SUPLASER

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专注于激光设备配套产品的研发和生产

SUP20S Fiber laser handheld welding head

Instruction manual V5.0

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超强伟业 CHAO QIANG WEI YE

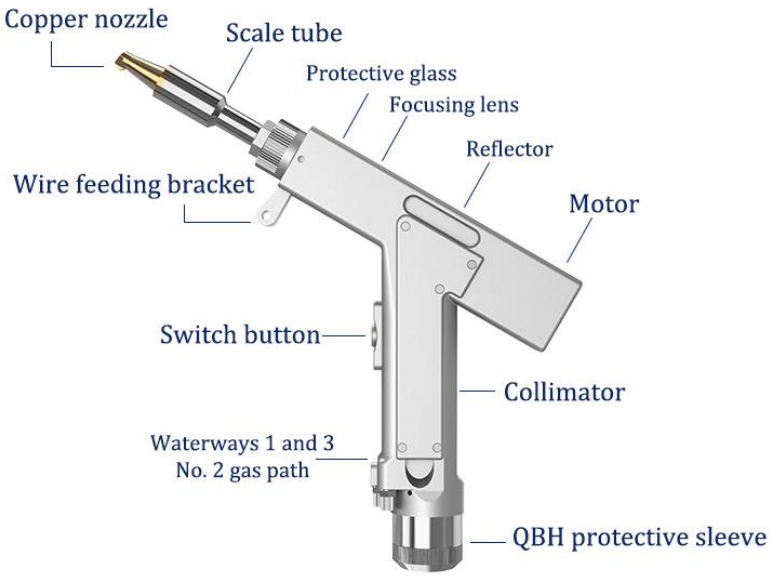
Thank you for choosing Super Weiye Handheld Welding System. This user manual provides you with important safety, operation, maintenance and other information. Therefore, please read this user manual carefully before using this product.

In order to ensure safe operation and optimal operation of the product, please observe the following cautions and warnings and other information in this manual.

1、Overview

This manual covers the basic installation, factory setting, operation and maintenance service of SUP series welding head products.

Super welding head is a handheld welding cutting head launched in 2019. The product covers hand-held welding guns and self-developed control systems, and is equipped with multiple safety alarms and active safe power and light-off settings. This product can be adapted to various brands of fiber lasers; the optimized optical and water-cooled design allows the laser head to work stably for a long time under 2000W.



Features

Basic features: Self-developed control system, multiple safety alarms, smaller size, flexible operation and easy to use.

More stable: All parameters are visible, real-time monitoring of the status of the whole machine, to avoid problems in advance, more convenient to troubleshoot and solve problems, to ensure the stable operation of the welding head.

Process: All parameters are visible, the welding quality is more perfect, the deformation is small, and the penetration is high.

Stable parameters and high repeatability: the determined nozzle air pressure and lens state, as long as the laser power is stable, the process parameters must be repeatable. Greatly improve efficiency, while also reducing operator requirements.

1.1 Operating environment and parameters

Supply Voltage (V)	220 ± 10% V AC 50/60Hz
Placement environment	Smooth, free from vibration and impact
Temperature of Working Environment	10~40
Humidity of Working Environment	< 70
Cooling Method	Water-Cooling
Applicable Wavelength	1064nm (± 10nm)
Applicable Power	⩽2000W
Collimation	D20*5/F60
Focus	D20*4.5/F150
Reflection	30*14 T2
Specifications of Protective Glasses	18*2
Maximum of Support Pressure	10bar
Vertical Adjustment Range of Focus	± 10mm
Adjustment Range of Spot	Line0-5mm
Weight	SUP15S 1.25KG / SUP20S 0.8KG

1.2 Attention information

1) Ensure reliable grounding before power supply.

2) The laser output head is connected with the welding head. Please check the laser output head carefully when using it to prevent dust or other pollution. When cleaning the laser output head, please use special lens paper.

3) If the equipment is not used in accordance with the methods specified in this manual, it may be in abnormal working condition and cause damage.

4) When replacing the protective lens, please make sure to protect it.

5) Please note: When using for the first time, when the red light cannot come out of the copper mouth, be sure not to emit light

2、Install

2.1 Controller wiring definition

Plug		Definition	Signal type	Detailed explanation
Power	1	-15V	Enter	V2 connected to 15V switching power supply provides 15V-
	2	GND	Reference place	Connect to any COM of 15V switching power supply
	3	+15V	Enter	V1 connected to 15V switching power supply provides 15V+
	4	GND	Reference place	Connect to V- of 24V switching power supply
	5	+24V	Enter	Connect to V+ of 24V switching power supply
LCD screen	1	G	Reference place	Power ground
	2	R	Sender	Data exchange
	3	T	Receiving end	Data exchange
	4	V	Output	Output 24V, and ① provide 24V to the serial port display
Signal interface 1	1	GND	Reference place	Signal ground
	2	Air pressure alarm signal	Enter	Polarity can be set in the setting interface, set to low level when not in use
	3	GND	Reference place	Signal ground
	4	Water tank alarm signal	Enter	Polarity can be set in the setting interface, set to low level when not in use
	5	Securely lock the reference ground		Connect the processed workpiece to form a loop with 6 feet to prevent accidental light emission
	6	Safely lock		The blue wire of the three-core wire that is connected to the connector
	7	Welding head light switch		The brown wire of the three-core wire connected to the welding head
	8	Welding head light switch		The black wire of the three-core wire connected to the welding head
Signal interface 2	1	Reserved	Reserved	Reserved
	2	Reserved	Output	Reserved (synchronized with 4 foot air valve signal)
	3	-Shielding gas valve-	Reference place	Signal ground, 2/4 is the reference ground-
	4	+Shielding gas valve+	Output	Output 24V, current>2A, built-in relay, directly to the air valve
	5	-Wire feed-		Wire feeder wire feed switch
	6	+Wire feed+		Wire feeder wire feed switch
Signal interface 3	1	Laser abnormal signal	Enter	Laser alarm signal
	2	Laser enable+	Output	+Laser enable+
	3	24V	Output	24V power supply pin, output when power on
	4	GND	Reference place	Reference ground (enable, DA, shared ground of 3 feet)
	5	Analog +	Output	Connect to the analog quantity of the laser, DA+
	6	-(PWM-) RF-(PWM-)	Output	Laser pulse width modulation signal-
	7	+(PWM+) RF+(PWM+)	Output	Laser pulse width modulation signal+

2.1.1 Controller power supply terminal

The power supply uses the 5P interface, and the supplied 24V switching power supply and 15V switching power supply are used for power supply

Please note that the 15V switching power supply distinguishes the positive and negative poles, V1 is connected to 15V+, V2 is connected to 15V-, and any COM on the 15V switching power supply is connected to pin 2 GND!

Please note that the switching power supply must be grounded!

2.1.2 Controller LCD24/5000

The LCD cable is delivered with the device and can be connected directly. See the figure above for specific definitions

2.1.3 Controller signal interface 1

①/②Pin is the air pressure alarm signal input, if you need to enable (wiring required), please set the air pressure alarm level in the background as high, otherwise it is low

The ③/④ pin is the water tank alarm signal input. If you need to enable it (wiring is required), please set the air pressure alarm level in the background as high, otherwise it is low

⑤The number pin is the reference ground for the safety ground lock, and it is directly connected to the processing workpiece with a wire

⑥ No. pin is the safety ground lock of the welding head, connected to the blue wire of the three-core wire, when the welding head touches the workpiece, the safety lock is on at this time

⑦The number pin is the switch of the welding head, connected to the brown wire of the three-core wire

⑧Pin No. is the light switch of the welding head, connected to the black wire of the three-core wire, when the trigger is pulled, the trigger button is on

Please note that only when there is no alarm, and the signal of the safe lock and trigger button is on, the output signal of the subsequent port will be sent out.

2.1.4 Controller signal interface 2

The 2 end of the signal interface uses a 6P interface, and the air valve is related to the wire feeding

①Reserved feet

②Reserved feet (synchronized with 4-pin signal)

③/④The foot is the valve 24V output, connect to the valve

⑤/⑥The pin is the signal wire of the wire feeder, the signal port of the wire feeder, regardless of positive or negative

2.1.5 Controller signal interface 3

①Pin is the laser alarm signal input +, if you need to enable it, please set the air pressure alarm level to high in the background

②Pin is enable+, connect to laser enable+

③The pin is 24V output, directly output 24V+ after power on

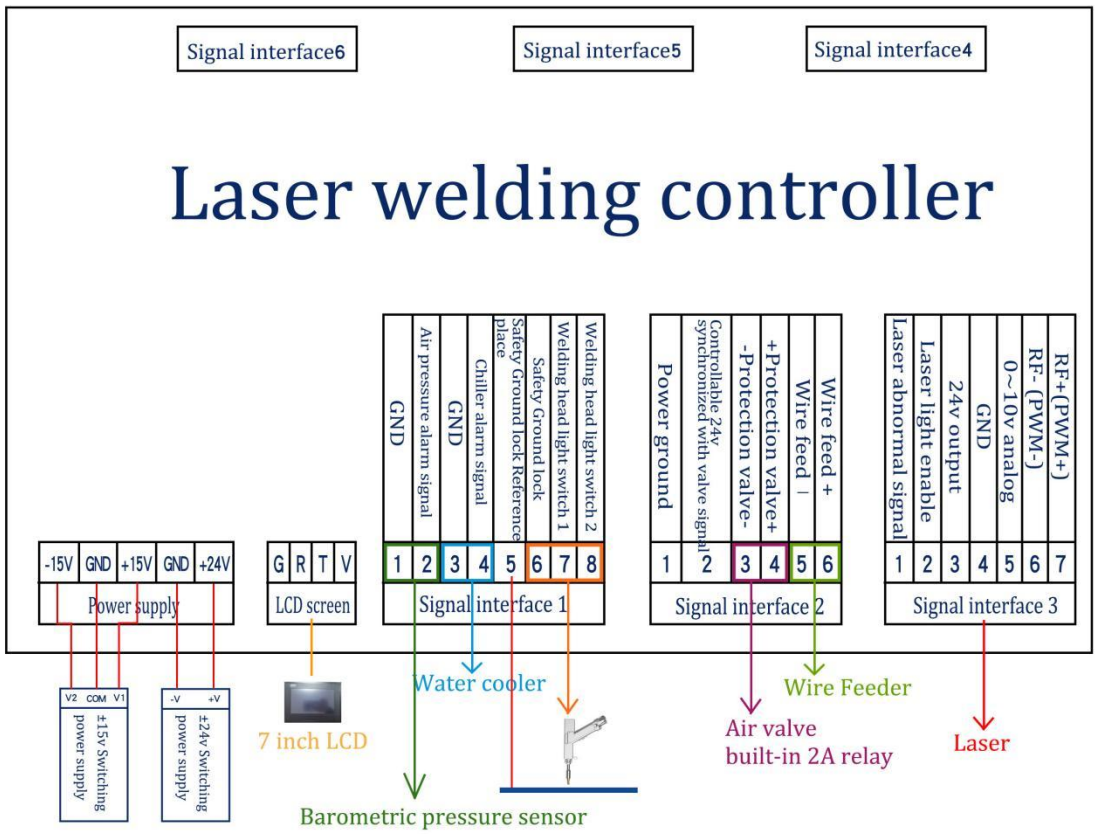
④Pet No. is a common ground (reference ground for feet 1/2/3/5)

⑤The number pin is analog quantity + output, the analog quantity is given

⑥Pin is PWM-modulated signal

⑦The number pin is PWM+ modulation signal

2.2 Controller wiring diagram



Note: The COM terminal of ±15V switching power supply and the -V (0V) terminal of +24V switching power supply must be connected to GND and fully connected to the workpiece at the same time. The shell of the switching power supply must be connected to the ground, otherwise, a safety ground lock alarm may occur, and no light will be emitted.

2.3 Optical input interface

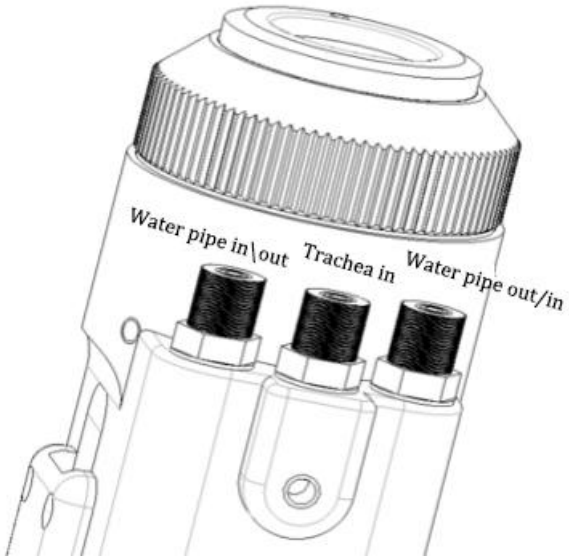
SUP welding head is suitable for most industrial laser generators. Commonly used optical fiber connectors include IPG, Ruike, Chuangxin, Fibo, Tottenham, Jept, Kaplin, etc. The optics must be kept clean and all dust must be removed before use

When the fiber is inserted, the cutting head must be rotated 90 degrees to be horizontal, and then the fiber is used to prevent dust from falling into the interface.

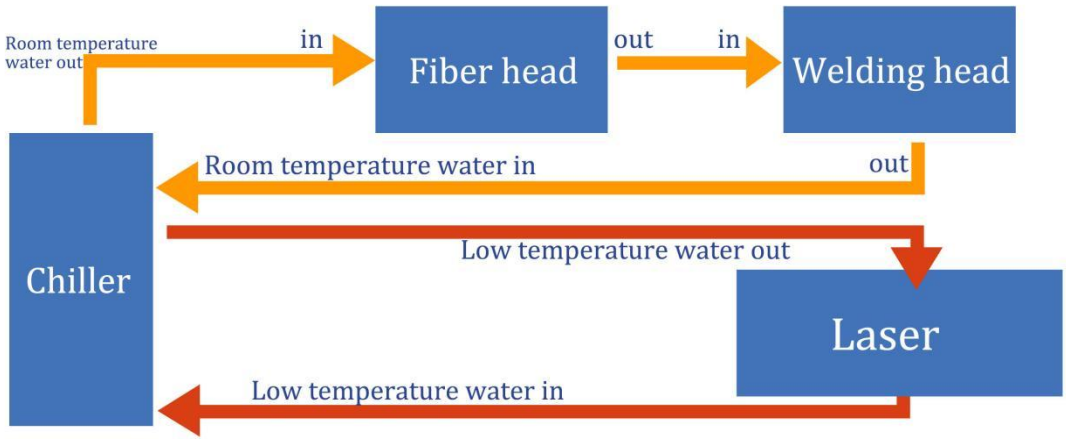
installation method （Applets ）

2.4 Shielding gas and water chiller interface

The water pipe and air pipe interface can be installed with hoses with an outer diameter of 6MM and an inner diameter of 4MM. The air path enters in the middle, and the two sides are Water inlet and outlet pipelines (regardless of the direction of inlet and outlet)， As shown below:



The cooling system is divided into the water circuit part of the welding head and the water circuit part of the optical fiber head, which are connected in series, as shown in the figure below:



2.5 Welding gun and control box connection interface

The welding gun and the control box use three wires to connect, including: two-core motor power line, five-core motor signal line, three-core safety ground lock and trigger button line

The motor power/signal wires (two black wires) are directly connected to the motor part of the welding head and can be disassembled (two options are available:**1. Open the motor cover and side plate of the handheld welding gun 2. Open the control box All are plugs)**

Safely lock and trigger button three-core wire used **Removable aviation plug**:Safely lock and button wires, of which 1 is blue, 2 is black, and 3 is brown (connected to pin 6/7/8 of signal interface 1, see the wiring definition of the control box above for details)

2.6 Wire feeder installation

The two-core aerial plug at the tail of the wire feeder is connected to pin 5/6 of signal interface 2. Refer to the following for the specific installation method

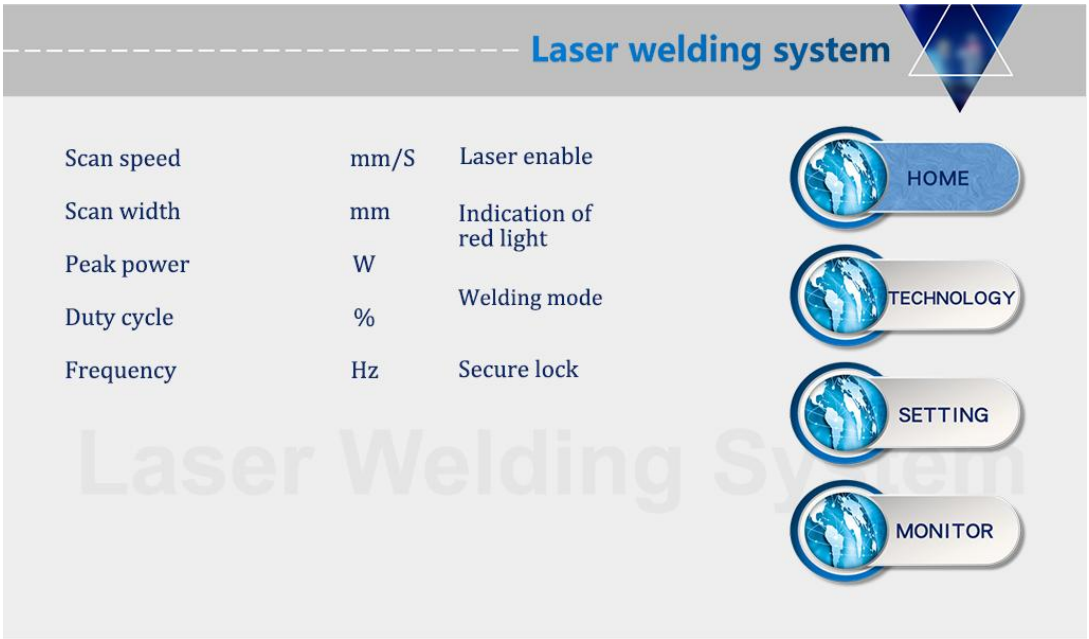
Click: Wire Feeder Installation Instructions(Applets)

3.Control panel and operation guide (the following is V3.3 version)

3.1 Operation summary and operation guide

The operation panel of SUP series is mainly composed of touch screen and control box. Touch the main page, process, setting, and monitoring of the operation interface.

3.1.1 Touch screen operation main screen



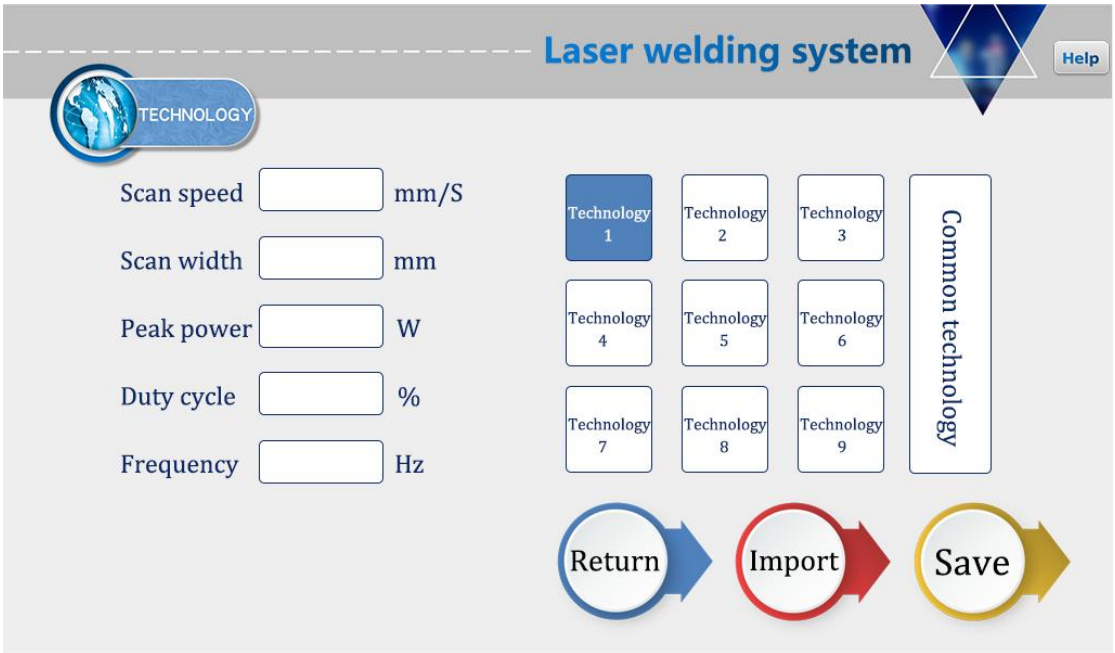
①In this interface, you can see the current process parameters and instant alarm information.

②The laser is enabled and the indicator red light is ON when it is turned on.

③The safety lock is usually gray, and when the welding head touches the workpiece, it becomes green and can be processed.

④ Welding mode selection, the default is continuous. When it is set to spot welding, it can emit light intermittently for spot welding operation, which is convenient for controlling the spot welding time due to human error. This function needs to be set as needed (V3.3 version is the above function)

3.1.2 Process operation main screen



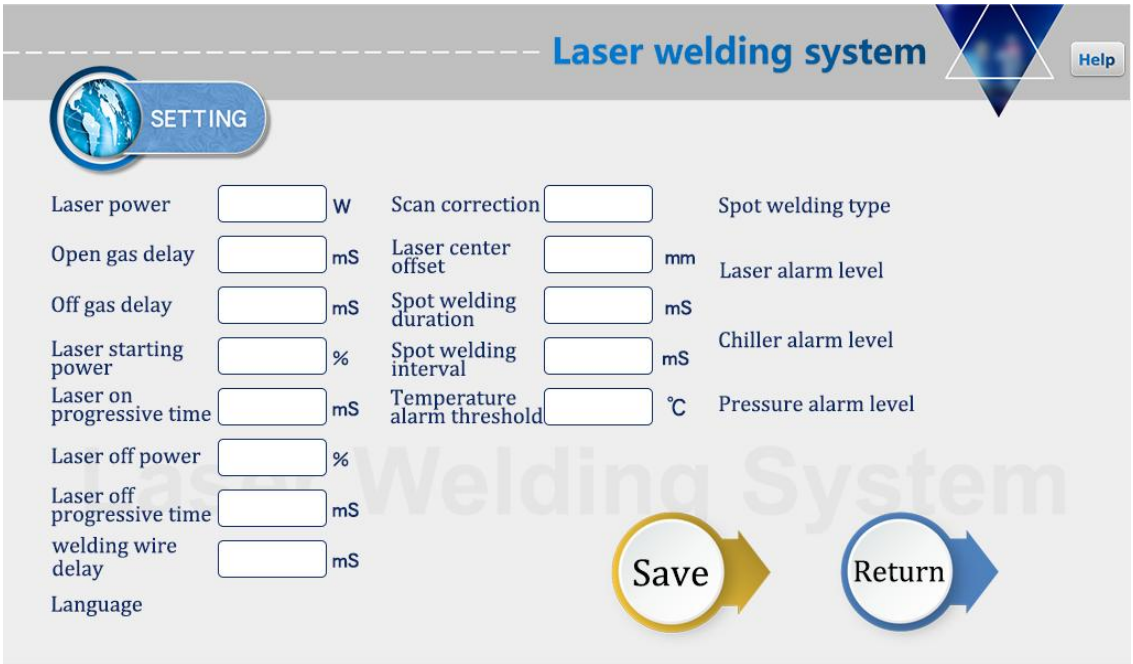
①The process interface contains the process parameters for debugging, which can be modified by clicking the box. After the modification is completed, click OK, and then save it in the shortcut process. When using it, click Import (Modify-Save-Import).
②The scanning speed range is 2-6000mm/S, and the scanning width range is 0^5mm. The scanning speed is limited by the scanning width. The limitation relationship is: 10≤scanning speed/(scanning width*2) ≤1000 If it exceeds the limit, it will automatically become the limit value. When the scan width is set to 0, it will not scan (ie point light source) (the most commonly used scan speed: 300mm/S, width 2.5mm).
③The peak power must be less than or equal to the laser power on the parameter page (for example, the laser power is 1000W, then the value is not higher than
1000).
④Duty ratio range 0~100 (default 100, usually do not need to change).
⑤The recommended pulse frequency range is 5-5000Hz (the default is 2000, usually it does not need to be changed).
⑥Click the HELP button on the upper right to get more related parameter explanations.

Process reference (subject to actual conditions, the following is for reference only)

Material	Material thickness	Wire feeding speed	Scan speed	Scan width	Power	Duty cycle	Pulse frequency	Welding wire
Stainless steel	1mm	90m/s	300mm	2.5mm	400W	100%	1000hz	1.0mm
Stainless steel	2mm	75m/s	300mm	3.0mm	700W	100%	1000hz	1.0mm
Stainless steel	3mm	60m/s	300mm	3.5mm	900W	100%	1000hz	1.0mm
Carbon steel	1mm	90m/s	300mm	2.5mm	400W	100%	1000hz	1.0mm
Carbon steel	2mm	75m/s	300mm	3.0mm	600W	100%	1000hz	1.2mm
Carbon steel	3mm	60m/s	300mm	3.5mm	900W	100%	1000hz	1.6mm
Aluminum	2mm	60m/s	300mm	2.5mm	700W	100%	1000hz	1.0mm
Aluminum	3mm	60m/s	300mm	3.0mm	900W	100%	1000hz	1.2mm

3.1.3 Set operation main screen

Password 123456

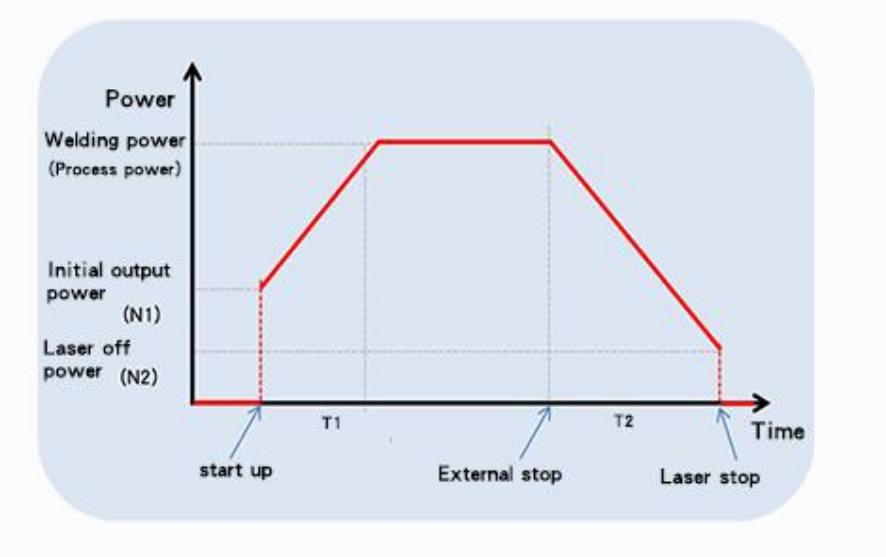


①The laser power is the maximum power of the laser used.

②The switch air delay defaults to 200ms, and the range is 200ms-3000ms.

③When the light is turned on, it will gradually increase from N1% of the process power to 100%; when the light is turned off, it will gradually increase from 100% of the process power.

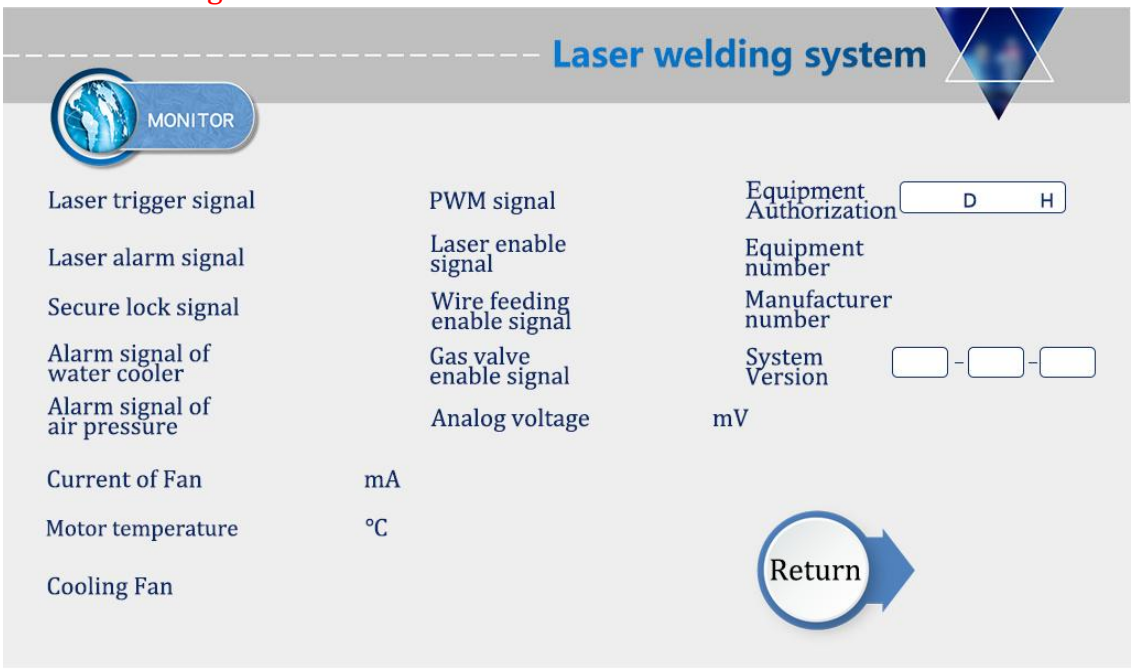
To N2; (as shown in the figure below).



④Wire feeding delay compensation is the wire feeding advance time relative to the light signal, which can be used in conjunction with the withdrawal function.

⑤The maximum temperature alarm threshold is 70℃. When the value is set to 0, the temperature alarm will not be detected.
⑥Scan correction coefficient range 0.01~4, coefficient target line width/measurement line width: generally 1.25.
⑦Laser center offset -3~3mm, reduce it and move it to the left, increase it and move it to the right.
⑧The alarm level signal is the default, and the shielded alarm can be directly changed to the corresponding level detection.
⑨Spot welding duration is the light emitting time after pulling the trigger, that is, even if the button is released, the light will still be emitted according to the time spent (V3.3 version is the above function)
⑩Spot welding interval time is the stop light time between two spot welding after pulling the trigger button (V3.3 version and above function)
⑧Click the HELP button on the upper right to get more related parameter explanation.

3.14 Monitoring main interface



This interface shows the status of each detection signal and device information

Click on the device authorization to enter the authorized use time interface, after entering the password, the system can be authorized for the use time
The authorization encryption and decryption methods are the same:
System decryption method **(Applets)**

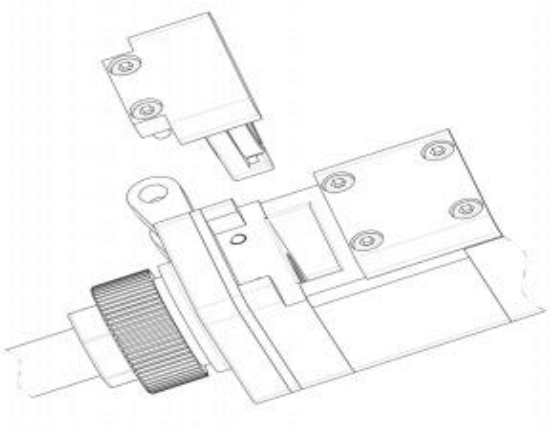
四、Maintain

4.1 How to maintain and replace protective lenses:

① The processing characteristics of laser welding require regular maintenance of the lens. If the welding effect is found to be poor, check that the protective lens is dirty, and the

protective lens should be replaced in time.

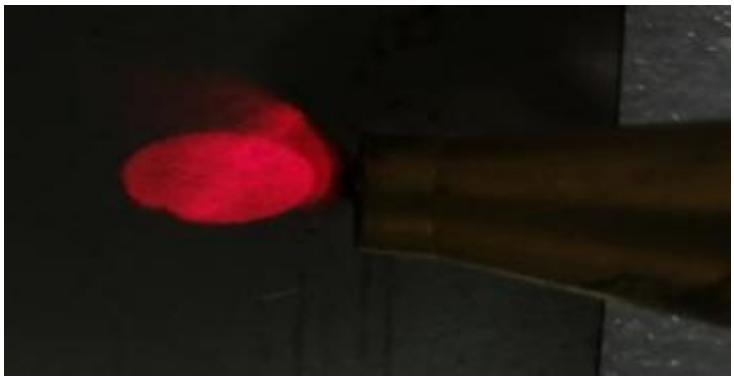
② The cleaning technology of the lens is extremely important. If it is not cleaned well, the performance of the lens will be reduced, and the lens will be damaged if it is not cleaned. Therefore, you must be very careful when cleaning the lenses.
③ Before operation, wash your hands with detergent and dry them, then wipe your hands again with cotton with alcohol.
④ Before cleaning, prepare a balloon (leather tiger), a set of clocks, dust-proof non-stick tape, anhydrous absorbent cotton (fine cotton), more than 99% industrial alcohol, finger cots or rubber gloves, and lens cleaning paper.
⑤ Remove the screws of the protective lens compartment cover in a relatively dust-free place, pull out the protective lens holder, and check the protective lens. If the protective lens is contaminated, it must be wiped clean with lens cleaning paper dipped in absolute alcohol. (If there are obvious burning spots on the surface of the protective lens, it should be replaced directly.)
⑥ Then check the white accumulating sealing ring under the protective lens. (If there is any scratch or deformation of the accumulating sealing ring
They cannot be used and must be replaced immediately.
⑦ Use a cotton ball dipped in alcohol to wipe the mouth of the compartment and the inside of the compartment cover, quickly insert the protective lens holder into the protective lens compartment, and tighten the screw.



4.2 Laser center adjustment method (oblique viewing angle)

（Click to browse video）(Applets)

When the red light cannot completely come out of the copper nozzle, manual adjustment is required at this time to prevent the copper nozzle from being burnt Please note: When using for the first time, when the red light cannot come out from the copper mouth, be sure not to emit light
① As shown in the figure below, no red light can be seen completely coming out of the copper mouth at this time



②. We need to remove the back cover, you can see four adjustment screws, adjust the center according to the video

③. Finally, this effect can be achieved

④. The slight left-right deviation can be set by setting the panel laser center offset

五、Common exception handling

5.1.Prompt laser/water cooler/air pressure alarm

①If the above alarm occurs without using the alarm signal, please change the alarm level.

②If the above alarm occurs when the alarm signal is used, check whether the alarm of the corresponding equipment or the high and low levels of the alarm signal are set incorrectly.

5.2.The screen does not light up/click no response

①The screen does not light up. If the controller is powered on (the fan is rotating), check whether the four-core wire between the controller and the screen is correctly wired, and whether the 24V voltage of the 1st pin and the 4th pin is normal

②If the click does not work during normal use, check whether the temperature of the whole machine is too high.

③Tap to fail to input, check whether the four-core wire between the controller and the screen is connected correctly, and whether the second and third pins are normal. For details, please refer to 2.1.2 LCD screen terminal of the controller

④If the newly installed equipment clicks and there is no response, it may be that the system version does not match, just re-flash the program. Please contact our company for the SD card.

5.3.No light

① The monitoring interface can exclude other alarms. When the welding head touches the workpiece to be processed, the safety lock is displayed in green, and it can be processed at this time. If it is gray, check whether the connection of the safety lock is normal.

That is, check whether all the ready signals are normal

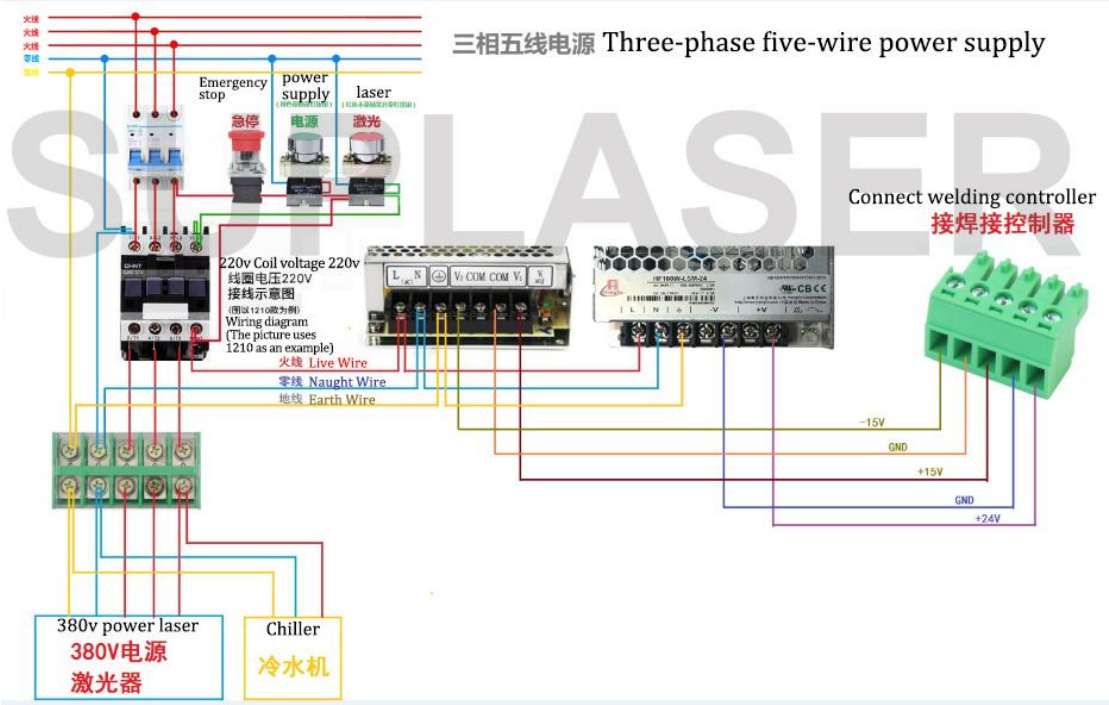
Normally, the failure of the air outlet and the wire to emit light is caused by the laser failure or the wiring problem. If the air does not emit and the wire is not fed, it may be a signal problem. For details, please refer to: 2.1.3 Controller signal interface 1

5.4.Suddenly stop emitting light during processing

The monitoring interface checks whether the safety lock and other alarms are normal, and at the same time checks whether the temperature exceeds the temperature alarm threshold.

5.5.Red light polarization

For details, please refer to 4.2 Laser Center Adjustment Method



Laser welding machine three-phase power wiring reference

Note: Two-phase or three-phase electricity depends on the power supply required by the laser and chiller, not the amount of wiring harness

Warning: Please do not move/install privately, please contact our after-sales company to provide the definition of power supply for the whole machine before preparing, and the whole machine must be grounded! !