OPERATION MANUAL of ADLWF HANDHELD FIBR LASER WIRE WELDING MACHINE

Service Hotline：86-0750-3582689

ANDE LASER INTELLIGENT EQUIPMENT (GUANGDONG)Co.,LTD.

2021.12


安德激光
ANDELASER

WARNINGS

Before using this product,

Please read this manual carefully and confirm that you understand its content!

Ande Laser (Guangdong) Intelligent Equipment Co., Ltd. (abbreviated as Ande Laser) reserves the right to modify the products and product specifications in this manual without prior notice.

Ander Laser is not responsible for direct, indirect, special, incidental or corresponding losses or liabilities caused by improper use of this manual or this product.

Ande Laser has the patent rights, copyrights and other intellectual property rights of this product and its software. Without authorization, it is not allowed to copy, manufacture, process or use this product and its related parts directly or indirectly.

The machine in motion is dangerous! The user is responsible for designing an effective error handling and safety protection mechanism in the machine. Ander Laser has no obligation or responsibility for the incidental or corresponding losses caused thereby.

Table of Contents

1 Safety

1.1 Safety information

Before using this machine, please read and understand this user manual and be familiar with the information we provide. This user manual provides important information about machine operation, safety and other aspects for you and all future users for reference. In order to ensure safe operation and the best performance of the machine, please follow the precautions and warnings below and other information in this manual to operate.

● Fiber laser sources of this series belong to Class IV. The laser sources of this series emit laser radiation of not less than 200W in surroundings of the wavelength range around 1080nm±5%. Prevent the eyes and skin from direct contact of the radiation emitted or scattered from the light output end.

● Do not look directly at the laser output head. Make sure to wear laser protective glasses when operating the machine.

● This laser source emits invisible light. Do not let the laser output head toward people when using it. Please wear laser protective glasses when the laser source is running.

● Please do not open the inside of the machine, because there are no product parts or accessories available for users. All maintenance or repairs must be handled by the Ande after-sales team.

Laser Source classification:

This series of laser sources belong to class IV laser: direct laser irradiation will definitely cause irreparable damage to the eyes, as well as skin burns and burned items. In some cases, the reflected light and scattered light of the laser can also cause eye damage and skin burns. .

Safety signs and their locations

The above two labels means laser radiation

The machine uses single-phase 220V, 50Hz alternating current.

Warning:

1) When using the laser, ensure reliable grounding to avoid possible personal injury.

2) There are no built-in parts available for use. All repairs should be carried out by our company's personnel. To prevent electric shock, please do not damage the label and remove the cover, otherwise any damage to the product will not be covered by the warranty.

3) The output head of the laser is connected with the optical cable. Please handle the QBH output head carefully when using it to prevent dust or other pollution. When cleaning the protective lens, please use a special wiping tool.

4) If the laser source is used in a manner not specified in this manual, the protection function will be weakened. Therefore, the product must be used in a normal environment.

5) When the laser source is in operation, it is strictly prohibited to install QBH output head.

6) The laser is using water cooling method to dissipate heat, and it must be ensured that there is enough water flow to dissipate heat.

7) Do not look directly at the QBH output head. When operating the machine, make sure to wear a laser protective glasses all the time.

8) Power interruption is very harmful to the laser source, please provide continuous and reliable power.

9) The QBH protection window is strictly prohibited from being opened by the customer to

prevent damage to the output head caused by pollution such as falling dust.

Precautions:

Before turning on the 220V AC power supply, make sure that the connection is the correct 220V voltage. If the power supply is incorrectly connected, the laser source will be damaged. If the controller or regulator is not used within the scope specified in this manual, it will cause harmful radiation. It is very important to keep the protective lens clean. Do not touch the protective lens and do not use any solvent to clean the lens. If necessary, use lens paper to clean the lens. The loss of light may be caused by incorrect operation and this kind of loss is not covered by the warranty.

1.2 Laser safety and protection

Fiber laser sources emit laser with a wavelength of around 1080nm. According to the European standard EN 60825-1, the laser sources of this series belong to Class 4 lasers. This type of laser is an infrared laser that is invisible to the human eye and can cause irreversible damage to the retina and cornea. And due to the laser power emitted by the optical fiber output head is greater than 1000W, it is a high-power industrial processing laser; any part of the human body, such as eyes or skin, directly or indirectly exposed to such a high-power laser will cause serious personal injury. Therefore, the customer's relevant operators must wear suitable and certified laser protective glasses during the operation of the laser equipment, and set up obvious protective devices around the laser and processing machine tools to avoid accidents.

Laser safety protective glasses

1.3 Electrical safety

a) Do not damage the power wires and cables. Do not step on, twist or pull the cable. Cable damage can cause electric shock, short circuit, and fire.

b) When there is a burning smell, abnormal sound, abnormal heat, smoke and other abnormal phenomena, please turn off the power to stop the operation, and contact our company immediately, otherwise there will be dangers of electric shock or fire.

c) Foreign objects, especially metal or conductive objects, should be avoided inside the equipment to prevent short circuits or malfunctions.

d) Do not use this equipment in a humid environment. Water in the electrical part may cause electric shock or short circuit.

e) When replacing the laser xenon lamp, be sure to cut off the power supply of the welding machine.

f) When the equipment does not need to work, do not power on it.

1.4 Material safety

a) For the stains out of the system, please wipe it with a dry cloth or a slightly damp cloth. If necessary, wipe it with a diluted neutral detergent or alcohol. Please do not use special solvents, gasoline, etc., otherwise it will cause structural deformation or surface discoloration.

b) Avoid placing containers with liquid on the cabinet. Spilled water will damage the insulation, and corrosive liquids will corrode the equipment.

1.5 Fire safety

a) It is forbidden to pile up flammable and explosive materials and sundries around the machine. Sparks splash out during welding, and a fire may occur if combustible materials are encountered.

b) Do not place flammable and explosive materials on the optical path or where the laser beam may be irradiated. If the laser beam irradiates flammable and explosive materials, it

may cause fire or explosion.

c) Do not cover the equipment with blankets, cloths and other textiles during use, so as to prevent the equipment from heating and causing a fire.

d) Once the machine causes fire or explosion, be sure to cut off all power and use carbon dioxide or dry powder fire extinguisher to extinguish the fire; or use dry sand to extinguish the flame.

1.6 Installation and debugging

Installation Environment

Main power supply: power supply grid fluctuation <5%, power supply frequency 50Hz, single-phase 220V, 10A, grid ground wire meets the requirements of the national standard of the computer room.

Cooling water: deionized water or pure distilled water and keep it clean

Note:

1. A leakage protector or air switch must be installed.
2. The power cord must be more than 4 square meters, and the three wires of zero fire ground must be divided into colors.
3. It must be grounded safely.
4. If the power grid fluctuates severely and there is equipment that affect the voltage nearby, it is recommended to use a voltage stabilizer to ensure the stability of the equipment.

During the installation process, please note the following:

a) Please designate a person with sufficient knowledge and experience of lasers and laser devices as the equipment administrator.

b) This equipment must be installed in a fixed, non-inclined place. Inclination or tipping of the device will cause malfunctions.

c) This equipment is a heavy current equipment. The installer must have a qualified electrician qualification and be connected to electricity in accordance with the national electrician regulations. The electricity must not be turned on before the equipment is installed. It can be powered on when safety is ensured.

d) Please operate the switches and buttons carefully by hand. Random operation or operation with screwdrivers, pen points and other objects may cause equipment failure or damage.

e) Please operate switches and buttons one by one in order carefully, to avoid switching multiple switches at the same time to cause equipment failure.

f) The outer panel and cover are connected to the main body of the equipment with grounding wires. After removing the outer panel and cover, be sure to reconnect the ground wire if the original position is restored.

2 Product Description

2.1 Introduction to the components of the whole machine

2.1.1 Design and function

1. The whole machine is moved by pulleys, which is convenient for welding operators to move to different positions for welding.

2. The 7-inch touch screen is convenient for the operators to modify the process parameters according to different materials and thicknesses.

3. The power button and emergency stop button protect the personal safety of welding operators.

4. Drag-type optical fiber cable, welding swing motor cable and safety lock ground wire are convenient for welding operators to weld in different environments, while the safety lock ground wire protects the personal safety of welding operators.

5. The automatic wire feeding mechanism ensures that the welding gap is firm and beautiful.

Special remind: The safety lock ground wire must not share the ground or workbench with other large currents such as argon arc welding and carbon dioxide welding. Otherwise， it will cause the electronic circuit of the controller to burn out.

2.1.2 Technical parameter

Cooling system

The refrigeration system needs pure distilled water, which can not only protect the laser and welding handle， but also prolong the service life of the laser. DO NOT use tap water.

Technical parameter

Dimensions: 1130*660*1265 (length*width*height/mm)

Whole machine weight: 150Kg ~ 190Kg

Input power: AC220v/50Hz

Length of welding head following line: 5 meters

Maximum power consumption: (ADLWF1000) 6Kw / (ADLWF1500) 9Kw

Working environment: 15~35℃ /humidity ＜70% /no condensation

Applicable plate tube: 0.3mm ~ 5mm

Gap requirements: 0.1mm ~ 1.6mm

Fiber length: 10 meters

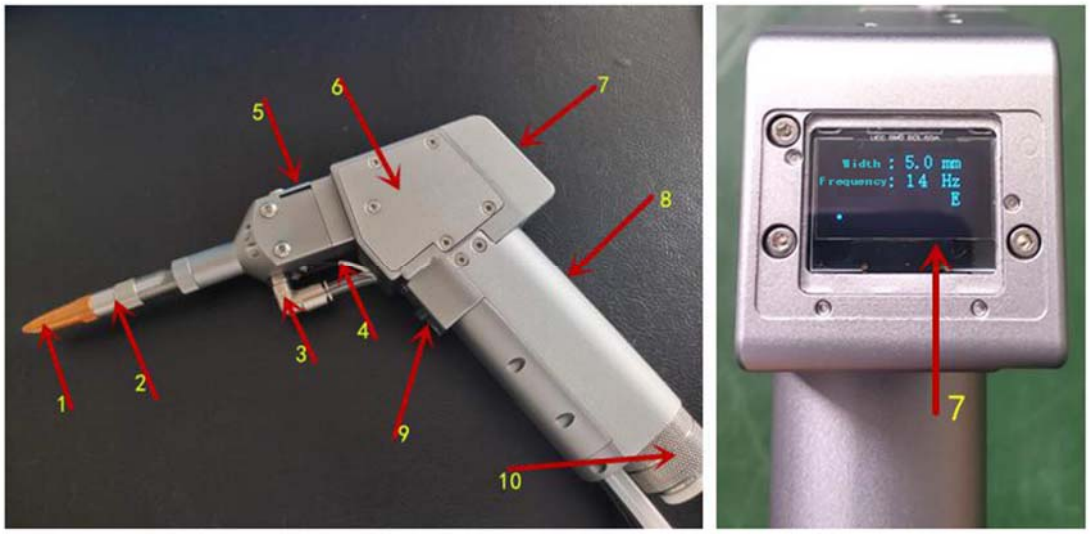
Customer power requirements:

ADLWF1000: 3*4mm² power cord, D40A, 2P circuit breaker

ADLWF1500: 3*6mm² power cord, D63A, 2P circuit breaker

Remark: The above parameters are different according to different models of machines and lasers. For details, please correspond to the actual machine model and the brand model of the laser.

2.2 Introduction of handheld welding joint



The figure shown in the above pictures means:

1. Copper nozzle: customers can change the corresponding nozzle according to different welding processes (copper nozzle at the internal corner, copper nozzle at the external corner, copper nozzle for wire feeding, etc.).

 Cutting nozzle	 Nozzle for wire feeding
 Nozzle for external fillet welding	 Nozzle for internal fillet welding

2. Threaded steel pipe: twist the threaded pipe to adjust the focal length, and the adjustable distance is ± 3mm

3. Air pipe interface: protective gas blowing port.

4. Conducting signal wire: it is connected with the copper nozzle. When welding, it will

touch the iron plate ground wire to produce a circuit, which plays a role in safety protection.

5. Installation port of protective lens: the protective lens has a water cooling structure, so the service life of the protective lens is longer. It is recommended to use an alcohol dust-free cotton swab to wipe the dust off the protective lens once a day.

6. Circulating water circuit: the cold water circulating structure is used to cool the reflector and the internal structure of the gun body.

7. LCD: used to display whether the parameters set by the system and the signal of the welding joint are normal.

8. Gun handle aluminum oxide process, light and comfortable.

9. Light out trigger button: after changing the handle structure and trigger button position, it can be used for left and right-hand operation to solve the problem of inconvenient operation for left-handers.

10. QBH locking sleeve: pay attention to cleaning when installing the QBH connecting end of the laser to avoid dust entering the gun body. After installation, seal the connecting section with masking paper.

2.2.1 Design and function

Internal design dexterous, excellent interactive control system, expand the processing parts tolerance range and weld width, solve the disadvantage of a small spot, weld forming is good. It is light in shape and comfortable in grip with ergonomic design method. It is easy to control and operate.

With multiple safety alarms, the light will be automatically locked after the workpiece is removed, with high safety.

The weld is beautiful, fast, no consumables, no traces, no discoloration, no need for later grinding.

It can be equipped with a variety of angle nozzles to meet the welding requirements of different products.

2.2.2 Auxiliary Medium

Assistance gas

To protect the welding joint from oxidation and make the welding joint well, the protective gas should have the chemical characteristics of no harmful chemical reaction with the welding material

The quality of assistance gas must comply with ISO 8573-1:2010, class 2.4.3 standard, without impurity particles, water, and oil. The higher the purity of assistance gas is, the longer the life of the protective lens is.

Technical parameter

Interface Type	QBH
Power range	1000W~2000W(According to the sales order)
Laser wavelength	1064~1080nm
Spot adjustment	（0.2-5）mm
Collimated focal length	50mm focus

Focal length	120/150 mm
Protective lens	D20X2 mm
Cooling method	Water-cooling
Handle weight	1.2KG
Mode selection	Point-line-circle-double 0-triangle-8 shape

2.3 Introduction of lasers and chillers

Attention:

- **Please drain the old distilled water from the chiller every two to three months and replace it with new pure distilled water.**
- **Please use compressed air to blow clean the cooling filter of the chiller regularly every month.**

- **Please check it regularly whether the liquid level of the chiller is within the required scale line.**

2.3.1 Laser switch instructions

Laser emergency stop button: press the self-locking button, power is off ; rotate to the right and release, the machine restart.

Laser key switch: rotate the left side (REM)-- external control of the laser;
rotate the right side (ON) -- single machine operation of the laser source; stay in the middle (OFF) – laser source power off

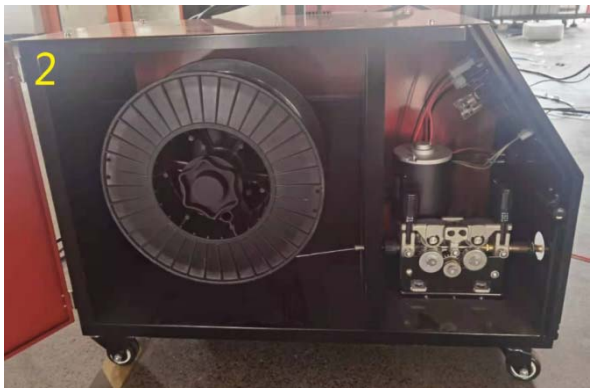
2.3.2 Instructions for the switches and connections of the chiller

Discharge of wastewater: open the vent, use the water tray or water pipe to lead into the drain, open the gate valve, and the wastewater will flow out automatically.

Adding pure distilled water: turn the plug head of water inlet anticlockwise, pour in pure water, and observe the change of actual liquid level. When the liquid level is in the green area, the water level is normal. When the water level is in the red area, it means that the actual cooling water level is insufficient; when the water level is in the yellow area, it means that the actual liquid level is too full, and it must be discharged to meet the requirements.

Chiller parameter setting: the cooling water temperature or other parameters can be set through the SET,▲, or ▼. (This parameter has been well set in the factory and does not need to be modified)

2.4 Structure and accessories of wire feeder



1. Wire feeding clamp, wire feeding copper nozzle, and welding copper nozzle.

2. The internal structure of the wire feeder adopts a high-precision fully enclosed low-speed motor and double drive wire feeding structure, which makes the wire feeding more smooth and powerful without jamming. It is equipped with a draggable Vientiane wheel, which can be easily moved at any time.

3. Closed case design with movable handle.

4. Wire feeding regulator, high precision speed control knob, higher adjustable range of wire feeding speed.

3. Steps of installation and use

Step 1: Fill the water tank of the chiller

Open the front cover of the cabinet, pour pure water into the water tank filling port, and add

the water level to the green line for the first use

Note: The water level should not exceed the green line, and the water should be changed at least once a month

In order to ensure the safety of the equipment, the laser cooling system needs to meet the following requirements:

1. Distilled water or purified water is used as cooling water, distilled water is recommended;
2. When starting the chiller cooling system for the first time, check the entire water system and joints for water leakage. The external water pipe must be installed and connected in accordance with the water inlet and outlet marked by the laser;
3. In order to prevent the growth of microorganisms and molds in the water in the chiller from causing pipeline blockage, it is recommended to replace the cooling water every 3 to 4 months to ensure the quality of the cooling water; users are not recommended to add antibacterial agents casually;
4. When the ambient temperature of the equipment is between -10℃ and 0℃, antifreeze must be used (please consult the after-sales department for the specific model), and replace it every 1 to 2 months. When the ambient temperature of the equipment is lower than -10℃, it is necessary to use a chiller with heating function, and to ensure that the chiller runs 24 hours a day to prevent the cooling water from freezing.
5. If the laser is not used for a long time, the cooling system and the cooling water inside the laser should be drained, otherwise the laser equipment will be damaged. Please use a compressed gas with a pressure of less than 0.3MPa to drain, otherwise the water cooling system will be irrecoverable damage.

Step 2: Connect the power

L is the live wire, N is the neutral wire, and PE is the ground wire.

Notice:

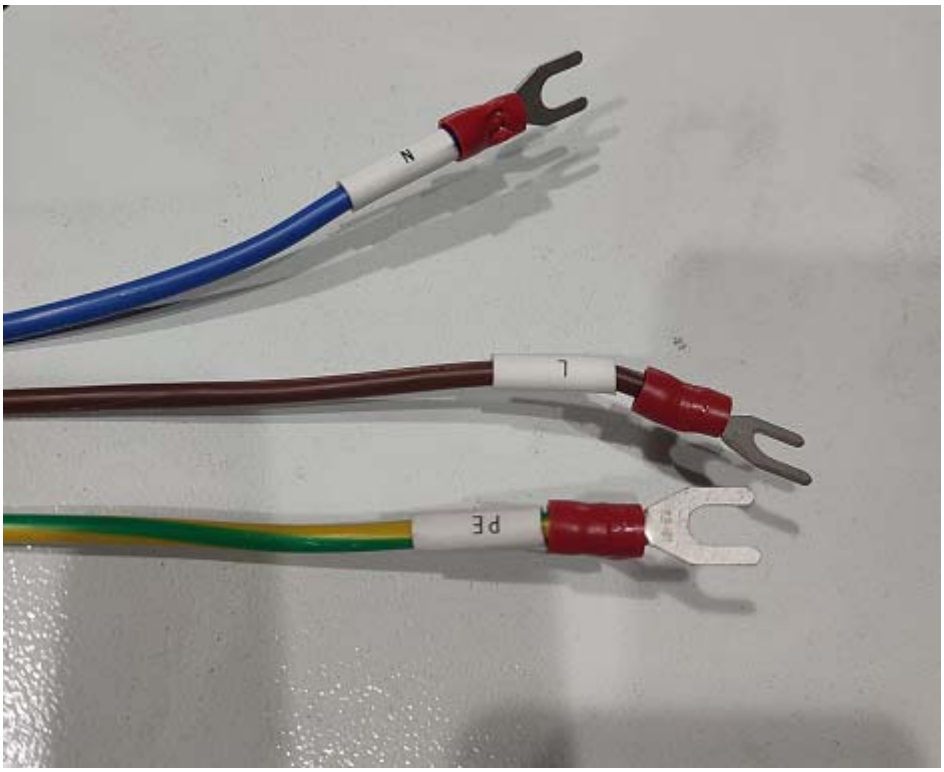
1. When wiring the laser source power supply, ensure a reliable and effective ground connection to avoid leakage and electric shock.

2. When the laser power is not disconnected, it is strictly forbidden to plug or install the QBH output head to avoid laser damage.

3. The QBH output head of the laser needs to be handled with care. Pay attention to dust. Please carefully check the end face of the output head before use to prevent dust or other pollution. Please use special lens paper when cleaning the output end face. Please refer to " Chapter 10 Maintenance and Maintenance of Main Components of Equipment".

4. Do not look directly at the output head. When operating the machine, make sure to wear protective glasses.

5. If the laser is used in a manner not specified in this manual, the laser may be in an abnormal working condition and cause damage. As a result, the company will not be liable for any repair or compensation if the laser is damaged.



Wiring image

Step 3: Turn on the main power of the machine, on the left side of the back of the machine (as shown below)

Press the chiller button, the laser button, and the system button on the control panel in turn (as shown below)

Note: The red button on the left is the emergency stop button.

Open the cabinet door, and when the water temperature of the chiller reaches the setting temperature, turn on the laser switch and turn it to the "REM" position on the left. The green indicator light "POWER" on the left is in normal condition (different laser source may differ.)

Step 4: Adjust the parameters

Set the corresponding parameters on the system according to the material to be welded. For the use of the system, please refer to "Chapter 4, Section 6 Touch Screen Interface Operation Introduction"

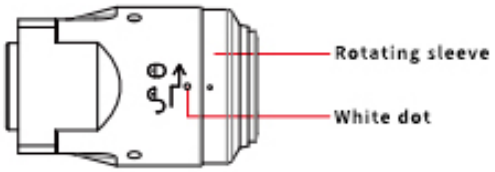
Step 5: Clamp the red safety clip on the metal workpiece, light up the "FGAP" of the touch screen, press and hold the hand-held gun to open the key, and the light will complete the installation

Note: The red clip is connected to the ground wire to prevent light from being emitted by mistake, so it must be clipped to the metal workpiece

4 Introduction of QBH port and optical fiber

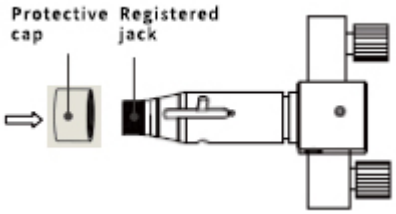
4.1 QBH and optical fiber connection

Step 1: Rotate the sleeve as shown in the figure below. Make sure that the red dot on the side of the sleeve is in line with the white dot on the outer sleeve.



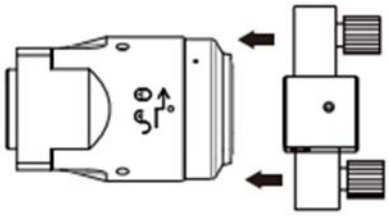
Step 2: Remove the dust cover of the optical fiber rod, and clean the head of the optical

fiber rod with a dust-free cleaning rod and absolute ethanol. Before installation, it is necessary to check whether the protective cap of the registered jack of the optical fiber rod is locked tightly to prevent the protective cap from being loose when the machine is working and affecting the welding effect and burning the optical fiber head.



Step 3: remove the dust cover of QBH, make the cleaned optical fiber head coaxial with QBH, and ensure that the white spot on QBH is in the same line with the positioning groove (long groove on optical fiber head). Then insert the optical fiber head into the QBH port gently until the optical fiber head fits the two contact surfaces of QBH.

Step 4: After inserting the optical fiber head into the QBH port, gently press the rotating sleeve with your hand, and rotate the sleeve about 15 degrees in the direction of the arrow on the rotating sleeve. When it is done, lift the rotating sleeve by hand until the bottom of the rotating sleeve is flush with the top of the QBH, and then rotate it in the same direction to the limit. The turning force should be moderate.



Note:

The fiber head needs to be inserted and unplugged GENTLY.

Plug-in type, make QBH and optical fiber connector coaxial cable in and out.

The operation process must be kept in a dust-free environment. Otherwise, it will contaminate the optical fiber head and cause light attenuation.

4.2 Maintenance

4.2.1 Precautions for QBH and optical fiber head

Attention:

Need a clean and dust-free working environment!

Need professional optical fiber installation special microscope!

Any laser cable equipment installed with a laser head must be carefully dust removed!

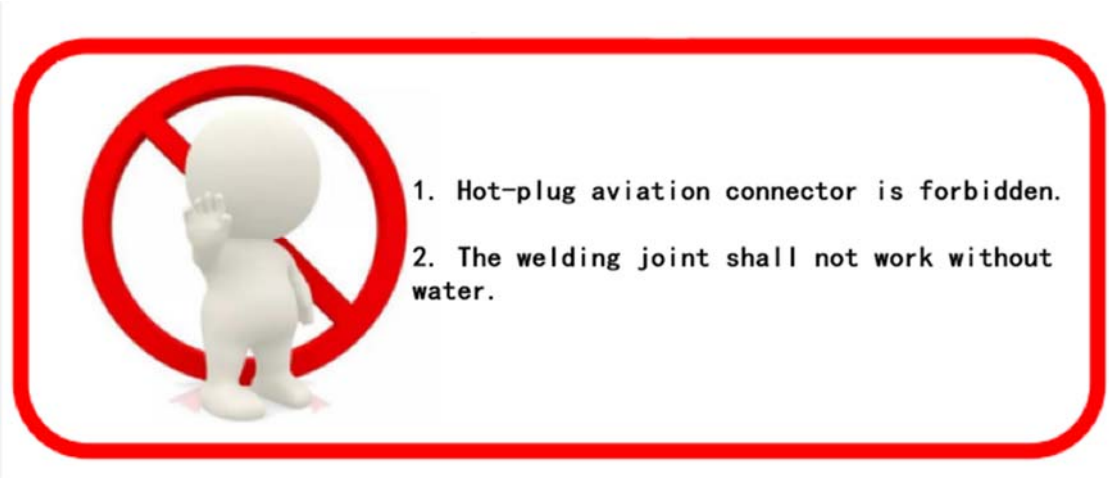
If the lens assembly must be replaced, all the replacement must be carried out in a clean environment!

- ✧ Any assembly or component replacement must be carried out in a clean environment!
- ✧ Before removing the old lens components, please well prepare new and clean components!
- ✧ If there are no spare lens components, it is recommended to purchase from our company!
- ✧ When the conditions are difficult to meet the requirements, it is recommended to seal the opening of the removed lens with non-adhesive protective film immediately!
- ✧ Minimize the exposure time of the laser head path in the air to prevent dust and dirt from entering!
- ➢ Check and confirm whether the equipment is running well.

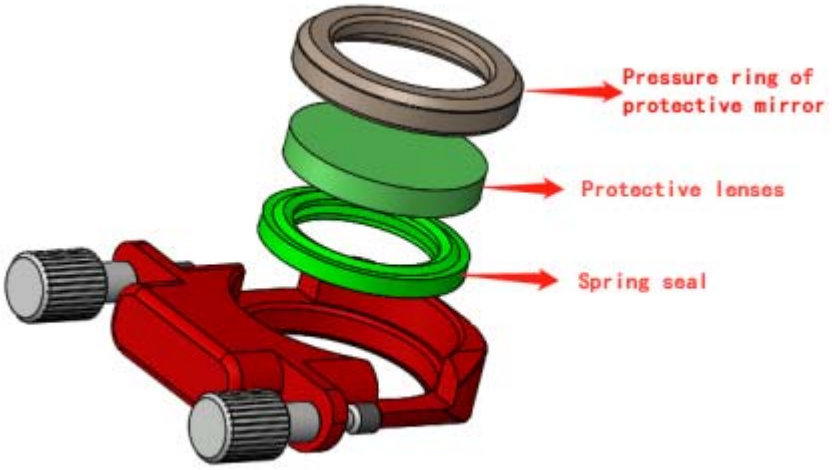
4.2.2 Maintenance of QBH and optical fiber head

1. The connection between QBH and optical fiber connector shall be covered with self-adhesive paper to avoid dust entering the gap and increasing the difficulty of maintenance.

2. The cooling water pipe of the optical fiber connector shall be well connected without water leakage. If QBH floods accidentally, please stop the machine immediately and stop using it. Contact our after-sales department immediately.



4.2.3 Protective lens replacement



1. Loosen the screws of the protective mirror drawer and take out the protective mirror drawer assembly.

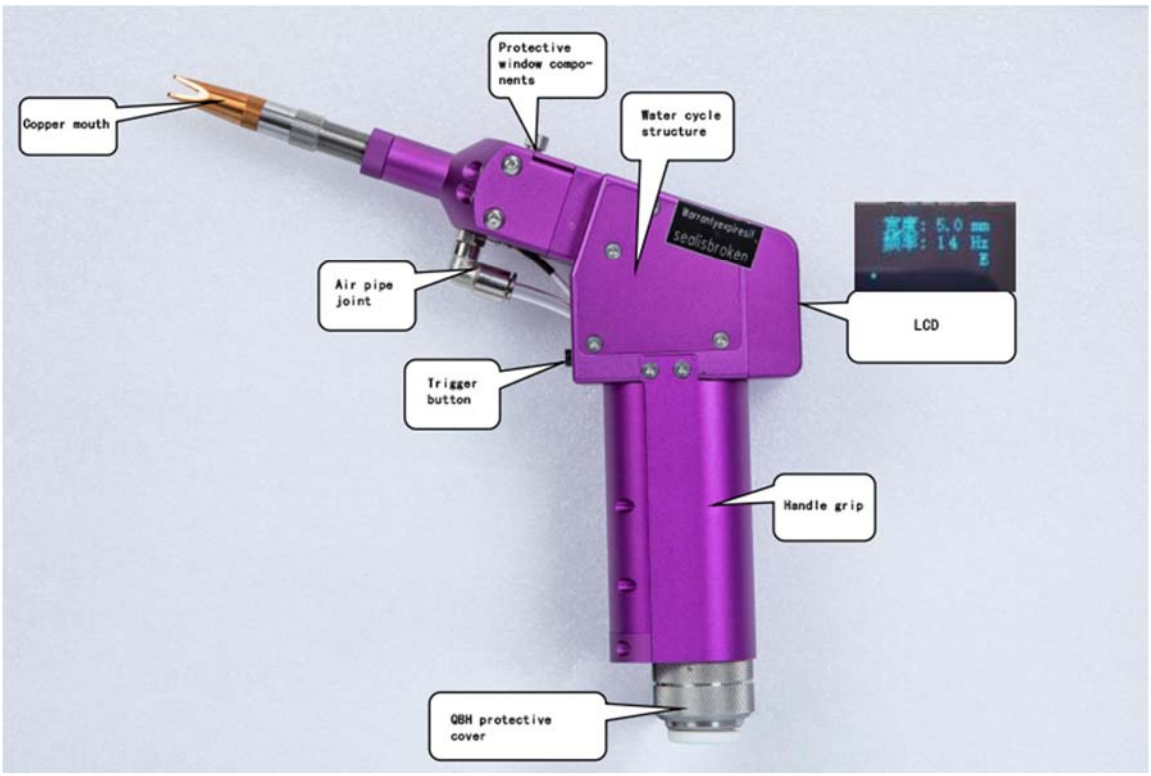
2. Take out the lens pressure ring .(The side with the white slip ring faces up).

3. Take out the protective lens (D20*2) and replace it with a new one.

4. After the lens place in the protective lens holder, press the lens pressing ring (the side with the white slip ring facing up) on the lens. At this time, the protective lens should be pressed in the groove of the lens pressing ring.

5. Install the whole protective mirror drawer assembly back into the hand-held welding joint and lock the screws.

4.2.4 Copper nozzle replacement

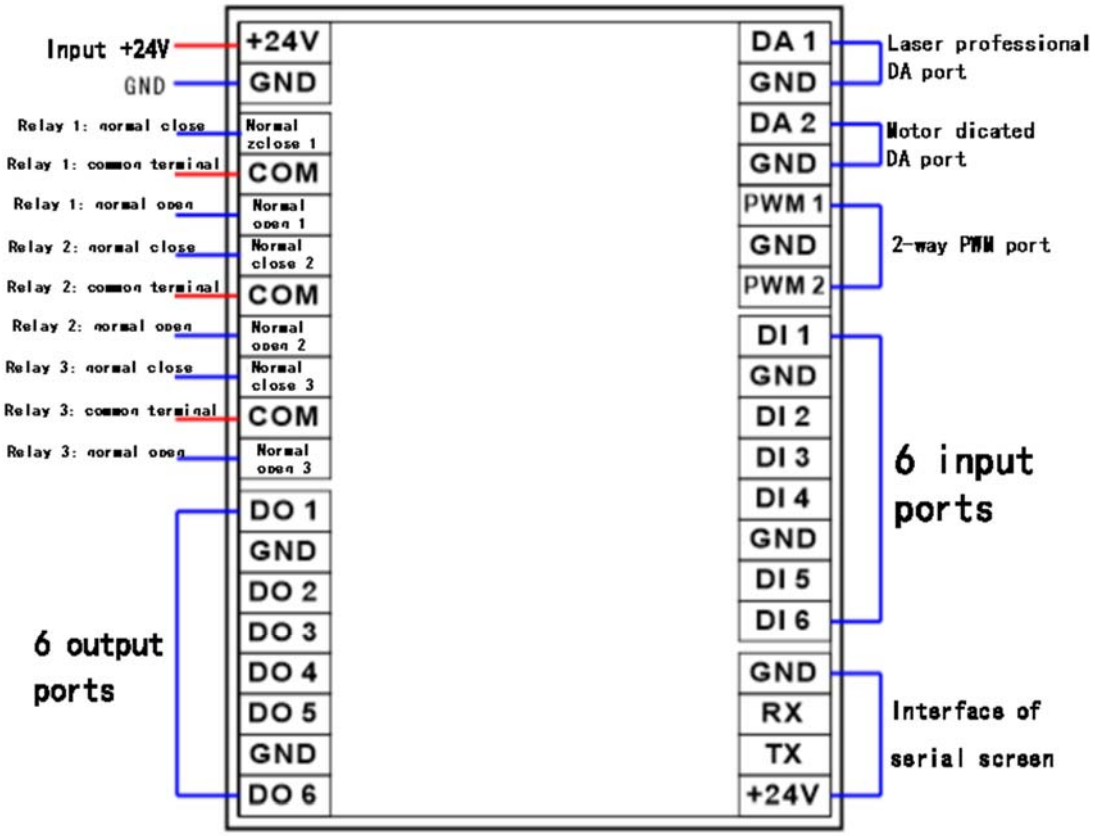


The copper nozzle can be unscrewed and removed directly.

Replace with a new copper nozzle and tighten it.

5 Product electrical articles

5.1Controller installation and port definition

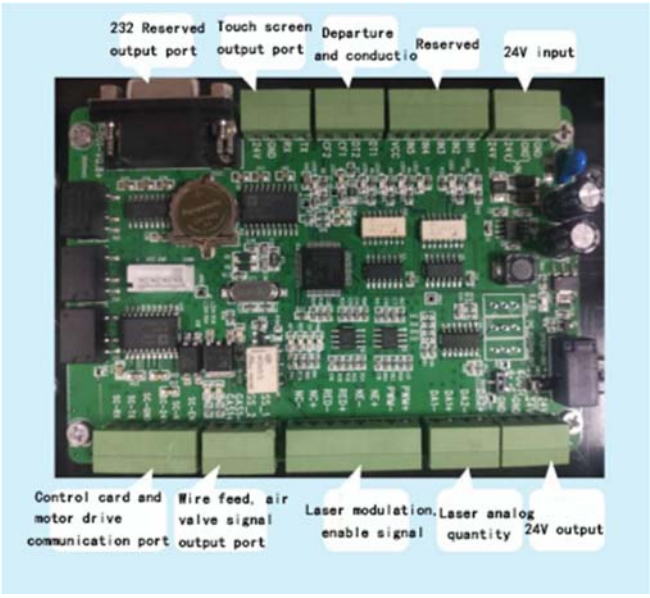


Note: the connection of the controller port is changed according to different models, for reference only.

5.2

Definition diagram of controller port

Schematic diagram of laser signal connection



5.3 Definition of laser control card wiring

Port number	PCB silk screen printing	Function
GND 24V (IN)	GND	Power supply: 24 V negative
	GND	Take any group of positive and negative input voltage to supply power to the board
	+24V	
	+24V	Power supply 24V positive
9	CF1	Trigger signal switch positive
	CF2	Trigger signal switch negative
	DT1	Turn on the positive pole of signal induction switch
	DT2	Turn on the negative pole of signal inductive switch
CON2	TX	Connect touch screen R2
	RX	Connecting touch screen T2
	GND	Connect touch screen G
	24V	Connect touch screen V
RS232	Standard RS232	reserve
GAS SS	GAS1+	Gas switch positive
	GAS1-	Gas switch negative
	SS1	Wire feeder wire output signal (normally open port, normally closed under the light state, that is, S1 and S2 are connected)
	SS2	
OUT	NC-	Output 24V when light is emitted (can be temporarily taken as a wire signal)
	NC+	
	NE-	Laser enable control, high level = 24 V
	NE+	
	PWM-	Laser modulation control, high level = 24 V, modulation frequency 50-30000 Hz
	PWM+	
DA1 DA2	DA1-	Laser power control, analog output 0-10V or 0-4V
	DA1+	
	DA2-	Gas proportional valve control, analog output 0-10V
	DA2+	

24V GND(out)	GND	Output 24 V
	GND	
	24V	
	24V	
DIP Switch	SW	Laser power control, analog output switching 10V or 4V

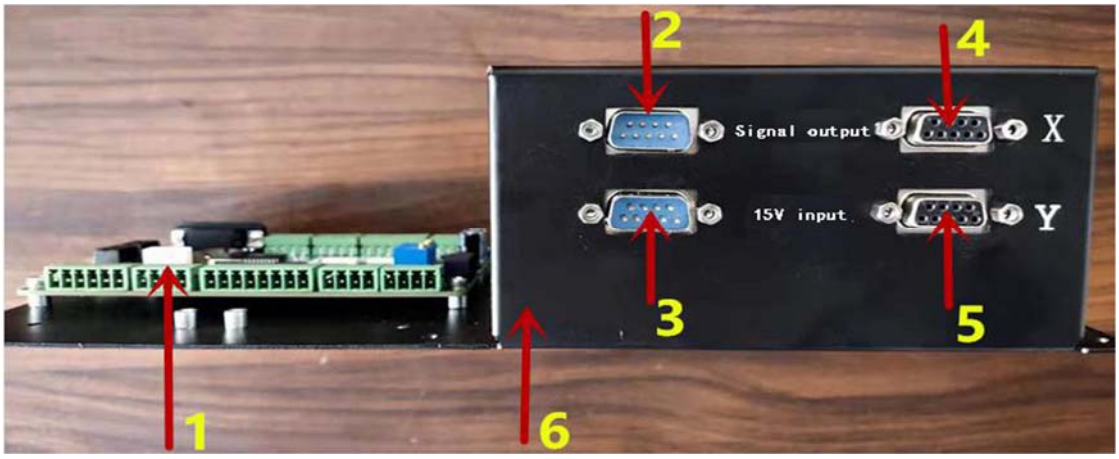
5.4 Definition of laser wiring

Card port	FEIBO Laser	LIANPIN Laser	Max Laser	Raycus1000X/2 pin interface	JPT Laser	Raycus 1000W/25 pin interface
PWM+	GATE	PWM+	Modulation +	15 Modulation +	PWM+	MOD+
PWM-		PWM-	Modulation -	16 Modulation -	MWM-	MOD-
EN+	EX-EN	EN+	Enable +	18 Enable +	EN+	6 Enable +
EN-	GDA-IO	EN-	Enable -	20 Enable -	EN-	9 Enable -
DA1+	IFWD-SET	DA+	DA0-10V	Analog quantity 0-10V	DA+	22Analog quantity +0-10V
DA1-	CASE	DA-	GDN		DA-	25 Analog quantity -
RED+	RED-EN					
RED-	GND-IO					
24V						7 External mode

5.5 System control box

Note: For the control circuit, please note that the DC24V input and DC15V input must

supply power to the welding system at the same time. Otherwise, it may cause signal transmission errors; the aviation plug and socket terminal must be wrapped with insulating tape after the docking is completed.



The serial number is shown in the figure above.

1. Main control card: control welding gun parameters and laser signal, etc

The filtering function is added to the output signal port of the touch display to effectively avoid the touch screen interference caused by an excessive electric ripple on the client site.

The wire feeding port is changed to send out a wire feeding short circuit signal while giving out an optical signal, to solve the problem that the power of the wire feeding motor is too high, which may lower the circuit voltage of the main control board and cause damage to the mainboard card. At the same time, the process problem that the tail of welding wire is too long when the wire is blown out is also fixed.

The optimization of the conduction signal, the enhancement of the communication ability of the conduction signal and the change of the light output sequence has solved the problem of no light output when customers weld rusty plates.

2. Signal output: communicate with the laser control card, and the signal is fed back to the LCD screen.

3. 15V input: Connect the DC ± 15V negative power supply to the power supply port of the galvanometer motor.

4. X: Connect to the X-axis motor communication line.

5. Y: Connect the Y-axis motor communication line.

6. Control box shell: aluminum oxide shell, shielding and anti-interference

5.6 Introduction to the operation of the touch screen interface

5.6.1 Description of the main interface function

The signal status in the page shows: optical shutter, gas, welding gun status, connection status, laser head status.

1. **FGAP:** control the light signal of the laser switch. (Turn on the FGAP button then the

light signal will come into effect. If no operation for 15 minutes, the FGAP button will automatically close.)

2. **Gas:** for gas control, percentage control is effective when installing the proportional valve. Turn the Gas button on, gas begins to work.

3. **Fillings:** when need to use the wire feeder, please turn the “Fillings” on before welding.

4. **Welding**: refers to the button on the gun, and the light will be on when the button on the gun is pressed.

5. **Connect**: refers to the loop signal generated when the gun head touches the metal plate. (When the gun head touches the metal plate with a crocodile clip, the conduction signal light will be on. This signal is light out protection function. Short circuit connection is prohibited.)

6. **Motor**: refers to the motor status of the laser gun. (This light is on when the motor is normally powered on for communication. when the motor fails to work, this signal light is off and the gun head LCD displays E signal for alarm. The light output signal is locked and the button on the gun is invalid.)

The control section on the page: laser control, laser head control, gas control.

1. Laser control:

1.1 Power: 0-100%

1.2 Frequency: 50-30000HZ

1.3 Duty cycle: 0-100%.

Suggestion:

- Power selects appropriate laser power according to different material thickness.
- Frequency recommendation: 3000-5000HZ.
- Duty cycle: According to the requirements for welding penetration. The duty cycle can be reduced appropriately when the thin plate does not need to penetrate through.

2. Laser head control:

2.1 Track mode: point, line, circle, double O, triangle, figure 8

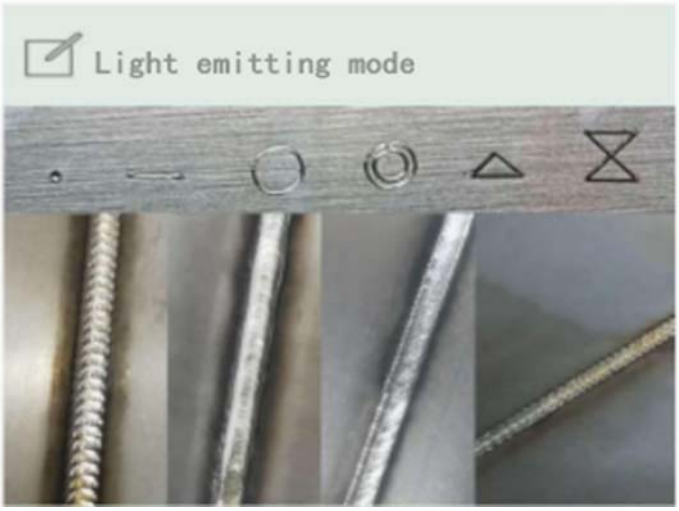
2.2 Welding frequency: refers to the adjustable motor speed (2-46HZms), where 1HZ=10

turns.

2.3 Welding spot width refers to the spot size, (0.2-5mm) adjustable.

NO.	Mode	Performance advantage
1	Point	Refers to the state where the motor is not swinging and the light spot is the smallest. Strong penetrating power, can be used for penetration welding, stitch welding, or thicker materials.
2	Line	It can adjust the direction and width to make the energy density concentrated. It can have a certain penetration force on thick plate and be used for tailor welding of external corner welding.
3	Circle	Double swing swing motor, the dot edge into different spot patterns. The diameter can be adjusted to make the energy density uniform. Thin plate welding has obvious advantages, with the smallest 0.3mm thin plate welding. For tailor welding and female fillet welding.
4	Double O	The diameter can be adjustable. The main function is to reduce the hollow spot, make the spot larger, and the plate receives more uniform light radiation, which is suitable for all kinds of angle welding.
5	Triangle	The width is adjustable. While reducing the hollow spot, the energy of the three sides can make the middle and left and right sides of the plate fully heated. When adding wire feeding welding, reduce the frequency. The welding spot can appear as a fish scale shape, which is significantly better than the single swing welding joint.
6	figure 8	Continue to increase the light spot based on the triangle, so that the plate is repeatedly heated, which is used for large width welding.

3. The advanced volume and the delay volume of gas are recommended to be set at about 150ms to protect the welding fumes from polluting the protective lens. When connecting to the proportional valve, the gas can be controlled effectively in a percentage.



(1) Six kinds of light spots can be selected freely, which meets the needs of different light spots for inner corners and outer corners, flat welding, and angle welding.

(2) The double pendulum can adjust the energy density at will, and can effectively weld the spot within 0.2-5 mm.

5.6.2 Protective function

1. **Laser source protection:** When the laser source has an E signal or no data output, the system detects a motor failure. The laser source status light goes out, and the system stops sending light signals. The torch status can be lit, but the trigger is invalid.

2. **Connection status protection**: the connection signal is controlled by an independent DC 24V voltage. When an interference signal or non-own DC 24V voltage is received, the status is off, and the system stops sending out light signals. The torch status can be lit, but the trigger is invalid.

3. **Welding gun protection**: when the welding gun receives the signal that the connection status and the laser source are both normal, flashing light will be shown when pressing the trigger button on the torch.

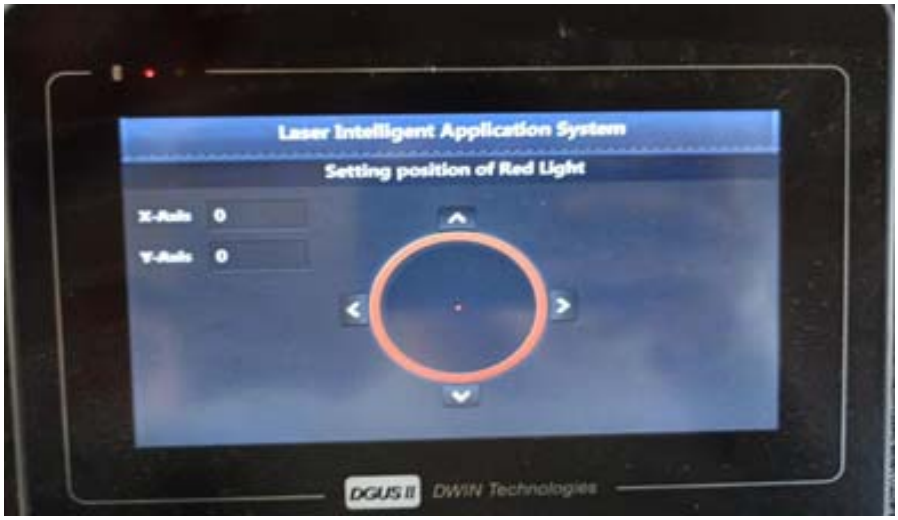
4. **Trigger button protection**: This button is equipped with multiple independent circuits. When any protection function is interfered or malfunctioned, releasing the trigger button can force the system to stop the connection with the laser, effectively preventing the laser

from being emitted.

5. **System leakage protection**: The motherboard has added multiple isolation protection to prevent the chassis leakage, lightning and other factors from burning the motherboard or disturbing the motherboard.

6. **Shell protection:** The motherboard and driver are protected by a metal shell, which can better shield external interference

5.6.3 Red light position setting



1. Adjust the angle of the reflection mirror of the X and Y motors to change the red light position.

2. The adjustment radius of the laser center point is 5mm.

3. Make sure to check that all motor circuits are normal before adjustment to avoid the wrong operation.

5.6.4 The lock setting of system

SN identification code: refers to the system administrator number, written by 8 digits (etc. 20200315)

Software version: the software version number of the motherboard.

Use period: refers to the effective use time,when (--) appears, it is the permanent use authority.

Registration number: refers to the number that needs to be entered when unlocking.

Multi-language selection: Chinese, English, Russian, Vietnamese, Korean.

6 Precautions in use

1. This machine is only used by trained personnel. Do not operate it without professional training.

2. Please check whether the liquid level of the chiller meets the minimum scale line before starting the machine, whether the laser, optical fiber cable and hand-held welding joint are with any abnormality, whether the power line is safely grounded and whether it is firmly connected;

3. In the process of welding operation, the welding operator must wear special laser protective glasses to avoid eye injury caused by strong laser light; when assisting the

welding operator nearby, they must wear protective glasses; others who are not operators are forbidden to watch the laser light outlet directly;

4. Whether the safety lock ground of hand-held welding has been connected to the work piece to be welded before welding (if there is no grounding, light cannot be emitted);

5. When the machine is powered on, the hand-held welding handle shall not directly face human or biological skin, clothes and hair;

6. During the welding process, the welding operator or the personnel assisting in welding must wear fire-resistant and high temperature resistant safety gloves;

7. When dragging the optical fiber line, it shall be noted that the optical fiber line does not touch sharp, high-temperature objects or ground to prevent damage to the optical fiber line or the following motor line and water air pipe; it is forbidden to bend or tie any part when dragging the following optical fiber line; it is forbidden for all personnel to step on the optical fiber line or motor line and water air pipe; the welding handle must be handled with care in any process, and it is forbidden to throw it at high altitude; for violations of regulations Any loss caused by operation of optical fiber cable, swing motor cable and water gas pipe shall be borne by the customer.

7. In case of any emergency during the welding process, please immediately release the "press out light" button of the hand-held welding joint, press and close the emergency stop switch of the machine, turn off the main power supply of the machine, and immediately contact our after-sales personnel.

8. There are no built-in replacement parts. All maintenance should be carried out by our professional personnel. Please do not damage the label nor open the welding gun head cover. Otherwise, any damage to the product will not be guaranteed by our company!

9. Continuous interruption of power supply will damage the welding control system. Please provide continuous and reliable power supply!

10. The external safety lock is DC24V high level. Please do not short circuit with GND shell of aviation plug of system wiring, or do not pay attention to mutual collision during installation. Otherwise, the power supply or the main control board may be destroyed by the short circuit. After the aerial plug of the gun head is connected, the insulating tape

shall be used to wrap the insulation treatment!

11. The control circuit should pay attention to the DC24 V input and DC15 V input must supply power to the welding system at the same time. Otherwise, the signal transmission error may be caused.

12. When installing QBH, pay attention to the cleanliness of the surrounding environment, turn off the fan and avoid flying dust. QBH must be wiped clean before it can be inserted into the gun body. Otherwise, the collimating lens will be burned!

13. The optical lenses in the double pendulum welding joint are all consumables (collimating, focusing and protecting lenses). If they are damaged, there is no warranty. Our company promises that the material cost will be charged for the product maintenance of vulnerable parts during the warranty period, and no other fees will be charged if they are sent back to our company for the replacement. The company shall bear all the maintenance costs during the warranty period for the parts that are not damaged by human beings

Note: the above precautions must be read and understood by the customer in detail. All illegal operations are prohibited. Our company will not be responsible for any safety accidents caused by illegal operations!

7 Frequently replaced parts

NO.	Material name	Unit	Quantity	Remarks
1	Copper mouth	Pieces	8	We have a standard set of the wear and tear parts mentioned above. If the customer is used up or damaged, please buy them from Ande Laser.
2	Protective lens	Pieces	5	
3	Dust-free cloth	Pieces	1	
4	Purification swab	Pieces	1	
5	Laser protective glasses	Pieces	1	
6	Toolbox	Set	1	

Protective lens

Dust-free cloth

Protective lens

Nozzle

Purification swab

8 Problems and troubleshooting

1. **No display of laser head status**: it is possible that the X.Y motor cable is loose. Or the 15V power input is interrupted, or the motor is damaged.

2. **No continuity status display or intermittent light emission during welding**: it may be that the continuity signal is not connected or the wire is loose and not inserted tightly, and the alligator clip does not form a loop with the DT1 signal. Intermittent light may cause by the loosening of the copper nozzle or the rust of the plate during the welding process, which is not connected to the clamp.

3. **The welding torch status is not displayed**: the switch button of the welding torch head may be loose. The terminal port is off.

4. **The gas cannot be controlled**: the gas button on the touch screen is not turned off or the gas delay setting is too high, or the positive and negative electrodes of the gas valve are reversed.

5. **The parameters of the LCD screen of the handheld head are not synchronized with the set parameters of the touch screen**: the system DC 24V power supply input and the galvanometer DC 15V power supply input cannot be powered on at the same time, which causes the parameters to be out of synchronization and the data cannot be

updated.

6. **It is easy to burn the protective lens**: impure gas or no air pressure, damaged seal ring, deviation of focus position, waterway damage and other factors. When welding, the gas start and end delay is set at about 150ms.

7. **Welding torch head is overheated**: the protective lens is burnt or the circulating water circuit of the chiller is not connected or the laser fiber diameter is too large.

9 After-sales service

1. After the final acceptance of the equipment is strictly signed, the quality guarantee period of the whole machine is one year;

2. If there is a quality problem with the system components during the warranty period, our company's well-trained service engineers will provide telephone or on-site service at any time. For any damage or damage caused by the quality of the equipment itself, our company is responsible for free replacement parts and services, except for conventional consumables (such as external operating optical fibers, optical lenses, cutting nozzles) and those who are responsible for the user's illegal operation;

3. During the warranty period, after we receive the maintenance notice from the buyer, we will follow up and reply within 2 hours. If the problem cannot be solved by phone, WeChat or fax, our company's technical service personnel can arrive within 24 hours (excluding travel time);

4. After the warranty period, our company still provides extensive and preferential technical support services, regular maintenance and spare parts supply for the complete machine and auxiliary machines. We provide full maintenance services for the products we provide, and provide equipment-related daily consultation and guidance, equipment improvement and maintenance technical information and materials at any time;

5. Our company has sufficient spare parts and can provide technical and spare parts services to the demander in time to meet the needs of equipment operation and

maintenance;

6. Our company regularly arranges project engineers to visit the user site for free technical return visit services;

7. In the process of developing new varieties and using new technologies, our company provides relevant technical services and technical support for free (such as software upgrade services).

10 Maintenance of main parts of equipment

10.1 Laser maintenance

1. Main body cooling of laser: distilled water or purified water without metal ions after multiple filtration treatment can be used, but distilled water is recommended. If the temperature is low, it is recommended to use a mixture of distilled water (or purified water) and antifreeze in a certain proportion for the coolant in the constant temperature chiller. The detailed blending ratio is shown in the table below.

Concentration and antifreeze relationship dilution ratio table (if it is an IPG laser, it is recommended to use Antifrogen N antifreeze from Clariant, USA)									
Antifreeze temperature（°C）	Concen-tration volume table	Antifreeze temperature（°C）	Concen-tration volume table	Antifreeze temperature（°C）	Concen-tration volume table	Antifreeze temperature（°C）	Concentration volume table	Antifreeze temperature（°C）	Concen-tration volume table
-8	20%	-14	28%	-21	36%	-29	44%	-40	52%
-9	21%	-15	29%	-21	37%	-30	45%	-42	53%
-10	22%	-16	30%	-22	38%	-31	46%	-43	54%
-10	23%	-16	31%	-23	39%	-33	47%	-45	55%
-11	24%	-17	32%	-24	40%	-34	48%	-47	56%
-12	25%	-18	33%	-25	41%	-35	49%	-48	57%

-13	26%	-19	34%	-26	42%	-37	50%	-50	58%
-13	27%	-20	35%	-28	43%	-38	51%	-52	59%

Remarks:

a. Any antifreeze cannot completely replace distilled water and purified water, and cannot be used for a long time throughout the year. After winter or the temperature rises above zero degrees Celsius, the pipeline must be cleaned with distilled water or purified water, and distilled water or purified water free of metal ion impurities should be used as the coolant.

b. Different brands of antifreeze have different blending ratios. For details, please consult the manufacturer who purchased the antifreeze.

QBH optical output terminal cooling (if applicable): distilled water or purified water, flow rate ~ 1L/min, the temperature is generally not higher than 33 ℃.

2. When the equipment is not in use, be sure to prevent the cooling water from freezing. Once the pipeline freezes, it may cause serious damage to the laser. Therefore, effective preventive measures must be taken. Common measures are:

a. Control the working environment temperature above freezing point;

b. The power of the laser is turned off, but the chiller keeps working, because the flowing water is not easy to freeze;

c. Add special antifreeze (Antifrogen N) for the laser to the cooling water inlet in the chiller;

d. When not in use for a long time, drain the cooling water in the laser;

3. Before repacking and shipping, be sure to drain the cooling water inside the laser. Otherwise, water may enter the internal circuit of the laser, and the product may be damaged due to low temperature freezing in winter.

4. The best temperature of the cooling water in the laser is between 20～25℃, but it should also be determined according to the actual working environment temperature and humidity, especially in the high temperature and high humidity environment. Otherwise, it will directly

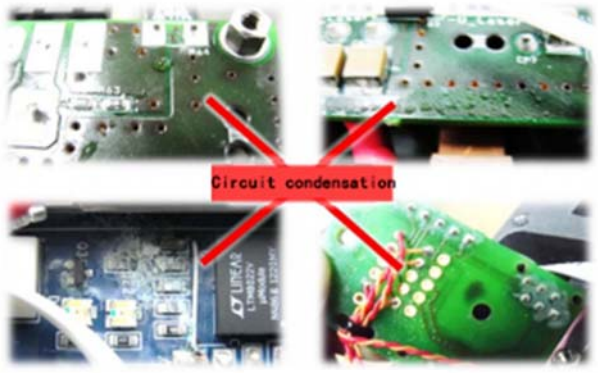


Figure 12

cause condensation, which will cause laser failure or optical components damage.

Ficture 12 is a picture of some typical condensation cases.

Under normal circumstances, the damage of condensation to the laser requires a certain process, because it takes time to accumulate into dewdrops. There are some signs of condensation inside the laser. For example, condensation will appear on the surface of the external cooling water pipe first, and then it will spread to the inside of the laser after a while.

10.2 Precautions for laser anti-icing in winter

1. When the temperature gradually drops below 0 ℃, the fiber laser needs to keep warm. The cooling water of constant temperature chiller must be added with a certain proportion of mixed antifreeze and distilled water (or purified water) for antifreeze, to ensure the normal operation of the machine. The details are as follows:

The laser cooling pipeline is not allowed to add any antifreeze without dilution. If the cooling circulating water freezes, it will cause serious damage to the equipment (especially the laser). The working temperature of the laser should be controlled at about 22 ℃. The mixture of distilled water (or purified water) and antifreeze is used as the coolant in the constant temperature chiller. The mixing ratio depends on the season and temperature.

2. If the laser welding machine is not used for a long time, as long as the cooling water passes through, especially the cooling water in the laser cavity and pipeline, it must be completely drained; the specific operation methods are as follows:

a. Open the drain valve of the thermostatic chiller to drain the water in the chiller;

b. Laser drainage, remove the inlet and outlet pipes at both ends of the chiller (make sure to make a mark when disassembling to prevent the wrong position when reinstalling);

Connect clean and dirt-free compressed air to the water outlet pipe of the chiller, and drain the cooling water in the laser cavity and pipeline at the water inlet pipe and blow dry (the cooling pipe inside the laser must be completely cooled Water or mixed coolant is completely drained);

c. The drain port is blocked by a small section of PU pipe and quick connector at the lower end of the condensate pan where the laser is connected. Press the quick connector and pull out the PU pipe to drain water. After the upper end of the water tank is unscrewed in a counterclockwise direction, a cover is used to drain it out with clean and dirty compressed air.

d. When draining the remaining cooling water in the chiller, use clean and dirty compressed air to connect to one of the outlet and inlet of the chiller. Using the principle of pressure difference, the remaining cooling water remaining in the pipe of the chiller is completely drained.

10.3 Precautions for laser anti-condensation in summer

Since the laser has high requirements for the working environment temperature, in summer, in order to protect the laser and prevent the large temperature difference between the laser and the external environment from condensation and damage to the laser, the following maintenance should be done when using the laser in summer:

1. It is recommended to put the laser alone in an air-conditioned room to improve the external working environment of the laser and keep the laser working in a dry and constant temperature environment.

2. It is recommended that customers purchase a temperature and humidity meter and place it next to the fiber laser to monitor whether the actual indoor environment of the fiber laser meets the requirements (the indoor temperature of the IPG laser is 10~27°C, and the humidity is less than 50%).

3. Adjust the temperature of the chiller according to the ambient humidity and temperature, set the high temperature to 28~32℃, and the low temperature to 25~29℃.

4. Strictly implement the boot sequence of fiber laser

10.4 Cleaning and maintenance of welding head

Regular and correct maintenance is one of the necessary conditions to ensure the long-term use of the laser head!

1. Clean up the slag on the nozzle of the welding joint at a fixed time, and check whether the laser comes out from the center of the nozzle. If it is off-center, please adjust the light again.

2. We suggest that the user should check the overall external condition of the laser cutting head before each processing in combination with their working conditions and materials to be processed. At the end of each processing, the surface temperature of the laser head TRA was checked. Check the protective lens once a day after processing, and replace it in time if it is dirty. Regularly return to the factory for cleaning according to the situation (such as focusing lens, collimating lens, optical fiber socket, sensor and other precision parts). Change the cooling water of the chiller regularly.

10.5 QBH installation steps

1. Before use, please blow off the dust on the QBH optical fiber interface and the protective cap with clean air to ensure that no dust remains during installation.

Figure 13: QBH fiber interface

2. The QBH fiber interface is shown in Figure 13. When not in use, the optical fiber inlet of the upper end of the QBH optical fiber interface must not be directly exposed to the outside, and must be covered with a dust cover to keep the inside clean.

3. As shown in Figure 14, the protective cap; when not in use, the protective cap should be sealed with a clean ziplock bag to prevent dust from falling.

Figure 14 protective

4. As shown in Figure 15, align the center hole of the protective cap with the fiber connector, and put it on the fiber connector. Note that all the sealing rings on the fiber head are exposed under the protective cap.

Figure 15: Protective cap with the fiber connector

Figure16

5. The schematic diagram of QBH fiber connector and fiber head installation is shown in Figure 16. First， check that the red dot on the upper end of the QBH optical fiber interface is aligned with the red dot on the optical fiber head. Then align the T-shaped pin groove on the optical fiber with the red dot to form a line, and insert the optical fiber head covered with the protective cap into the QBH optical fiber interface.

Note: Insert the optical fiber connector in a horizontal direction during installation to prevent dust from falling into the laser head when inserting the optical fiber connector, and insert the optical fiber head firmly to the end to ensure that the sealing ring on the optical fiber connector sinks into the QBH optical fiber interface.

6. Rotate the locking rotating ring counterclockwise to the end to complete the "primary locking" . Lift the rotating ring vertically, and then turn the rotating ring counterclockwise to lock the rotating ring to complete the "secondary locking”.

7. Slightly shake the fiber connector left and right, up and down, and check whether the QBH fiber interface and the fiber head are completely fixed. Complete the locking procedure.

Note: The arrow indicator below the red dot has a scale line, which is displayed as the standard locking range value. After locking, please confirm that it is within the range.

10.6 Disassembly and assembly of the protective lens of the cutting head

The protective lens is a vulnerable part and needs to replace when damaged. The following are the replacement steps:

1. As shown in Figure 17, in a dust-free and clean indoor environment, unscrew the locking screw, open the protective lens cover, pinch both sides of the drawer, and pull out the protective lens seat;

2. Fasten the protective cover to ensure that dust does not enter the laser head;

3. As shown in Figure 18, pinch both sides of the protective lens press ring and remove the protective lens press ring;

4. Put on the finger cots, pinch both sides of the protective lens pressure ring, and take out the lens (be careful not to remove the sealing ring)

5. Install the cleaned new protective lens (regardless of the front and back) into the docking seat;

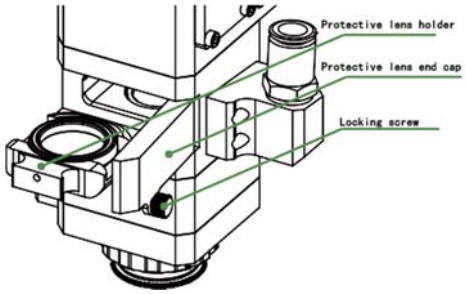


Figure 17 Remove the protective lens

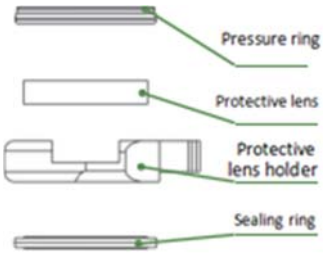


Figure 18 Protective mirror structure

6. Re-install the protective pressing ring;

7. Reinsert the protective lens holder back into the laser processing head, close the protective lens cover, and tighten the locking nails.

10.7 Clean the protective lens

1. After wearing gloves, take the side of the lens. Do not touch the upper and lower

surfaces of the lens with your fingers, as shown in Figure 19.

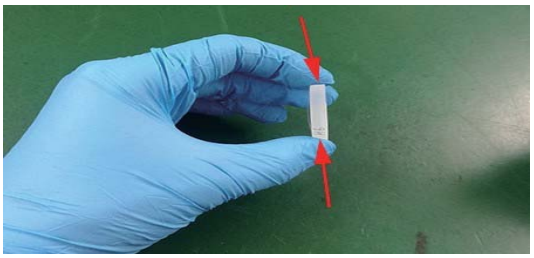


Figure 19

2. Use a self-spraying IPA cleaner (component: isopropanol water-based) to spray 2 to

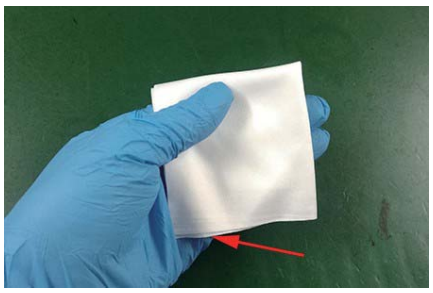


Figure 20

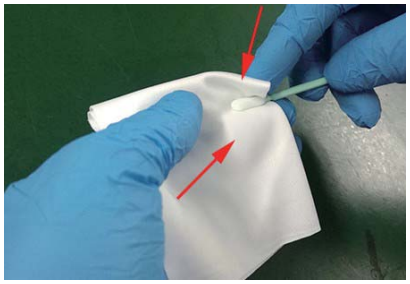


Figure 21

Figure 22

3 drops on the lens to be cleaned. Use a dust-free cloth or a dust-free cotton swab to clean the surface of the lens, as shown in Figure 20-22.

3. If the lens is slightly contaminated, use a dust-free cloth to clean it. Take a clean lint-free cloth and fold it in half twice, and spray the lens cleaner on the right-angle position after folding in half, as shown in Figure 20. Then slowly drag the dust-free cloth horizontally on the lens to ensure that there are no drag marks. After dragging, the lens becomes clean. This step can be repeated many times until the cleaning is complete.

4. If the lens is heavily contaminated, you need to use a cotton swab to clean the mirror surface. Spray the lens cleaner on a clean cotton swab (as shown in Figure 21) and gently move it counterclockwise from the inside to the outside. At the same time, gently rotate the cotton swab along the longitudinal axis to clean the lens as efficiently as possible (Figure 22).

10.8 Environmental requirements for disassembly and assembly of optical parts

1. Disassembly and assembly of optical components such as disassembly and assembly of the QBH head of the optical fiber, disassembly and assembly of the welding head, disassembly and assembly of the focusing lens and protective lens, and cleaning of the optical lens should be carried out in an ultra-clean environment.

2. Equipment manufacturers and users should prepare ultra-clean rooms, ultra-clean workbenches or ultra-clean sealing sleeves as much as possible to have a dust-proof working environment when operating optical devices.

10.9 Maintenance of nozzle connector

In the process of laser welding, the copper nozzle of the laser head will inevitably encounter the slag generated from the plate, which will easily cause the nozzle to be blocked. At this time, the nozzle needs replace.

10.10 Replace nozzle

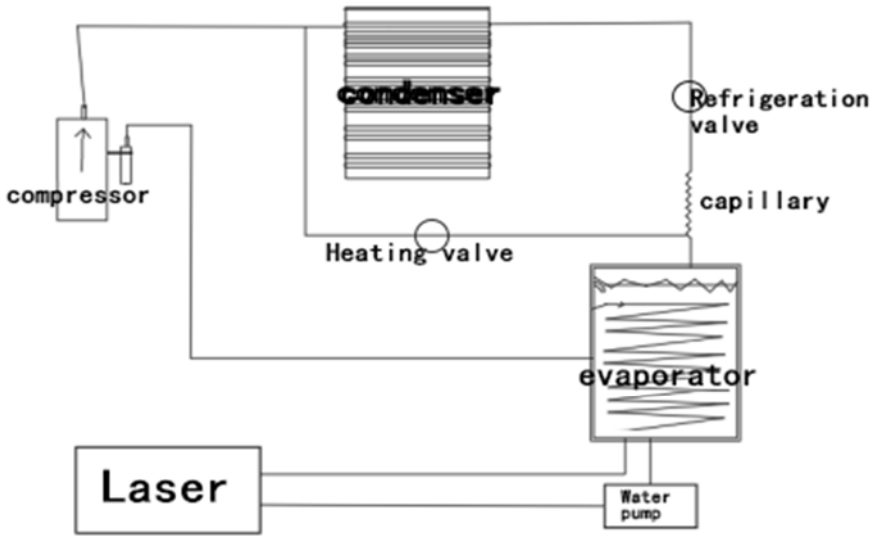
1. Unscrew the nozzle;

2. Replace with a new nozzle and re-tighten with appropriate force;

Note: The focal length calibration must be done again after replacing the nozzle.

10.11 Cleaning and maintenance of the chiller

The chiller is mainly composed of the water tank, compressor, fan, circulating water pump, condenser and control system. The compressor compresses the refrigerant and exchanges heat through the evaporator in the water tank to complete the refrigeration. The control system controls the compressor and various components to start and stop to control the temperature of the water tank.



Refrigeration cycle diagram of chiller

Power on/off

After the device is powered on, it will enter the temperature display state after about 7 seconds.

Controller temperature display

The display screen defaults to display the low temperature of water (L.xx.x).

When the temperature is displayed, press the <▼> key to switch the display temperature of room temperature water (H.xx.x), low temperature water (S.xx.x), and set temperature difference of room temperature water (d.xx.x). , 30s no switching operation will automatically return to the low temperature water interface.

[Remarks]: L./H./S./d. is the temperature code, and xx.x is the temperature value.

Parameter settings

In the non-fault state, press the <▲>+<▼> keys at the same time to enter the low temperature water setting interface, the set temperature xx.x flashes, and you can press

the <▲> or <▼> key to modify the setting temperature.

If there is no key operation for 5 seconds after the setting is completed, the system will automatically save the setting value and exit the setting state.

Room temperature water set temperature = [low temperature water set temperature] + [F01 temperature difference of room temperature], change the factory parameter [F01 [F01 temperature difference of room temperature].

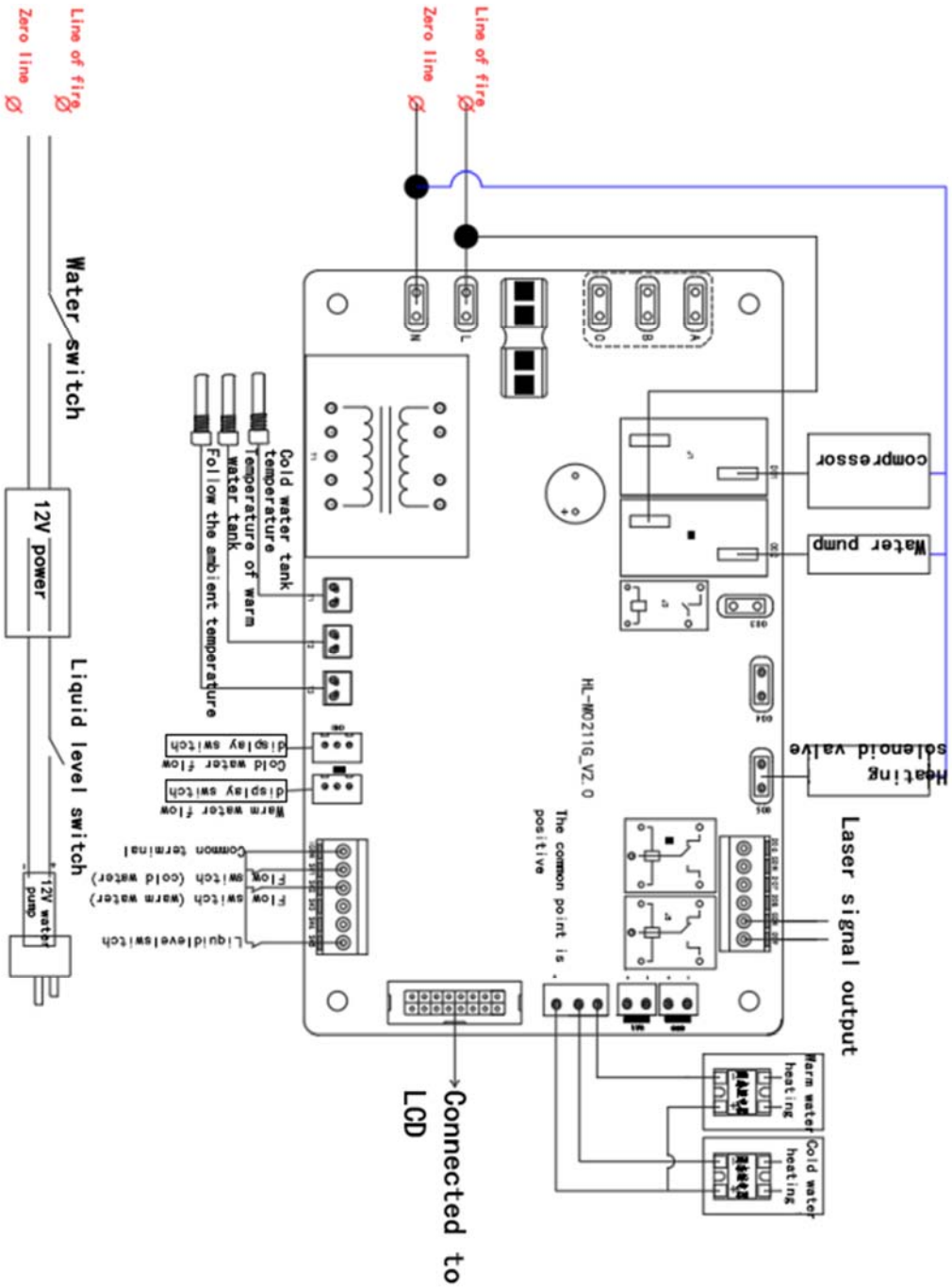
In the temperature display interface, press the <▲>+<▼> keys at the same time for 5 seconds to enter the factory parameter setting state. The factory setting parameters are generally not adjusted. If you need to adjust, please ask for the apporval from the chiller manufacturer.

In the process of selecting factory parameters, press <▼> to select parameter items, press <▲> to enter parameter setting, and exit the factory parameter setting after 15s without operation (the display screen displays the parameter item).

When setting the parameters, you can modify the parameter value through <▲> or <▼>.

After 5 seconds of no key operation, or press the <▲>+<▼> key to return to the parameter selection and save (the display screen flashes to display the parameter value).

Main control board wiring diagram: (the power cord wiring is 220v)



Simple troubleshooting

When there is a fault or alarm in the system, the fault output port is disconnected (normally conducting). According to the display of the fault name for simple troubleshooting. If the fault can not be cleared after troubleshooting, please contact our after-sales department.

Trouble/phenomenon	Possible reason	Handling method
High temperature alarm	The filter and the condenser are dirty	Power big air gun blowing
Warm water flow failure	Warm water filter element, warm water pipe, laser head waterway	Replace the filter element, whether the water pipe is discounted, and the air gun blows through the water path of the laser lens lens
	Water pump and water flow start	Replace the water pump or start the water flow.
Cold water flow fault	Cold water filter element, cold water pipe	Replace the filter element water pipe
	Water pump and water flow start	Replace the water pump or start the water flow
No power	The power cord is not connected properly	Check whether the power supply and wiring are correct
	Fuse inside the machine blown	Replace the main control board fuse in the machine
High voltage alarm	Poor cooling of condenser	Check the fan, clean the condenser
	High voltage switch is broken	Replace high voltage switch
Low pressure alarm	Refrigerant missing	Refill refrigerant
	Low voltage switch is broken	Replace low voltage switch
High temperature alarm	Excessive heat load	Reduce heat load or switch to models with larger cooling capacity

	Poor cooling of condenser	Check the fan, clean the condenser
Trouble/phenomenon	Possible reason	Handling method
Low temperature alarm	Improper setting of low temperature alarm value	Reset the low temperature alarm value
	Bad temperature sensor	Replace temperature sensor
Compressor overload	Abnormal power supply voltage	Check whether the power supply voltage is normal
	Poor cooling of condenser	Check the fan, clean the condenser
	Improper setting of compressor overload current	Reset the compressor overload protection value
Phase protection	Parameter setting error	For single-phase use, please turn off the parameter phase detection
	Power supply lacks opposite phase	Check the power supply for lack of phase, change the phase
Sensor failure	The temperature sensor connector is loose	Reconnect the sensor interface
	Bad temperature sensor	Replace temperature sensor
Liquid level alarm	Low water tank level	Insufficient water tank needs to add water
	The level switch is broken	Replace the level switch

No display/fuzzy screen	Loose connection	Reconnect the monitor and motherboard cable

Malfunction repair

Warn that maintenance should be carried out by personnel with maintenance qualifications. When the power is turned on, there will be dangerous voltage in the low part, so be careful when measuring the electricity when the power is on.

The circuit board is not powered.

The circuit board indicator light does not light. Check whether the emergency stop switch damages the circuit board insurance or whether the circuit board insurance is loosened. The circuit board insurance is a cylindrical 5X20, 6A transparent glass tube.

The compressor is not running (no cooling or no start)

Check the starting capacitor of the compressor, the compressor capacitor is in the electric box of the unit (purchased and reinstalled in ordinary hardware stores)

Check whether the circuit board is disconnected or has poor contact.

The pump does not run

Turn it off with a flat-blade screwdriver and turn it on (it may get stuck if the unit is used for a long time).

Check the starting capacitor of the water pump, the water pump capacitor is in the electric box of the water pump (you can purchase and reinstall it at ordinary hardware stores).

Insufficient pump suction

Check that there is air in the water path of the pump. Check whether the filter element is

replaced.

Check whether the voltage is too low. Check whether the straightness of the water pipe is too low, and check whether the fluid viscosity is too high.

The fan does not turn.

Check the capacitor of the fan (purchased and reinstalled at ordinary hardware stores). Check whether the circuit is damaged or poorly connected, and the main motor of the fan is damaged.

10.12 Precautions for summer maintenance of chiller

1. To prevent the water temperature from being too low to cause water pipe condensation to affect the equipment, which will cause short-circuit failure of electrical equipment such as fiber lasers.

2. Condensation is a very common phenomenon in our daily life. For example, in a hot summer environment put a bottle of frozen beverage at room temperature. After a while, you can see a "cold" on the bottle. Sweat” phenomenon. This is the result of water vapor in the air condensing on the bottle wall, which is what we call condensation. In the same way, if the water temperature setting of the chiller is lower than the dew point temperature of the water vapor under the corresponding atmospheric pressure, then the water vapor will condense on the water pipe wall at this time, thereby damaging the heating device components. Therefore, in summer, the water temperature setting value of the chiller is not as low as possible. In order to ensure the normal operation of the equipment, the circulating water temperature of the chiller can be set according to the following table:

Temperature of dew point / Ambient temperature / Relative humidity	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
16				0	2	4	5	7	8	9	10	11	12	13	14	15
18			1	3	4	6	8	9	11	12	13	14	15	16	17	18
21		1	3	5	7	9	11	12	13	14	16	17	18	18	19	21
24		3	6	8	9	11	13	14	16	17	18	19	20	21	22	23
27	2	5	8	10	12	14	16	17	18	19	21	22	23	24	25	26
29	4	7	10	12	14	16	18	19	21	22	23	24	26	27	28	28
32	7	10	12	15	17	19	21	22	23	25	26	27	28	29	31	31
35	9	12	15	17	19	21	23	24	26	27	29	30	31	32	33	34
38	11	14	17	20	22	24	26	27	29	30	31	33	34	35	36	37

For example: when the ambient temperature is 32°C and the relative humidity is 65%, to ensure that no condensation occurs on the equipment, the circulating water temperature setting value of the chiller should be greater than 25°C.

Change the water quality regularly. The water must change in 62 days to prevent deterioration of water quality. Due to the difference in temperature between the north and the south, the weather in the north is lower than 4 to 5 degrees or lower. Only ethanol (industrial alcohol) needs to be added with external liquid. The ratio of water to alcohol is 4:1. It is recommended not to shut down at night to avoid freezing of waterways. It can cause damage to the machine or frost cracks in parts. When the temperature rises, the water must be drained and renewed.

When not use it for a long time, please open the drain of the water tank to drain the water.

10.13 Clean the dust screen and cooling fan of the condenser

In the hot summer, the workload of the chiller will also increase. In order to ensure the normal operation of the chiller, please clean the high-pressure air regularly without dirt

to clear the dust of the dust screen to ensure the good cooling function of the chiller. Because the dust screen is dirty and blocked, the chiller will have poor heat exchange, poor cooling effect, increase water temperature and compressor exhaust, and even cause the chiller to overload and stop.

The schematic diagram of cleaning the air filter of the chiller is shown in Figure 24. Ensure that the air inlet and outlet channels of the chiller are smooth. The chiller achieves the effect of cooling by exchanging heat with the ambient air, so if the air is not smooth in or out, the cooling effect will be poor.

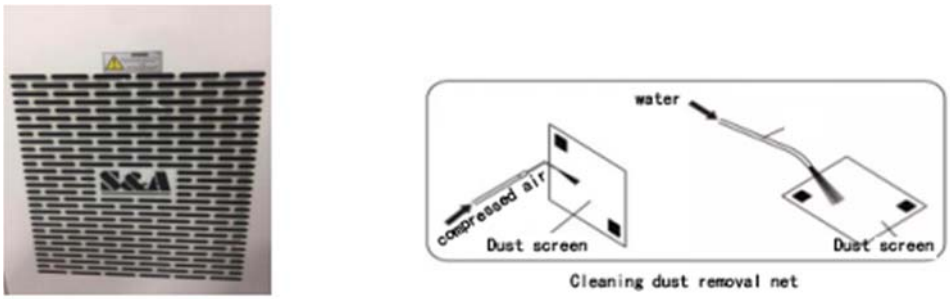


Figure24

10.14 Regularly replace the cooling water and filter element

Regularly replace the circulating cooling water or filter element according to the actual situation of the user. It is recommended to replace the circulating cooling water every month or the pure water filter element every 3 months. As the cooling water is used for a long time, the scale will gradually increase, which not only affects the normal use of user equipment, but also affects the heat exchange effect of the chiller.

10.15 Precautions for the use of bottled gas

In the environment of equipment trial bottled oxygen and nitrogen cutting, the requirements are as follows:

1. No flammable and explosive materials should be placed around the machine tool;
2. Cannot be mixed with other flammable gases;

3. To prevent safety accidents caused by frostbite and explosion at low temperature after high-pressure compression;

4. Fire extinguishers must place around the machine tool.

10.16 Maintenance and inspection of electrical components

When the equipment is powered off, periodically use a vacuum cleaner to clean the dust in the electrical components in the electrical cabinet. Use a large Phillips screwdriver and a small flat-blade screwdriver to tighten all the fastening screws of all electrical component terminals to prevent a short circuit caused by the loosening of a terminal screw. (Note: The operation of this item must be performed by professional and technical personnel who have legally obtained electrician work certificates and the machine must be shut down and powered off.)

When the machine is power on, please regularly use infrared temperature measuring instruments to measure all the electrical components, chillers, voltage stabilizers, air compressors, terminals of the main power circuit breaker, and wire and cable terminals in the electrical cabinet. Check whether the temperature of a terminal of the electrical component or the wire and cable sheath exceeds 38℃. If any abnormality is found, shut down and power off for inspection.

After the machine is powered off, use a screwdriver and other tools to check whether the terminal screw at the abnormal temperature position is loose and whether the terminals or insulating plastic parts of wires and cables are loose, scorched, smelly, etc. After checking, find out the cause of abnormal temperature. If the electrical components are abnormal and need to be replaced, please contact our after-sales technical personnel for details.

10.17 List of daily maintenance items

NO.	Daily maintenance	Maintenance interval
1	Clean the dirt and dust on the internal and external sheet metal parts, and keep the equipment tidy and clean.	Every day
2	Clean the dust on the electrical components of the electrical cabinet (must be cleaned after power off)	Every month
3	Clean the dust on the laser surface (must be cleaned after power off)	Every day
4	Clean the dust on the surface of the chiller, filter and condenser (must be cleaned after power off)	Every day
5	The chiller changes the water regularly (it must be distilled water). Check whether the filter element is polluted (if the filter element is polluted, it must replace.)	Every month
6	Use an air gun and a rag to clean the dust and dirt on the outer surface of the welding head. (Air pressure is about 1MPa)	Every day
7	Clean and protect the surface of the lens from dust to ensure welding quality. (The lens should be wiped gently, and the surface coating should not be damaged)	Every day
8	Check whether the cooling water circulation is normal. Avoid the poor cooling of the optical path lens to affect the cutting quality.	Every day
9	Open the drain valve of the air compressor regularly to drain. When the wastewater is drained, close the drain valve.	Every day
10	Clean the air filter of the air compressor. (If the air filter gets dirty easily, you should increase the number of cleanings per month)	Every month
11	Clean the air filter element regularly. (If the filter element is easy to get dirty, you should increase the number of monthly cleanings)	Every month
12	When the machine is powered off, regularly clean the cooling fan of the heat exchanger of the electric cabinet and the dust in the cooling aluminum mesh. (If	Every month

	it is easy to get dirty, you should increase the monthly cleaning frequency.)	
13	When the machine is power on, regularly check whether the cooling fan of the heat exchanger is running.	Every day
Serial number	Daily maintenance	Maintenance interval
14	When the machine is energized and running, use an infrared thermometer to check whether the actual working temperature of all electrical component terminals ,such as: main power circuit breaker, voltage stabilizer, chiller, exhaust fan, electric cabinet, air compressor and other electrical components and wire and cable sheaths exceeds 38°C.	Every quarter
15	When the machine is shut down and powered off, use a vacuum cleaner to clean the dust from the electrical components regularly. Regularly use a large Phillips screwdriver or a small flat-blade screwdriver to tighten all the terminal locking screws of all electrical components. (The dust removal cycle should be shortened if the working environment is bad.)	Every quarter

Warning:

Please read this document carefully before using the product to understand your legal rights, responsibilities and safety instructions.

1 **Warning**: before operating the handheld laser device, please read the operation contents carefully and strictly abide by the operation procedures.

2.**Warning**: This equipment uses strong laser radiation, which may cause the following accidents:

Ignite combustibles around;

In the process of laser, other radiation and harmful gases, toxic gases, or odorous gases may be produced due to the difference of laser direct objects;

Direct exposure to laser radiation can cause human injury. Therefore. Operators must keep a distance from the equipment and wear protective equipment (such as goggles,

protective covers, protective clothing or fire-fighting equipment, etc.). It is strictly forbidden to stack flammable and explosive materials on the workbench and around the equipment. At the same time, keep the working environment well ventilated.

3. **Warning**: There may be risks in the laser working process, and the user should carefully consider the material of the welding object suitable for laser operation.

4. **Warning**: The working voltage of the equipment is AC220V 50HZ. It is strictly forbidden to operate under overload or unstable voltage. If the grounding wire at the end of the power supply (such as a power strip) of this product is not working effectively, the power cannot be turned on for operation. Otherwise, there will be dangerous risks of electric shock.

5 **Warning**: This product is equipped with very sophisticated and dangerous laser source components. It is strictly forbidden to place the equipment near electrical appliances with strong electromagnetic interference. It may cause electromagnetic interference to it. When the laser turns on, the laser beam will be emitted, and the user must avoid direct exposure to the laser beam.

6. **Warning**: It is strictly forbidden to place any irrelevant total reflection or diffuse reflection objects in the equipment to prevent the laser from being reflected on the human body or flammable objects.

7. **Warning**: When using this product to weld objects, please ensure that the emissions produced by the laser beam and the welding objects comply with local laws and regulations.

Emergency contact

Phone number: 86-0750-3582689

Contact E-mail: info@ande-laser.com

Contact public account: We-chat

WeChat Public Account