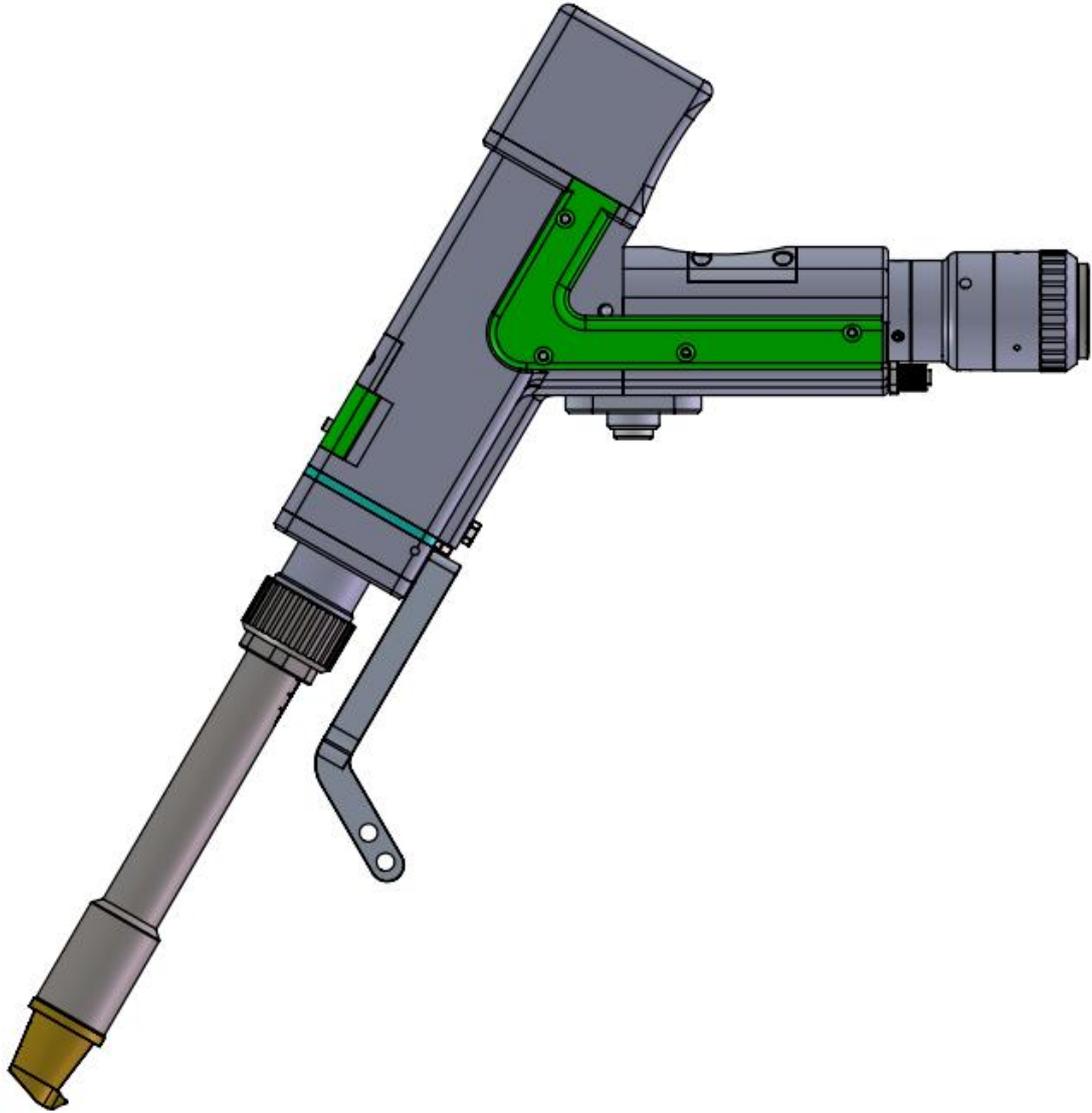


Shenzhen RelFar Intelligent Technology Co., Ltd.

FWH60-S40A Intelligent Single Pendulum Handheld Welding Head



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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 I Overview

1.1 Product Parameter

Name	Intelligent single pendulum handheld welding head
Model	FWH60-S40A
Fiber interface	QBH
Wavelength range	$1070 \pm 20\text{nm}$
Rated power	$\leq 6000\text{W}$
Collimating focal length	50mm
Focus length	250mm
Focus adjustment range	-10mm ~ +10mm
Spot adjustment range	0 ~ 12mm
Auxiliary gas pressure	$\leq 1\text{Mpa}$
Weight	1.3Kg

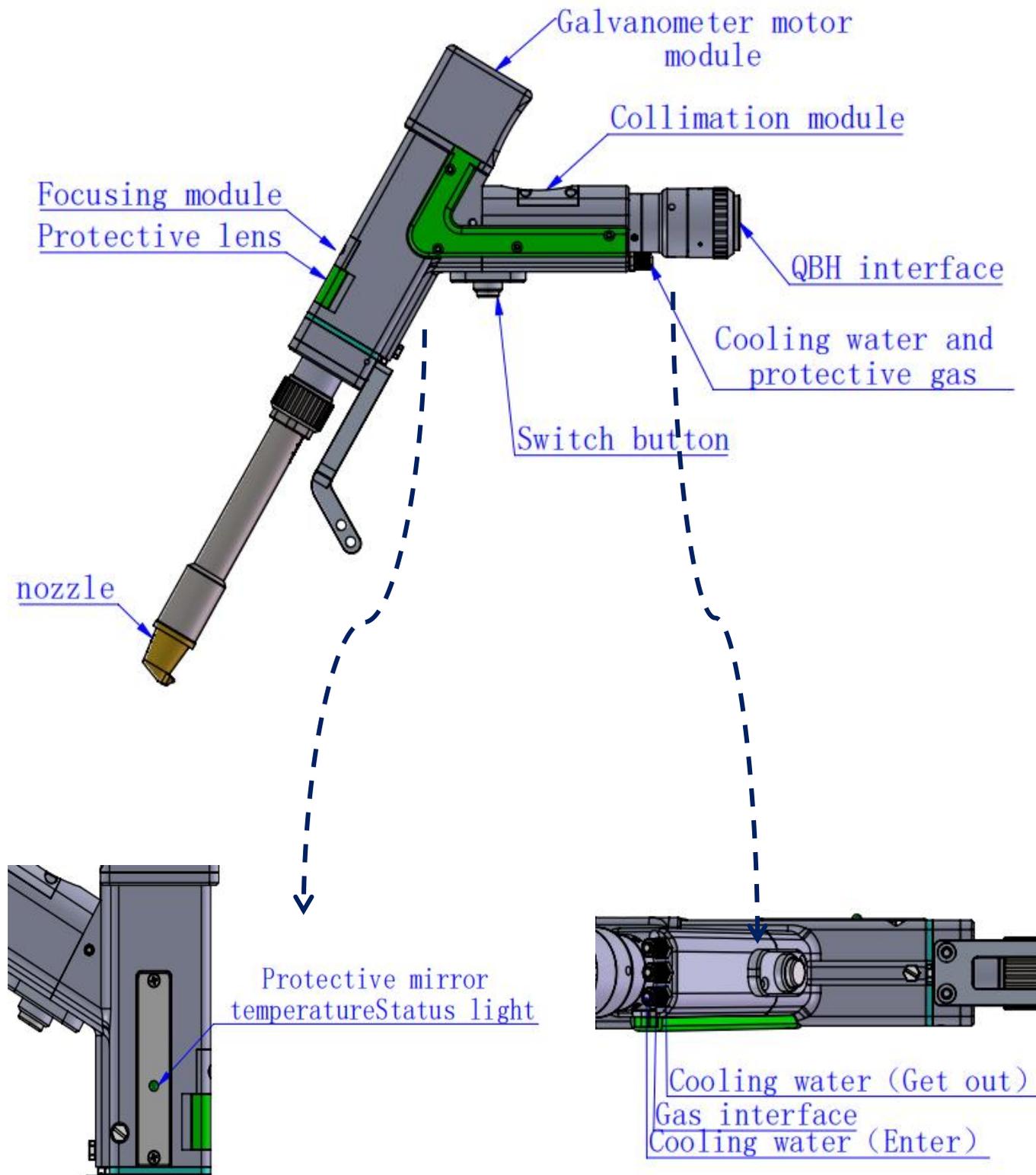
1.2 Cautions

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 II Structure and Feature

2.1 Product Structure

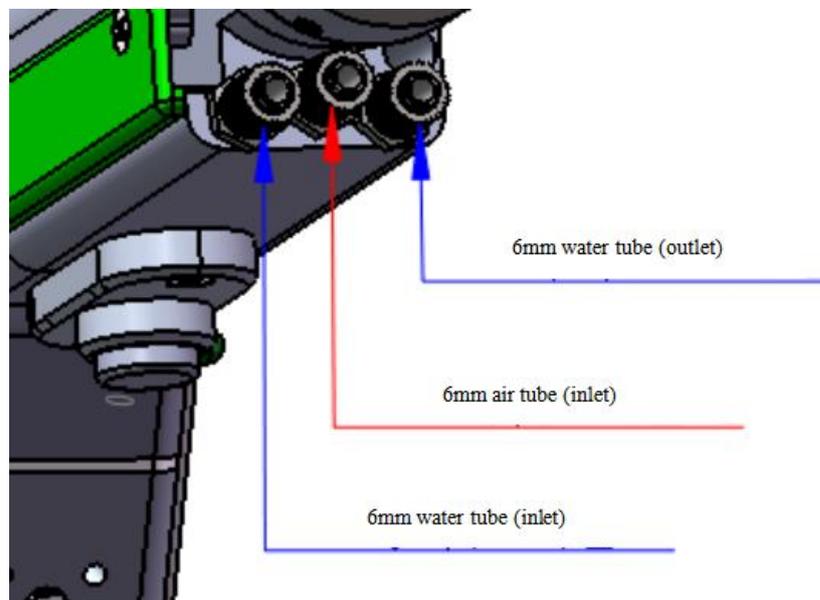


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Chapter III Product Assembly

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)

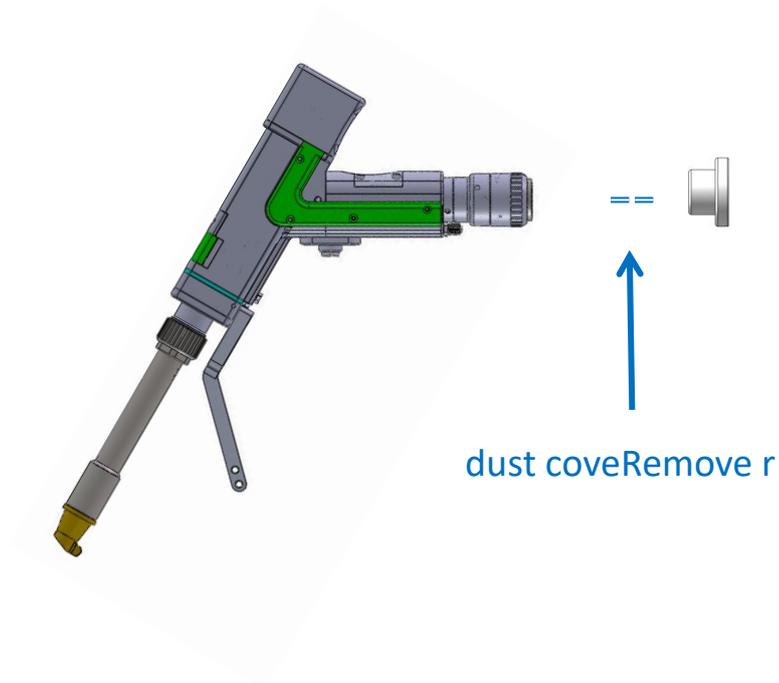
3.1.1 Cooling water: connected with 6mm gas pipe. When the light path in the cavity generates heat, the internal waterway will remove excess heat to ensure the welding performance. Cooling water pipe requires series and connection with the inlet and outlet pipes.

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

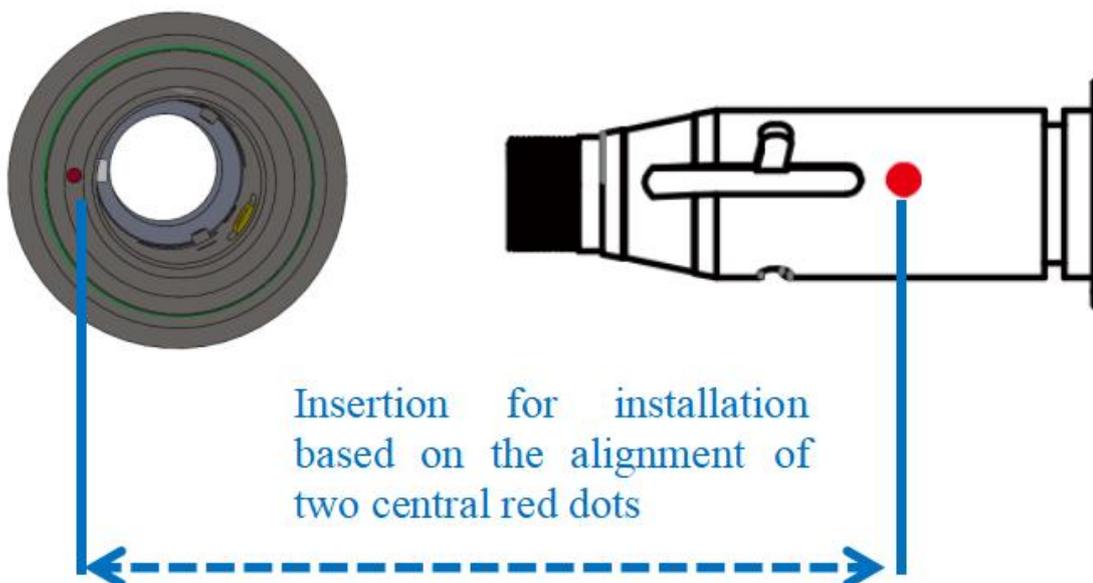
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3.2 Fiber input installation

Put QBH horizontally and take out the dust seal cover

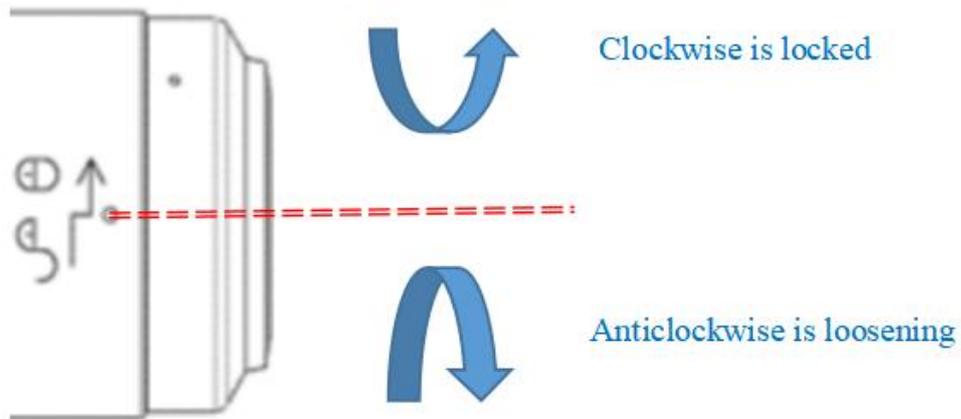


Align the red point on the optical fiber head with that in QBH, and insert the optical fiber head into QBH slowly.



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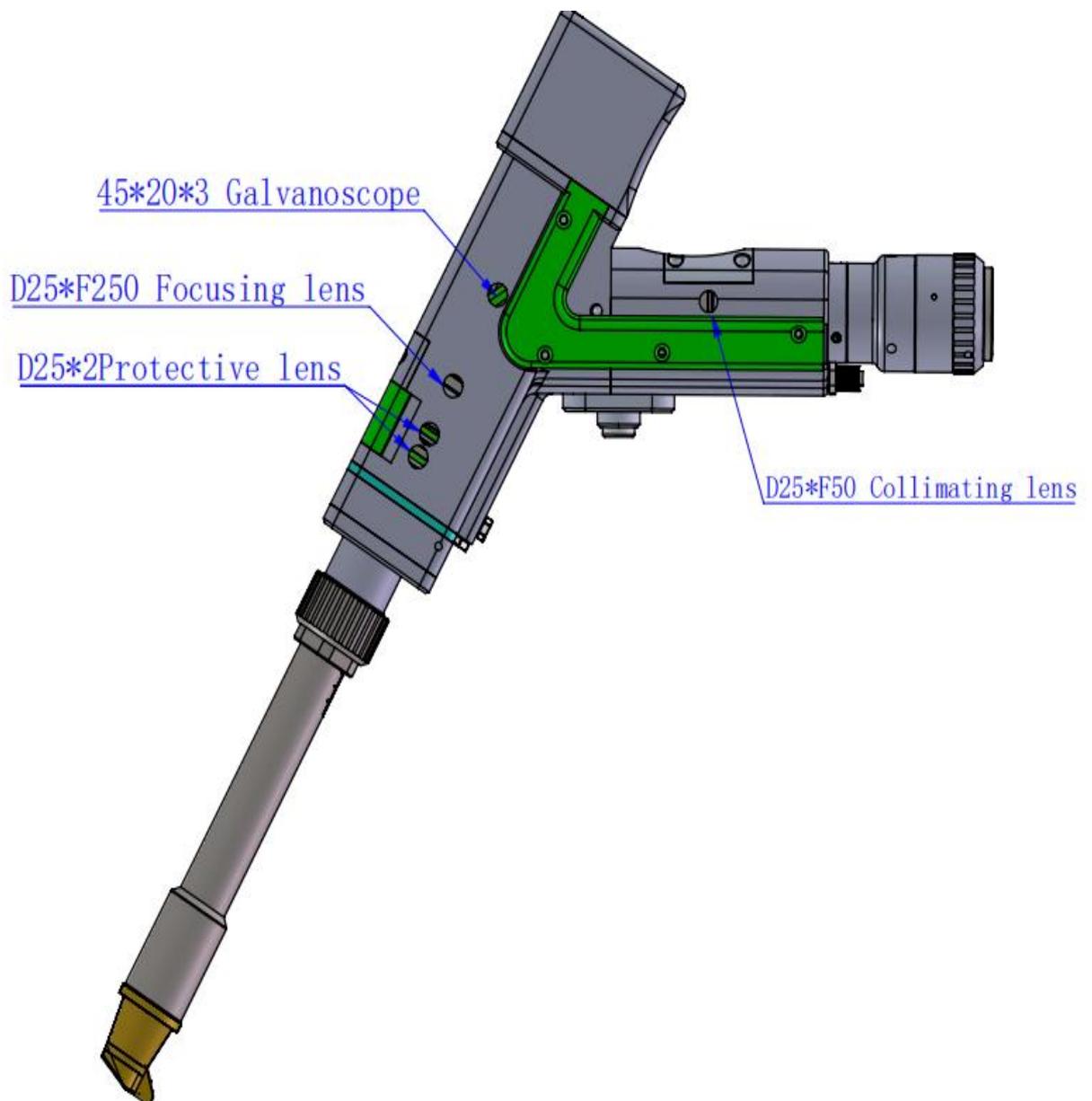
Tighten QHB to the locked state: rotate the QHB clockwise to the limit position with a “click”, then lift the rotary knob up and rotate the knob clockwise again until it presses down on the optical fiber head.



Chapter IV Maintain

4.1 Optical Lens Structure

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.



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4.2 Cleaning of Optical Lenses

※ 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.



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4. 3 Disassembly and assembly of optical lenses

4.3.1 Disassembly and assembly of collimating lens

tool: 2mm hex wrench, dust-free cotton swab, alcohol

The disassembly process needs to be completed in a clean place, and dust-free gloves or finger cots must be worn when disassembling lenses.

※ Disassembly and assembly steps:

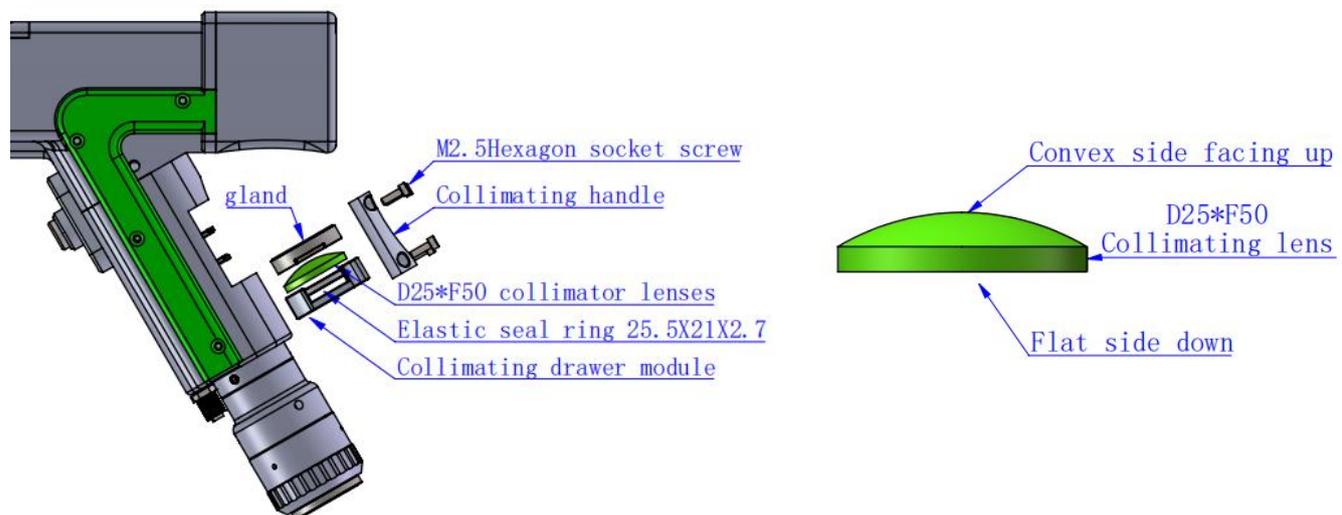
Step 1: Use a 2mm hex wrench to loosen the M2.5 screw.

Step 2: Pull out the collimated drawer module directly in the horizontal direction.

Step 3: Seal the port with masking paper to prevent dust from entering the chamber and contaminating it.

Step 4: Gently press down on the cover and rotate it 90°. Align the two protrusions with the left and right openings, then remove the cover upwards to replace the focusing lens.

(Note: Install the lens with the concave convex direction facing)



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4.3.2 Disassembly and assembly of focusing lens

Tools: 2mm hex wrench, dust-free cotton swab, alcohol, masking tape

The disassembly process needs to be completed in a clean place, and dust-free gloves or finger cots must be worn when disassembling lenses.

※ Disassembly and assembly steps:

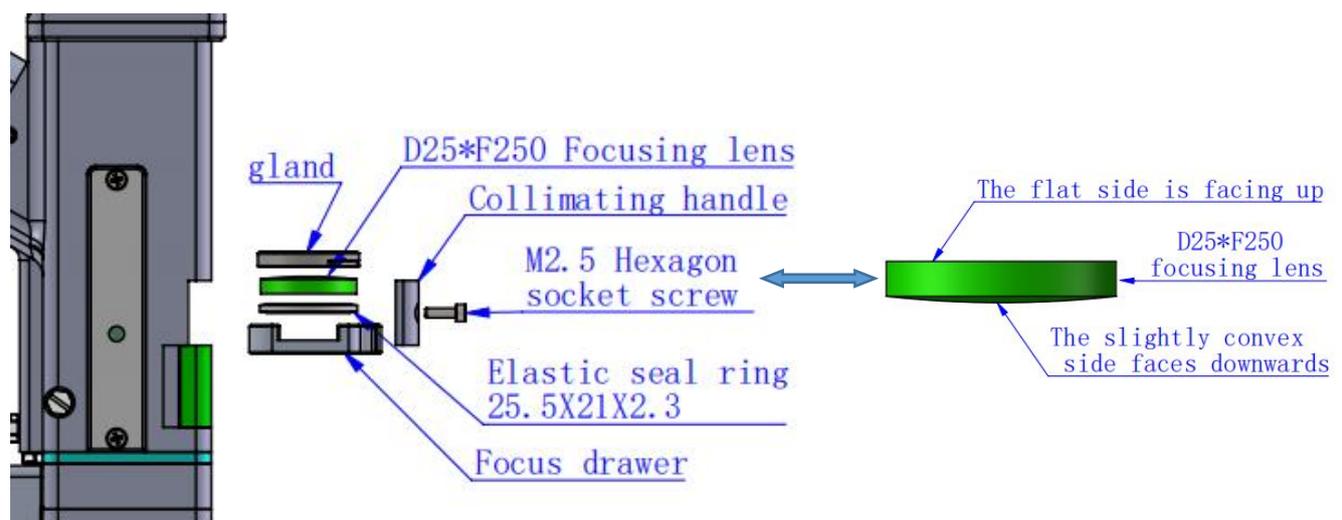
Step 1: Use a 2mm hex wrench to loosen the M2.5 screw.

Step 2: Pull out the focusing module directly in the horizontal direction.

Step 3: Seal the port with masking paper to prevent dust from entering the chamber and contaminating it.

Step 4: Gently press down on the cover and rotate it 90°. Align the two protrusions with the left and right openings, then remove the cover upwards to replace the focusing lens.

(Note: Install the lens with the concave convex direction facing)



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4.3.3 Disassembly and assembly of protective lenses

The disassembly process needs to be completed in a clean place, and dust-free gloves or finger cots must be worn when disassembling lenses.

Operation method:

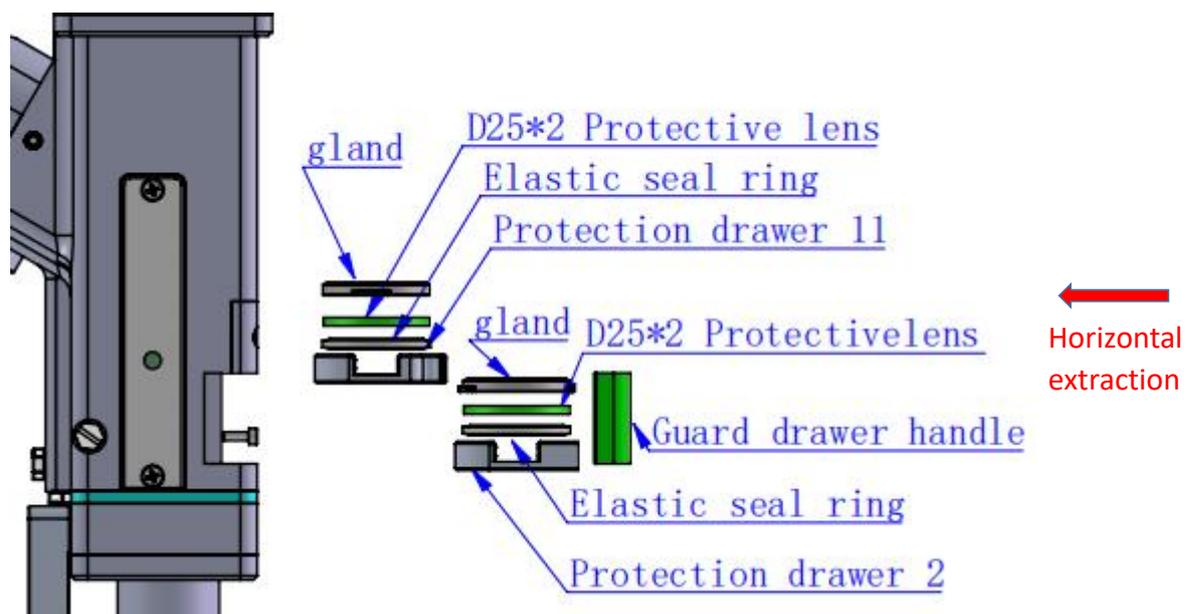
Replace protective mirror 01

Step one, hold both sides of the handle of the green drawer module 1 with your hands and pull out the protective lens horizontally. Pay attention to dust prevention, seal the exposed window on the cavity with masking paper to prevent dust from entering and contaminating the cavity, and then replace the protective lens.

Step 2: Gently press down and rotate the cover by 90 degrees. When the two ear ends and two slots are aligned, release it. Remove the cover and replace the protective lens.

Replace protective mirror 02

Step 1: Take out the green drawer handle module 1 and horizontally pull out the handle module 2. Pay attention to dust prevention, seal the exposed window on the cavity with masking paper to prevent dust from entering and contaminating the cavity, and then replace the protective lens. Gently press down and rotate the cover by 90 degrees. When the two ear ends and two slots are aligned, release it. Remove the cover and replace the the protective lens.



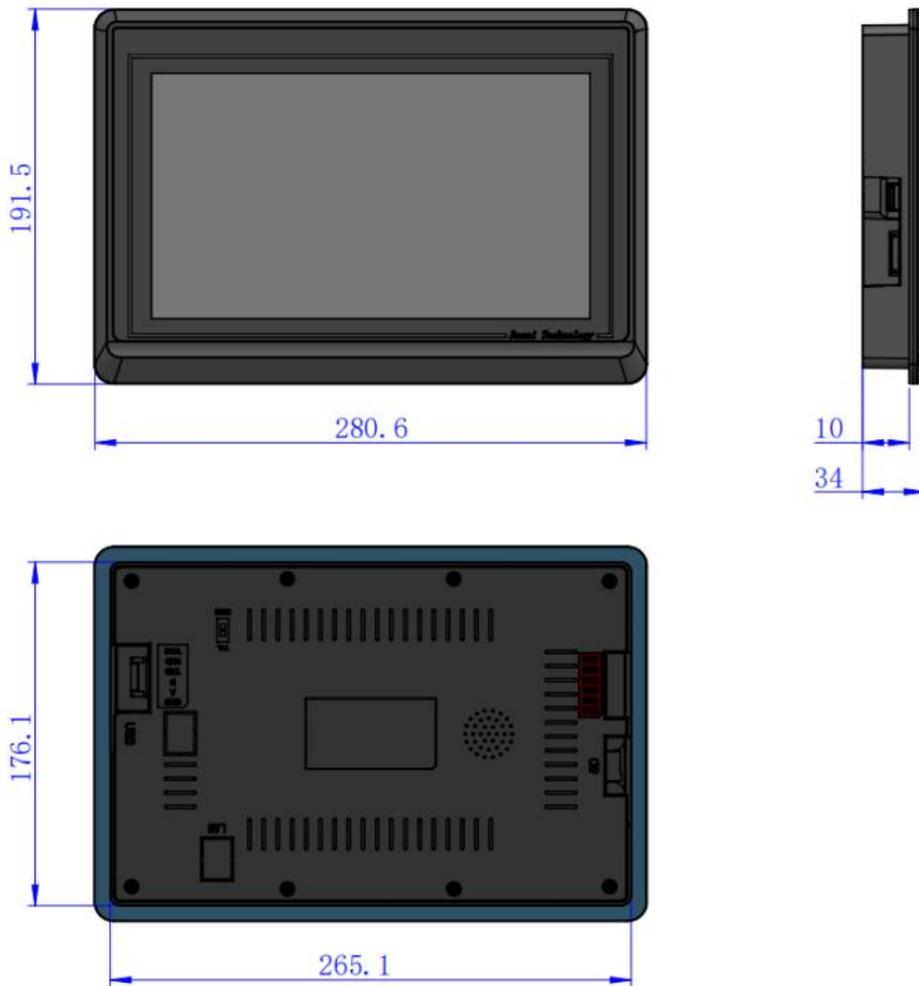
Chapter V Welding System

5.1.1 Product dimension figure

Dimension of touch screen

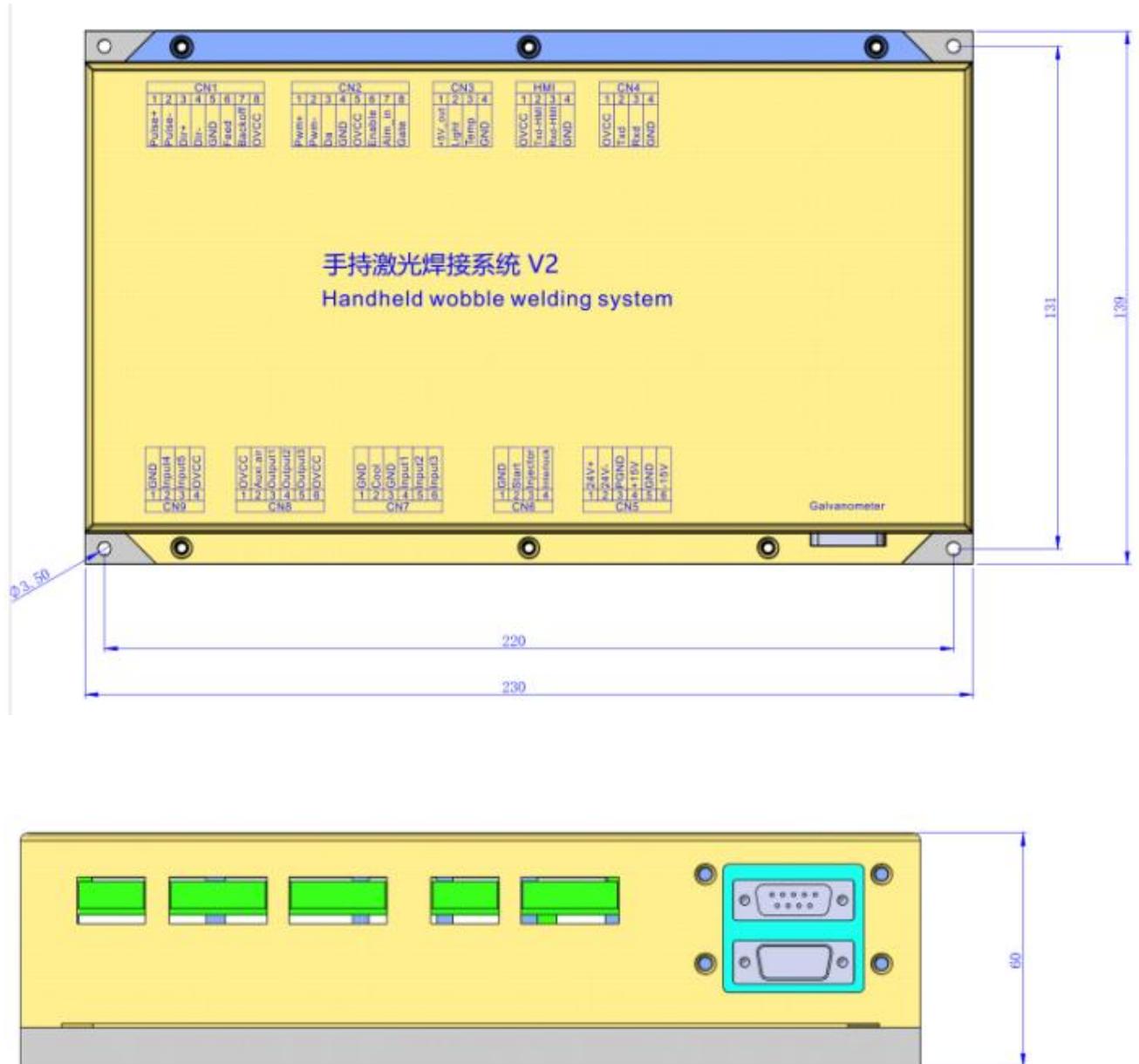
Size: (280.6*191.5*34)mm

Dimension figure of touch screen:



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5.1.2 Mainboard dimension figure



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Chapter VI Supplies

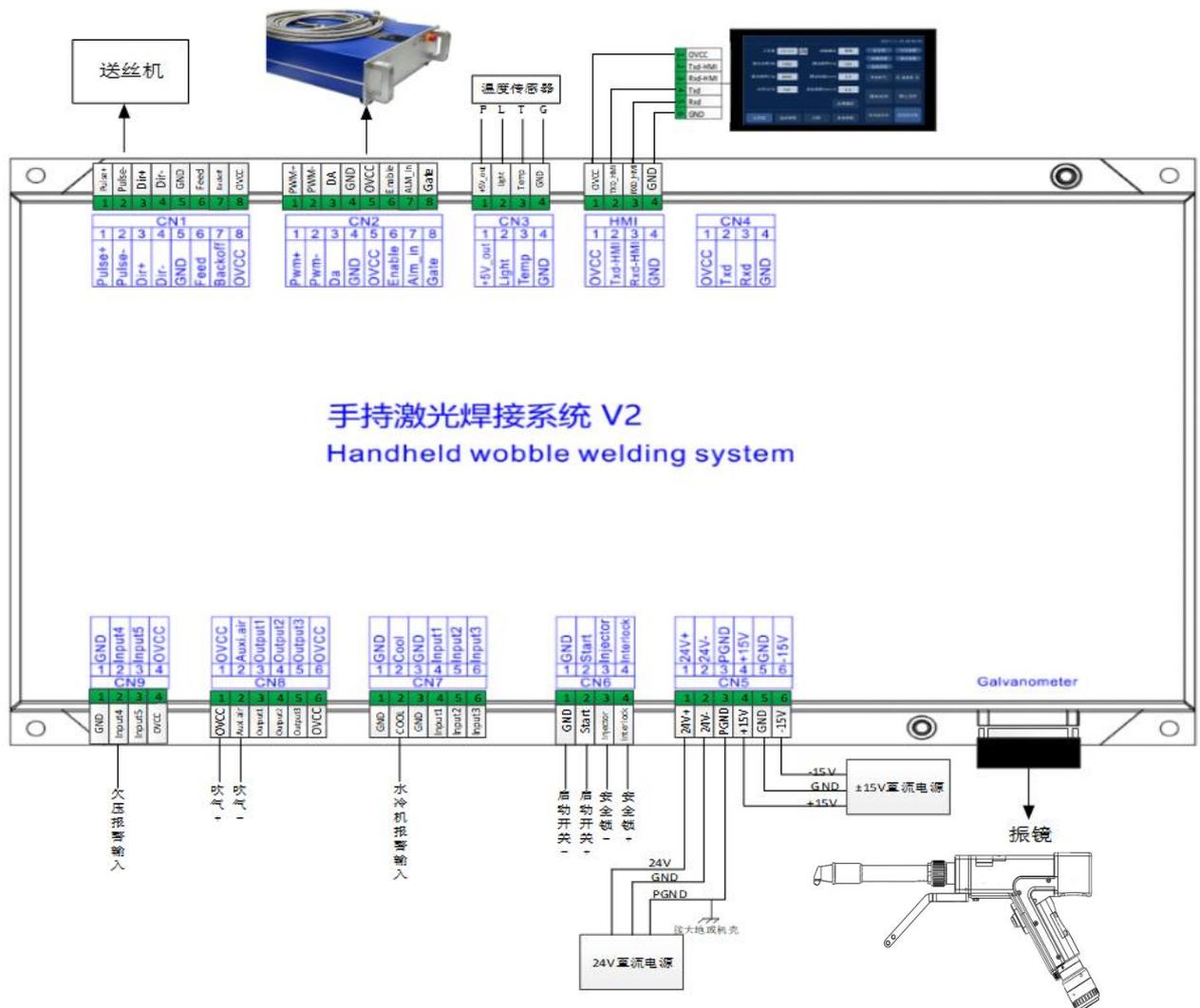
6.1 Electrical material list

List				
Serial number	Name	Picture	Number	Remark
1	Intelligent handheld welding head		1PCS	
2	24V power box		1PCS	
3	15V power box		1PCS	
4	Earth clamp assembly		1PCS	
5	Ten-inch screen		1PCS	
6	1.5m- Black with connectors 6pin and 4Pin		1PCS	
7	Bluetooth antenna		1PCS	
8	V2 welding system control		1PCS	

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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.

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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 ± 15 . Chart 6.3.1 shows the definition of CN5 power supply interface.

Chart 6.3.1

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.

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.

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

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6.5 CN2 laser interface

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

Chart 6.5.1

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.

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.

Chart 6.6.1

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

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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.

表 6.8.1 Chart 6.8.1

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	—

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

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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。

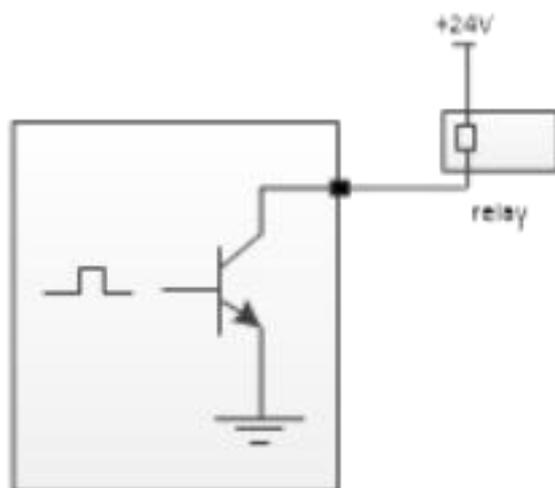
CN7 interface is a 6-pin green terminal of NPN type. Chart 6.10.1 shows the definition of CN7 interface.

Chart 6.10.1

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

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Chart 6.11.1

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.

6.12 CN9 Universal input interface 2 CN2 general input interface 2

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

Chart 6.12.1

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.

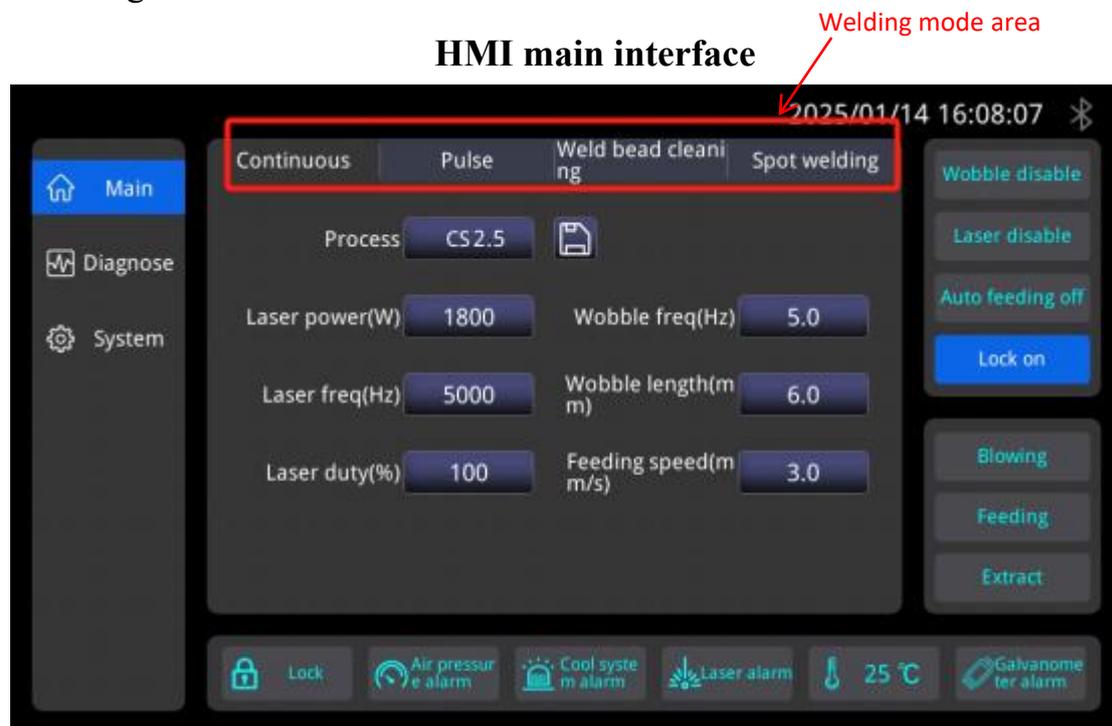
6.13 Galvanometer interface

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

Chapter VII 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:



[Home screen]: The system home screen.

[Diagnosis]: View device status entry.

[System Settings]: Enter system parameter Settings.

[Device parameters]: Advanced parameter entry, you need to enter the password to enter.

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[**Welding mode area**]: Different welding modes can be selected in the mode area[**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

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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 will stop blowing. For manual wire feeding and wire withdrawing, long press the corresponding small triangle area.

7.2HMI operation introduction

7.2.1Parameter 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

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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.

7.2.2Point 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

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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.

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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

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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

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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.

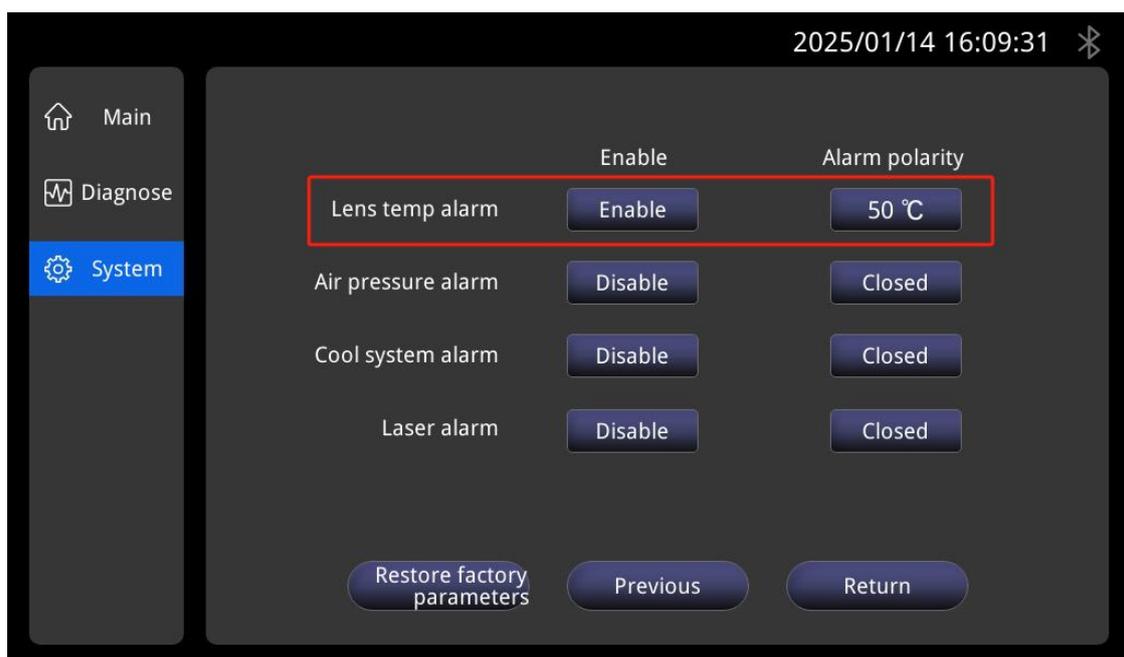
Low pressure level: used to set low pressure alarm to trigger the level logic.

Chapter VIII Monitoring Protection Device

8.1 Temperature parameter setting of Protective Lens

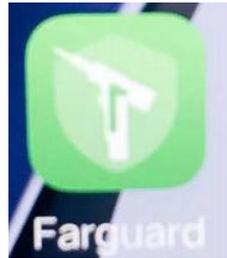
Home→ page-System→ parameter-Device→ parameter-Enter→ password 888666→Next page→Limited value of lens temperature alarm

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.



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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
 The screenshot shows the main screen of the Farguard app. It has a dark blue background with the 'Farguard' logo at the top in green. Below the logo are three green rectangular buttons with white text: 'Welding system', 'Cleaning system', and 'Language'.	 The screenshot shows the device status page of the Farguard app. It has a dark blue background with the 'Farguard' logo and a Bluetooth icon at the top. Below the logo is the title '设备状态' (Device Status) and the device ID 'RDWelder-00'. There are five status indicators, each with a green dot: 'Safety lock', 'Laser alarm', 'Underpressure alarm', 'Flow alarm', and 'Temperature alarm'. At the bottom, there is a large green digital display showing '27°C'.

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Thanks for using our products!

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