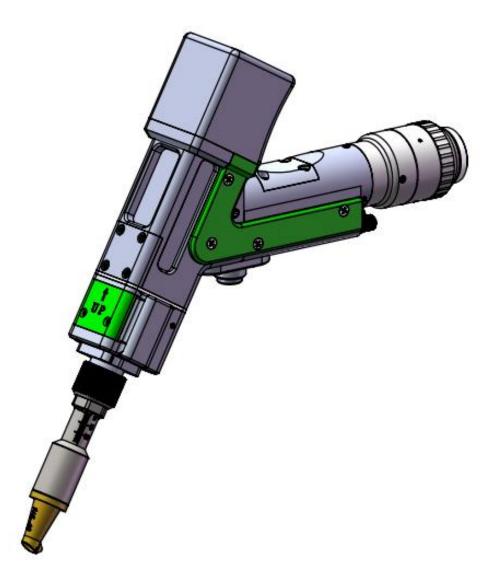
FWH20-S10A Intelligent Single Pendulum Handheld Welding Head (Three in One)



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#### Introduction

Thanks for choosing our products!

To ensure you an overall understanding about this product, the manual has made a detailed introduction on features, structure, technical parameters, instructions and maintenance of this product. Before using the product, please read the manual carefully to help you use it better.

For the constant renovation of function for the product, I want to apologize for that there may be differences between the product and the manual. If you have any question when using it, please call us in time. We will help you as possible as we can.

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#### Chapter 1 Overview

#### 1.1 Product Parameter

Name	Intelligent single pendulum handheld
	welding head
Model	FWH20-S10A
Fiber interface	QBH
Wavelength range	1070±20nm
Rated power	≤3000W
Collimating focal length	50mm
Focus length	150mm
Focus adjustment range	-10mm~+10mm
Spot adjustment range	0~5mm
Auxiliary gas pressure	≤1Mpa
Weight	0.72Kg

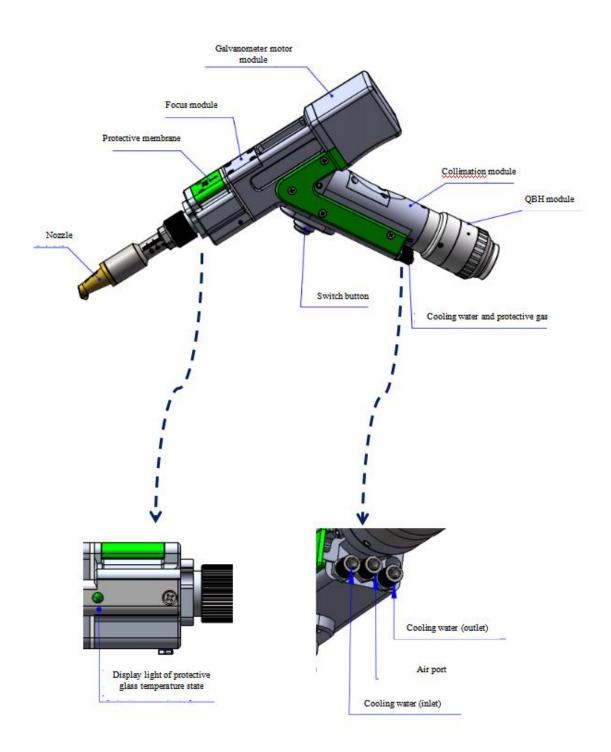
Cautions

To ensure personal safety, please wear special fiber laser protective glass before operation.

Please keep the product clean and stop the entry into the cavity of cooling liquid, condensate water and other objects to, otherwise, the function may be impacted.

#### **Chapter 2 Structure and Feature**

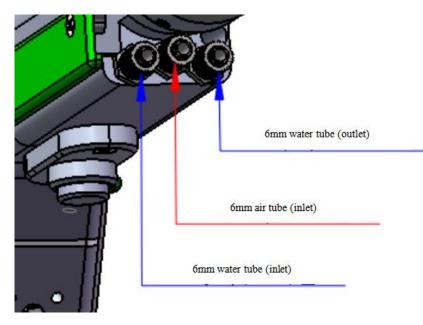
#### 2.1 Product Structure



Chapter 3 Product Assembly

### 3.1 Tube connection

Cooling pipe and auxiliary gas pipe are connected.



Connection between cooling water and protective gas as well as the operating requirements

Attention: commonly used gas: compressed air ( It's necessary to filter oil and water)

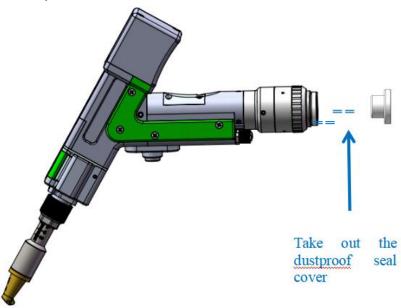
Compressed used gas: Argon, Nitrogen and compressed air ( It's necessary to filter oil and water)

3.1.1 Cooling water: connected with 6mm gas pipe. When the light path in the cavity generates heat, the internal waterway will remove excess heat to ensure the welding performance. Cooling water pipe requires series and connection with the inlet and outlet pipes.

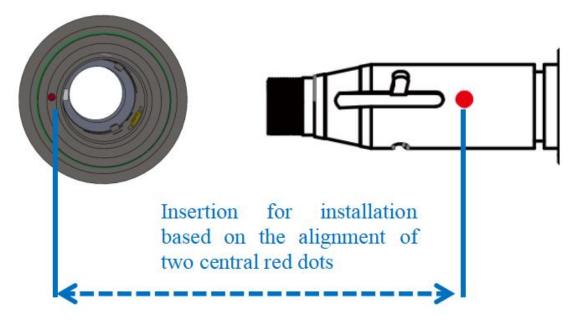
3.1.2 Protective gas: connected with 6mm gas pipe. It is used for the protection of welding gas with input pressure less than 1Mpa.

3.2 Fiber input installation

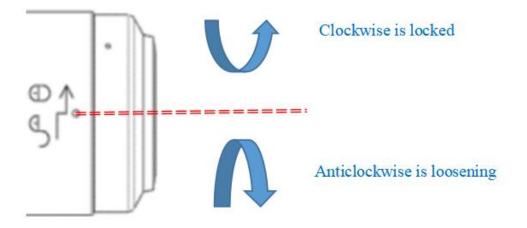
Put QBH horizontally and take out the dust seal cover



Align the red point on the optical fiber head with that in QBH, and insert the optical fiber head into QBH slowly.

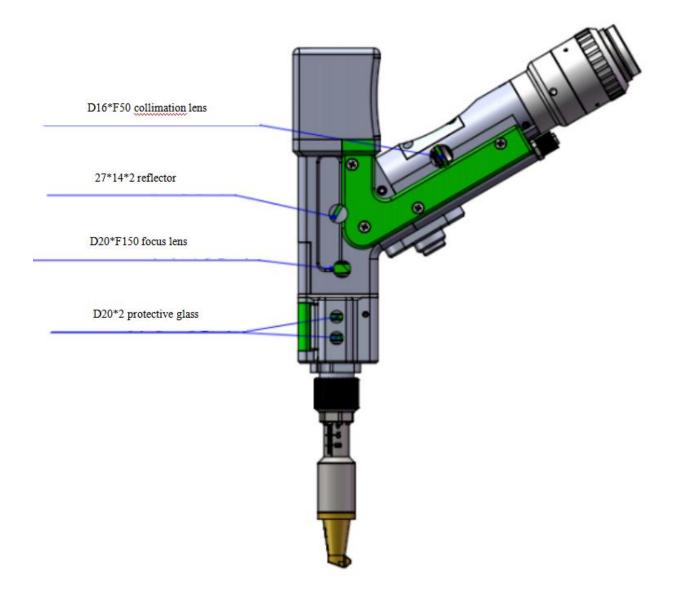


Tighten QHB to the locked state: rotate the QHB clockwise to the limit position with a "click", then lift the rotary knob up and rotate the knob clockwise again until it presses down on the optical fiber head.



### **Chapter 4 Maintain**

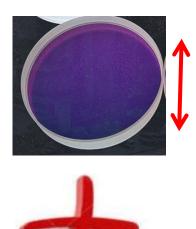
Replaceable components should be equipped in the dust-free plant. In principle, the modules of the optical lens can't be assembled or disassembled except the drawer of protective lens. If you have to check the collimating lens, focusing lens and galvanometer lens, please disassemble them in the clean environment.

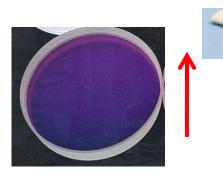


Operating method and cautions:

Tool: dust-free gloves or dust-free fingertips, dust-free cotton swab, isopropyl alcohol and canned dry pure compressed air.

Spray the isopropyl alcohol onto the dust-free cotton swab, make the lens face your eyes, gently pinch the side edge of the lens with the thumb and forefinger of your left hand, wipe the front and back of the lens in one direction from left to right or from top to bottom with dust-free cotton swab held in the right hand ( remember not to wipe the lens back and forth to avoid the second contamination), and blow the surface of the lens with dry pure compressed air to ensure there is no dust on the lens.







Tool: 2mm inner hexagon wrench, special fixture wrench, clean cotton swab and alcohol.

The disassembly of lens should be operated with hand wearing dust-free gloves or fingertips in clean environment.

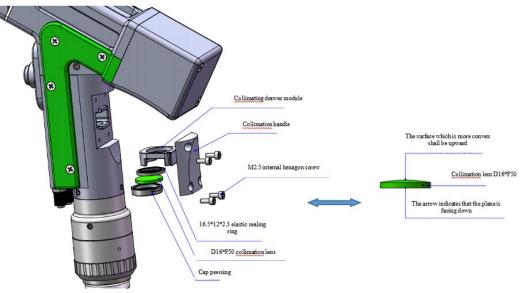
Steps:

Step 1: remove all the dust on the surface of laser head

Step 2: loosen the 3-M4\*6 set screw in the figure with a 2mm inner hexagon wrench.

Step 3: take out QBH module and seal the port with masking tape to stop the entry of dust into the cavity.

Step 4: use the special fixture for the disassembly of lens cone, rotate counterclockwise to loosen the locking spring ring and slowly take out the welding head download. Seal the port with masking tape to stop the entry into the cavity of dust. Change the collimating lens. (Pay attention to the position and thickness of washer because it will impact the light path. After disassembly, take a record of the thickness and size of the washer.)



Tool: 2mm inner hexagon wrench, clean cotton swab, alcohol and masking tape The assembly and disassembly of lens should be operated with hands wearing dust-free gloves or fingertips in clean environment.

Steps

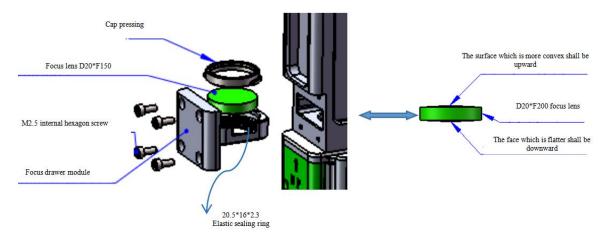
Step 1: loosen M4 screw with a 2mm inner hexagon wrench.

Step 2: pull out of the focusing module horizontally

Step 3: seal the port with masking tape to stop dust from entering the cavity to cause contamination.

Step 4: the cover is gently pressed down and rotated 90°. Align the two convex places with the left and right openings. Take out the cover upward and the protective lens can be changed.

(Note: install lens in concave and convex direction.)



The assembly and disassembly of lens should be operated with hands wearing dust-free gloves or fingertips in clean environment.

Steps:

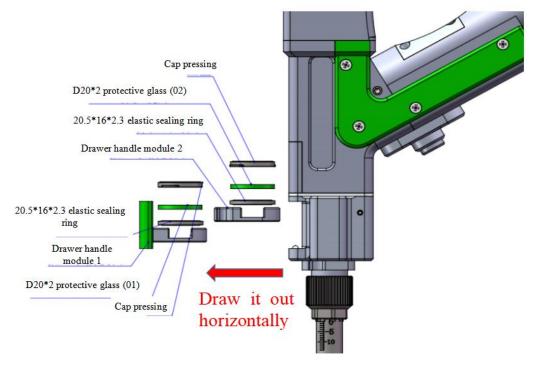
Change protective glass 01:

Step 1: hold both sides of the green drawer handle module 1 in hand and pull out the protective lens horizontally. Take care of the dust, seal the port exposed on cavity with masking tape to stop the entry of dust into the cavity and replace the protective glass. Step 2: the cover is gently pressed down and rotated 90°. Loosen it when the two sides align with the two notches. Take out the cover and change the protective lens.

Change protective glass 02:

Step 1: take out the green drawer handle module 1 and pull out the protective lens horizontally. Take care of the dust, seal the port exposed on cavity with masking tape to stop the entry of dust into the cavity and replace the protective glass.

Step 2: the cover is gently pressed down and rotated 90°. Loosen it when the two sides align with the two notches. Take out the cover and change the protective lens.



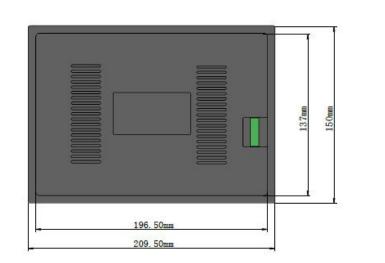
### **Chapter 5 Welding System**

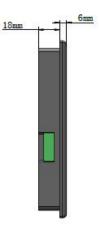
### **Product dimension figure**

Dimension of touch screen

### mm Size: (209.5\*150\*24)mm

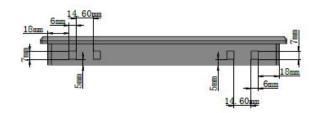
Dimension figure of touch screen:





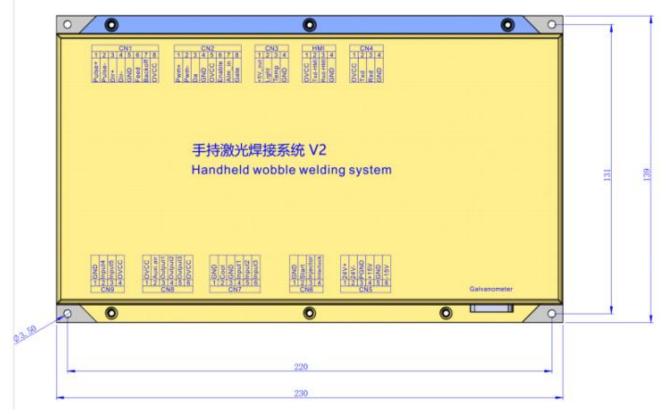
Rear View

Left View



Top View

5.1.2 Mainboard dimension figure



	8

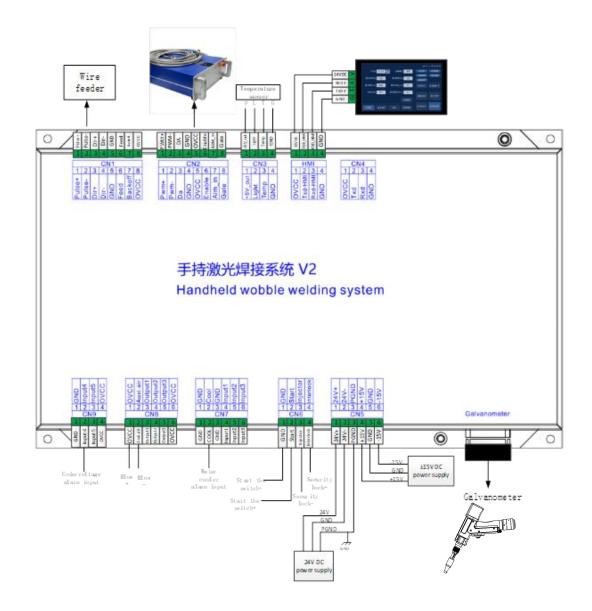
Chapter 6 Supplies

### 6.1 Electrical material list

	List				
Serial number	Name	Picture	Number	Remark	
1	Intelligent handheld welding head	00	1PCS		
2	24V power box		1PCS		
3	15V power box		1PCS		
4	Earth clamp assembly	2	1PCS		
5	Display screen		1PCS		
6	Touch screen 4-core cable-1.5m- black	0	1PCS		
7	Bluetooth antenna		1PCS		
8	V2 welding system control		1PCS		

### 6.2 System wiring

The following is the wiring diagram of the whole system. System can refer to this diagram. For the detailed interface definition, please refer to the relevant chapter.





#### Important:

Do not connect the pins reserved on the mainboard.

#### 6.3 CN5 power supply interface

Power supply interface is a 6-pin green terminal and a power interface provided for mainboard and galvanometer by external part. The voltage is DC 24V and DC  $\pm 15$ . Chart 6.3.1 shows the definition of CN5 power supply interface.

Chart 0.5.1			
Pin	Signal	Definition	Description
1	24V+	Power input	+ 24 V external power input. The power output current is more than 3A.
2	24V-	GND	—
3	PGND	External shield ground	Generally connected to the ground or case
4	+15V	Power input	+ 15 V external power input. The power output current is more than 3A.
5	GND	GND	—
6	-15V	Power input	- 15 V external power input. The power output current is more than 3A.

Chart 6.3.1

#### 6.4 CN1 wire feeder interface

CN1 wire feeder is a 8-pin green terminal supporting motor wire feeding and IO wire feeding. The definition of wire feeder is shown in Chart 6.4.1.

Pin	Signal	Definition	Description
1	Pulse+	Motor wire feeding pulse+ interface	PUL+ Used during motor wire feeding, connected with driver PUL+
2	Pulse-	Motor wire feeding pulse- interface	Used during motor wire feeding, connected with driver PUL-
3	DIR+	Motor wire feeding Dir+ interface	Dir+Used during motor wire feeding, connected with driver Dir+
4	DIR-	Motor wire feeding Dir- interface	Dir-Used during motor wire feeding, connected with driver Dir-
5	GND	GND	—
6	Feed	Wire feeding control interface	Used for automatic wire feeding by IO controlled wire feeder
7	Backoff	Wire drawing control interface	Used for automatic wire drawing by IO controlled wire feeder
8	OVCC	+24V power output	Power supply can output 500mA at most

Chart 6.4.1

### 6.5 CN2 laser interface

Laser interface is a 8-pin green terminal. Chart 6.5.1 shows the definition of laser interface.

Pin	Signal	Definition	Description
1	PWM+	Modulating signal+	Duty cycle from1% to 99% is adjustable, 24V level
2	PWM-	Modulating signal-	Duty cycle from1% to 99% is adjustable, 24V level
3	DA	Analog voltage output	0-10 V analog voltage is used for adjustment of laser peak power
4	GND	GND	Generally connected with DA- and Enable terminals
5	OVCC	+24V power output	power supply, maximum output 500mA
6	Enable	Laser enable signal	24V level, high level is effective
7	Alarm	Laser fault alarm input	
8	GATE	Red light indicator signal	Part of laser needs this signal and this function is reserved before delivery.

#### Chart 6.5.1

#### 6.6 CN3 temperature sensor interface

CN3 temperature sensor interface is a 4-pin green terminal. Users can directly insert the connecting wire with terminal into this interface. Chart 6.6.1 shows the definition of temperature sensor interface.

Pin	Signal	Definition	Description
1	+5V out	Sensor P interface	+5V power supply, maximum output
	TOV_OUT	Sensor r interrace	500mA
2	Light	Sensor L interface	_
3	Temp	Sensor T interface	—
4	GND	Sensor G interface	—

Chart 6.6.1

#### 6.7 HMI touch screen interface

HMI interface is a 4-pin green terminal through which mainboard supplies power to HMI and communicates with it. Chart 6.7.1 shows the definition of HMI interface.

Chart	6.7.1
-------	-------

Pin	Signal	Definition	Description
1	OVCC	+24V power supply, 500mA	Power supply by panel
2	TXD_HMI	HMI sending end	Serial communication TXD signal
3	RXD_HMI	HMI receiving end	Serial communication RXD signal
4	GND	GND	_

### 6.8 CN4 reserved serial port interface

CN4 reserved serial port interface is a 4-pin green terminal without wiring. Chart 6.8.1 shows the definition of CN4 interface.

	·····			
Pin	Signal	Definition	Description	
1	OVCC	+24V power supply, 500mA	Power supply	
2	TXD	TXD signal	Serial communication TXD signal	
3	RXD	RXD signal	Serial communication RXD signal	
4	GND	GND	—	

表 6.8.1Chart 6.8.1

### 6.9 CN6 external start and interlock interface

CN6 interface is a 4-pin green terminal, the definition of which is shown in Chart 6.9.1.

Chart 6.9.1			
Pin	Signal	Definition	Description
1	GND	GND	Generally connected with the Start switch- on
	GND		the welding head
0	0	External start	Generally connected with the Start switch+ on
2	Start	switch input	the welding head
		Injector signal input	The pin must contacted to the injector. Before
3	Injector		welding, clamp the safety clamp to the metal
			material.
		Interlock signal input	The pin must be contacted to the nozzle of the
4	Interlock		handheld head. When welding, the nozzle
			should be in contact with the metal material.

### 6.10 CN7 general input interface 1

CN7 接口是一个 6PIN 绿色端子, NPN 类型,表 6.10.1 为 CN7 接口定义。

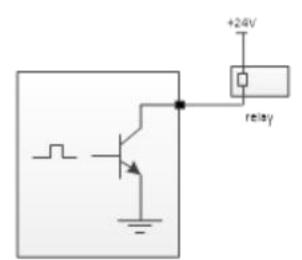
CN7 interface is a 6-pin green terminal of NPN type. Chart 6.10.1 shows the definition of CN7 interface.

Chart	6.	1	0.	1
Chart	$\mathbf{v}$		$\cdot$	

Pin	Signal	Definition	Description
1	GND	GND	—
2	Cool	Water chiller alarm	
		input	
3	GND	GND	—
4	Input1	Reserve	—
5	Input2	Reserve	—
6	Input3	Reserve	—

### 6.11 CN8 general output interface

CN8 is a 6-pin green terminal adopting OC output to drive relax directly with the maximum current adding up to 500mA. Chart 6.11.1 shows the wiring diagram.



Wiring diagram of output port relax

Pin	Signal	Definition	Description
1	OVCC	+24V power output	Power supply can output at most 500mA.
2	Auxi.air	Protective gas	For the blowing control of protective gas
3	Output1	Green light	—
4	Output2	Red light	—
5	Output3	Buzzer	—
6	OVCC	+24V power output	Power supply can output at most 500mA.

### Chart 6.11.1

### 6.12 CN9 通用输入接口 2 CN2 general input interface 2

CN9 interface is a 4-pin green terminal. Chart 6.12.1 shows the definition of CN9 interface.

Pin	Signal	Definition	Description
1	GND	GND	_
2	Input4	Low pressure input	
3	Input5	Reserve	—
4	OVCC	+24V power output	Power supply can output at most 500mA.

#### 表 6.12.1 Chart 6.12.1

#### 6.13 Galvanometer interface

The system provides two DB9 galvanometer interfaces, one for male and the other for female.

### **Chapter 7 HMI Operating Instruction**

#### 7.1 HMI function introduction

Handheld laser welding control system operating panel ("HMI" for short) adopts a 7-inch configuration TFT touch screen with beautiful interface and convenient operation. It can set laser related parameters. On the main interface, the input and output IO status, alarm information and motion state can be displayed in real time. HMI main interface is shown in the figure below:

	2022-1-13 09:30:00 🔻
Process library CS 3.0 💾 Welding mode Countinue	Lock Blowing alm
Laser power(W) 1000 Wobble freq(Hz) 90	Cool sys alm Laser alm Temp 25 °C Drive Alm
Laser freq(Hz) 2000 Wobble length(mm) 2.5	Blowing Feeder
Laser duty(%) 100 Feeding speed(mm/s) 6.0 Spot Welding	Wobble disable Laser disable
Main Feeding paras Diagnose System paras	Auto feeding off Lock on

#### HMI 主界面 HMI main interface

Bluetooth logo: to show whether this device is connected with the mobile terminal through bluetooth.

Swing off: to set galvanometer motor swing on or off

Safety lock: to start or close the safety lock. When the lock is started, during the welding, the laser will stop when the welding head does not touch the welding material.

Automatic wire feeding off: to control whether to start automatic wire feeding during welding. It will start automatic wire feeding only when laser emits light.

Emit laser: to start emitting laser or stopping emitting laser

Alarm status area: when alarm signal enables, protective gas low pressure, cool

water flow alarm, laser alarm and temperature alarm status will be displayed in real time. When the safety lock is started, its status will be displayed in real time. When the alarm signal is not triggered, the alarm icon is blue; when it is triggered, the alarm icon is blue and red alternately.

Homepage/ Wire feeding parameter/ Diagnosis/ System parameter: to display the type of parameter on the current page. Click an icon to enter the switch of the corresponding parameter page. For instance, if the icon on the homepage turns on, the parameter in the current display area is the parameter of the homepage. When it needs to switch to wire feeding parameter, just click the position of wire feeding, and the icon of this parameter will turn on.

Blowing manually/ Wire feeder: for manual blowing test and the wire feeding and wire withdrawing tests of wire feeder. For example, long press manual blowing key, and it will blow all the time; loosen this key, and it ill stop blowing. For manual wire feeding and wire withdrawing, long press the corresponding small triangle area.

#### **7.2HMI operation introduction**

#### **7.2.1**Parameter setting:

Parameter setting includes: Home page, System parameter, Wire feeding parameter and Diagnosis page

Home page: used to set parameters related to laser, swing and process library when welding.

Process library: click the white box area in process library. The set process library parameter can be selected.

Welding model: to set welding mode, continuous and pulse modes.

Power: to set the peak power of laser when welding

PWM frequency: used to set the frequency of laser PWM modulating signal

Duty cycle: used to set duty cycle of PWM signal with the range from 1% to 100%

Swing frequency: used to set motor swing frequency

Swing length: used to set motor swing length

Wire feeding parameter: used to set system parameter, including wire feeding, slow rise and fall parameters

Light emission time: the time that processing lasts when single point welding mode is set.

**7.2.2**Point welding mode: click to enter the single point light emission mode

System parameter: used to set the basic parameters of device. Generally, the setting is performed by manufacturers. Before entering the page, users need to enter password.

System password: 666888

Pulse on time: the time to start light emission in pulse mode

Pulse off time: the time to stop light emission in pulse mode

Slow rise time: used to set the time that the laser analog voltage rises from initial power to the maximum power when it is enabled.

Slow fall time: used to set the time that laser analog voltage falls from the maximum power to initial power when it is stopped.

Light on power: used to set the initial power of laser, the percentage of welding power

Light on asymptotic time: the time to control the light on power of laser to rise slowly to the set power

Light off power: used to set the light off power of laser, the percentage of welding power

Light off asymptotic time: the time to control the light off power to fall slowly Language: to switch language

Advance gas on delay: when starting processing, users can set gas activation delay. When the external start button is pressed, after blowing delay for some time, the laser can emit light.

Gas off delay: when stopping processing, users can set gas closure delay. When processing is stopped, stop the laser first. After delay for some time, stop gas blowing.

Automatic swing: used to set whether the galvanometer swings automatically.

When automatic swing function is enabled and the safety lock is connected, But if the safety lock is not connected, make the motor not carry out automatic swing after delay for some time.

Device parameter: used to switch to the device parameter page. It requires password.

Authorization: for the authorization management of mainboard

Device number: used to set the bluetooth number of control system. When users have multiple devices, they can define the number for management.

Offset in middle: for the setting of the offset in middle of red light.

**7.2.3**Wire feeding parameter: used to set parameters related to wire feeding, wire supplement and withdrawal.

Wire withdrawal speed: the wire withdrawal speed of motor when the start button is loosened.

Wire withdrawal time: the time for motor wire withdrawal

Wire supplement speed: the speed of motor wire supplement

Wire supplement time: the time for motor wire supplement

Wire feeding delay time: wire feeding after light delay for a period, generally it's

0.

Continuous wire feeding: used to change wire for the wire feeder. Click once for continuous wire feeding, click again to stop it.

Continuous wire withdrawal: used to change wire for the wire feeder. Click once for continuous wire withdrawal, click again to stop it.

Diagnosis: to monitor the IO status of current system

7.2.4 Device parameter: used to set parameters related to device

Laser rated power: used to set the rated power of laser

Maximum deflection angle of galvanometer: used to set the range of the maximum deflection angle of galvanometer.

Maximum frequency: set the maximum frequency of laser PWM signal. When

PWM frequency set by welding parameter exceeds the maximum frequency, the frequency will be limited to the maximum value.

Maximum swing length: set the maximum length during swing. When the length set by welding parameter exceeds the maximum length, the length will be limited to the maximum length.

Wire feeding step: used to set the step during motor wire feeding.

Direction of motor wire feeding: used to set the direction polarity of motor wire feeding.

Galvanometer correction coefficient: when there is a nuance in the set length and the actual length, it can be modified by this parameter. When there is no need for correction, it is usually set as 1.

Lens temperature alarm enable: enable lens temperature alarm. When the temperature exceeds the limited value, the alarm signal will be generated.

Lens temperature alarm limited value: the limited value of lens temperature

Laser alarm enable: used to enable laser alarm. When laser generates alarm, the alarm signal will be generated.

Laser alarm level: used to set laser alarm to trigger the level logic.

Water-cooling machine alarm enable: used to enable water cooling machine alarm. When the water cooling machine generates alarm, the alarm signal will be generated.

Water-cooling machine alarm level: used to set water-cooling machine alarm to trigger the level logic.

Low pressure alarm enable: used to enable gas alarm. When gas low pressure generates alarm, the alarm signal will be generated.

Low pressure level: used to set low pressure alarm to trigger the level logic.

Chapter 9 Monitoring Protection Device

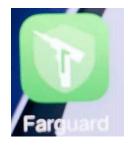
8.1 Temperature parameter setting of Protective Lens

Home page-System parameter-Device parameter-Enter password 888666-Next page-Limited value of lens temperature alarm

The lens temperature value is proposed to be 50. When the temperature exceeds this value, there will be an alarm prompt on the home page and at the same time, the indicator light on the side of the handheld head turns red.



**8.2**For the first use, users need to download Farguard mini program, which provides after-sale service. Note: presently, this APP only supports Android system. The icon for the mini program is shown as follows:

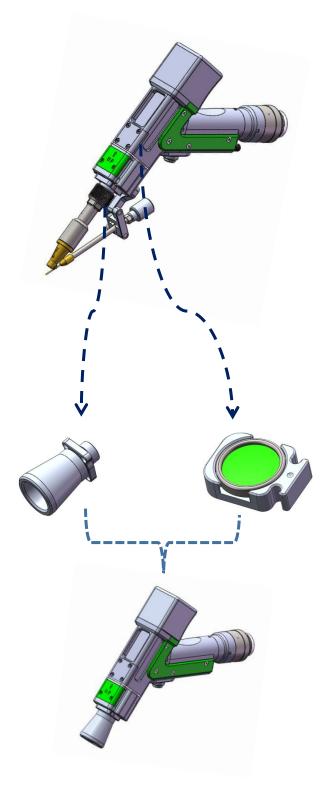


In the monitoring main screen, users can select welding system and cleaning system as required.

The current use status can be viewed in device status page.

Main screen	Device status	
Farguard	Farguard ≉ \Xi	
	设备状态 RDWelder-00	
	Safety lock	
Welding system	Laser alsrm	
	Underpressure	
Cleaning system	Flow alarm	
	Temperature	
Language	20°5	

Chapter 9 Replacement of Cleaning Module The schematic diagram for replacement of part of the structure is as follows



9.2Module replacement

Wire feeding bracket module: loosen the 2-M3 screw and take out the module (Figure 1)

Copper nozzle connecting part: loosen the 4-M2.5 screw and take out the module (Figure 2)

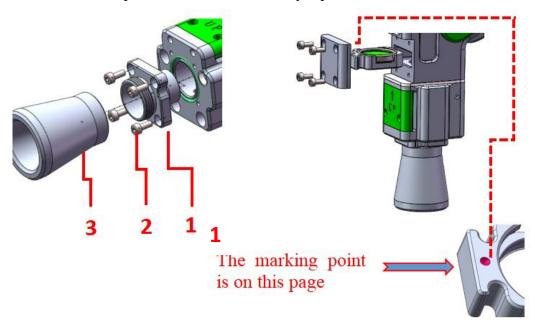


### 9.3 Assembly and Replacement

Assembly and Replacement

Outer case assembly: install them in order of 1,2 and 3.

Focusing drawer assembly: loosen 4-M2.5 screw and take out the focusing module directly. Pay attention that the side with a small dot in the middle is on the top when replacing and cleaning the focusing module. And the replaced welding focusing module should be protected from dust for easy replacement.



Chapter 10 Processing Mode Switch

### 10.1 Select processing type

Taking the welding mode switched into 80mm cleaning mode as an example, enter System parameter, License and then Processing type. Finally, enter password 666666. When the password is correct, enter the Select system type as follows:

	2022-1-13 09:30:00 💲	2022-1-13 09-30.00 🖇
Process library CS 3.0 📳 Welding model Countinue	Lick (Bowing Jim)	Please select the working type :
Laser power(W) 1000 Visition Registry 60	(Dotry with) Lawram Temp: 25 C Dive Am	
Laser heg/12 2000 Victole length(mm) 2.6	Blowing 📲 Fooder 🕨	Welder Clean-80mm Clean-160mm
Lener duly(%) 100 Feeding speed same) 6.0	Wotele dualer	
Man. Fooding pares. Diagnose System parties	Auto leading of Lock on	Cancel

### **10.2Prompt of module replacement**

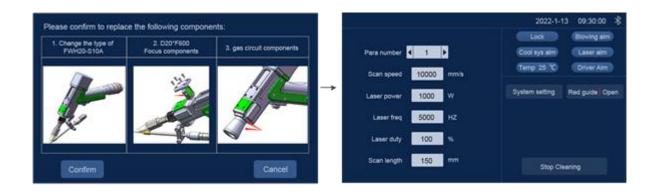
After selecting the system type by users, the system will give a prompt for the gun head components in the form of words and pictures. Then, users click OK after confirming the corresponding hardware components and the replacement conditions, and the system will prompt you to power on. The user interface should power off the device and replace the corresponding

component



### **10.3 Complete switch**

After completing components replacement by users, power on the device. And the system will prompt whether to confirm the replacement of the corresponding hardware components. Click OK after confirming the completion of the components replacement according to the prompt. Then, the system processing mode is switched.



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