WSX Laser Drives the Future

Contents

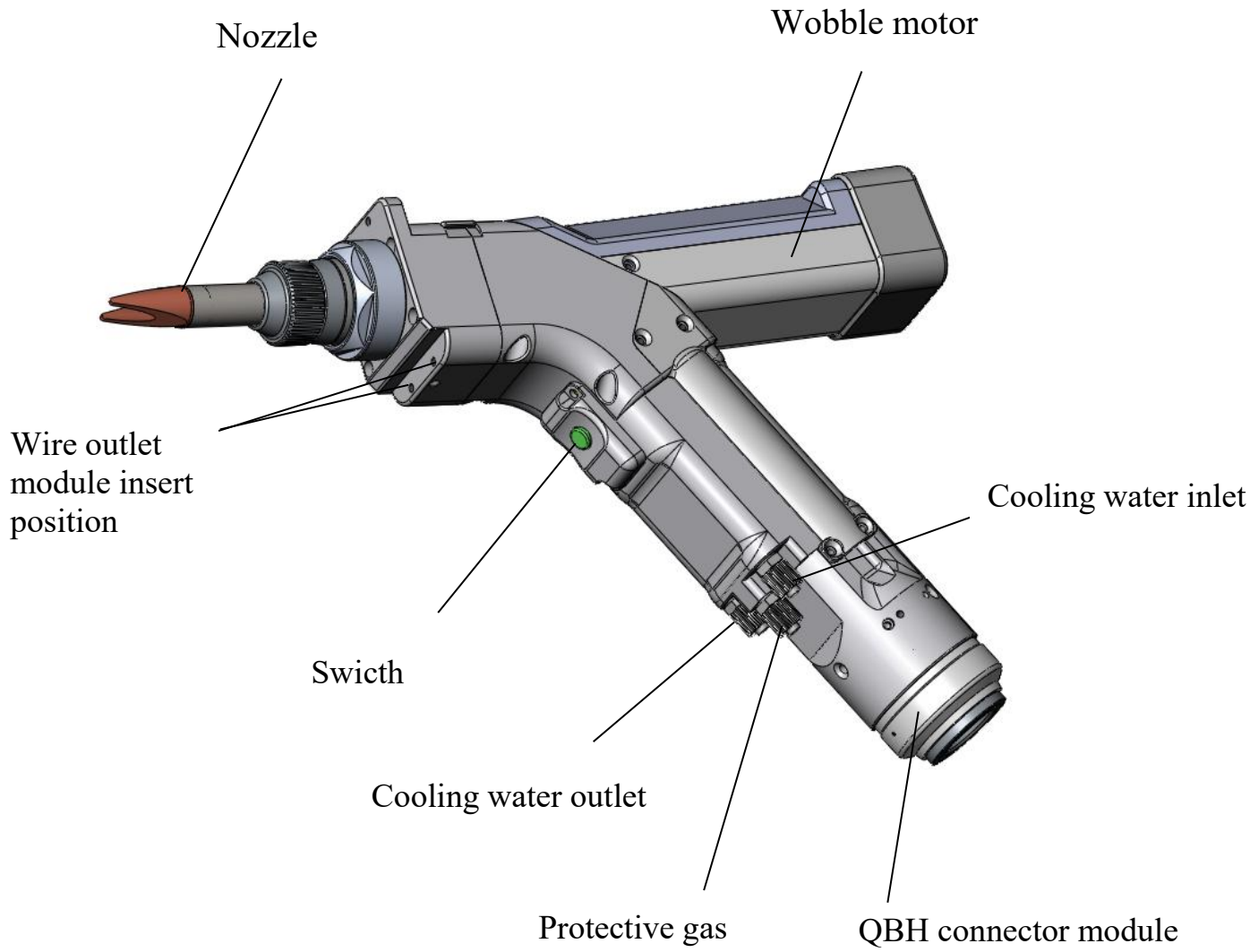
Please read this manual carefully
and make sure you understand
its contents before using the laser head.

Please keep this manual for future
operation and maintenance.

1.Product Description

1.1 Product Structure

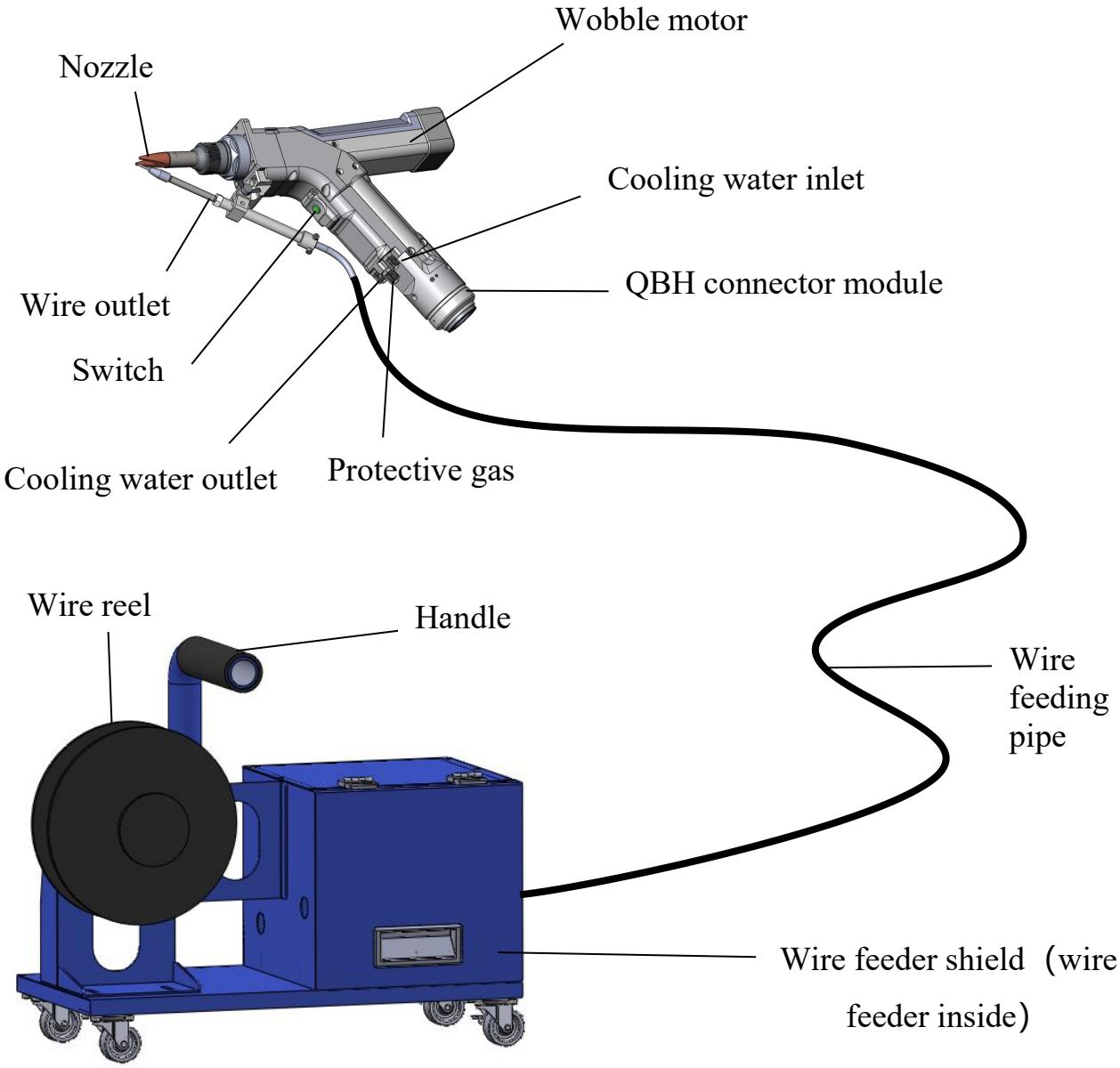
Type1 （Hand-held wobble welding head）



Note： Cooling water quantity must be sufficient, the water pressure should be above 0.4MPa；

Please keep the bending radius of the connected air pipe not less than 30mm.

Type2（Hand-held wire feeding welding head）



Note： Cooling water quantity must be sufficient, the water pressure should be above 0.4MPa；

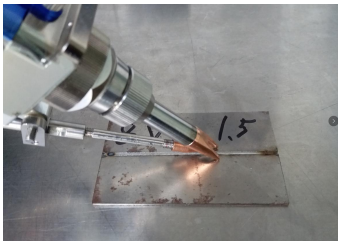
Please keep the bending radius of the connected air pipe not less than 30mm.

1.2Main Function

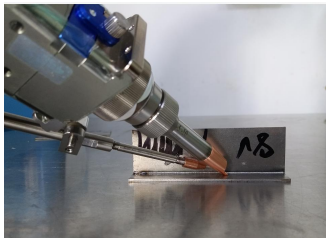
1.2.1 Design and Function

1.Smart internal design and interactive control system expand the tolerance range and welding width of the processing parts, and solve the disadvantage of minor laser welding spot, and provide better welding forming.
2.Light shape, Ergonomic design, advanced structure, and reliable performance ensure comfort grip and simple operation.
3.With multiple safety alarms, the laser will be locked automatically when the workpiece is removed.
4.Nice welding seam, fast welding speed, no consumables, no welding marks, no discoloration, no later polish.
5.This head could be equipped with a variety of angular nozzles to meet the welding needs of different products.

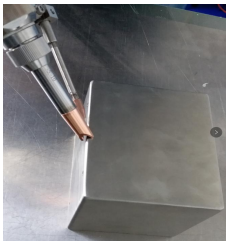
Diagram of welding with different angular nozzles



Nozzle1 （For planar welding）



Nozzle2 （For internal corner welding）



Nozzle3 （For outer corner welding）

1.2.2 Auxiliary Medium Protective gas

In order to protect the welding position from oxidation, the protective gas should not have any harmful chemical reaction with welding material.
The protective gas must meet the Standard of ISO 8573-1:2010, Class 2.4.3 without impurity particles, water and oil. High purity protective gas will prolong the lifespan of protective window.

2 Technical Specifications

Connector Type：QBH	Laser Incident Mode：Coaxial
Max Power：1500W	Laser Wavelength Range：1070±20
Collimating Length：50mm	Focusing Length：120mm/150mm
Protective Gas：Nitrogen	Weight：1.36kg
Adjustable Width：0-4mm	

Can be fit with various laser sources.

3. Installation & Connection

3.1 Safety Instructions

Any maintenance or fault survey should be conducted by professional trained personnel who must have got safety training and be aware of the possible danger and safety measure. Users should learn the related safety knowledge and prepare necessary safety devices before using.

Copper nozzle part with voltage, do not touch directly!

Danger - High Pressure!
The gas pressure inside some laser head component can reach to 2.5MPa.

Danger - High Voltage!
Keep the power off during the maintenance and repair.

Danger - Pinching Hand!
During maintenance and repair, do not put hands or any other body parts under the laser head or forward direction of the moving axis.

Danger - Laser!
The ground wire of the AC access interface must be connected to the AC grid and connected to the ground wire end of the power supply ;The laser ma chine will generate level 4 laser while working.

Keep the eyes or skins from being directly shot or scattered by laser.
Do not look directly into the laser beam even if wearing eye protecting equipment.
Please wear the goggles which meet the standard of DIN EN 207 & BGV B2.

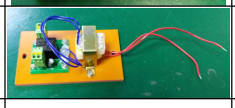
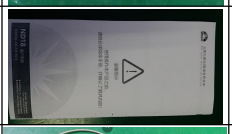
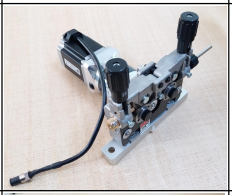
3.2 Unpacking check

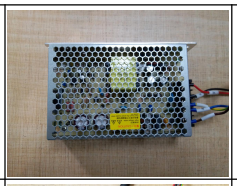
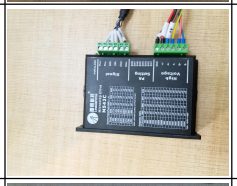
Unpacking check

1. Intact box;
2. The signage should be clear with conformity mark and accord with the purchased models;
3. The upper and lower opening tear-proof seals are not broken or disassembled;
4. If the above does not match, contact the seller.

Items list of two models of welding heads (Corresponding √ Option)

Items list						
No.	item	model	quantity	picture	Model 1	Model 2
1	Hand-held wobble welding head	ND18	1		√	√
2	Control box	ND18-KZXZJ-001	1		√	—
3	Integrated wire feeding control box	ND18-SCSS-KZX-001	1		—	√
4	Switching power	±24V,4A	1		√	√
5	nozzle	ND18-019T ND18-020T ND18-021T	3types		√	√
6	PVC Rubber protective cover （red）	Bore diameter 10mm, Length 30mm	1		√	√
7	DC External power harness; 2 meter	ZJ2-DCPOWER-2MT1	1		√	√
8	Motor extension wire; 10 meter	ND18-DJYCYC-A-10M/T	1		√	√

9	Switch & safety lock lead cable	ND18-KGAQYC-A-10M/T	1		√	√
10	Control box mounting bracket	YW52-240L	4		√	√
11	Nozzle connecting pipe	ND18-090L	1		√	√
12	Dwin display +Four-core shielded wire	7.0 inch+4 core 4 pin 2.54mm 4 core 8 pin 2.0mm	1		√	√
13	Safety lock isolation panel module	ND18-GLB-001	1		√	√
14	Lock ring wrench	ND18-117T	1		√	√
15	Display mounting buckle	/	4		√	√
16	User manual	ND18	1		√	√
17	Wire outlet module	ND18-CSZ-001	1 set		—	√
18	Wire feeder shield	SS-BJHZ-002T	1		—	√
19	Step Wire Feeder	SX-005	1		—	√
20	Welding wire reel	盘面∅200mm， 筒体∅100mm， 内宽45mm， 外宽55mm， 轴孔∅52.5mm	1		—	√

21	Wire feeder switching power supply	HF150W-SE-24	1		—	√
22	Wire feeder driver	M542C	1		—	√
23	Step motor extension cable	WSX-SSJBJ-YC001	1		—	√
24	Wire feeder power connecting cable	WSX-SSJBJ-DY001	1		—	√
25	Step drive control cable	6-core cable，7-24AWG 2 meter	1		—	√

3.3 Preparation for Installation Tools

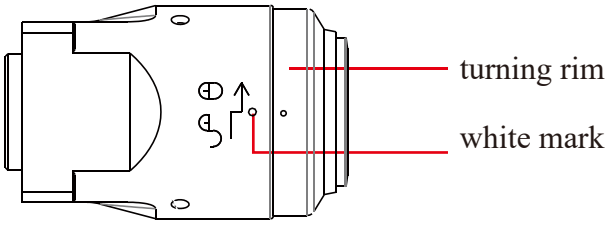
1. A set of metric hexagonal handle；
2. One bag of clean rod, one bottle of anhydrous ethanol(500ml), one package of clean gloves；
3. Clean and dust-free working environment.

Preparation of installation personnel

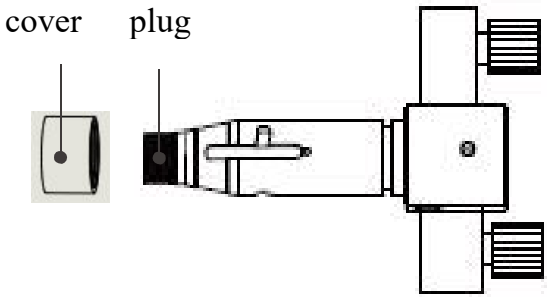
1. Read this manual carefully;
2. Wash hands with soap;
3. Wear dust-free gloves;
4. Wear a mask if necessary.(Note - Dust removal is of utmost importance)

3.4 QBH and Fiber

Step one：Before turning the rim as below, make sure the red marks are aligned to the white marks.

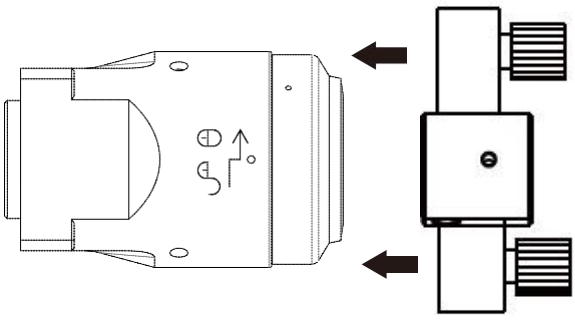


Step two：Remove the dust cover of fiber rod, clean the fiber rod with anhydrous ethanol. Before installing, check the protective cover of fiber plug to see if it is locked, avoid the cover from loosening and effecting the welding performance or burning the fiber and welding head.



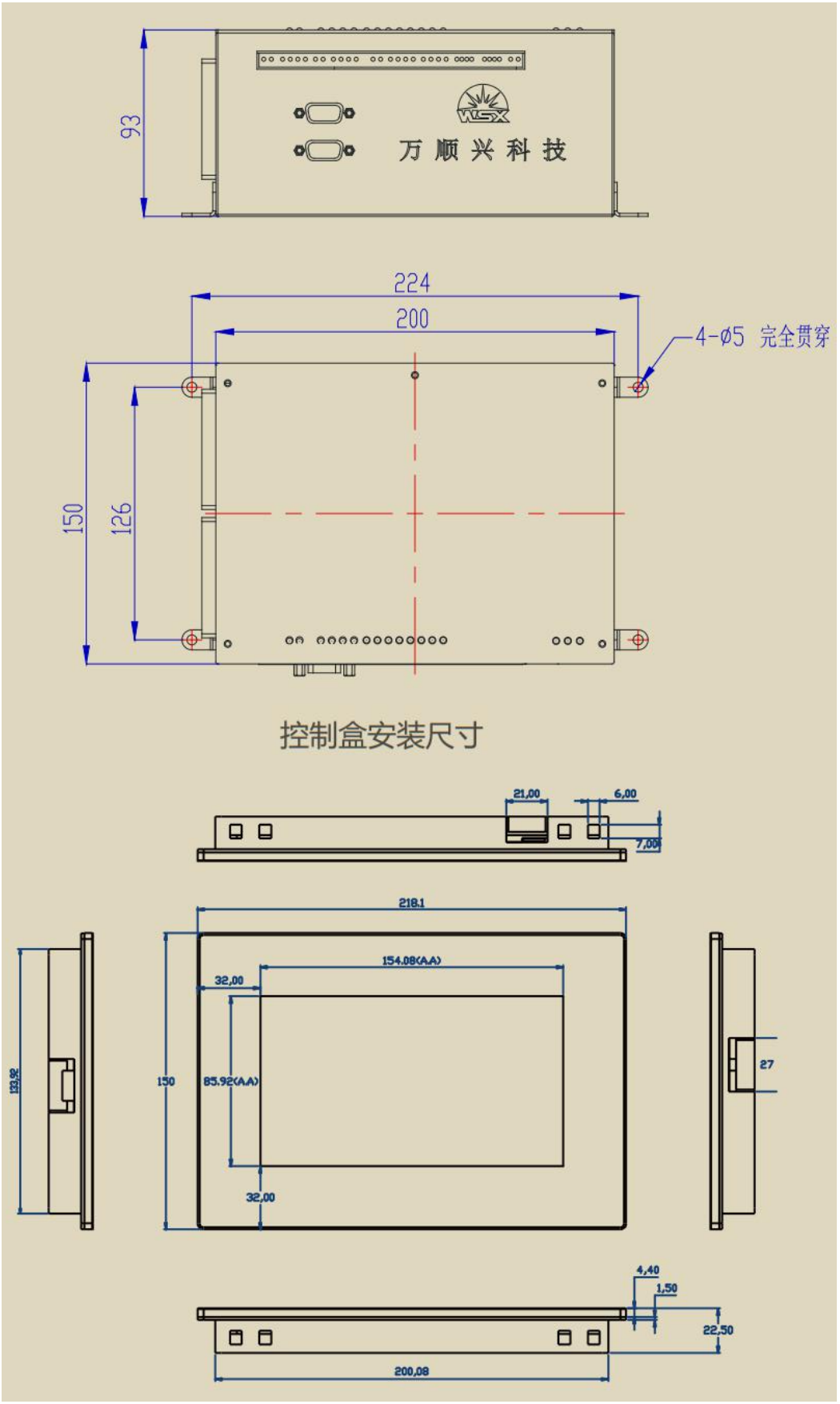
Step three：Remove the dust cover from QBH, place the clean fiber rod and the QBH coaxially, make sure the white mark on the QBH is aligned with the locating slot (long slot on fiber rod), insert the fiber rod into QBH gently, until the fiber rod joints the QBH contact surface.

Step four：After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.



Note: 1. Insert or pull out the fiber rod gently;
2. When inserting or pulling out, QBH and fiber rod should be coaxially;
3. The operation should be kept as dust-free as possible.

3.5 Structure and dimension



Display mounting dimensions

4 Maintenance

Clean and dust-free working environment is required.

Any laser circuit equipment fitted with a laser head must be carefully dedusted.

Assembly or replacement of lens or other components must be conducted in clean working environment.

Prepare new lens component before removing the old one.

Users could purchase spare lens components from us.

In case that user could not meet the above requirements, it is advised to use nonstick protective film to seal the opening after the removing of the lens immediately.

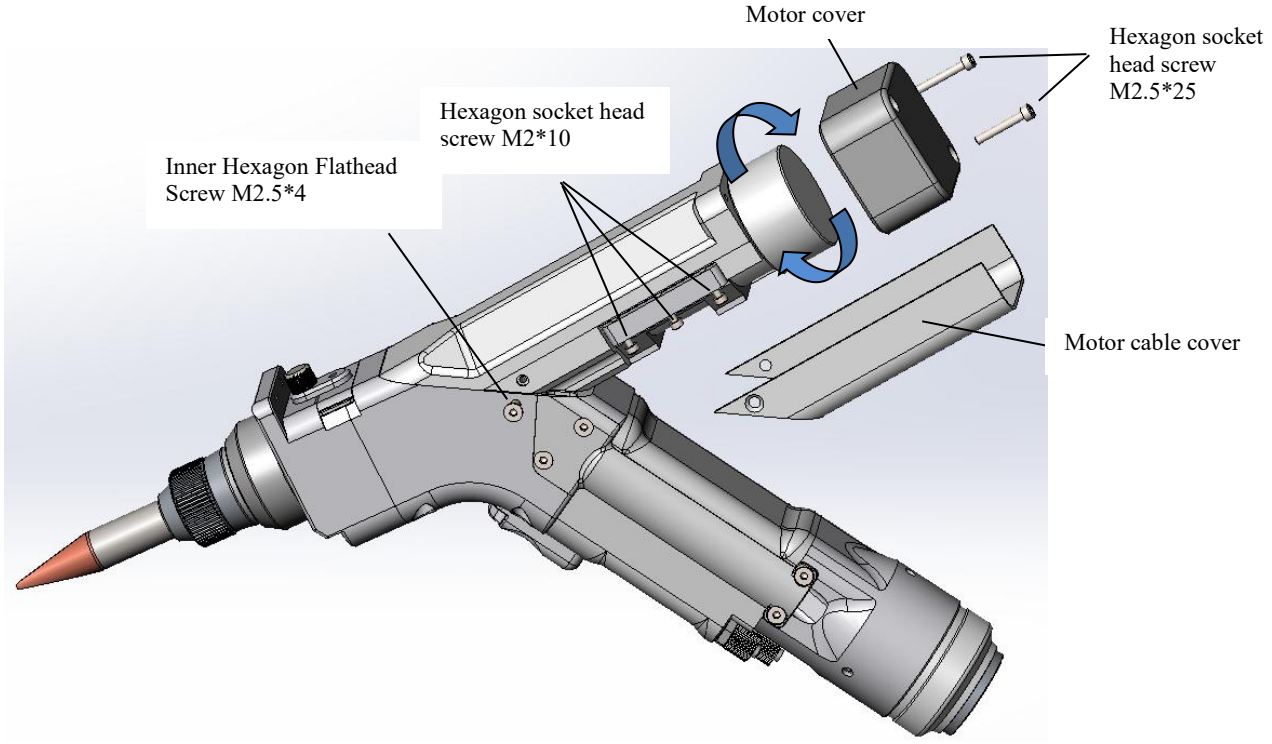
Minimize the time of laser path being exposed to the air to prevent the dust and dirt entering into the laser head.

If any safety or protection device has been removed, it must be reinstalled before the equipment being operated or debugged and checked whether the device could run well.

4.1 Maintenance of QBH and Fiber Connector

1、Use self-adhesive paper to cover the junction of QBH and fiber connector to prevent dust from entering the gap;
2、Fiber connector water cooling pipe must be connected well to prevent leaking. If QBH has water inside accidentally, please stop using immediately and send it to the factory to handle with.

4.2 Angle adjustment of red light polarizing



1.Remove the two M2.5*25 hex screws from the motor cover and remove the cover;

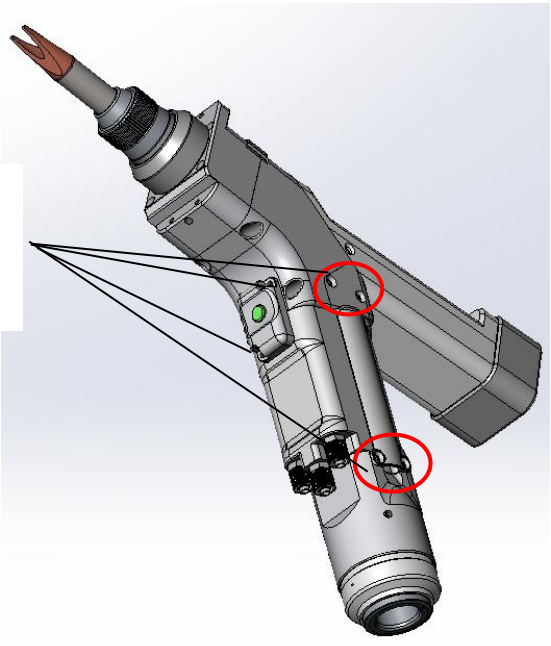
2.Remove the two M2.5*4 hexagon flathead screws locking the motor cable cover, then remove the cover;

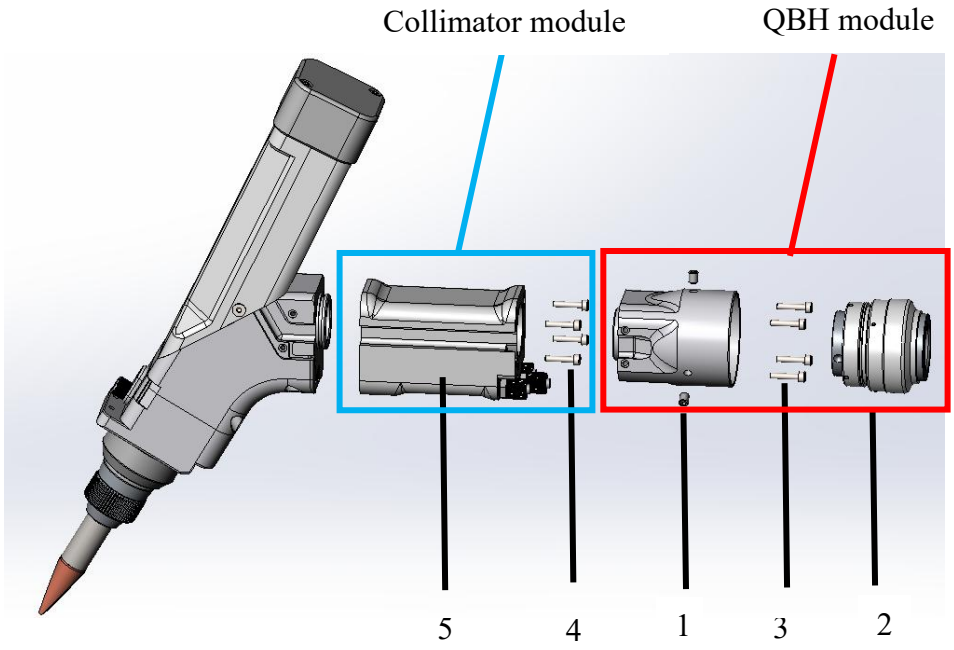
3.Loosen the six M2*10 hexagon socket head screws, twist the motor slightly, adjust the red light to the canter of the nozzle.

4.3 Replacement of collimating lens

Step 1：

Remove the screws and remove the slot cover



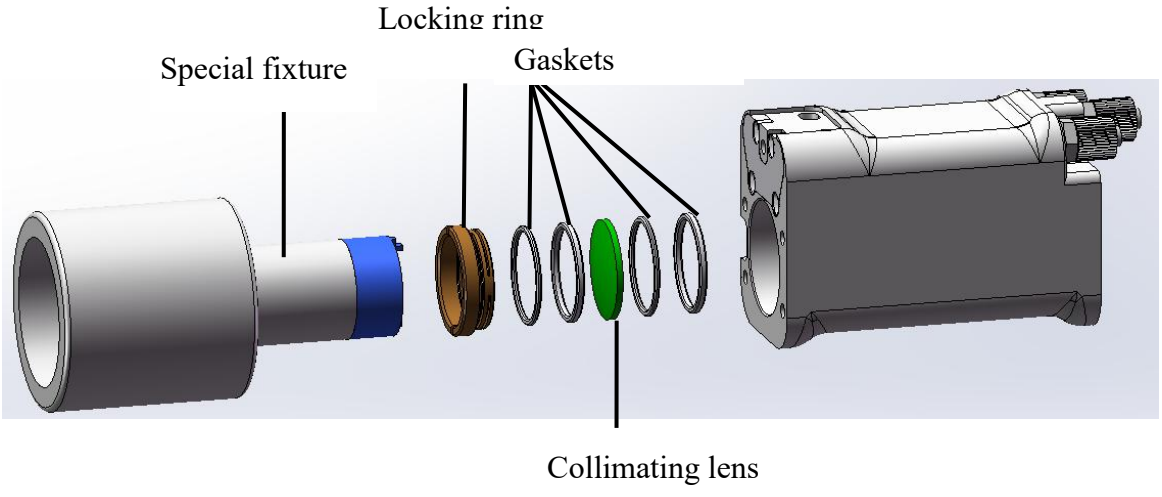


Step 2：

①、Remove the three screws(1) from QBH module, then remove the QBH module(2);

②、Remove the four M2.5*12 hexagon screws(3) from QBH conversion block, make the whole QBH module separated from the welding head;

③、Remove the six M2.5*12 hexagon screws(4) from collimating lens block, make the whole collimating module separated from the welding head, seal the reflection module with adhesive tape immediately to avoid dust entering.



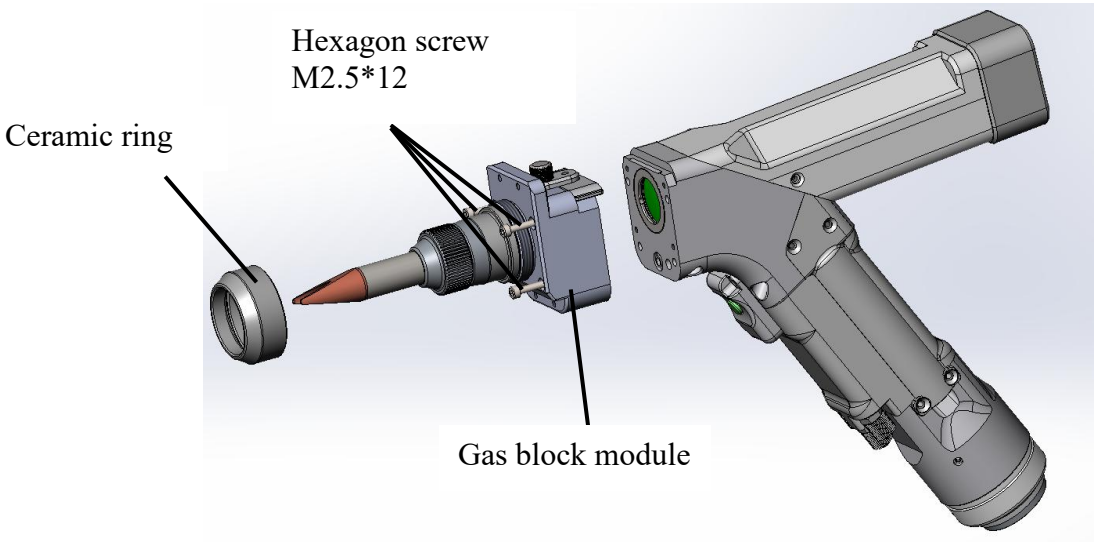
Step 3：

①、In a dust-free environment, use a special fixture to remove the locking ring ;

②、Remove the gaskets from the collimating lens block(record the thickness of the gaskets), remove the lens and replace it with a new, clean one, then put back the gaskets and lock with locking ring;

③、Then install it back in opposite steps.

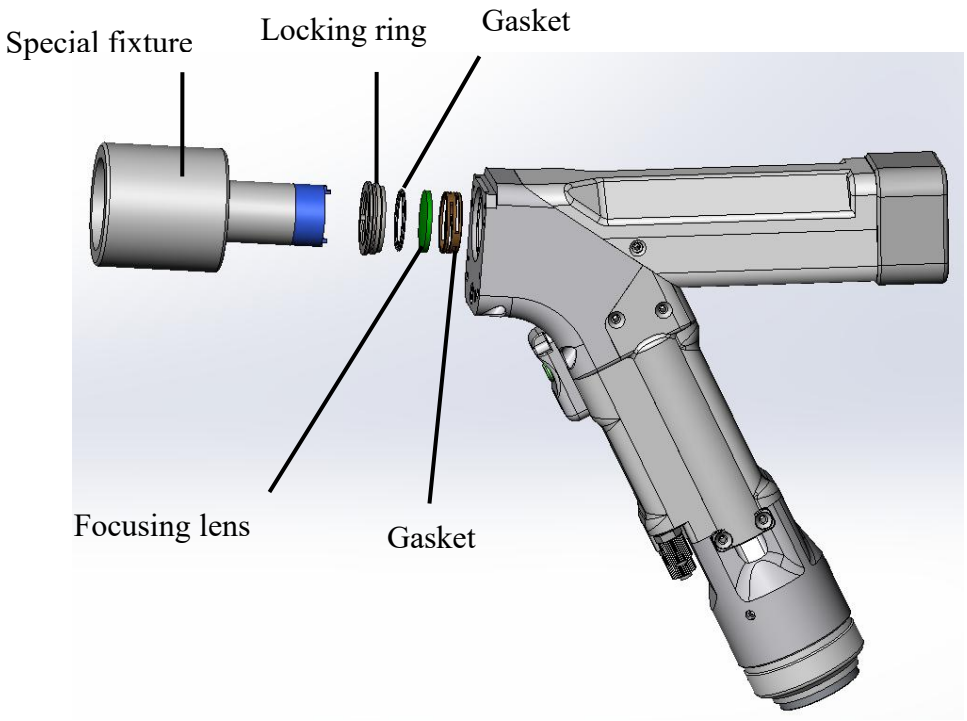
4.4 Replacement of focusing lens



Step 1：

①、Remove the ceramic ring;

②、Remove the four M2.5*12 hexagon screws from the gas block module, seal the lens position with adhesive tape.



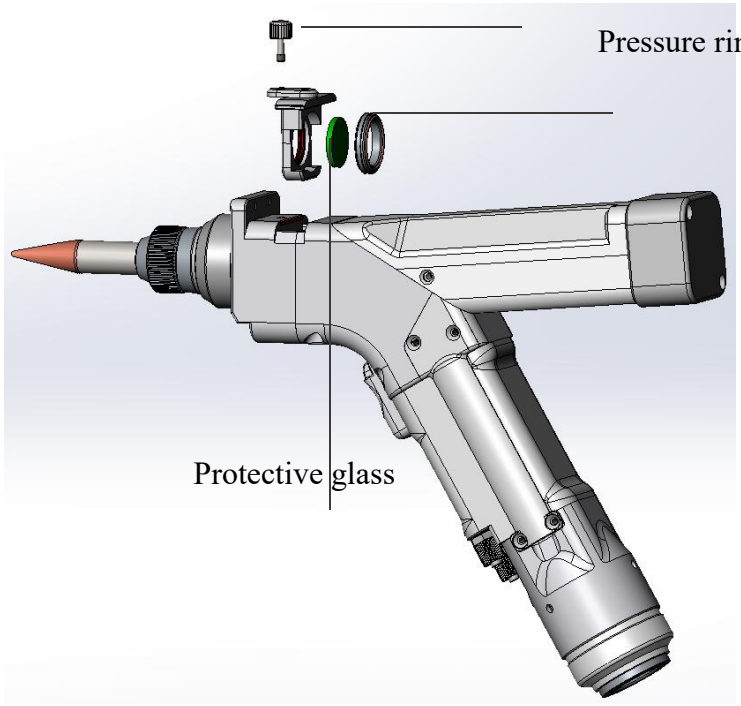
Step 2:

①、In a dust-free environment, use a special fixture to remove the locking ring;

②、Remove the gaskets and the lens and replace it with a new, clean one, then put back the gaskets and lock with locking ring;

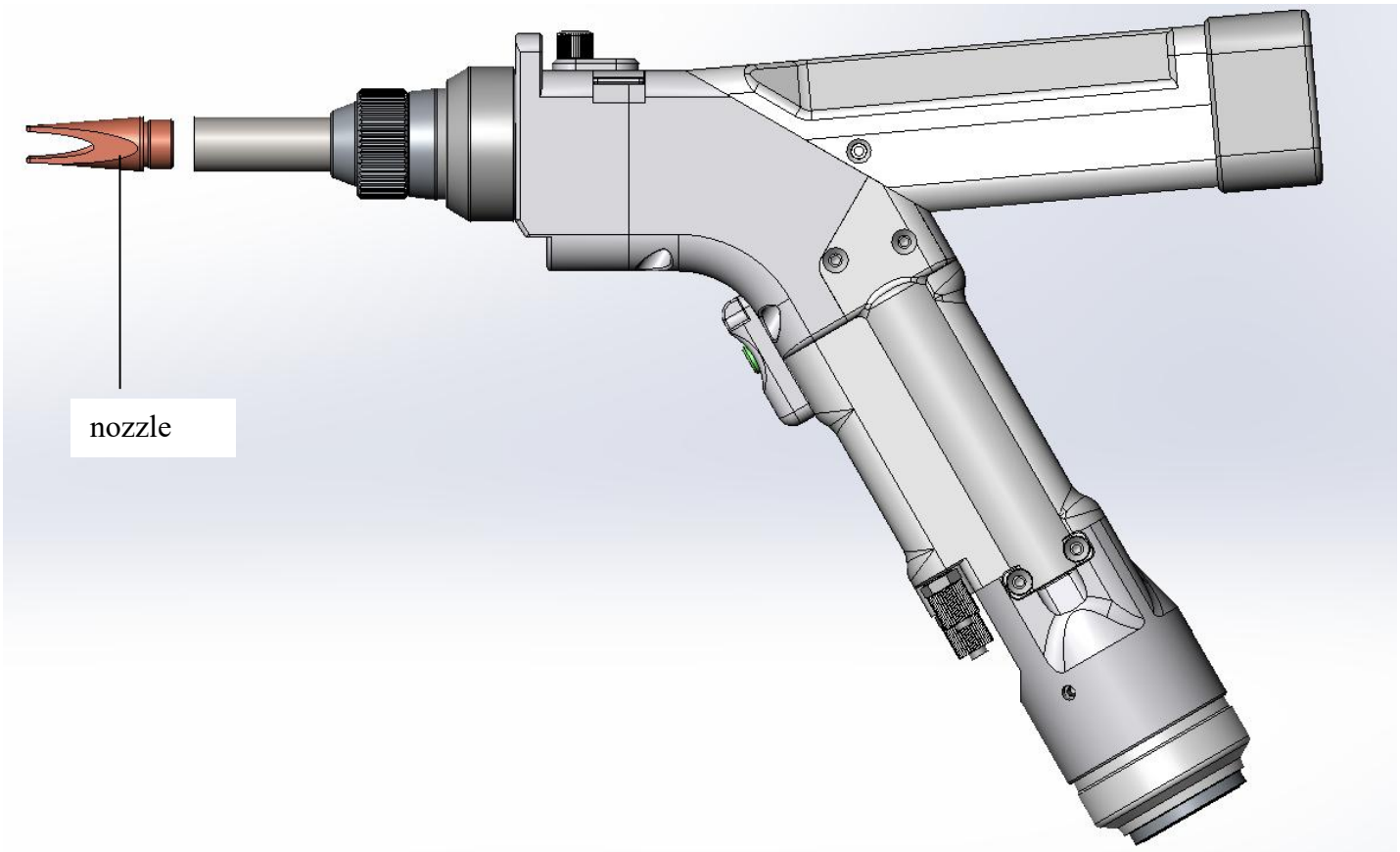
③、Then install it back in opposite steps.

4.5 Replacement of protective lens



1. Loosen the protective window screw, remove the protective window module;
2. Remove the pressure ring;
3. Remove the protective glass (D18*2) and replace a new one;
4. After the protective glass is placed in the protective window seat, press the pressure ring on the glass, the protective glass should be pressed into the groove of the ring;
5. Install the protective window module back into the hand-held welding head and tighten the screw.

4.6 Replacement of nozzle



1. Take the nozzle off the connecting tube;
2. Tighten the new nozzle clockwise onto the connecting tube.

4.7 Notes for regular maintenance of welding head

1.Regular inspection of the protective glass for contamination and timely replacement if contaminated (daily inspection) ;

2.Regular inspection of ceramic ring for damage (daily inspection) ;

3.Regular inspection of QBH connector for looseness (every 3 days);

4.The connection line must not have water to enter, pay attention to protect the interface section; check the interface (e.g. aviation plug) for water droplets when the lens is abnormal.

5. Electric chapter

5.1 Connection Diagram,

Power installation： this hand-held welding machine power cord has two types, one is AC three-phase five-wire, with R/S/T three fire lines; N zero line; PE ground wire. One is AC two-phase three-core wire, one fire line, one zero line, one ground wire.

Note: The ground wire of the AC socket must be connected to the ground of the AC grid and connected to the ground wire end of the power supply.

5.2 Port definition

5.2.1 Laser control port：

Starting from the voltage side in turn:	
Power Indicator	This light is on when 24V power supply is normal.
Operation light	This light flashes when the vibrating output is enabled, otherwise the power will be on.
Alarm light	This light will be on when the control card system detects an abnormal and stop output. The abnormal conditions: 1 receiving alarm signal; 2 control card system abnormal
Security and valid lock signal indicator	The indicator light will be on when the input signal connect to low level
Welding switch valid signal indicator	
Foot switch valid signal indicator	
Laser alarm valid signal indicator	
Galvanometer alarm valid signal indicator	
Cooling water alarm valid signal indicator	
SSJ alarm valid signal indicator	
Reset valid signal indicator	
Laser enable valid signal indicator	The indicator light will be on when the output signal connect to high level.
Protective gas enable valid signal indicator	
Reserved output valid signal indicator	
Reserved output valid signal indicator	
NC	
NC	

5.2.2Input control port：

When all input ports are connected to low level (0~0.7V), it is a valid signal input. The high level is 24V or left floating, and the access signal is invalid.	
Security lock input+	It is necessary to ensure that welding piece is connected to the "security lock input-" signal pin of the controller
Welding torch switch input+	This signal is valid when the switch of torch head is closed
Foot switch input+	This signal is valid when the foot switch is closed
Laser alarm input+	The laser alarm signal input from this interface, and the low level is regarded as a valid
Galvanometer alarm input+	The galvanometer drive card alarm signal input from this interface, and the low level is regarded as a valid signal.
Cooling water alarm input+	The cooling water control alarm signal input from this interface, and the low level is regarded as a valid signal.
SSJ alarm input+	The SSJ alarm signal input from this interface, and the low level is regarded as a valid signal.
System reset input+	When the system needs to be reset, the interface will input low level, the operation light will flash 3 times, and the system parameters will be set to the factory default.
input signal- 1	These two interfaces are common to all input ports, and the "-" of all input signals can be connected here, and is connected to the "output signal-".
input signal- 2	

5.2.3 Output control port：

All output ports output high level (≥19V) as valid signals	
Laser enable output+	When the security lock and the torch switch input signal are valid at the same time, this port outputs
Protective gas enable output+	When the protection gas function is enabled, when the security lock and the torch switch input signal are valid at the same time, this port outputs a high level (≥20V).
Output retention+	No function definition
Output retention+	No function definition
output signal- 1	These two interfaces are common to all outputs, and the "-" of all output signals can be connected here. Also connected to the "input signal -"
output signal- 2	

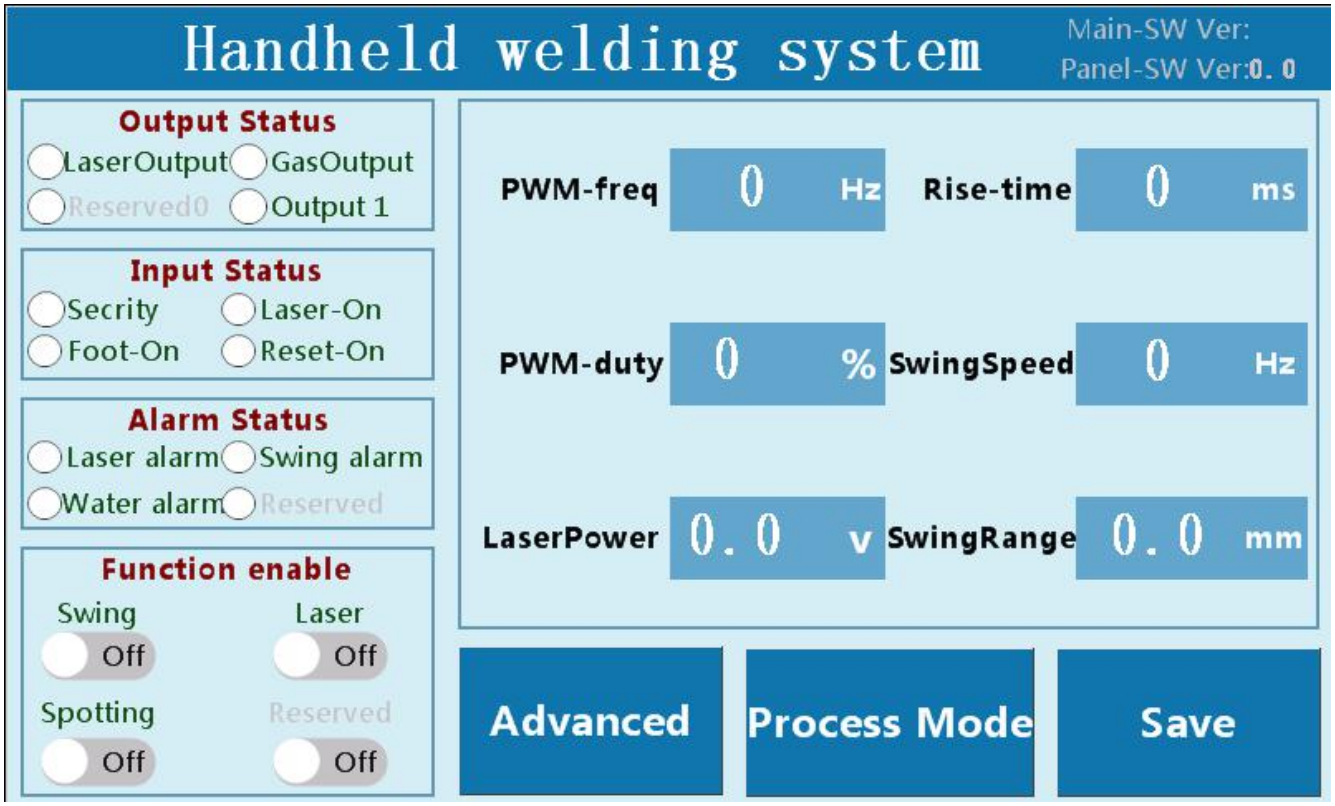
5.2.4 Laser control port：

Laser enable +	"Laser enable output +" with the output
Laser PWM+	The output range is 0~100000Hz. The correspond ing output value can be adjusted by adjusting the laser frequency parameter.
NC	
Laser PWM-	Equivalent to output signal- / input signal-
Laser DA+	The output range is 0~10V, which corresponds to 0%~100%of the laser power. The corresponding output value can be adjusted by adjusting the laser power parameter.
Laser DA-	The ground wire of the DA signal cannot be connected to the ground wire of the input and output port;

6. User Interface

6.1 Main interface

corresponding English menu：



6.1.1 Function Description:

Output port status

Laser output：The IO indicator lights up when the laser is emitting light;
Gas output: The IO indicator lights up when the gas is working;
Wire output：The IO indicator lights up when the wire feeder is working;
Output port 1：The IO indicator lights up when the output port 1 is valid;

Alarm status

Swing alarm: When the galvanometer driver board is abnormal, the alarm lights up;
Laser alarm: When the laser is abnormal, the alarm lights up;
Water alarm: When the water cooler is abnormal, the alarm lights up;
Wire alarm：When the wire feeder is abnormal,the alarm lights up;
※ Stop working as long as one of the alarms is valid.

Input port status

Security lock: The IO indicator lights up when the security lock is locked
Laser-on: This IO indicator lights up when the laser switch is on
Foot-on: This IO indicator lights up when the foot switch is turned on.
Reset-on: program reset at 3S later after reset

Function enable

Swing: Turn galvanometer on or off, when the galvanometer function is turned on, and the laser is not triggered, the galvanometer will stop after 30s, and the galvanometer will start automatically again when the laser is on.
Laser：enable laser welding;
Spot ：enable laser spotting mode;
Wire feeding：enable wire feeding.

6.1.2 Parameter setting description：

PWM-Freq(Hz)： Set the laser frequency;
PWM-Duty(%)： Set the laser duty cycle;
Rise time(ms)： Time required to start soldering to achieve predetermined laser power;
Swing Speed(mm/s)： the speed at which the lens oscillates;

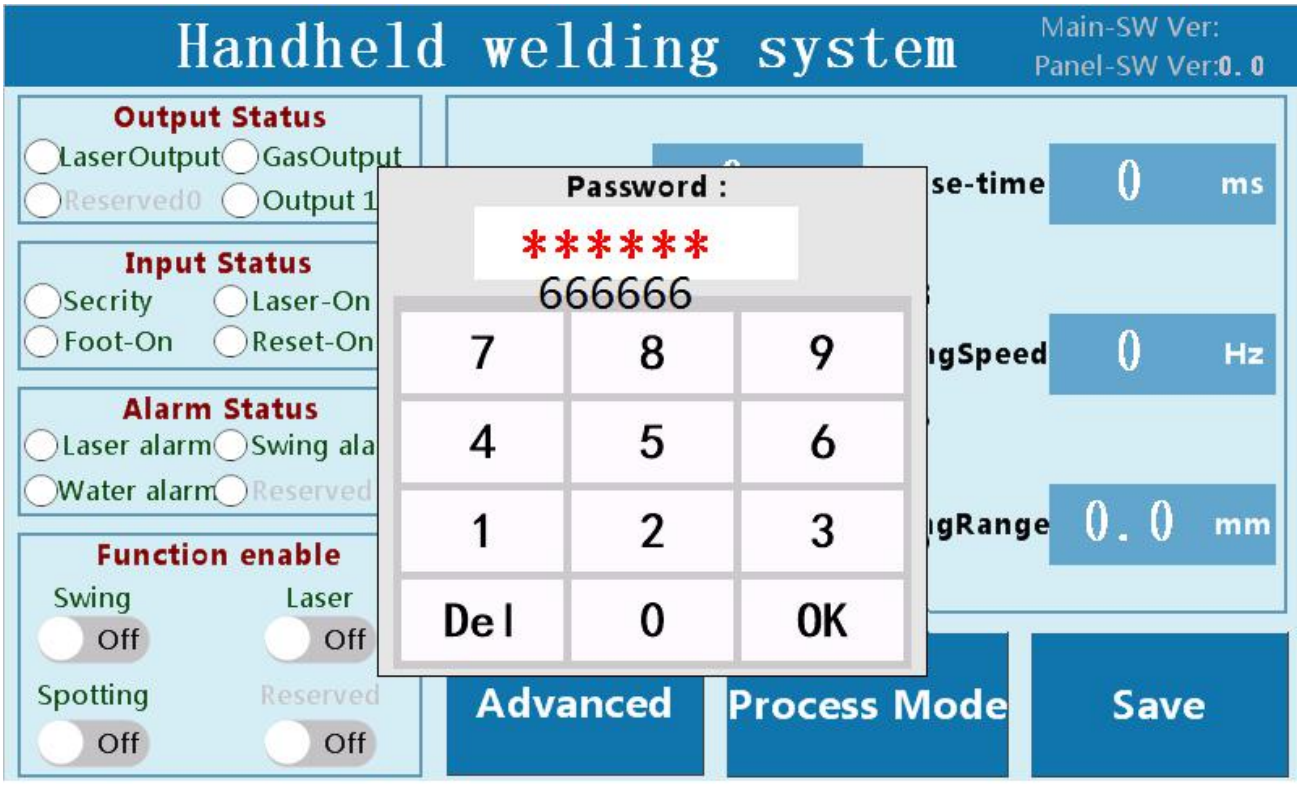
Laser power(V)： Set Laser Power
Swing range(mm)： Set the amplitude of the oscill ation of the galvanometer;
Feeding speed(mm/s)： Set the wire feeding speed
Manual feeding《： Manual wire feeding when triggered
Manual feeding》： Manual dewire when triggered

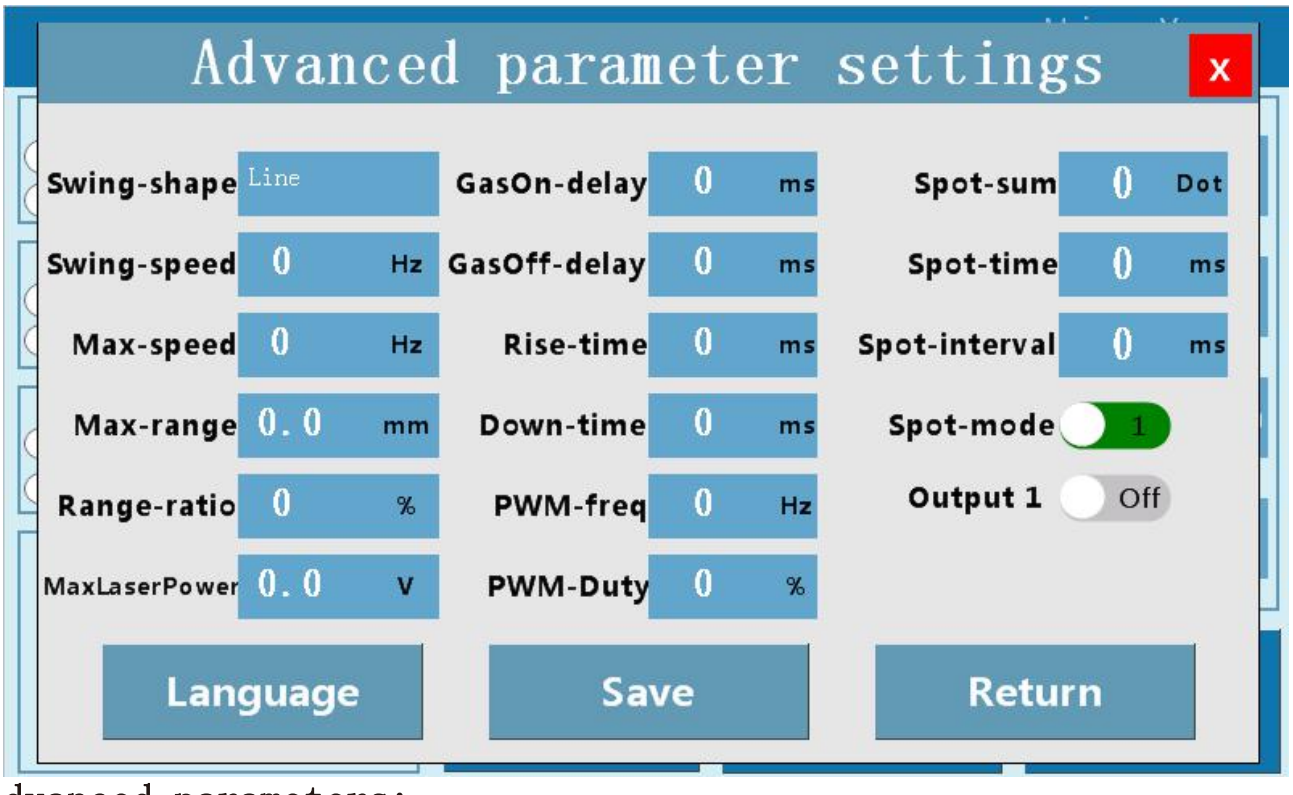
※The above parameters can only be set in the Advanced Parameters menu;

Advanced parameters: Click to enter password interface. Enter correct password to enter advanced parameter settings interface;
Processing mode： Click to enter processing mode parameter setting interface;
Parameter save： save current settings.

6.2 Password and advanced parameter interface:

Corresponding English menu：





Advanced parameters:

Click the advanced parameter button on the display interface to enter the password input interface, set the corresponding parameters click the save parameter to exit the interface.

Swing shape: the shape of the oscillating lens, Hand-held welding has only one shape: straight line;
Swing speed: Set the speed of the lens swing, which does not exceed the maximum swing speed;

Max swing speed： Set the maximum speed of the oscillating lens, up to 300Hz;
Max swing range: Set the maximum amplitude of the oscillating motion, up to 6 mm;
Swing range expansion ratio： Set to fine-tune the swing amplitude:-100~0 is the compression amplitude and 0~100 is the stretching amplitude;
Max power： Set the required max voltage when the laser power reaches maximum, up to 10v;

Gas On Delay： setting the delay time for turning on the gas, up to 6000ms;
Gas Off Delay： setting the delay time for turning off the gas, up to 6000ms;
Rise time： Set the delay time between the opening laser (the laser power is 0) and the laser reaching the preset power, up to 6000ms;
Down time： Set the delay time to turn off the laser until the laser power is 0, up to 6000ms;

PWM-Freq： Set the laser frequency, up to 10000Hz;
PWM-Duty： Set the laser duty cycle, Range: 0~100%;

Spot-sum： Set the number of laser spot， up to 1000;
Spot-time： Set the length of time the light is emitted, up to 6000ms;
Spot-interval： Set point to spotting light interval, up to 6000ms;
Spot mode： Set spot mode 1 or 2, the parameters of two modes can be different, and the parameters are independent of each other;
Note：The spot parameter is shown as gray invalid when the point-shot function is not enabled ;

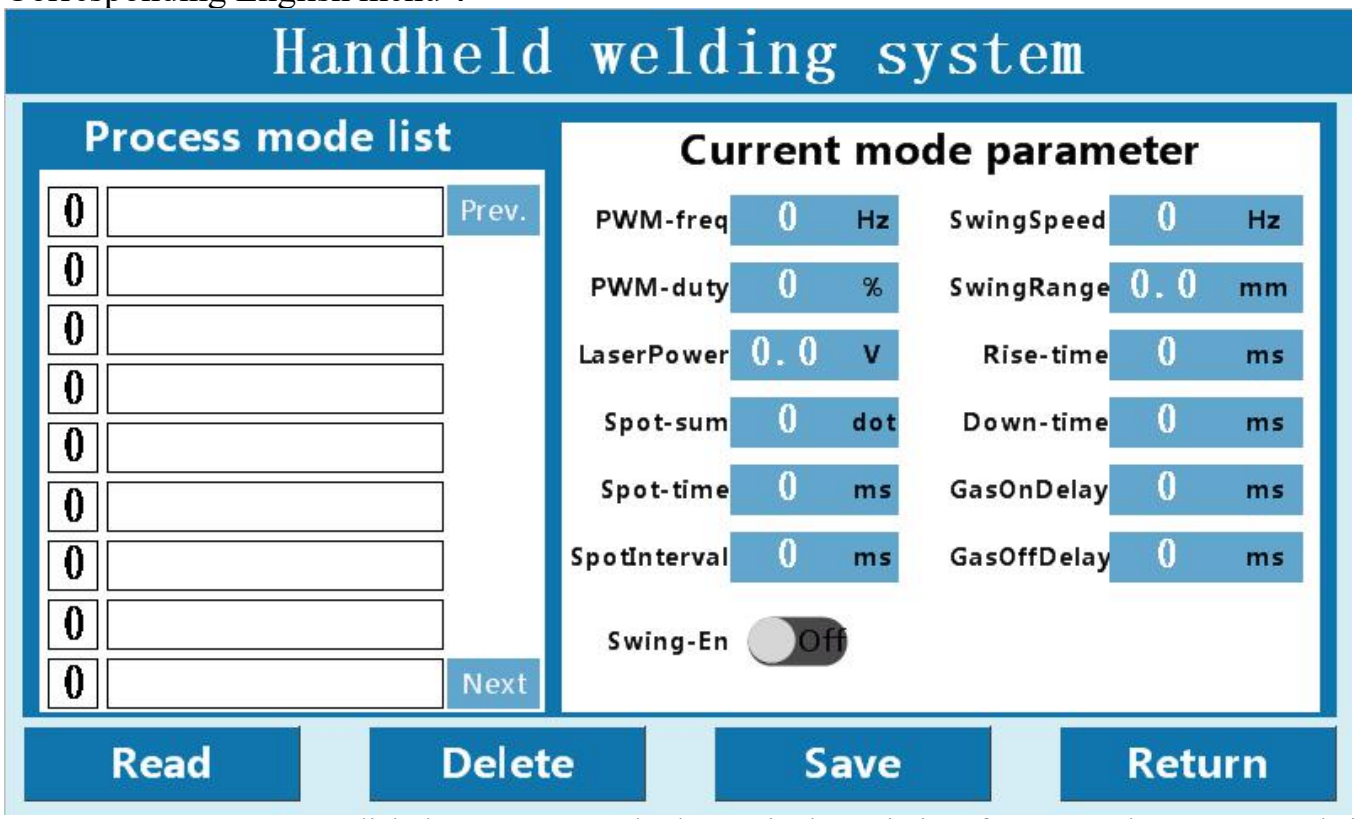
Output port 1： Set the level of output port 1, output port 1 output high when open, low when closed ;

语言/Language： for switching interface languages; interfaces as follows：

Corresponding English menu：

6.3 Process mode interface:

Corresponding English menu：



Process mode interface： Click the "Process Mode" button in the main interface, enter the process mode interface, set the corresponding parameters, and click "Save Parameters" to take effect, press "Return" to exit the interface.

Current mode parameter: Display and modify the current process parameter; Maximum process mode number is 18; Parameters are saved independently;

Process mode list**:** Display and modify the number and name of process modes; process mode supports Chinese input, but note that Chinese may not be shown in English mode;

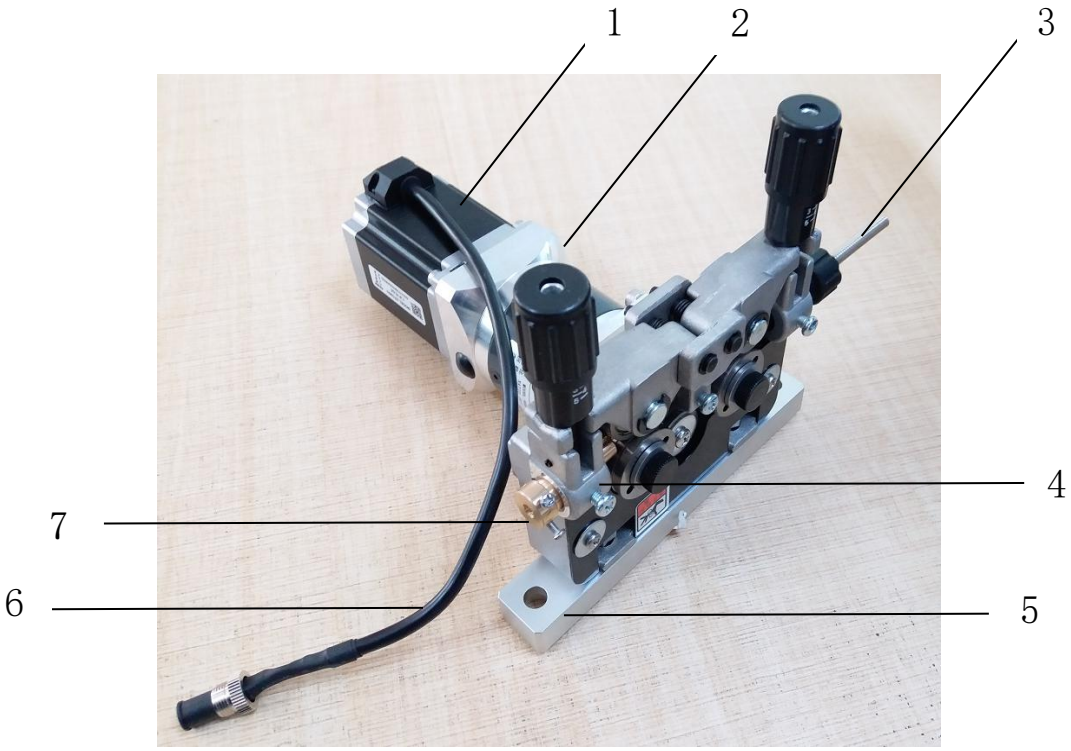
Prev.: Process mode cursor moves to previous box, the parameter in the parameter bar on the right is updated to the parameter of the current mode;
Next: Process mode cursor moves to next box, the parameter in the parameter bar on the right is updated to the parameter of the current mode;

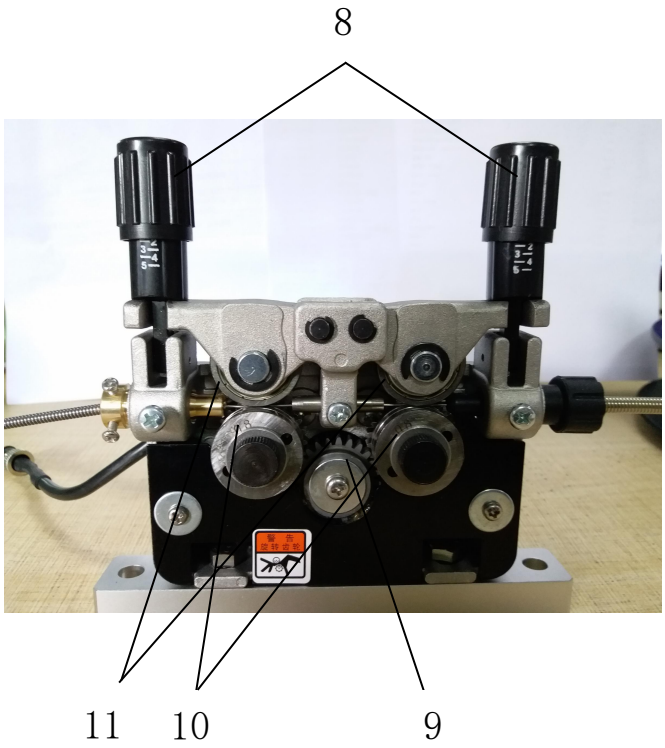
Read： Read the current mode parameter, and update to display screen;
Delete： Delete the current mode, the mode next to the deleted mode becomes the current process mode;
Save： Save the parameter of current mode;

Mode name input keyboard interface as follows：

7. Wire Feeder

7.1 Schematic diagram





No.	Name
1	Stepper Motor
2	Reducer
3	Wire Feeding Tube
4	Bracket
5	Mounting Plate
6	Motor Cable
7	Connector for Wire Out
8	Adjustable Preload Pressure Bar
9	Driving Gear
10	Wire feeding Wheel
11	Wire Pressing wheel

7.2 Main Function Introduction

7.2.1 Design and Function

1. This wire feeder is an automatic drive mechanized wire feeder.
2. Light in shape and easy to operate.
3. Mainly used for automatic wire feeding of laser handheld welding.
4. The system is controlled by microcomputer and driven by stepping reduction motor, with high wire feeding accuracy and good repeatability.
5. It can transfer steel wire and copper wire with specifications of 0.8mm and 1.0mm.

7.2.2 Working Principle

The wire feeding machine generally has a control section to provide parameter settings. The driving section performs wire feeding drive under the control of the control section, and the wire outlet nozzle sends the welding wire to the welding gun position.

7.2.3 Technical Parameters

Motor type: stepper motor	Wire feeding speed: 0-80mm / min
Wire feeding length: 5 meters	Wire feeding diameter: 0.8mm, 1.0mm
Wire diameter: 200mm	

7.3 Installation and Connection

7.3.1 Safety Instructions

Any repairs or accident investigations that require specialized knowledge must be performed by trained personnel! Trained professionals must be trained in safety, understand the dangers that can occur, and be familiar with safety measures to deal with them. In addition to the safety regulations required by laws and regulations, the safety regulations specified by the manufacturer must also be complied with. You need to know the relevant safety equipment and have the necessary safety equipment before use.

Danger-Ultra High Voltage

During equipment maintenance and repairs, the power must be turned off and prevented from being turned on during this time.

DANGER – Prevent injuries to rotating moving parts!

1. Do not place fingers, hair, clothes, etc. near rotating parts such as wire feed wheels.
2. When feeding the welding wire, do not place the end of the welding gun close to the eyes, face and body, otherwise the welding wire may hurt people.。

Watch out for high temperatures!

1. The motor generates heat during operation. Do not touch it with your hands.
2. Welding wire produces high temperature, please do not touch it with your hands directly.

Knocking is strictly prohibited!

7.3.2 Preparation before installation

Preparation tools

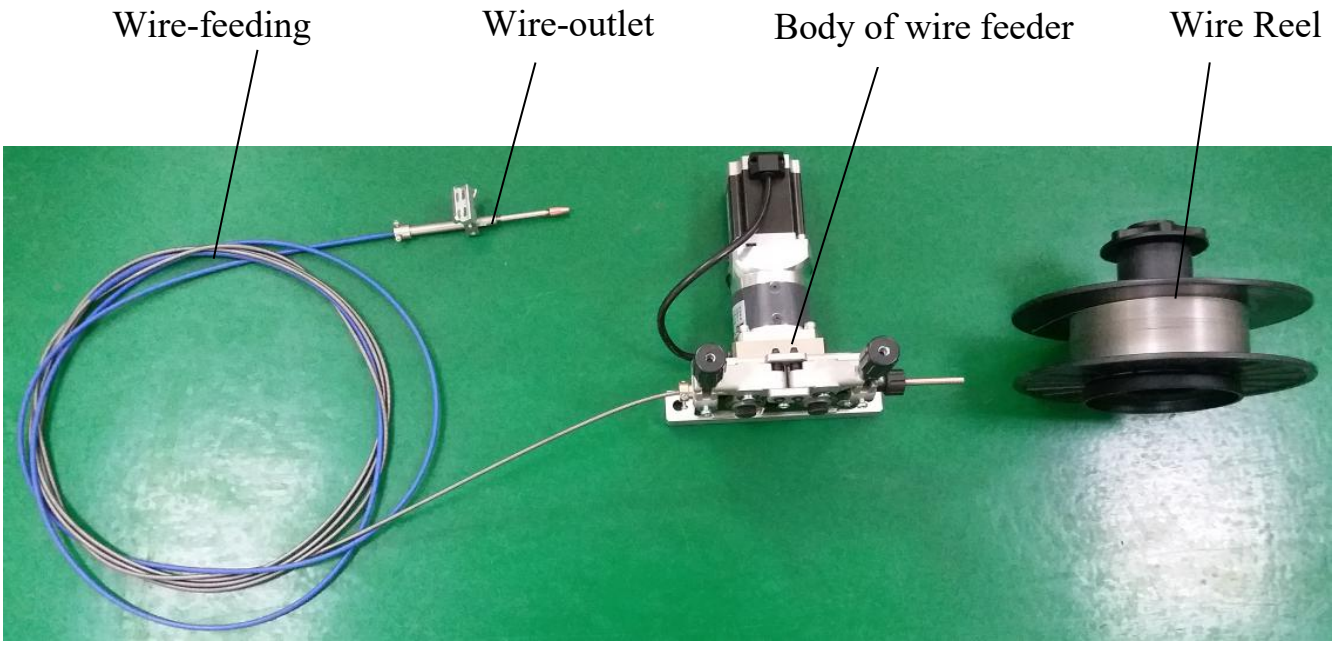
1. A set of metric hexagon socket handles;
2. A large Phillips screwdriver;
3. A pair of protective gloves.

Installation personnel preparation

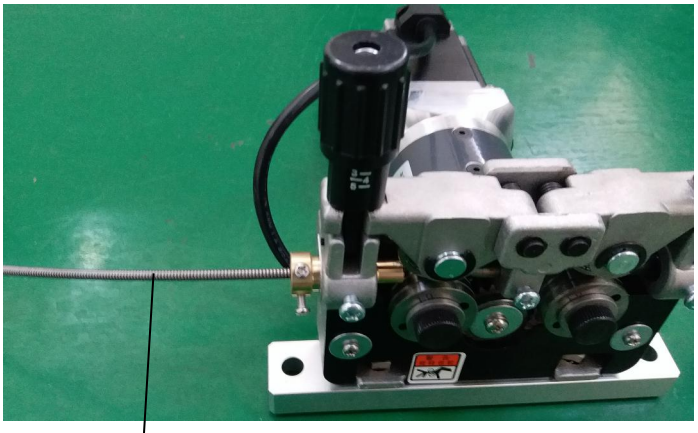
1. Read this manual carefully;
2. Put on protective gloves.

7.3.3 Wire Feeder Connection

Step 1: Connect the main body of the wire feeder and the wire outlet with a wire feeding tube, and install a suitable wire reel, as shown in the figure below.



With Protective Film

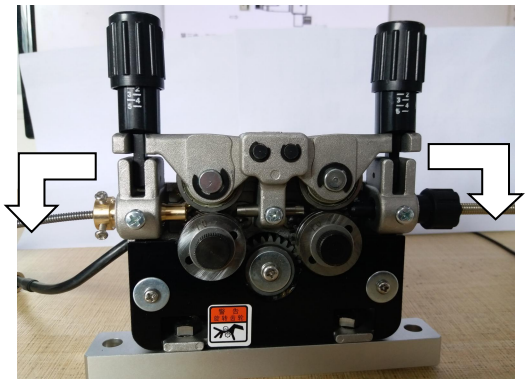


Without Protective Film

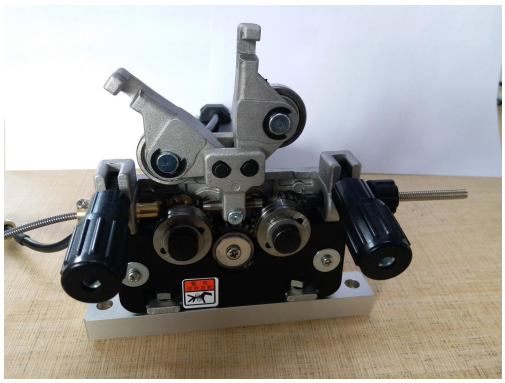
Note:
1. Connect one end of the wire feeding tube with the protective film to the wire outlet, and the other end without the protective film to the wire feeder.
2. The welding wire must be used smoothly and without knotting.
3. Please keeps the bending radius of the wire feeding tube not less than 30cm.

Step 2: Install the appropriate wire feeding wheel according to the wire diameter.

Preload Pressure



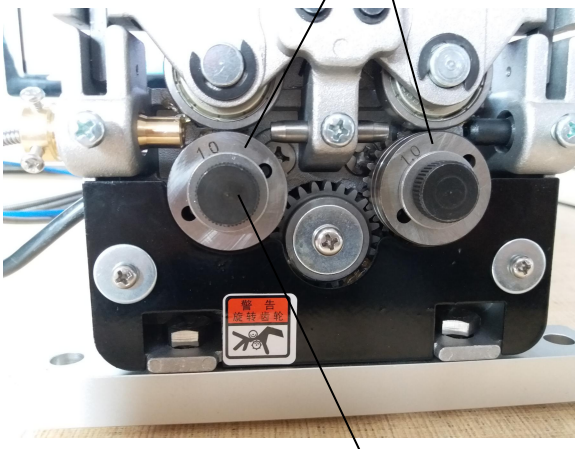
Before the bar release



After the bar release

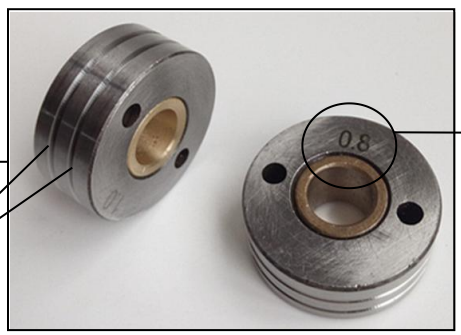
Steps for installing the wire feed wheel:
1. First loosen the two adjustable Preload Pressure Bar, as shown above
2. Then loosen the two screws and remove the wire feed wheel;
3. Replace the appropriate wire feeding wheel, place the side of the wire feeding slot corresponding to the

Wire-feeding Wheel



Screw

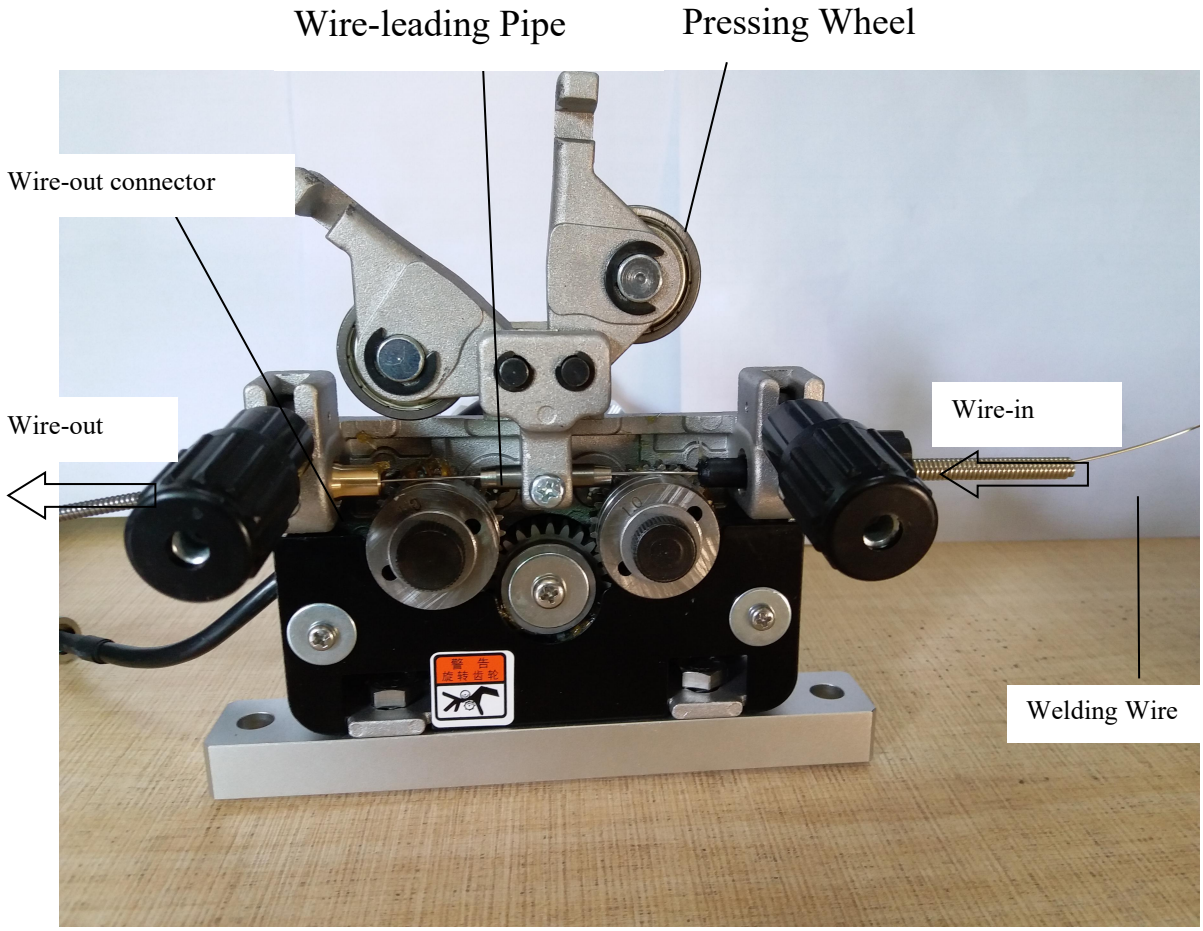
Wire-feeding Wheel



Specification Model

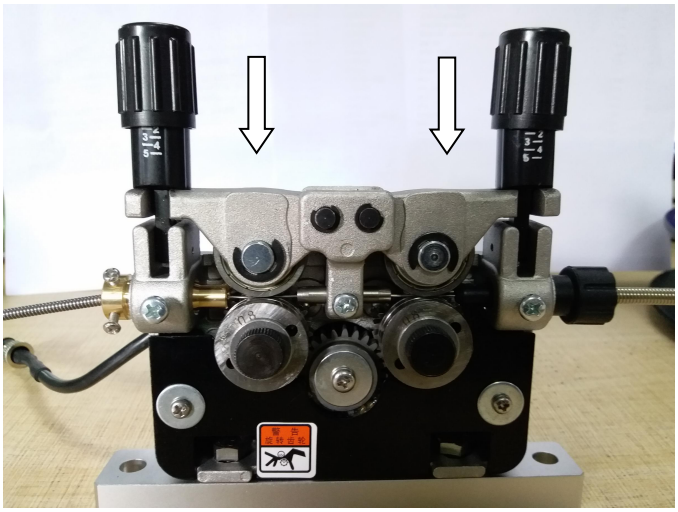
Wire-feeding

Step 3: Thread the wire and connect the wire reel.



Threading operation steps:

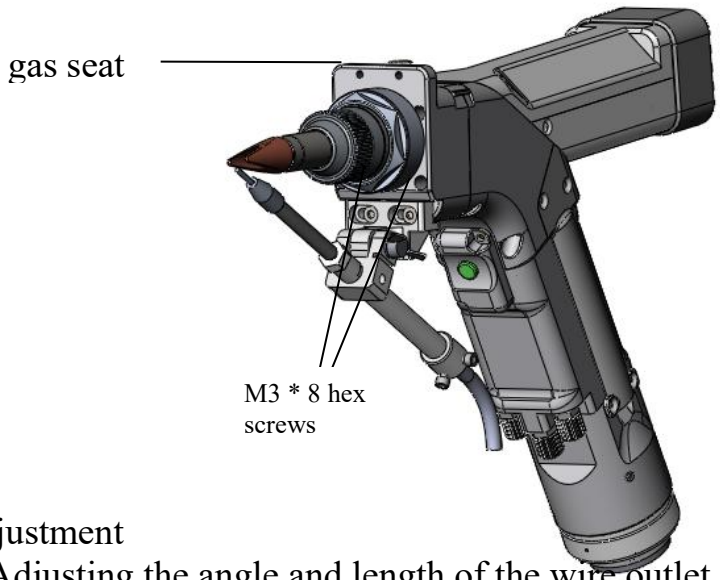
1. First loosen the two adjustable pre-load= pressure bars, and then pop open the wire= roller, as shown above.
2. Withdraw the welding wire from the= wire reel, insert the welding wire from the= wire tube according to the direction= shown in the figure, pass through the= middle guide wire tube, and exit from the= wire tube joint direction.
3. Press the welding wire into the wire= feeding slot of the wire feeding wheel,= press the wire pressing wheel, lock the=pre-load pressure bars, and press the= welding wire tightly, as shown on the=right.
4. Connect the power plug and turn on the= power switch to adjust the wire feed= speed to the fastest. Click the wire feed= switch on the control panel to make the= welding wire reach the wire outlet as soon= as possible. Stop the wire feeding when= the welding wire passes through the=nozzle.



7.3.4 Connect wire outlet to handheld welding head

1，First, use two M3 * 8 hex screws to connect the wire outlet module to the gas seat of the handheld welding without locking;

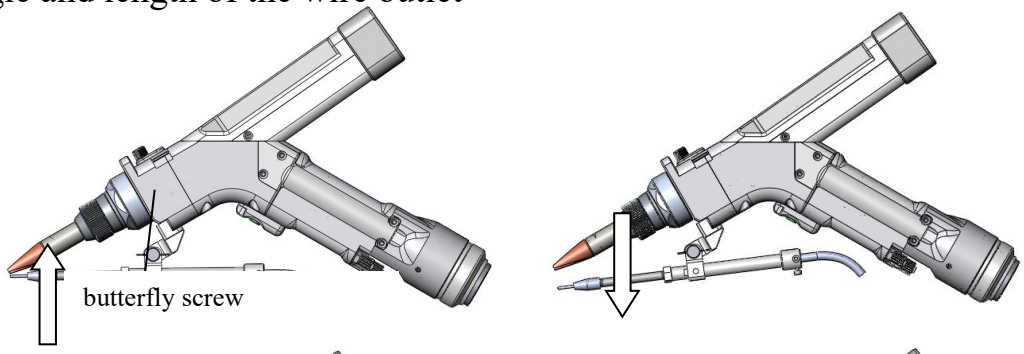
2，Adjust the wire nozzle assembly left and right so that the welding wire is in the red light center, and then tighten the screw.



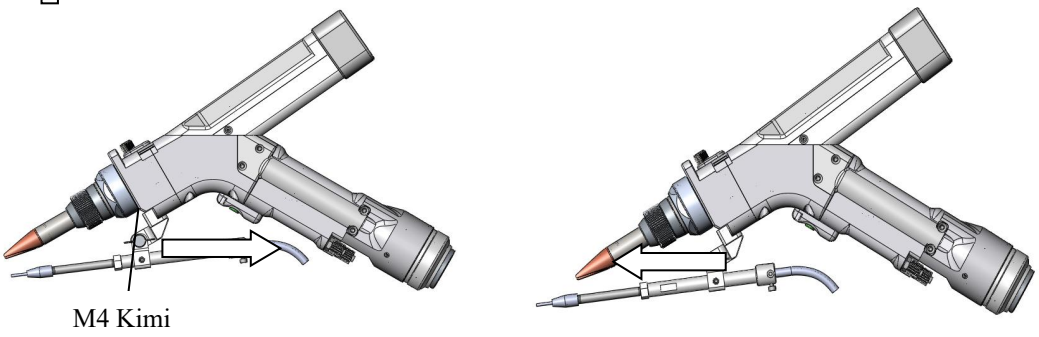
7.4 Adjustment

7.4.1 Adjusting the angle and length of the wire outlet

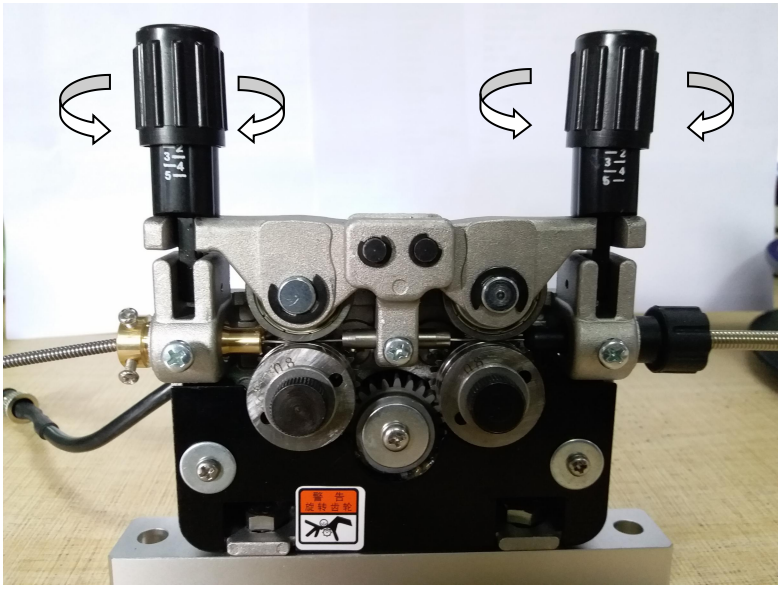
Angle adjustment:
Loosen the butterfly screw, you can adjust the angle of the wire mouth up and down, as shown on the right.



Length adjustment:
Release M4 Kimi, you can Adjust the length of the wire outlet back and forth, as shown on the right.

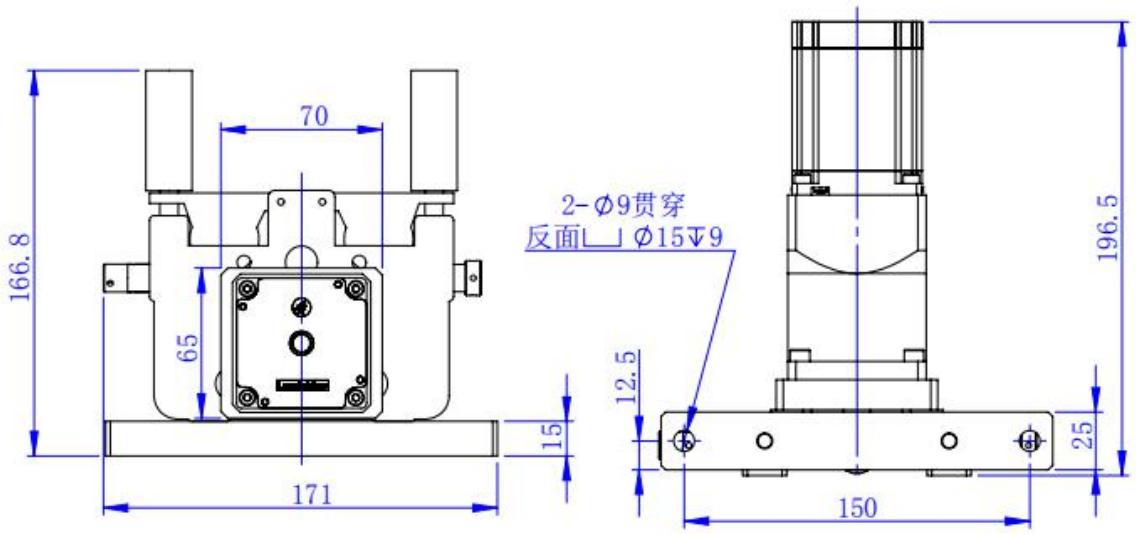


7.4.2 Pressing force adjustment

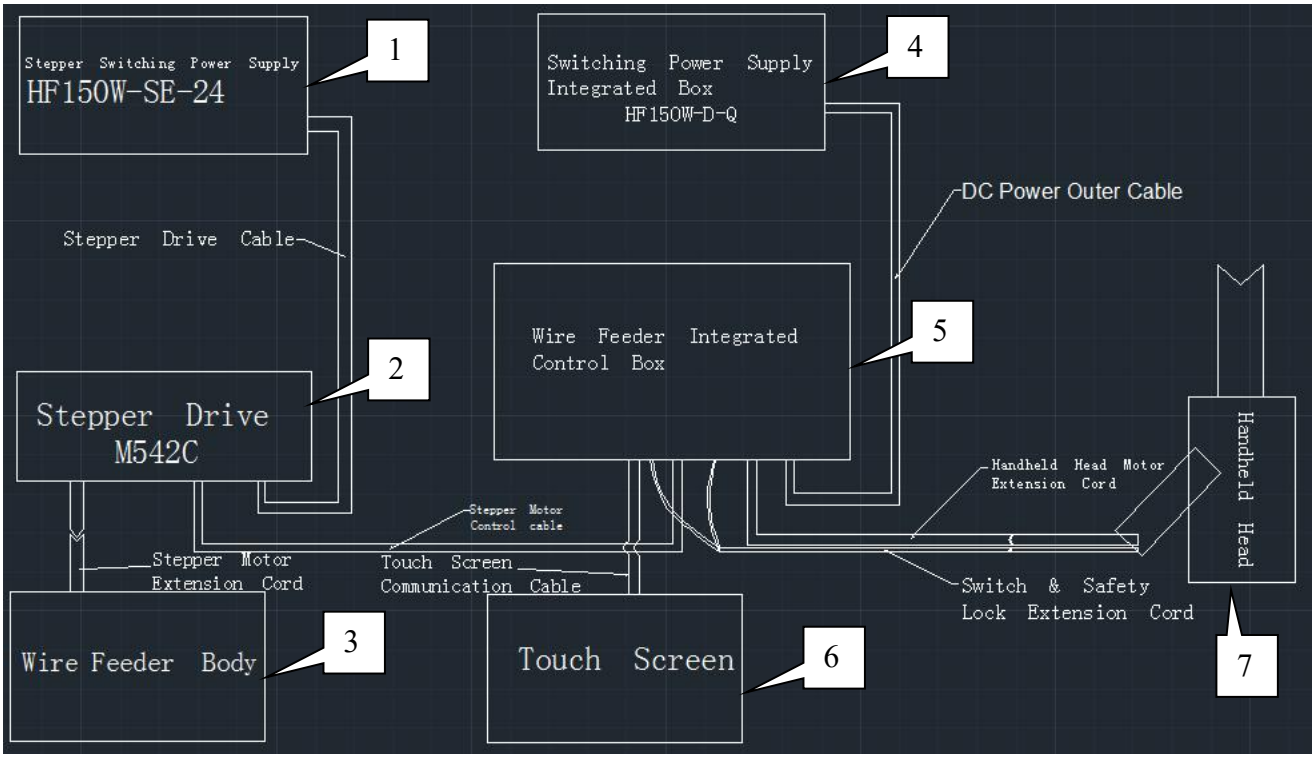


Adjustment method:
According to the tightness of the wire feeding, turn the two adjustable pre-tightening pressure lever rotation sleeves left and right until the clamping force is appropriate.

7.5 Appearance and installation dimensions

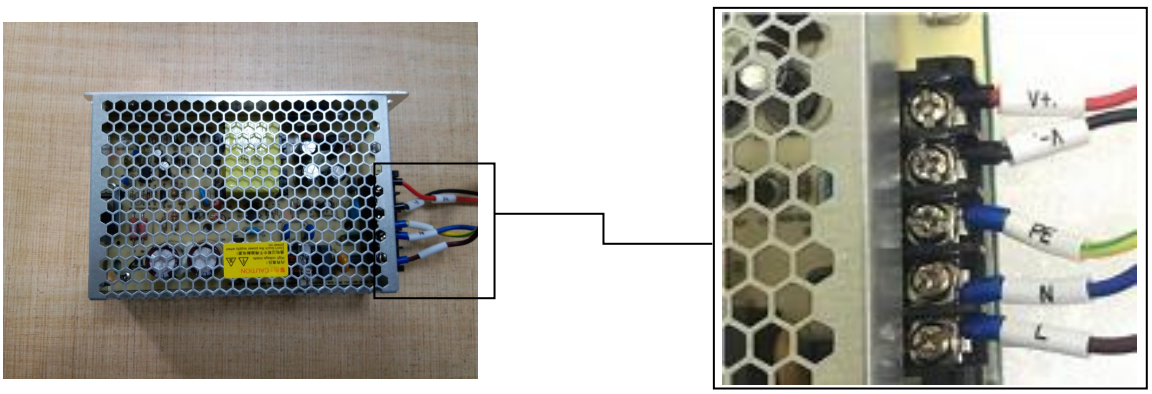


7.6 Wire feeder electrical wiring diagram

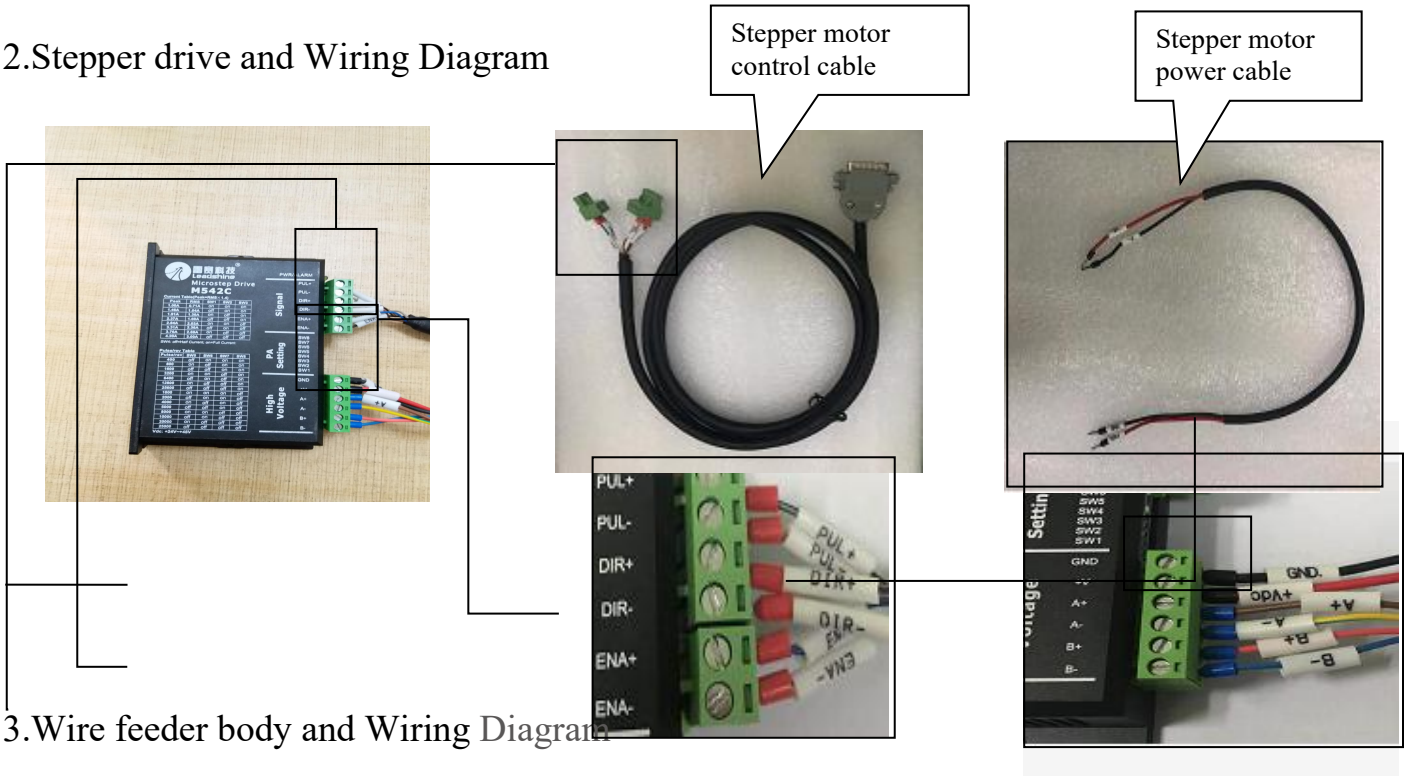


Wiring pictures show:

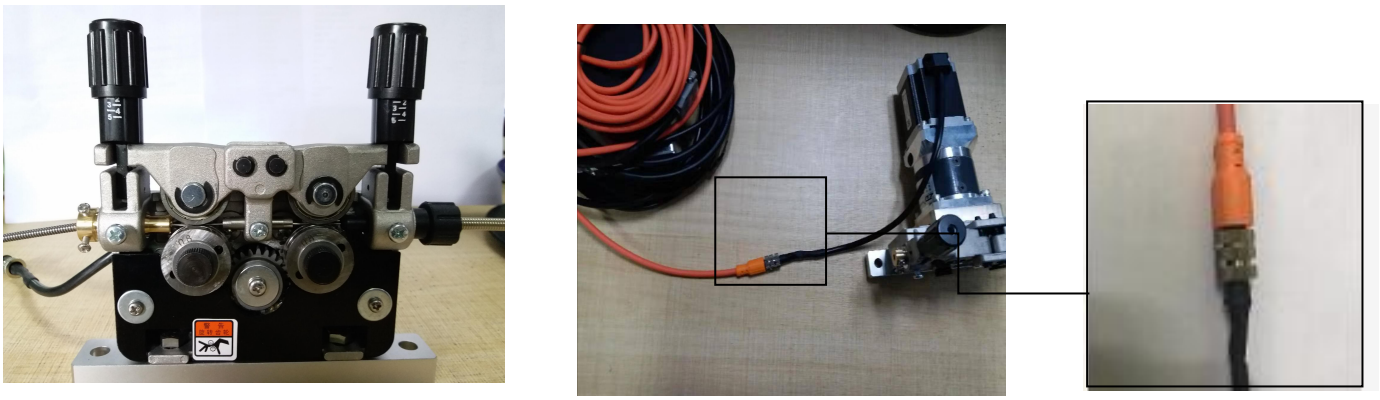
1. Stepper Switching Power Supply and Wiring Diagram



2.Stepper drive and Wiring Diagram

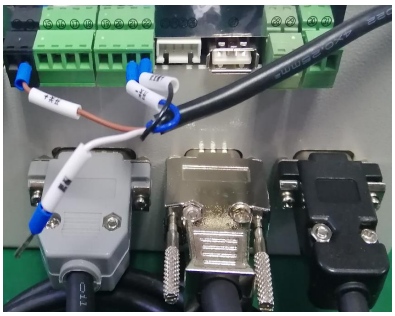


3.Wire feeder body and Wiring Diagram



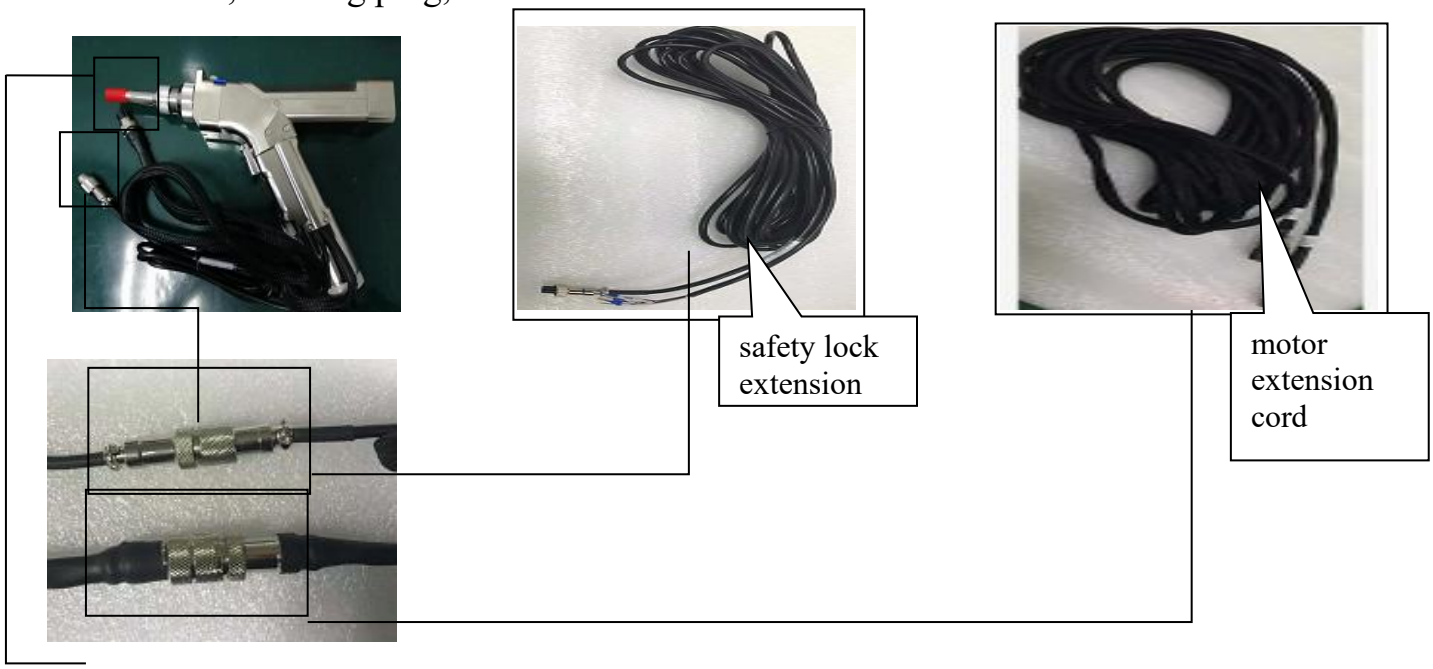
4. Switching power supply Integrated box, external wiring harness and wiring diagram

5. Wire feeder integrated control box and plug wiring diagram


6. Touch screen, communication cable and control box plug wiring diagram

7. Handheld gun and switch & safety lock extension cord, motor extension cord, docking plug, etc.

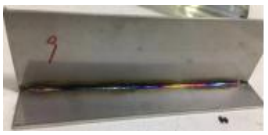


8. Reference table for welding process of handheld welding head

WSX ND18 handheld laser welding head Process testing

Test environment: room temperature 30 ℃, ND18 handheld laser welding head, and IPG-700 laser;
Test conditions: the laser comes with air cooling, the cooling water flow of the welding head is 1.2L / min, and the water temperature is 28 ° C;

Material	Laser Mode CW/QCW	Thickness（mm）	Welding Process					Picture	Welding Performance
			Power（0-10V）	Wobble Speed（mm/s）	Wobble Diameter（mm）	Welding Speed（estimated）（mm/s）	Protective gas pressure（bar）		
stainless steel	CW	0.5	5	300	1	20	0.3		Butt welding of 0.5mm stainless. The welding power will generate heat at 350Watt, because the thin plate will cause deformation of the plate, but the welding effect is good.
		1	9	300	1.5	20	0.3		Butt welding of 1mm stainless steel. The welding power will still generate heat at a welding power of more than 600 watts, because the laser penetrating power is strong, the 1mm plate has been welded through without deformation, and the welding effect is good.
		1.2	9	300	1.5	18	0.3		Butt welding.The thickness of 1.2mm stainless steel and 1.0 stainless steel butt welding are the same, and the effect is the same.
		1.5	10	300	1.5	15	0.3		1. Butt welding of 1.5 stainless steel can still penetrate through, but the welding temperature is too high at 700 watt. The surface of the material is a bit black, but the welding effect is very good.

		2	10	300	1.5	10	0.3		Butt welding of 2mm stainless steel. The welding penetration depth has just reached 2mm at a power of 700 watts. Due to the slow speed, the handheld control speed is not as fast as stable, which results in a welding effect that does not reach the fast welding speed.
		0.5	5	300	1	20	0.3		Fillet welding of 0.5mm stainless steel. The penetration depth is better when the power is 350 watts, the surface is welded white, welded through, and no deformation.
		0.9	8	300	1	20	0.3		Fillet welding of 0.9mm stainless steel fillet welding, the power is more than 500 watts when welding, the power is greater, the temperature of the smoke is too high, the surface weld is a little too dark, the effect is good.
		1.2	8	300	1. 5	15	0.3		Fillet welding performance of 1.2 is the same as the above 0.9mm.
		1.5	10	300	1. 5	10	0.3		Fillet welding of 1.5mm stainless steel, power of 700 watts, good penetration, no distortion.
		2	10	300	1. 5	10	0.3		Fillet welding of 2mm stainless steel. With a power of 700 watts. Welding penetration failure due to insufficient heat input, surface welding effect is very good.

		0.5	7	300	1	20	0.3		0.5 / 0.5 stainless steel penetration welding, the power is more than 400 watts. The back of the welding has been completely penetrated, and the thin material causes greater deformation.
		1	10	300	1. 5	8	0.3		1mm / 1mm stainless steel penetration welding, failed to weld two pieces of 1mm stainless steel, the effect is very good.
Carbon steel	CW	1	7	300	1.5	20	0.3		Butt welding of 1mm carbon steel. The welding power is very effective under the condition of more than 400 watts, and the surface can blow white.。
		1.5	9	300	1.5	20	0.3		Butt welding of 1.5mm carbon steel. With a welding power of 630 watts. The penetration is better. The back has been welded through, but the surface is black.
		2	10	300	1.5	10	0.3		Under the full power condition, welding 2mm carbon steel failed to weld through, there was no deformation, and the surface was black. Works well.
		0.8	8	300	1	20	0.3		0.8mm carbon steel fillet welding, power is 640 watts, no deformation, no blackening, penetration welding.
		1.5	10	300	1	15	0.3		1.5mm carbon steel fillet welding. The welding effect is good with full power, but the surface is black and there is no penetration.

		2	10	300	1. 5	10	0.3		2mm carbon steel fillet welding, because the plate is too thick to pass through.
		0.5	10	300	1. 5	10	0.3		With 0.5 and 0.5 overlap welding, it can be fully penetrated when full power welding, and the effect is good
		1.5	10	300	1. 5	10	0.3		1.5 and 1.5 overlap welding, the welding effect can be, but can not be penetrated, the surface is black.
Remarks: This trial is a 700W CW laser. In the continuous mode, the bead is bright and smooth, the penetration is strong, the joint overlap is low, and there is fewer spatters during welding. The power control is more accurate, and the power distribution of the light spot is more uniform. The welding process is more stable, and the welding depth of the IPG laser is greater, and the welding effect is better. Moreover, the laser is an air-cooled structure, which is more worry-free, labor-saving and convenient to install for handheld welding.									

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