Figure 3-21 The professional cleaning system setting interface -2

Table 3-11 Description on the functions of professional cleaning system setting interface -2

Name	Parameter description	Notes	Default value
Turn-on optical power	Initial optical output power	The higher the power of laser, the lower the recommended turn-on optical power. The turn-on optical power should not exceed 50%. High turn-on optical power will greatly reduce the service life of lens.	20%
Turn-on optical progressive time	It indicates the time required from the turn-on optical power to the welding power.	/	200ms
Turn-off optical power	End optical output power	/	20%

Turn-off optical progressive time	It indicates the time required from the welding power to turn-off optical power	/	200ms
Trigger setting	Trigger conditions for optical output	Click to switch to double click optical output or single click optical output.	Double click
Motor driver temperature threshold	It shows that the motor drive temperature has reached its maximum temperature.	Give an alarm when the measured temperature exceeds the set value. When the threshold is set to 0, no temperature alarm is detected.	65℃
Temperature threshold of the protective lens	It shows that the temperature of protective lens has reached its maximum temperature.		
Temperature threshold of collimator lens	It shows that the temperature of collimator lens has reached its maximum temperature.		
Language	Show the language of the current system	Click to switch to another language	/

After entering the setting interface, click 枪头型号 to enter the focus lens selection interface. Different focal lengths of lens cleaning amplitude aren't the same, please select them according to actual situations. For example, for 800mm focal length - 300mm width, you must replace the focus lens of cleaning gun head with the lens of focal length 800mm. At this time, the maximum scanning width of light spot 300mm. Please set the proper scanning width according to the actual focus lens model. As shown in figure 3-22.

Figure 3-22 Focus lens selection interface

3.3.5 Monitoring interface description

Click [Monitor] on the home page of the cleaning system to enter the cleaning mode monitoring interface. The status of each signal and device information are displayed on the interface. Monitor the high and low level status of laser/water-cooling machine/air pressure alarm signal.The authorization status of the current device is displayed by device authorization. When the device is used beyond its set time, the authorization termination is displayed. The system version is three groups of numbers, and the meaning is hardware version - single-chip microcomputer program version - touch screen version. See Figure 3-23. The description of functions are shown in Table 3-12.

Figure 3-23 The interface of professional cleaning system monitoring

Table 3-12 Description on the professional cleaning system monitoring

Name	Parameter description	Notes
Laser trigger signal	Switch button signal on the welding gun	After pressing the welding gun switch, the signal closes, and the state changes from dark to bright. Releasing the welding gun switch, the signal is

		disconnected, and the state changes from high light to dark.
PWM	Pulse width modulation	The output is 24V when working. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
Laser is enabled.	Control the working and non-working status of laser.	The output is 24V when working. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
Analog quantity	A quantity that varies continuously within a range	Output rated voltage control signal when working, 10V output at full power. This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
The air valve is enabled.	Control the working and non-working status of air valve.	This signal is a real-time monitoring signal and will fluctuate within a certain range, with an error of less than 0.3V.
Communication status	It shows the communication between the touch screen and the main board.	If they are not synchronized, check the screen connection cable.
Optical output time	It shows the optical output time of the current device.	Click [Device Authorization], and enter "FFFFFFBB001" on the password page to start timing. Enter "FFFFFFBB000" to clear and stop timing.
Motor driver temperature	Measuring the real-time temperature of the motor driver	This temperature affects the motor swing performance.If the temperature rises abnormally, it will affect the laser scanning speed, resulting in the decrease of weld joint quality.
Temperature of protective lens	Measuring the real-time temperature of protective lens	The temperature of lens reflects the working status of lens. According to the temperature of lens, determine if the lens are damaged.
Temperature of collimator lens	Measuring the real-time temperature of collimator lens	

On the monitoring page, Click [Diagnosis] to enter the diagnosis page. The laser does not emit light on this page. PWM, laser enabling, air valve enabling and analog quantity is controlled by the button [Switch Control]. The test value is compared with the theoretical value to determine whether the function of the control box is normal. As shown in Figure 3-24.

Figure 3-24 The diagnosis interface of laser cleaning system

3.4 Description on other mode functions

3.4.1 Weld joint cleaning

If you use the weld cleaning function, please operate in weld mode. It must be replaced with [AS-2.0D] copper nozzle, and the copper nozzle opening is located above the weld joint to keep the safety ground lock smooth, and then weld joint is subject to laser cleaning.

3.4.2 Cutting mode

Set the scanning speed and scanning width to 0, replace with the copper nozzle [M8D1.5] for cutting to ensure the safety ground lock smooth, and perform cutting operations. The process parameters of the cutting mode is shown in Figure 3-25.

Figure 3-25 The process parameters of the cutting mode

3.5 Description on water-cooling system functions

3.5.1 Display of water-cooling system settings

The basic temperature and upper and lower limit temperature have been set before delivery. The alarm will be sent if temperature is out of range. Please pay attention to the value of the thermometer and the environment temperature.

Table 3-13 Description on the water temperature settings of digital tube

Name	Parameter description
Hxx.x	It shows that the water temperature is normal, providing cooling effect for optical fibers and welding gun.
Lxx.x	It shows that the water temperature is cold, providing cooling effect for the laser.

Notes: x is a specific number.

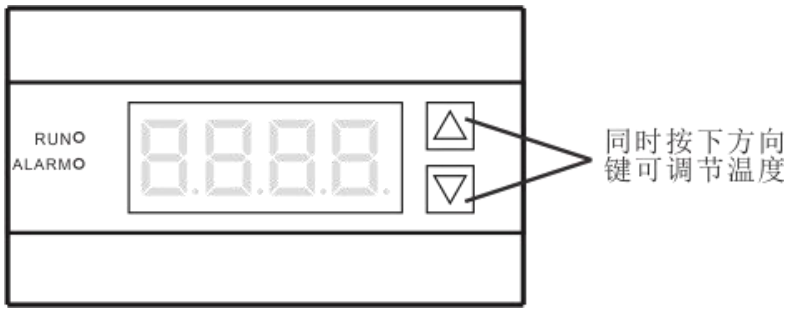


Figure 3-26 Water temperature settings for digital tube

3.5.2 Marking for coolant filling scale

Pay attention to the mark line when filling the coolant. The red area represents the water shortage area, the green area represents the standard area, and the yellow area represents the overflow area. Stop adding when the coolant is about to reach the standard area, turn on the laser power supply, turn off the laser power supply after the completion of water cycle, continue adding the coolant to the middle of the standard area scale line. The coolant added must be pure water or antifreezing solution. When the environment temperature is below 5 ° C, antifreezing solution should be used. Do not change the water temperature of factory setting at will.

3.6 Operation process

3.6.1 On/off process

Startup process:

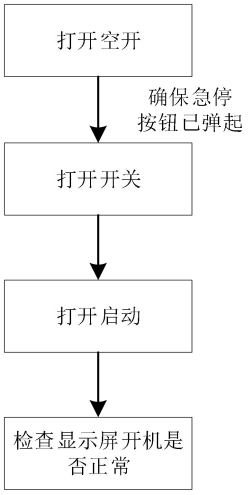


Figure 3-27 Startup flow chart

Shutdown process: Just turn off the switch. In case of emergency, press the emergency stop button immediately to power off.

3.6.2 Process operation regulations

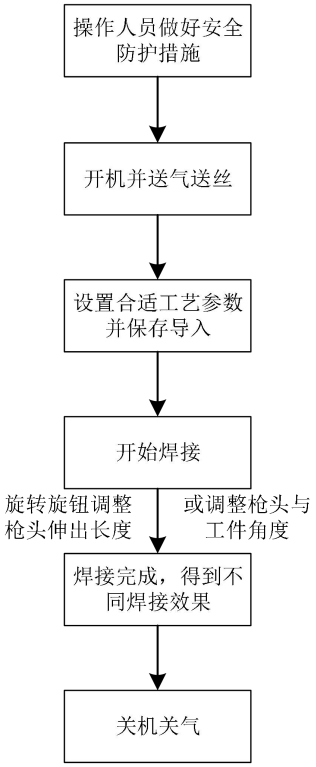


Figure 3-28 Process operation flow chart

Notes:

1．Click the hand-held gun head button“Press”to output light, and click “Release” to stop the laser. (Do not align at people or flammable materials.)

2．For butt welding of plates, the angle of welding gun shall be 45° ~ 60° with the surface of plate. (The red light indicates a 2mm line. When welding, the line segment shall be perpendicular to the welding direction to reach the ideal seam width.)

3．For the right-angle weld joint, the welding gun shall be 45° with the vertical plate. The angle between two plates is used as support to push forward or pull back at a constant speed.

4．When the workpiece is inserted into the gun nozzle, the focal length has a few millimeters of deviation. It is necessary to adjust the extension length of nozzle accordingly.

Chapter IV Fault diagnosis

4.1 Common anomaly analysis on screen

Table4-1 Common anomaly analysis on screen

Abnormal information	Description
Laser alarm	Please connect a mobile phone Bluetooth APP to view the warning reason. High settings of laser power, high laser temperature, and abnormal fiber connection can lead to laser alarm.
	If the alarm signal is not used, an alarm is given. Please change the alarm level on the screen settings page.
Alarm from water-cooling machine	The damaged fan, too high water temperature, insufficient water flow, bent water pipe, and water leakage at the water pipe junction cause the alarm of water-cooling machine. Specific faults are shown in Table 4-2.
	If the alarm signal is not used, an alarm is given. Please change the alarm level on the screen settings page.
The screen does not light up/no response after clicking.	If the screen doesn't light up, the operator must ensure that the controller is powered on, and check whether the voltage between the controller and the screen is 24V.
	If the screen doesn't respond after clicking, please check whether the TXD and RXD communication signal cables in the terminal between the control box and the screen fall off are worn.
	The newly installed device does not respond to the click, which may be caused by the mismatched system version. The operator must refresh the program. Please contact us for the specific version.
No optical output/abnormal optical path	Please check whether the laser has an abnormal alarm.
	In case of an anomaly during welding,please check whether the laser trigger signal and safety lock signal on the monitoring page are normal, and whether the PWM, laser enabling and analog output are normal.
	Whether authorization is terminated
Device time locking	If the use of device has expired, please contact after-sales personnel to unlock it.

4.2 Analysis on the digital tube fault codes for water temperature settings

Table4-2 Analysis on the digital tube fault codes for water temperature settings

Abnormal information	Fault code	Fault name
Alarm of water-cooling machine	E01	Fault of low temperature water probe
	E02	High temperature fault of low temperature water
	E03	Compressor fault
	E05	Flow alarm
	E06	Water level alarm
	E08	Low temperature fault of low temperature water
	E09	Fault of the high temperature water probe
	E10	High temperature alarm of high temperature water
	E11	High temperature alarm of high temperature water
	E12	Fault of the ambient temperature probe
	E13	Fault for too high ambient temperature

Chapter V Equipment maintenance

5.1 Daily inspection and cleaning

🕮 Safety warning

Daily inspection must be conducted after turning off the power supply of the user's distribution box and the power supply of the device to avoid personal injuries such as electric shock and burn. (For the appearance that doesn't contact with a conductor, daily inspection isn’t required.)

- Notice for use

1. Daily inspection is very important to keep the high performance and safe operation of the welding device.
2. Check the welding power, housing and cables daily, and clean or replace if necessary.
3. To ensure the high performance of the product, please select the parts provided or recommended by the original manufacturer.

5.2 Regular inspection and cleaning

🕮 Safety warning

1. Regular inspection must be performed by professionals to ensure safety.
2. Regular inspection must be conducted after turning off the power supply of the user's distribution box and the power supply of the device to avoid personal injuries such as electric shock and burn.

- Operating instruction

1. In order to prevent the semiconductor components and circuit boards from being damaged by static electricity, please wear anti-static devices or touch the metal parts of enclosure to remove static electricity before touching the conductors and circuit boards in the machine.
2. Do not use solvents other than household neutral detergents when cleaning plastic parts.

- Regular inspection plan

1. Regular inspection must be performed to ensure the long-term normal use of the equipment.
2. Pay attention to regular inspection, including internal inspection and cleaning of the equipment.
3. In general, regular inspection is performed once every six months. If there is a lot of dust or oily smoke at the welding site, regular inspection must be performed once every three months.
4. The recommended regular inspection plan is shown in Table 5-2.

Table5-1 Regular inspection schedule(the year of XXXX)

No.	Scheduled inspection date	Actual inspection date	Inspector
1	xxxx-xx-xx		
2	xxxx-xx-xx		
3	xxxx-xx-xx		
…	…		

- Content of regular inspection

Table5-2 Regular inspection and cleaning content

Item	Regular inspection and cleaning
Water-cooling machine	Regularly replace pure water or antifreezing solution in the water-cooling box, remove the seal cap before adding water.
The dustproof net on a side cover	There is a dustproof net on the side cover.Check the integrity of the dustproof net and regularly clean dust to ensure ventilation and heat dissipation of the cabinet.
Fan/condenser	Remove dust and sundries regularly
Copper welding tip	Regularly clean the slag of the copper nozzle and replace the copper nozzle.
guide wire nozzle	Check and replace the guide wire nozzle regularly.
Protective lens	Regularly check the protective lens of laser are dirty or damaged. If they are dirty, please clean them in time. If they are damaged, please replace them in time.

5.3 Cleaning and replacement of laser lenses

1．Cleaning of laser lenses

In installation and cleaning process of lens, sticky matters, finger marks or oil droplets will affect the light transmittance of lens, reducing the service life and affecting the quality of laser processing, so the following measures must be taken:

① Do not install lenses with bare fingers. Wear powder-free finger stalls or rubber/latex gloves.

② Do not use suction apparatus to avoid scratching the surface of lens.

③ Do not touch the film and mirror surface when picking up the lens. You should hold the edge of lens and put the lens on the lens paper.

④ Avoid talking over the lens, and keep all contaminants away from the work environment as much as possible.

⑤ The vinegar only dissolves dirt and cannot damage the lenses.

⑥ The lens shall be cleaned in a dust-free environment as much as possible.

Main maintenance tools: blowing balloons for cleaning, medical alcohol, cotton bud.

2．Replacement of protective lens

According to the laser welding process characteristics, it is necessary to regularly maintain lenses. If the welding effect is poor, replace the protective lens as shown in Table 5-3.

Table5-3 Protective lens replacement steps

Operating requirements and steps	Operating instructions
Preparation before operation	Prepare a dust-proof non-stick tape or textured paper, anhydrous absorbent cotton (fine cotton), anhydrous alcohol, finger stalls or rubber gloves, and lens wiping paper.
	Wash your hands with clean water and dry with an alcohol cotton, and wear gloves.
Environmental requirements	Relatively dusty places
Operation of lens removal	Unscrew the hatch cover of protective lens and pull out the support of protective lens, seal the protective lens bay with textured paper to avoid dust, remove the protective lens ring to replace them, and check the white seal ring under the protective lens.
Lens installation	Install the protective lens pressing ring, tear off the textured paper, wipe the inside of the hatch and cover with a cotton ball with alcohol, rapidly insert the protective lens support into the protective lens compartment, tighten the screw to complete the replacement of protective lens.

Notes:

① If the protective lens are polluted, they must be wiped with the lens wiping paper dampened with anhydrous alcohol; if there are obvious burning points on the surface of protective lens, they must be replaced directly.

② If there is any scratch or deformation of the pressing seal, it must be replaced immediately.

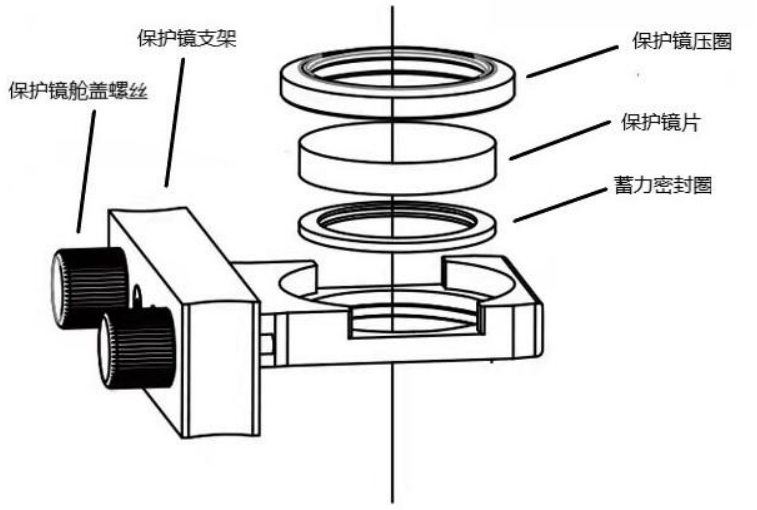


Figure 5-1 Protective lens diagram of welding gun

3．Replacement of focus lens

If the welding result is poor, check whether the protective lens are dirty, and replace the focus lens in time, as shown in Table 5-4.

Table5-4 Replacement steps of focus lens

Operating requirements and steps	Operating instructions
Preparation before operation	Prepare a dust-proof non-stick tape or textured paper, anhydrous absorbent cotton (fine cotton), anhydrous alcohol, finger stalls or rubber gloves, and lens wiping paper.
	Wash your hands with clean water and dry with an alcohol cotton, and wear gloves.
Environmental requirements	Relatively dusty places
Operation of lens removal	Loosen the fixing screws, remove the dust cap, pull out the drawer of focus lens, cover with a textured paper to avoid dust, rotate to remove the focus lens pressing ring, and replace the focus lens. Pay attention to the lens plane facing upward during installation, and check the white pressing seal ring under the protective lens.
Lens installation	Lock the pressing ring of focus lens, tear off the textured paper, put the focus lens drawer back into the lens compartment, reinstall the dust cap, lock the fixing screws to complete the replacement of focus lens.

Notes:

① If the focus lens are polluted, they must be wiped with the lens wiping paper dampened with anhydrous alcohol; if there are obvious burning points on the surface of focus lens, they must be replaced directly.

② If there is any scratch or deformation of the pressing seal, it must be replaced immediately.

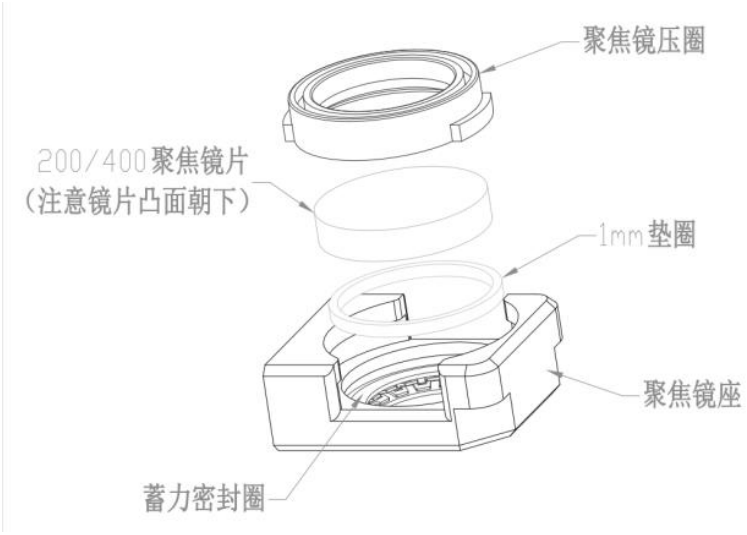


Figure 5-2 Focus lens diagram of welding gun

5.4 Red light correction

When the red light cannot emit from the copper nozzle,do not output light to prevent burning out the copper nozzle, and adjust as follows:

1．Software fine tuning (left and right fine tuning)

Click to enter the setting interface, change the laser center offset value, negative value to the right, positive value to the left. For the latest version,the maximum adjustable value is +3/-3. If the laser center offset value cannot be adjusted by this method, you shall use the mechanical adjustment.

2．Mechanical adjustment (up down, left and right)

After removing the rear cover, we can see the adjustment screw, and adjustment is as follows:

C: The motor can be removed after loosening, and the left and right direction can be adjusted after loosening.

A: Including one screw on each side. The light goes down after tightening screws (loosen the screws on two sides first).

B: Including one screw on each side. The light goes up after tightening screws (loosen the screws on two sides first).

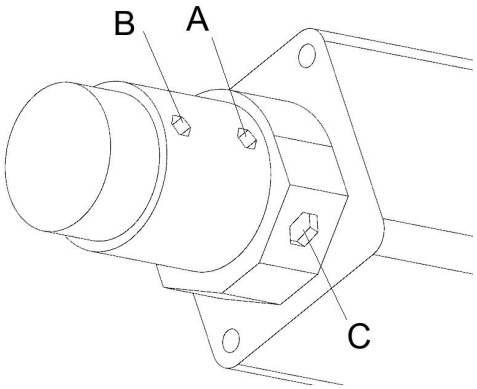


Figure 5-3 Schematic diagram of the motor on the rear cover of welding gun

For example: If the red light cannot come out of the copper nozzle, please open the protective lens compartment to check the specific position of the red light, prioritize the adjustment [C] screw, and then adjust the upper and lower positions.

5.5 After-sales service

- Warranty card

Each device has a warranty card. Please fill in the relevant content on the warranty card.

Please read the warranty card carefully and keep it properly.

- Maintenance

Please contact your local dealer in case of component repair or replacement. Please use parts and components provided by Shenzhen Megmeet Welding Technology Co., Ltd.

The warranty period of this product is one year, starting from the warranty card or purchase invoice. Abnormal use and artificial damage isn’t included in the free warranty coverage.

Chapter VI Warranty statement

6.1 Comprehensive Terms

The company shall provide warranty services for products with defects caused by materials or production processes in the contract warranty period, and ensuring that the product meets the relevant quality and specification requirements specified in the document in normal use.

The company shall provide maintenance and replacement services for products with defects caused by materials or production processes in the contract warranty period. The repair or replacement of product within the scope of warranty shall still be performed according to the remaining warranty period of the original product.

The company has the right to selectively repair or replace any product with material or technical problems during the warranty period.

6.2 Warranty limitation

Products, parts (including fiber optic connectors) or equipment are not covered by the warranty in the following circumstances:

(1) Damage to the product and its parts (including optical fiber) which is caused by tampering, opening, disassembly, misassembly and modification by professionals not specified by the company;

(2) The laser damage which is indirectly caused by the failure of user software or interface;

(3) Damage caused by misuse, negligence or incident;

(4) Use beyond the specification range, wrong installation and maintenance;

(5) The damage that is caused by misuse or failure to follow the information and warnings in the ***Product Manual***;

(6) The damage that is caused by improper installation, maintenance, or other abnormal operating conditions not covered by this manual;

Within the scope of the warranty, the buyer must raise a claim in writing within 31 days from the date of discovery of the product problem. This warranty does not cover third parties (including specified buyer, final user or customer, and excluding the parts, equipment or other products not made in the Company).

Notes:

◎ Customers shall understand and comply with the operating instructions in the user manual and operating specifications. The damage caused by wrong operation is not covered by the warranty scope, accessories and optical fiber and other parts are not covered by the warranty scope.

6.3 Technical support

This product has no built-in accessories for user maintenance, so all maintenance shall be conducted by technical personnel specified by the company.

If there is any fault in the use of product, immediately notify the company's technical personnel in time to deal with the problem.

All repaired or replaced products must be put in the original packaging box provided by the company, otherwise, the company has the right not to repair any product damage arisen from this.

When receiving the company's products, the user shall check whether the products are complete and intact in time. In case of any abnormal situation, please contact the carrier or the company in time.

The company will constantly develop new products. The product information listed in the manual may be changed without notice. For all technical parameters, the terms of the contract shall prevail.

The above warranty and service terms of our products are used for user reference only. For the formal service and warranty contents, the agreement in the contract shall prevail.

Appendix I System Configuration Table

Configuration				Machine type	
Name	Standard/optional configuration	Quantity	Notes	LUX-1500	LUX-2000
Welding machine	Standard configuration	1	Includes welding torch, combination control cable, and power cable	●	●
Wire feeder	Standard configuration	1		●	●
Control line of wire feeding signal	Standard configuration	1	5m	●	●
Wire feeding hose	Standard configuration	1	5m, including installation tools	●	●
Wire feeding roller	Standard configuration	2	Optional (0.8/1.0)V/U,(1.2/1.6)V/U	●	●
Safety ground lock line	Standard configuration	1	5m	●	●
Protective lens	Standard configuration	5	Standby 5 PCS	●	●
Copper welding tip	Standard configuration	8		●	●
Graduated tube	Standard configuration	1		●	●
Dust-free cotton bud/dust-free cloth	Standard configuration	1		●	●
User Manual	Standard configuration	2	User manual of laser welding machine and wire feeder	●	●
Welding gloves	Optional	1		○	○
Protective glasses	Optional	1		○	○
Focus lens set	Standard configuration	1		●	●
Cleaning dust cover	Standard configuration	1		●	●

Notes: ●Standard configuration,○Optional configuration

Appendix II Electrical Connection Diagram

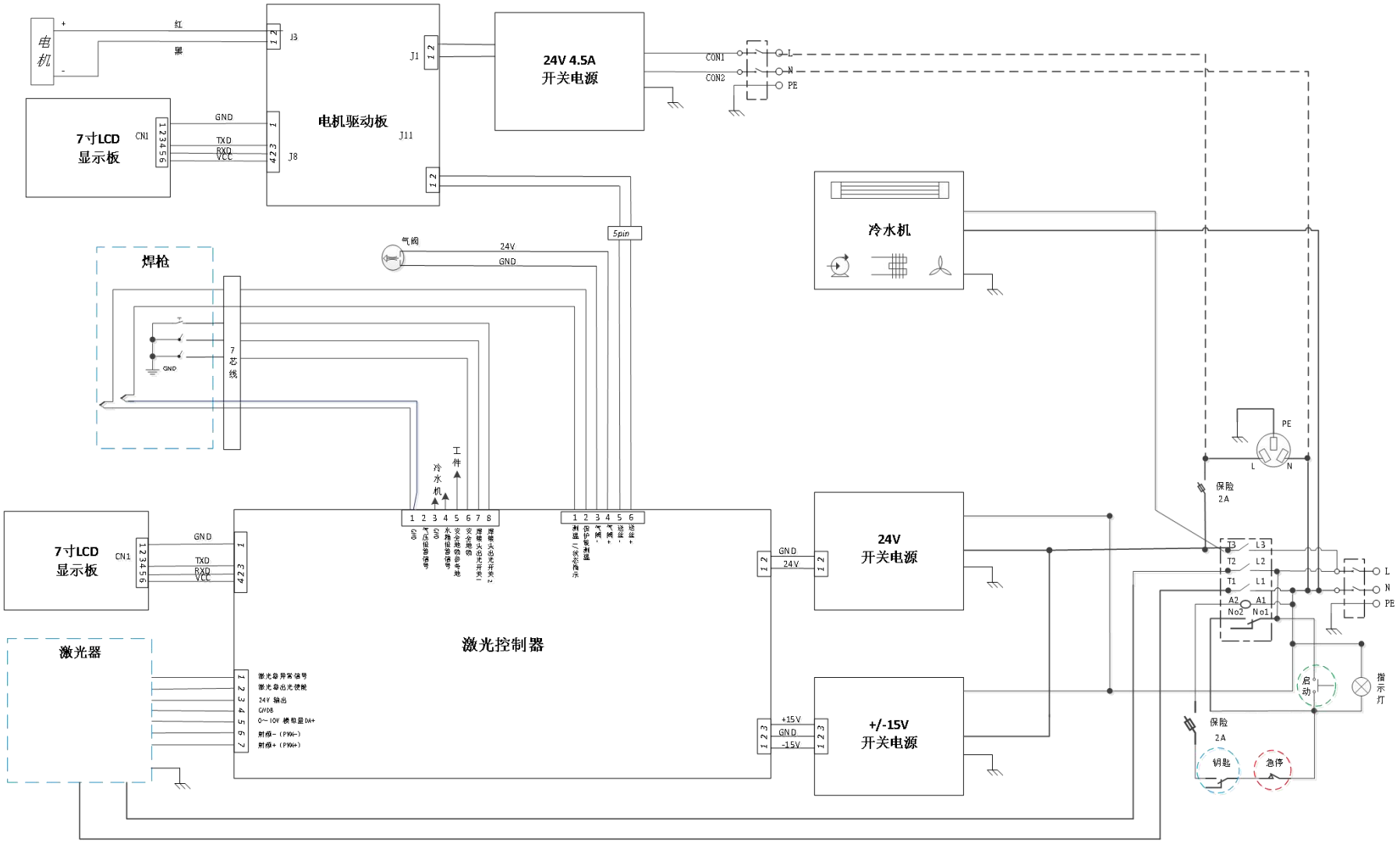
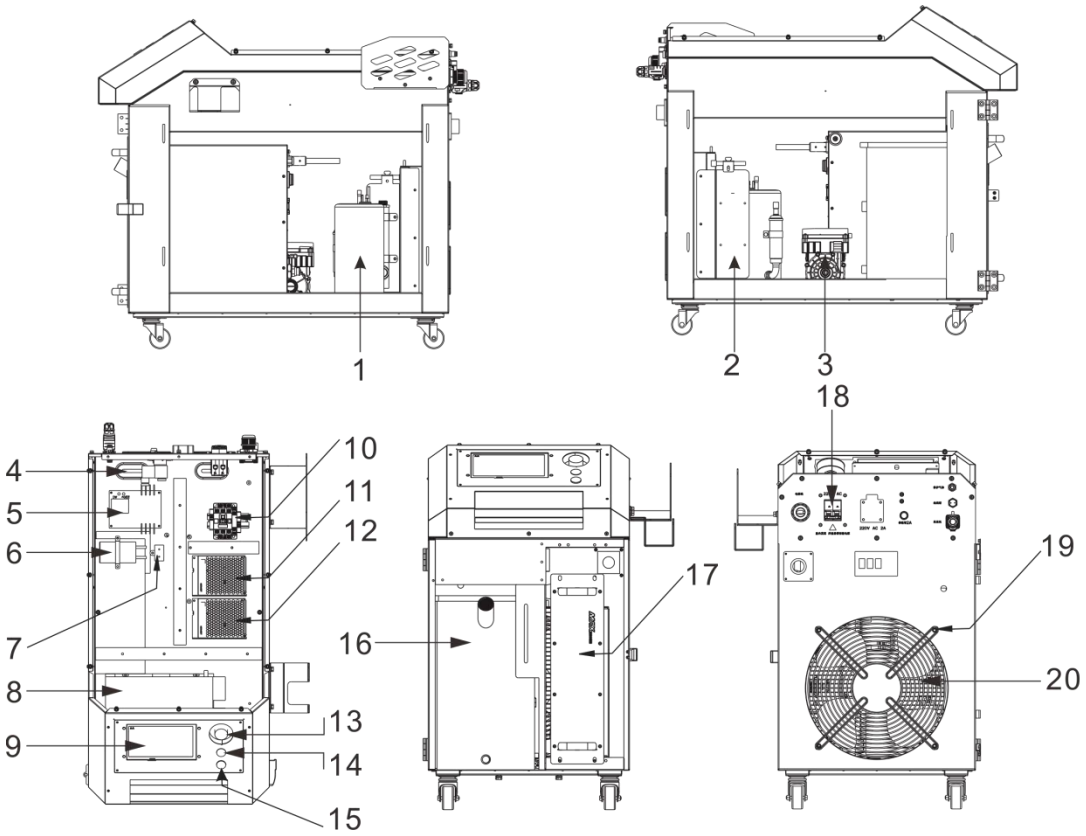


Figure 1 Electrical connection diagram

Appendix III Welding Machine Structure Drawing



1-1	压缩机-1500W	R37060031	13	急停按钮开关	R34010984
1-2	压缩机-2000W	R37060059	14	金属按键电源开关	R34010986
2-1	冷凝器-1500W	R37060029	15	金属钥匙开关	R34010983
2-2	冷凝器-2000W	R37060060	16-1	水箱	R37060036
3	水泵	R37060034	16-2	水箱盖	R37060037
4	气阀	R34090053	17-1	创鑫激光器1.5KW	R37010003
5	冷水机控制板	R37060030	17-2	创鑫激光器2.0KW	R37010004
6	压缩机电容	R37060032	17-3	凯普林激光器1.5KW	R37010001
7	风扇电容	/	17-4	凯普林激光器2.0KW	R37010002
8	控制盒	R37060006	18	空气开关	R34010973
9	液晶屏	R37060007	19	风扇螺丝/平垫	/
10	交流接触器	R34040148	20-1	风扇带扇罩-1500W	R37060033
11	±15V开关电源	R00200030	20-2	风扇带扇罩-2000W	R37060062
12	24V开关电源	R00200020			

Figure 2 Welding machine structure drawing

MEGMEET Shenzhen Megmeet Welding Technology Co., Ltd.

Welding machine warranty card

User unit:	
Detailed address:	
Zip code:	Contact person:
Tel.:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Date of purchase:
Service unit:	
Contact person:	Tel.:
Maintenance personnel:	Tel.:
Date of maintenance:	
User evaluation of service quality: □ Good □ Better □ General □ Poor Other opinions: User's signature: DD/MM/YYYY	
Return visit record of Customer Service Center: □ Telephone follow-up □ Letter follow-up Other: Signature of technical support engineer: DD/MM/YYYY	

Notes: This order is invalid when the user cannot be interviewed.

MEGMEET Shenzhen Megmeet Welding Technology Co., Ltd.

Welding machine warranty card

User unit:	
Detailed address:	
Zip code:	Contact person:
Tel.:	Fax:
Machine model:	
Power:	Machine No.:
Contract No.:	Date of purchase:
Service unit:	
Contact person:	Tel.:
Maintenance personnel:	Tel.:
Date of maintenance:	
User evaluation of service quality: □ Good □ Better □ General □ Poor Other opinions: User's signature: DD/MM/YYYY	
Return visit record of Customer Service Center: □ Telephone follow-up □ Letter follow-up Other: Signature of technical support engineer: DD/MM/YYYY	

Notes: This order is invalid when the user cannot be interviewed.

User notes

1. Warranty scope refers to the body of welding machine.
2. The warranty period is 12 months. Under the normal use of the warranty period, the welding machine is faulty or damaged. We repair it free of charge.
3. The start time of the weld is the manufacture date of welding machine. The code of welding machine is the only basis to judge the warranty period. The equipment without the code of welding machine is treated out of warranty.
4. If any of the following conditions occur even during the warranty period, a certain maintenance fee will be charged:

- The fault of welding machine is caused by failure to operate according to user manual;
- The damage of welding machine is caused by fire, flood, voltage abnormality, etc.;
- The damage of welding machine is caused by the use of abnormal function.

5. The service fee is calculated according to actual costs. If there is another contract, it must follow the principle of contract priority.
6. Please keep this card and show it to the maintenance unit during the warranty period.
7. In case of any question, please contact the agent or contact with our company directly.

Shenzhen Megmeet Welding Technology Co., Ltd.
Customer service center

Address: 5/F, Block B, Ziguang Information Port, Langshan Road, North Area of Science Park, Nanshan District, Shenzhen, Guangdong
Postal code:518057
Customer service hotline: 4006662163

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