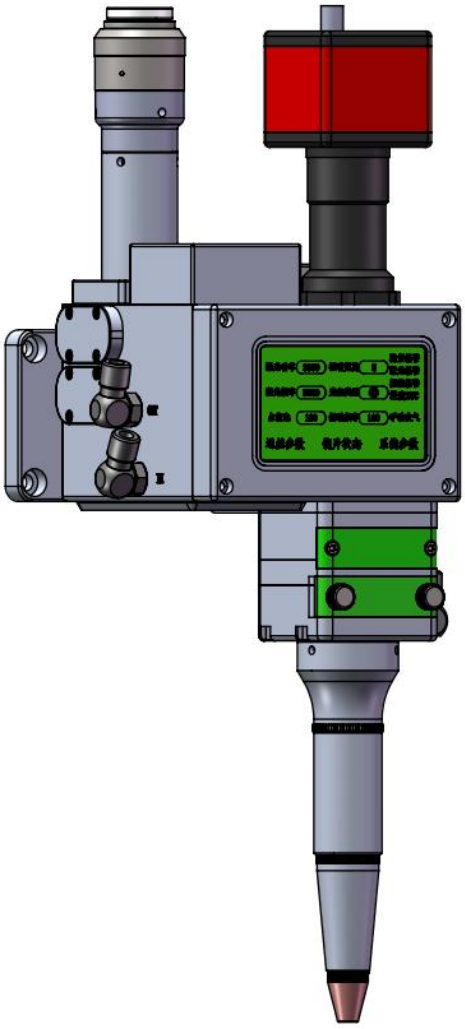
Shenzhen RelFar Intelligent Technology Co., Ltd.

FWP30-V10 Intelligent Double Swing Welding Head



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Shenzhen RelFar Intelligent Technology Co., Ltd.

Introduction

Thank you for choosing our products!

To enable you to have an overall understanding of our company, there is a detailed introduction regarding features, structural features, technical parameters, instructions for use and maintenance of the product in the Manual. Carefully read the Manual to help you better us it before the product is used.

Due to constant update of product functions, the product you received may differ from the description in the manual. We hereby express our deep sorry for this matter! In case of any question in the use process, timely call us for consultation, and we will offer dedicated service to you wholeheartedly.

Contents

Chapter I Overview

1.1 Product parameter

Fiber interface	QBH
Wavelength scope	1070±20nm
Rated power	≦4000W
Collimation focal length	100mm
Focus focal length	200/250/300/350mm
Scanning Range	X-axis: 0-5mm, Y-axis: 0-5mm
Intelligent protection function	Yes
Auxiliary gas	Coaxial/paraxial
Effective clear aperture	24mm
Weight	2.9KG

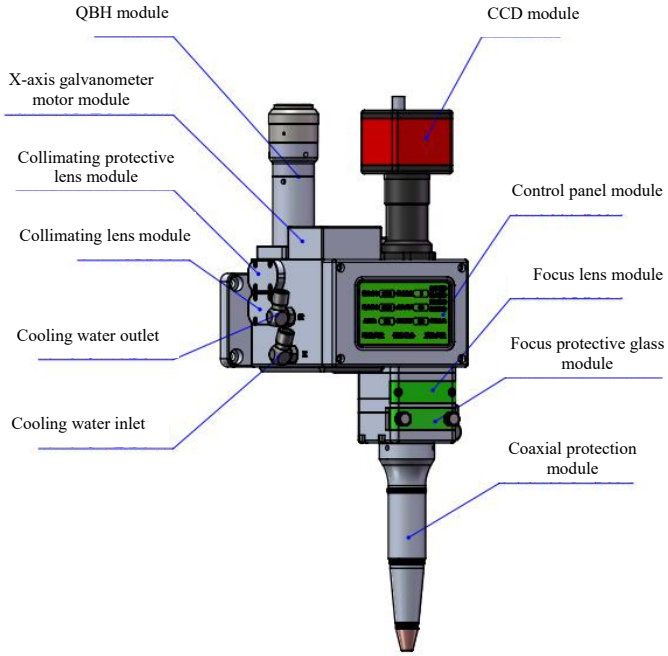
1.2 Precautions

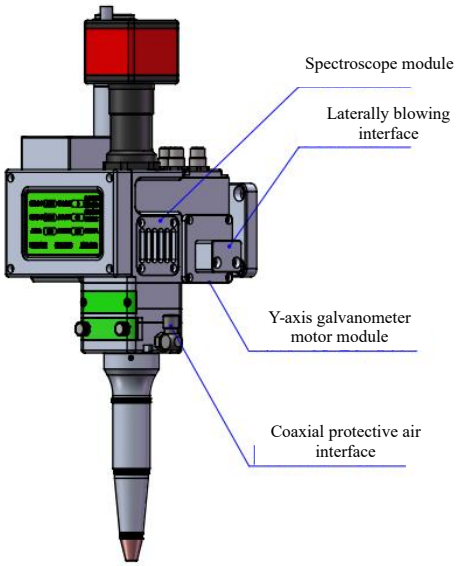
※ To ensure personal safety, wear the special fiber laser protective glasses before operation.

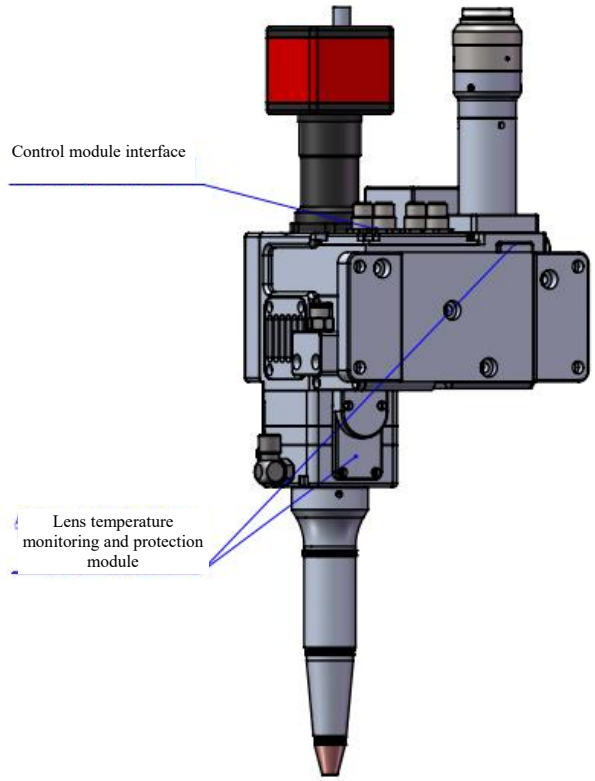
※ It's necessary to keep the product clean and prevent the cooling liquid, condensate water or other foreign matter from intruding into the cavity, or the functional contamination and functional impact of related parts will be incurred.

Chapter II Structural Characteristics

2.1 Product structure

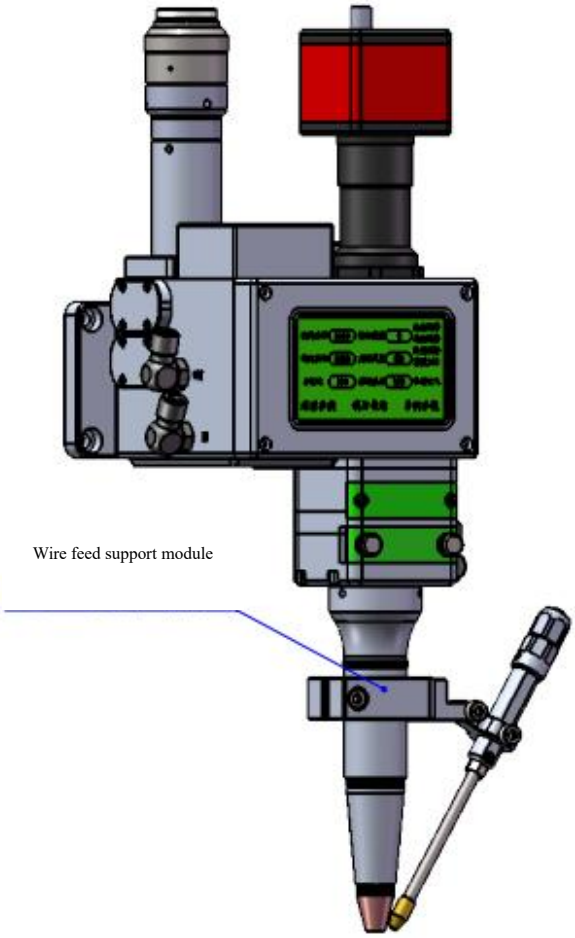


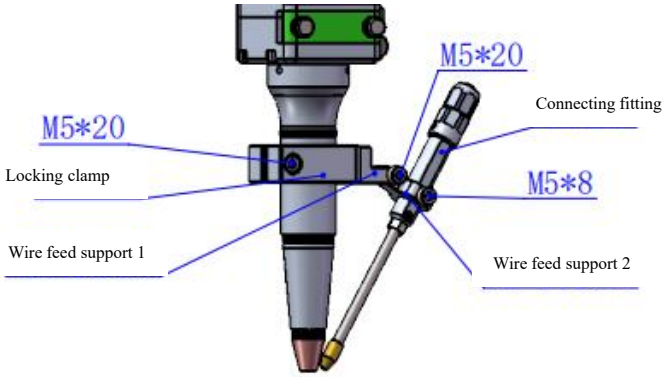




2.2 Structure of selected parts

2.2.1 Wire feed structure





※ Installation and debugging of wire feed structure:

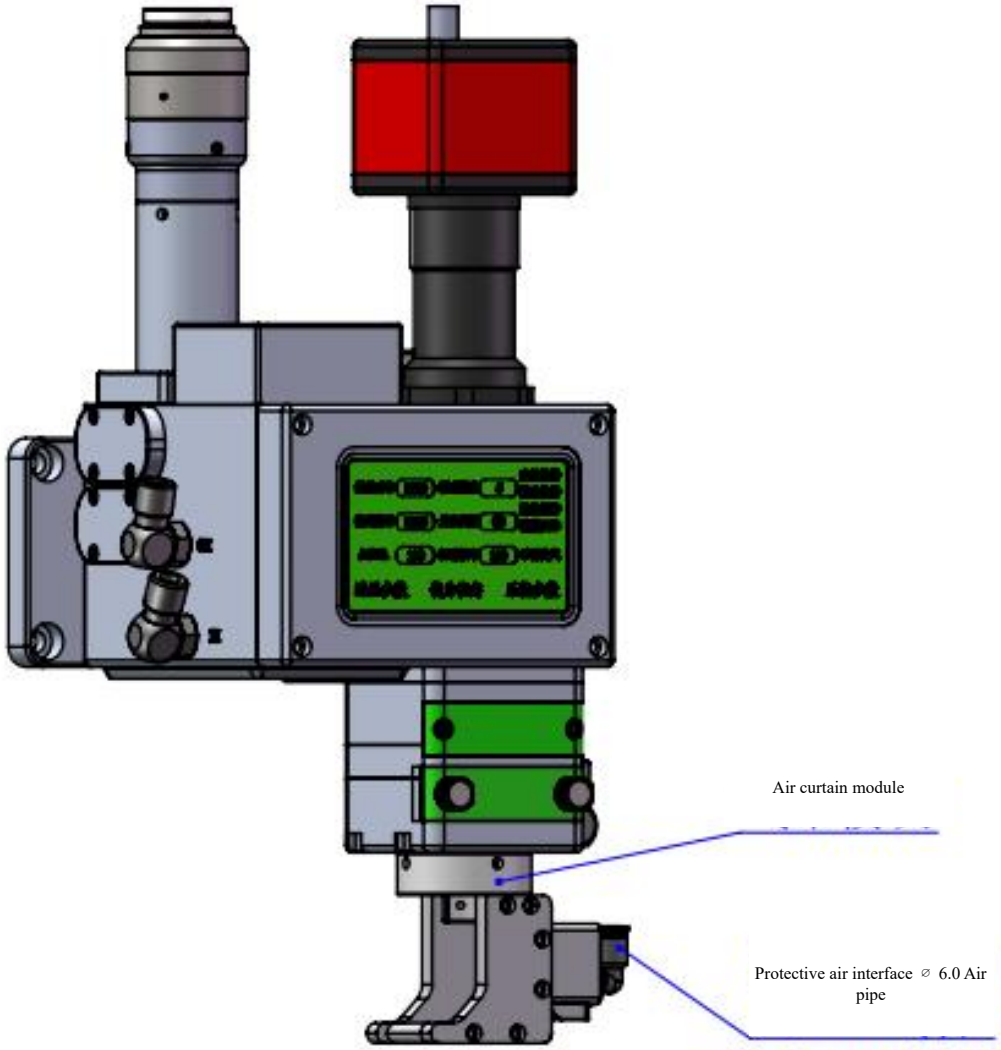
1. The locking clamp can be adjusted by M5*20 screws to adjust the height of the wire feed support.

2. The wire feed angle can be adjusted by connecting the wire feed support 1 with the wire feed support 2 through M5*20 screws.

3. The wire feed distance between the wire feed support 2 and the

connecting piece can be adjusted by M5*8 screws.

2.2.2 Air curtain structure



※ Selection of air curtain structure:

1. The air curtain structure shall be adopted in the welding of special-shaped structure, and the structure with coaxial protection module interference and small distance.

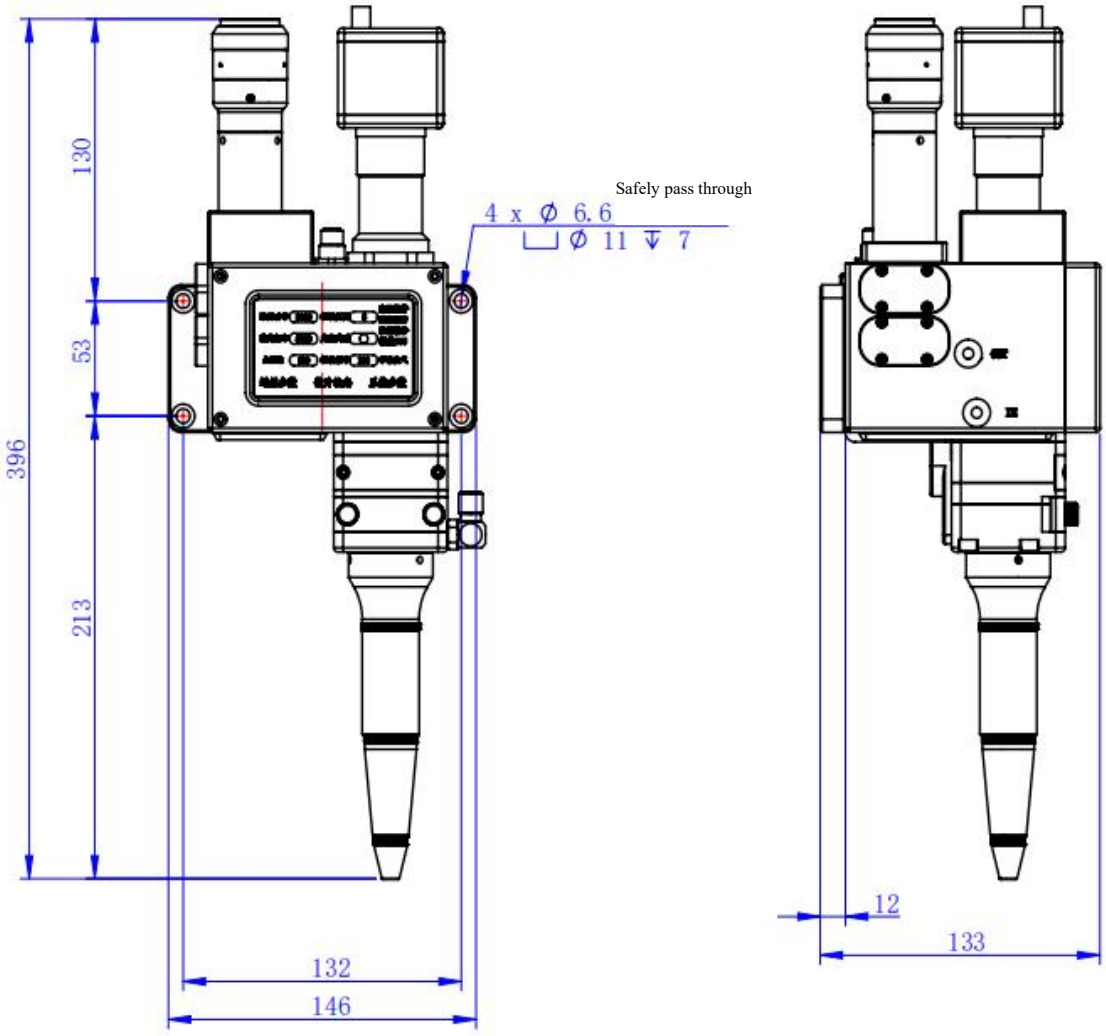
※ Function of air curtain structure:

1. The φ6 air pipe connection is used to blow air from the side to form

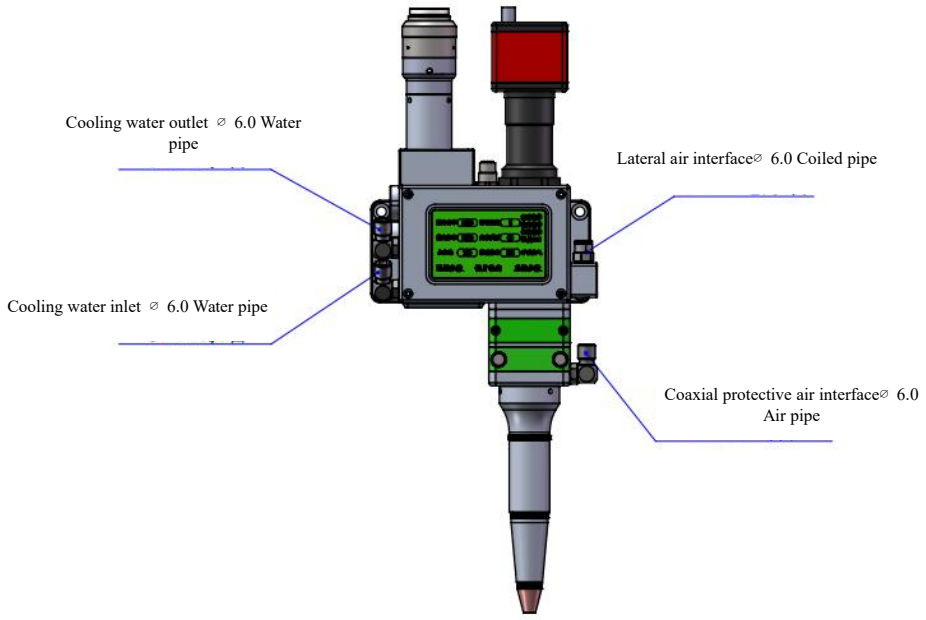
an air curtain that can blow away the welding splash.

Chapter III Product Installation

3.1 Installation dimension



3.2 Pipe connection



Connection of cooling water and proective gas and usage requirements:

Note: Gas for regular use: Compressed air (oil-water filtration required)

Gas for regular use: argon, nitrogen and compressed air (oil-water filtration required).

3.2.1 Cooling water: The 6mm air tube is connected. The main function is that the excess heat is taken away by cooling through the internal structural member water route when the heat is produced by the light path in the cavity to ensure the welding performance. The series connection of cooling water pipeline is required, with one-in and one-out water circulation

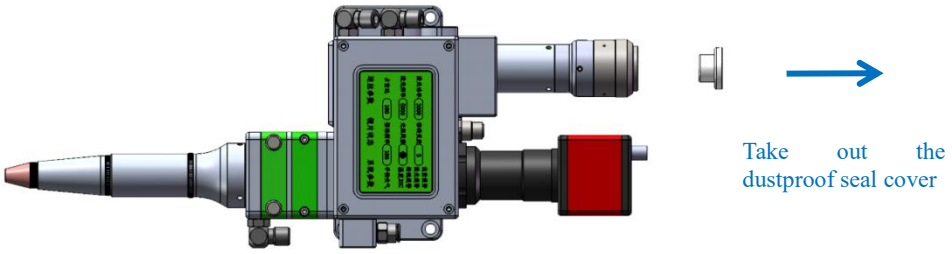
connected.

3.2.2 Coaxial protective air: The 6mm air tube is connected for butt welding gas protection, with input pressure＜1Mpa.

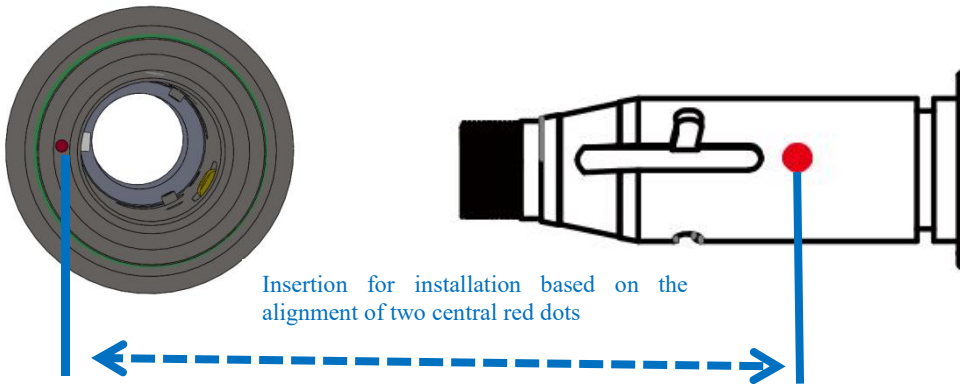
Laterally blowing interface: It is connected with coiled pipe to blow air from the side so as to blow away the welded splashes.

3.3 Optical fiber input installation

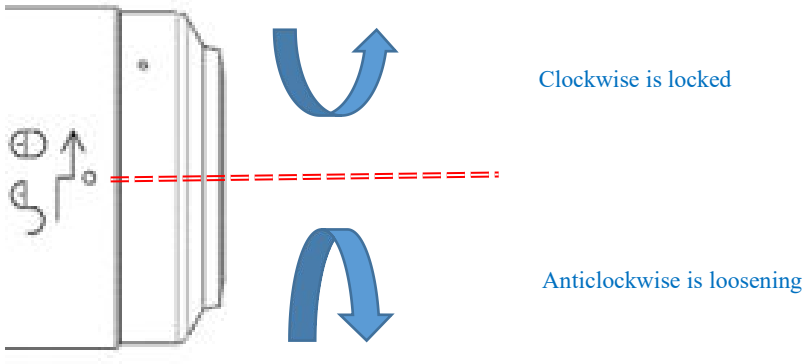
※ The QBH is a horizontal arrangement to take out the dustproof seal cover.



※ Align the red dot on the fiber optic head with the QBH red dot, and slowly insert the fiber optic head into the QBH.



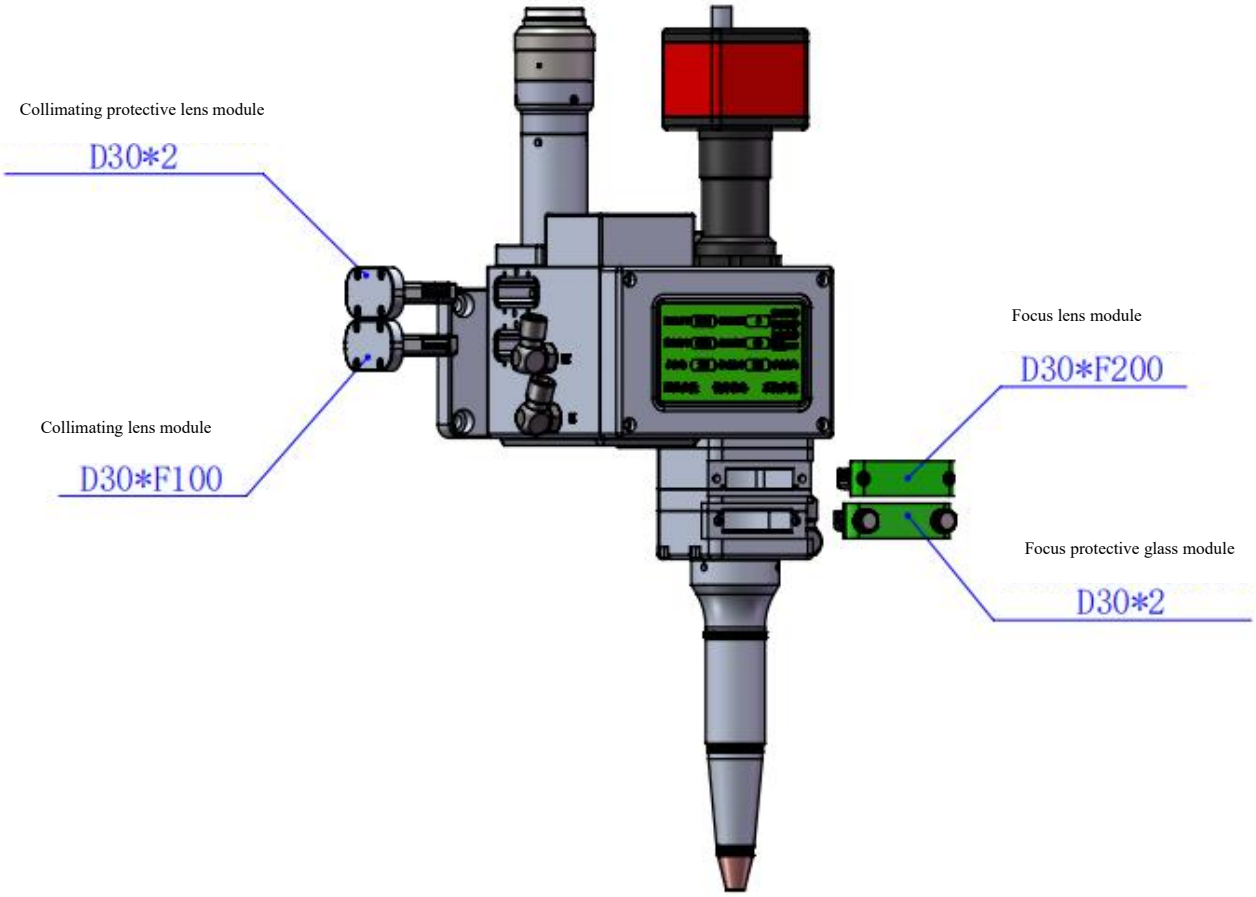
※ The QHB is screwed to the locking state: Rotate it to the limiting position clockwise (hearing the "click"), lift up the rotating mantle, and clockwise rotate the mantle until the head of optical fiber is compressed.



Chapter IV Maintenance

4.1 Structure of optics lens

※ The assembly is completed in the dust-free plant at the time of replacement of parts. In principle, other modules are forbidden to be dismounted except that the drawer protective glass can be disassembled and assembled. If it is necessary to check the collimating lens, focus lens and galvanometer lens, the product shall be put into a clean environment for disassembly.

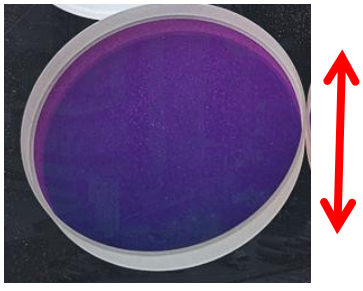


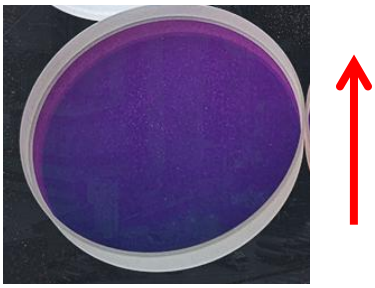
4.2 Cleaning of optics lens

※ When the optics lens are cleaned, the operation method and attention points are as follows:

※ Tools: Dust-free gloves or dust-free fingerstall, dust-free wiping cotton swab, isopropyl alcohol, and caned dry and pure compressed air.

※ Spray the isopropyl alcohol onto the dust-free cotton swab, align the lens to eyes, gently pinch the side edge of the lens with left thumb and index finger and hold the dust-free cotton swab with right hand to gently wipe the front and back of the lens in a single direction from bottom to top or from left to right (avoid wiping back and forth to avert the secondary contamination of lens), blow the surface of the lens with filling dry and pure compressed air and confirm the surface of lens is free from foreign matters after cleaning.





4.3 Disassembly and assembly of optics lens

4.3.1 Disassembly and assembly of collimating protective lens

Tools: 2mm hexagon key wrench, dust-free cotton swab, alcohol

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

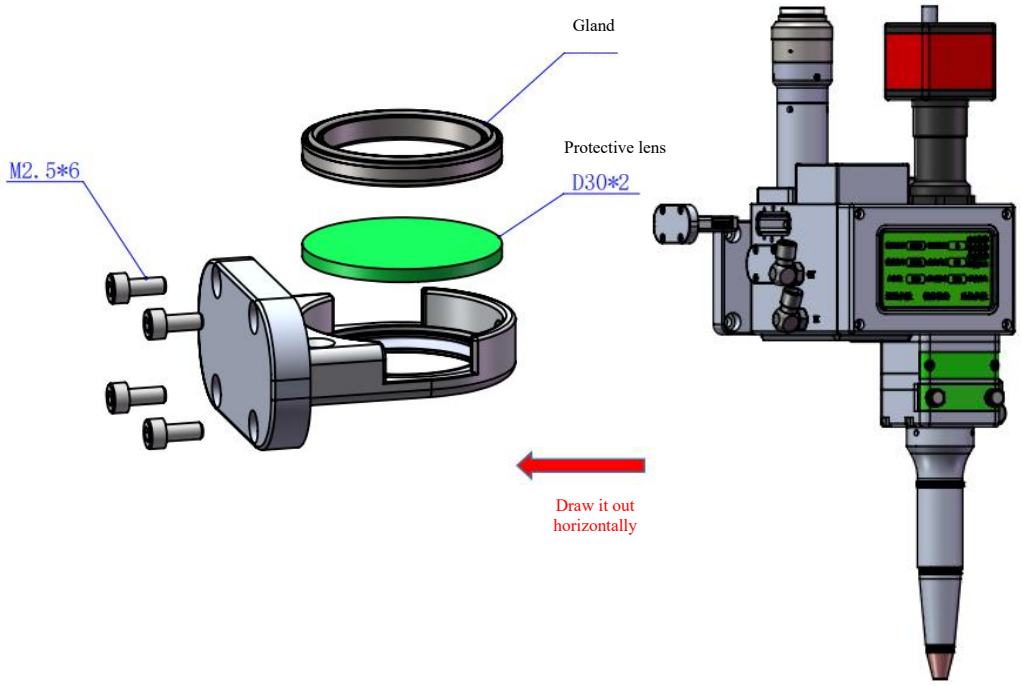
※ Disassembly and assembly steps:

Step I: Clean up all the dust on the surface of the laser head firstly.

Step 2: Loosen the 4-M2.5 hex socket cap screw in the figure by hand with a 2mm hex wrench.

Step 3: Take out the collimating protective lens drawer assembly directly in the horizontal direction (pay attention to dust prevention, after taking out the drawer module, seal the window exposed on the cavity with masking tape to prevent dust from entering the cavity and being polluted, and then replace the protective lens).

Step 4: Remove the gland upward to replace the lens.



4.3.2 Disassembly and assembly of collimating lens

Tools: 2mm hexagon key wrench, dust-free cotton swab, ethyl alcohol and masking tape.

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

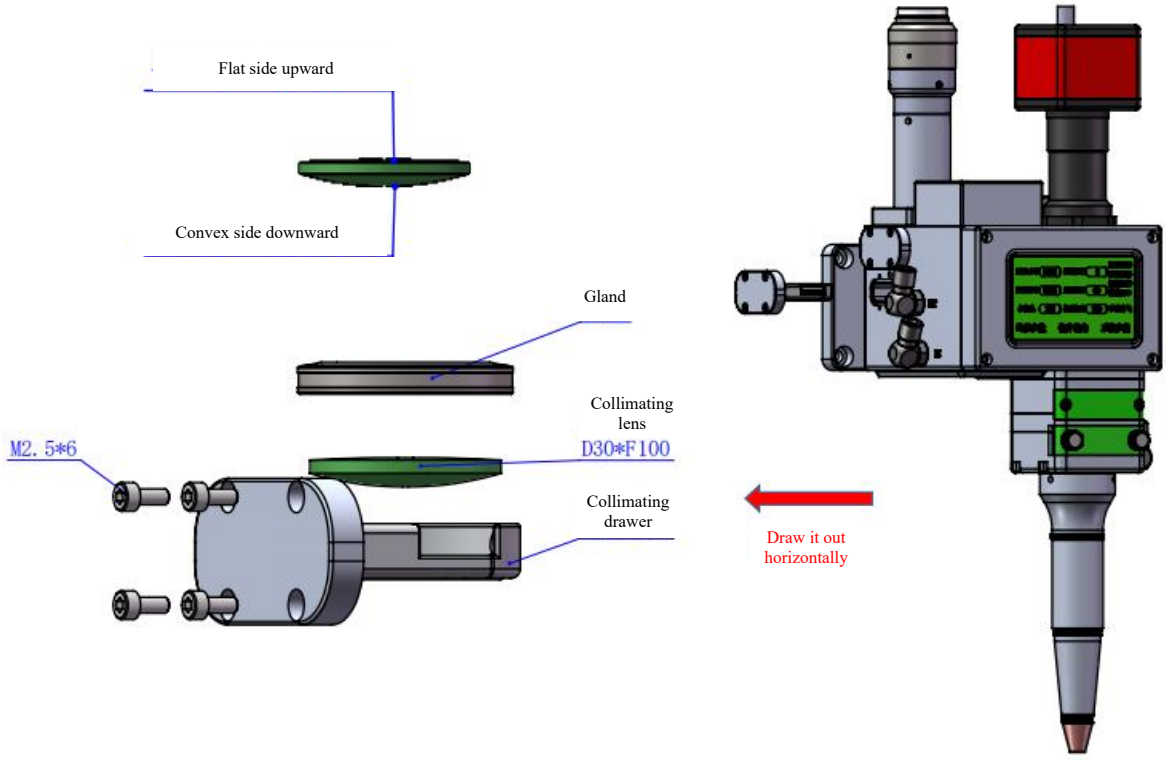
※ Disassembly and assembly steps:

Step 1: Clean up all the dust on the surface of the laser head firstly.

Step 2: Loosen the 4-M2.5 hex socket cap screw in the figure by hand with a 2mm hex wrench.

Step 3: Horizontally take out the collimating drawer module and seal the port with masking tape to prevent the dust from entering the cavity.

Step 4: Take the gland upward and replace the lens. (Note that arrow sand is marked on the concave and convex surface of the lens or on the side of the mirror to identify the orientation of the lens)



4.3.3 Disassembly and assembly of focus lens

Tools: 2mm hexagon key wrench, dust-free cotton swab, ethyl alcohol and masking tape.

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

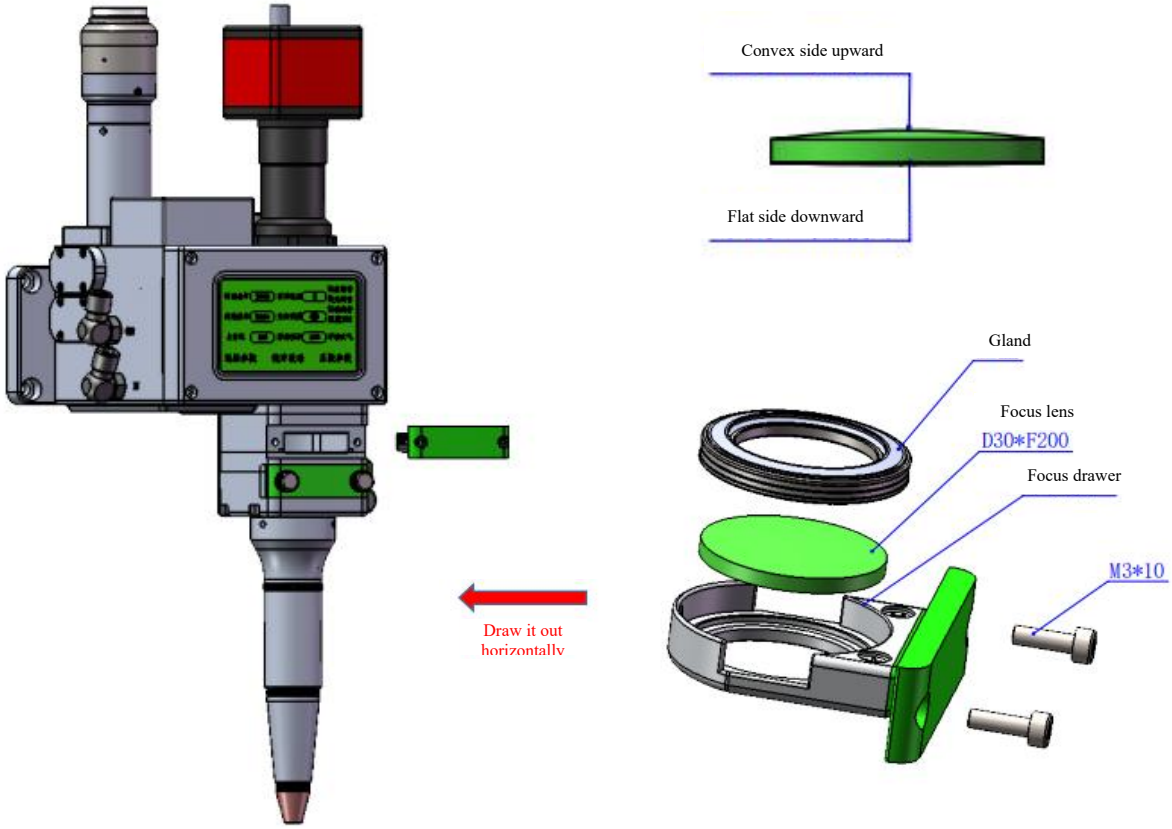
※ Disassembly and assembly steps:

Step 1: Clean up all the dust on the surface of the laser head firstly.

Step 2: Loosen the 2-M3 screw with 2.5mm shex wrench.

Step 3: Horizontally take out the collimating drawer module and seal the port with masking tape to prevent the dust from entering the cavity.

Step 4: Take the gland upward and replace the lens. (Note that arrow sand is marked on the concave and convex surface of the lens or on the side of the mirror to identify the orientation of the lens)



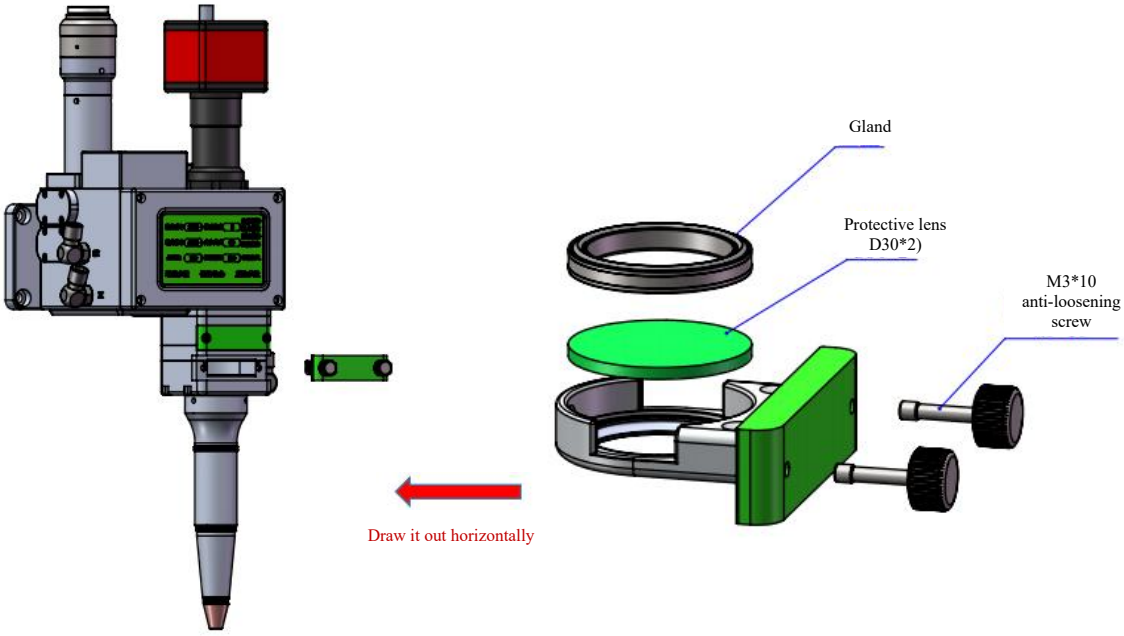
4.3.4 Disassembly and assembly of focus lens

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

Operation method:

First, loosen the left and right screws and pull the screws horizontally to pull out the protection drawer. Remove the gland upward to replace the lens. Pay attention to dust prevention and seal the exposed window on the cavity with masking tape to prevent the dust from entering the cavity that results in the

pollution after the drawer is taken out, and then replace the protective glass.



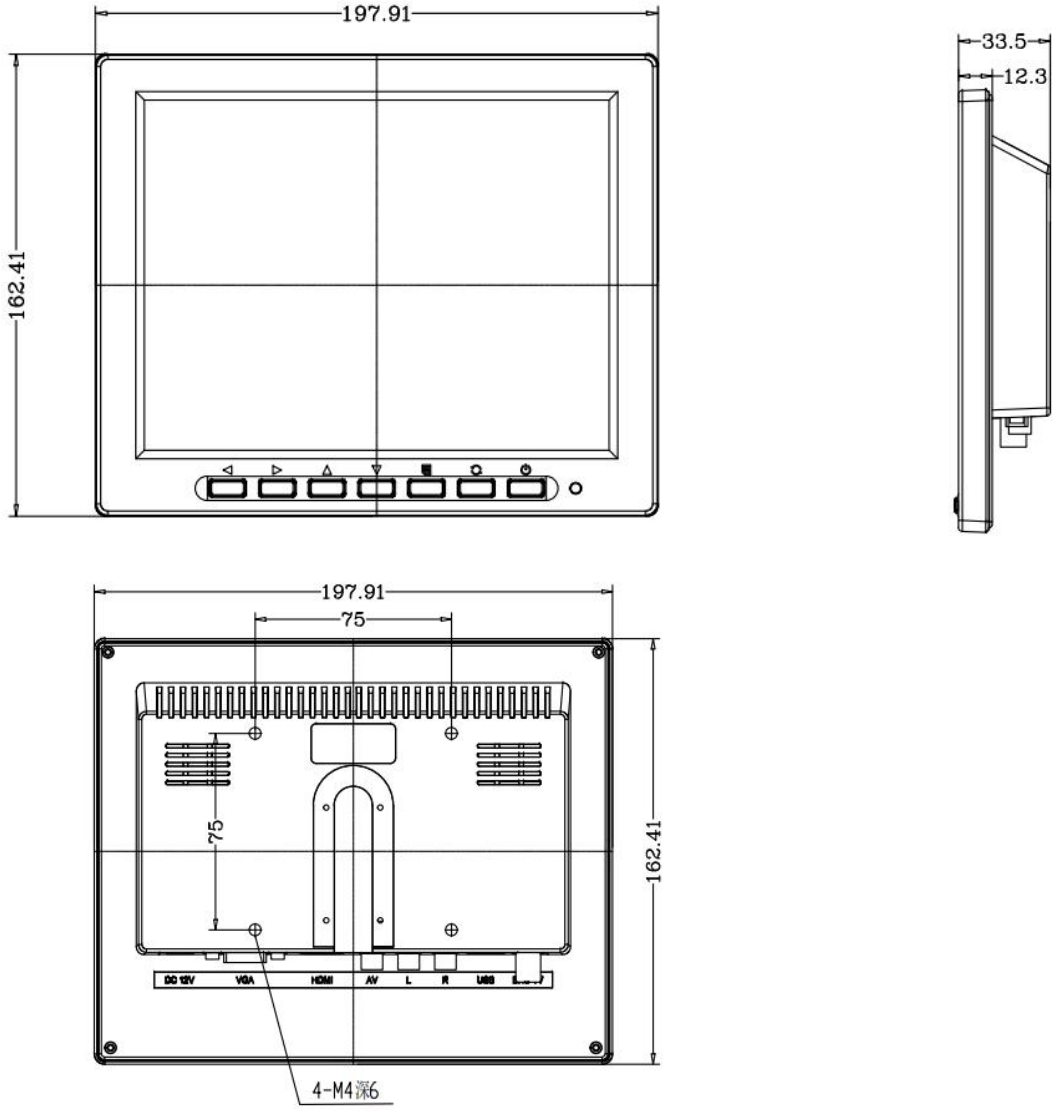
Chapter V Welding System

5.1 Installation dimension drawing for product

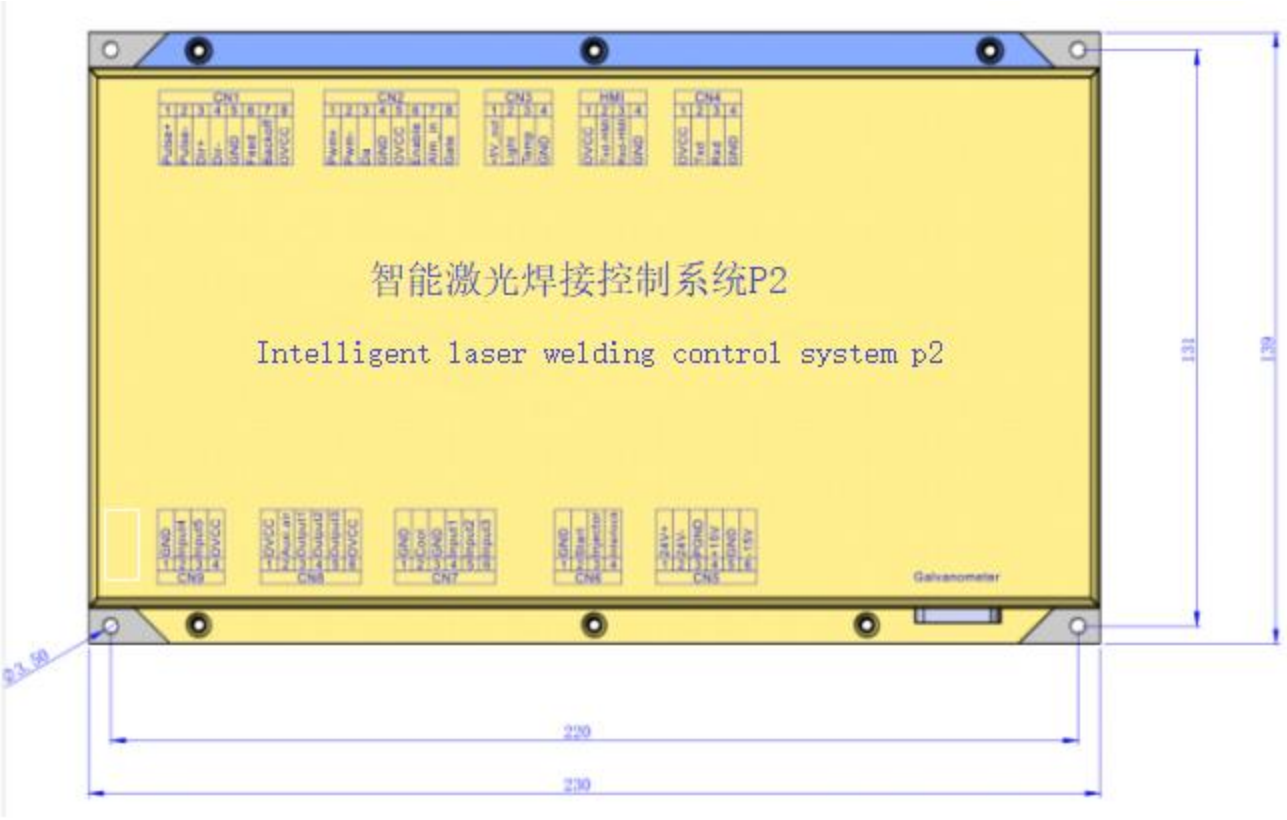
5.1.1 Installation dimension of CCD Display screen

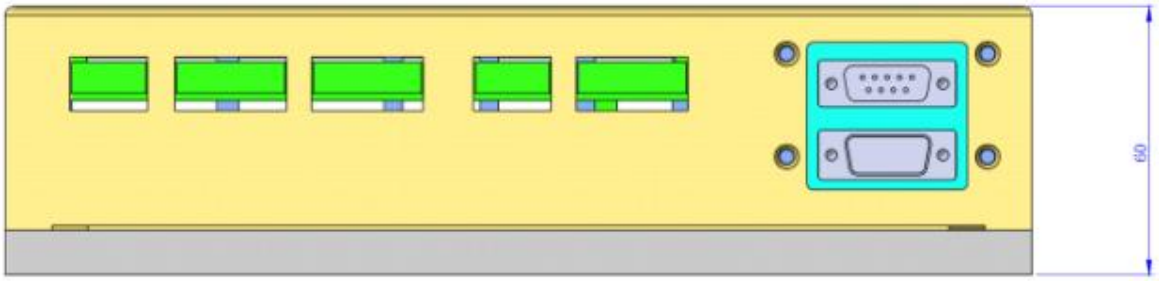
External dimension Eight-inch screen (200*165*20.1) mm

The installation dimension of the touch screen is shown in the following figure:



5.1.2 Installation dimension of mainboard





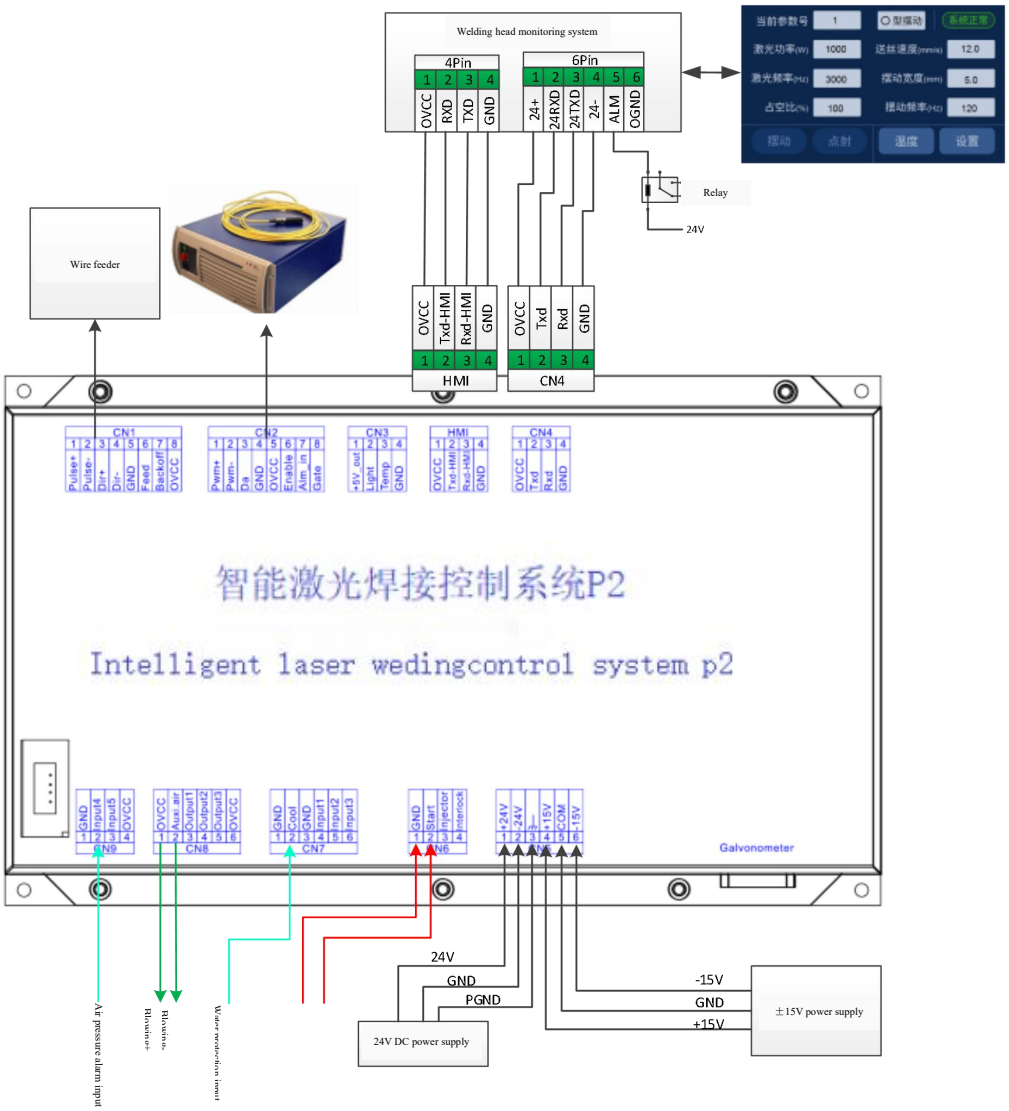
Chapter VI Electrical

6.1 Packing list

List				
S/N	Name	Graphical Representation	Quantity	Remarks
1	Intelligent double swing welding head		1	
2	24V Switching power supply		1	
3	±15V Switching power supply		1	
4	X-axis/Y-axis motor line		1	
5	Screen cable/monitor cable		1	
6	Display screen		1	
7	Display screen signal cable		1	
8	Power adapter cable (display screen)		1	
9	Fixed button		1	
10	Fixed foot stool		1	
11	Fixed hem facing		1	
12	Power adapter cable (camera)		1	
13	Intelligent laser welding control system P2		1	
14	Coiled water pipe assembly		1	
15	Laser welding blue light working lamp		1	

6.2 System wiring

The following figure is a schematic diagram for wiring of the whole system. Refer to the schematic diagram for system wiring. Refer to relevant chapters for detailed interface definition.



Note:

Don't connect the reserved pin in the mainboard.

6.3 CN5 power supply interface

The power supply interface falls into 6PIN green terminal, providing a power interface for mainboard and galvanometer externally, with voltage: DC 24V (DC 24V) and DC ±15V (DC ±15).

Table 6.3.1 shows the definition of CN5 power supply interface.

Table 6.3.1

Pin	Signal	Definitions	Instruction
1	24V+	Power supply input	+24V external power input and power supply output current: above 3A
2	24V-	Power reference ground	—
3	PGND	External shielding ground	Generally connecting to ground or enclosure
4	+15V	Power supply input	+15V external power input and power supply output current: above 3A
5	GND	Power reference ground	—
6	-15V	Power supply input	+15V external power input and power supply output current: above 3A

6.4 CN1 wire feeder interface

The wire feeder interface CN1 is a 8PIN green terminal, supporting motor wire feed and IO wire feed. Table 6.4.1 shows the definition of wire feeder interface.

Table 6.4.1

Pin	Signal	Definition	Instruction
1	Pulse+	Motor wire feed pulse + interface	Used for motor wire feed and connection with driver PUL+
2	Pulse-	Motor wire feed pulse - interface	Used for motor wire feed and connection with driver PUL-
3	DIR+	Motor wire feed direction + interface	Used for motor wire feed and connection with driver Dir+

4	DIR-	Motor wire feed direction-interface	Used for motor wire feed and connection with driver Dir-
5	GND	Reference ground	—
6	Feed	Wire feed control interface	Used for automatic wire feed of IO control wire feeder
7	Backoff	Wire draw control interface	Used for automatic wire draw of IO control wire feeder
8	OVCC	+24V power output	Power supply, maximum output: 500mA

6.5 CN2 laser interface

The laser interface is a 8PIN green terminal. Table 6.5.1 shows the definition of laser interface.

Table 6.5.1

Pin	Signal	Definition	Instruction
1	PWM+	Modulating signal+	Duty ratio: 1%-99% (adjustable), 24V level
2	PWM-	Modulating signal-	Duty ratio: 1%-99% (adjustable), 24V level
3	DA	Analog voltage output	0-10V analog voltage, used for laser peak power adjustment
4	GND	Power reference ground	Generally connecting to DA- and Enable-end
5	OVCC	+24V power output	Power supply, maximum output: 500mA
6	Enable	Laser enabling signal	24V level and high level: effective
7	Alarm	Laser failure alarm input	—
8	GATE	Red light index signal	The signal is needed by part of lasers. The function

			is reserved for use when leaving the factory

6.6 CN3 temperature sensor interface

The temperature sensor interface CN3 is a 4PIN green terminal. Table 6.6.1 shows the definition of temperature sensor. The user directly inserts the supporting connection line with terminal.

Table 6.6.1

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

6.7 HMI touch screen interface

The HMI interface is a 4PIN green terminal and power supply to and communication with HMI by the mainboard are performed via the port. Table 6.7.1 shows the definition of HMI interface.

Table 6.7.1

Pin	Signal	Definition	Instruction
1	OVCC	Power supply, 500mA	Monitor board and panel power supply
2	Txd-HMI	Connecting to the HMI sending end	Serial port communication TXD signal
3	Rxd-HMI	Connecting to the HMI receiving end	Serial port communication RXD signal
4	GND	Power reference ground	—

6.8 CN4 reserved serial interface

The reserved serial port CN4 interface falls into 4PIN green terminal, with no connection reserved. Table 6.8.1 shows the definition of CN4 interface.

Table 6.8.1

Pin	Signal	Definition	Instruction
1	OVCC	Power supply, 500mA	Monitor board and panel power supply
2	Txd	Connecting to TXD signal of monitor board	Serial port communication TXD signal

3	Rxd	Connecting to TXD signal of monitor board	Serial port communication RXD signal
4	GND	Power reference ground	—

6.9 CN6 external start and safety lock interface

The CN6 interface is a 4PIN green terminal. Table 6.9.1 shows the definition of CN6 interface.

Table 6.9.1

Pin	Signal	Definition	Instruction
1	GND	Reference ground	Generally connecting to the start button switch on the welding head-
2	Start	External start switch input	Generally connecting to the start button switch on the welding head+
3	Injector	Safety clamp signal input	The pin must be connected to the safety clamp and the safety clamp shall be clamped onto the metal material before welding.
4	Interlock	Safety lock signal input	The pin must be connected to the nozzle of the handheld head. The nozzle touches the metal material at the moment of welding.

6.10 CN7 common input interface 1

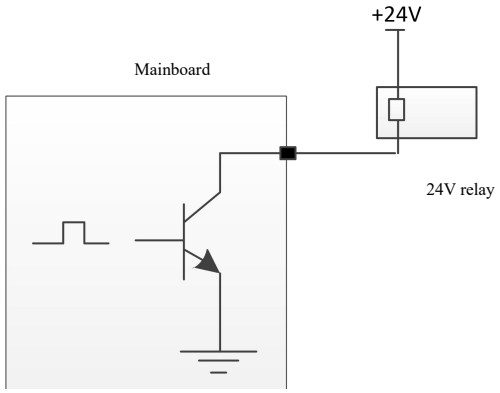
The CN7 interface is a 6PIN green terminal and of NPN type. Table 6.10.1 shows the definition of CN7 interface.

Table 6.10.1

Pin	Signal	Definition	Instruction
1	GND	Reference ground	—
2	Cool	Water-cooling machine alarm input	
3	GND	Reference ground	—
4	Input1	Reserved	—
5	Input2	Reserved	—
6	Input3	Reserved	—

6.11 CN8 common output interface

The CN8 interface is a 6PIN green terminal. The OC output can be used to directly drive the relay and the maximum current can reach to 500mA. Table 6.11.1-Schematic Diagram for Wiring is as follows:



Schematic Diagram for Output Port

Table 6.11.1

Pin	Signal	Definition	Instruction
1	OVCC	+24V power output	Power supply, maximum output: 500mA
2	Auxi.air	Protective gas	Used for protective gas blowing control
3	Output1	Green light	—
4	Output2	Red light	—
5	Output3	Buzzer	—
6	OVCC	+24V power output	Power supply, maximum output: 500mA

6.12 CN9 common input interface 2

The CN9 interface is a 4PIN green terminal. Table 6.12.1 shows the definition of CN9 interface.

Table 6.12.1

Pin	Signal	Definition	Instruction
1	GND	Reference ground	—
2	Input4	Undervoltage alarm input	
3	Input5	Reserved	—
4	OVCC	+24V power output	Power supply, maximum output: 500mA

6.13 Galvanometer interface

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

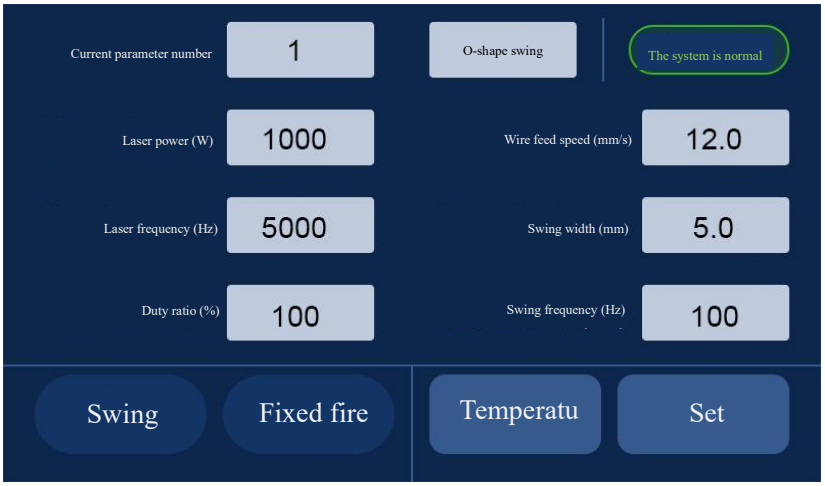
Chapter VII Introduction To HMI Operation

7.1 Introduction to HMI function

As for the laser welding system operation panel (hereinafter referred to as "HMI"), the 7-inch configuration TFT touch screen is used, with beautiful interface and convenient operation. The laser-related parameters can be set, respectively and the real-time display of input/output IO state, alarm information and running state can be realized on the main interface.

Refer to the following figure for the HMI main interface.

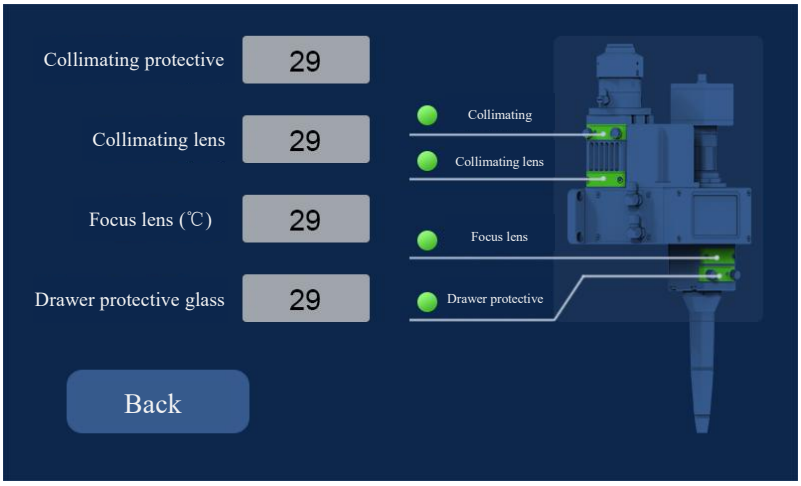
Main interface of HMI



[Swing]: It shows whether the current motor is swinging. Users can also use this button to control the swing of the galvanometer motor on or off.

[Fixed fire]: The light emitted by the laser that is controlled by this button, in a fixed fire way. The fixed fire parameters can be set in < Settings >-< Fixed Fire Parameters >.

[Temperature]: Click the touch button < temperature > to enter the real-time temperature monitoring interface, and observe the temperature of each lens of the welding head, as shown in the figure

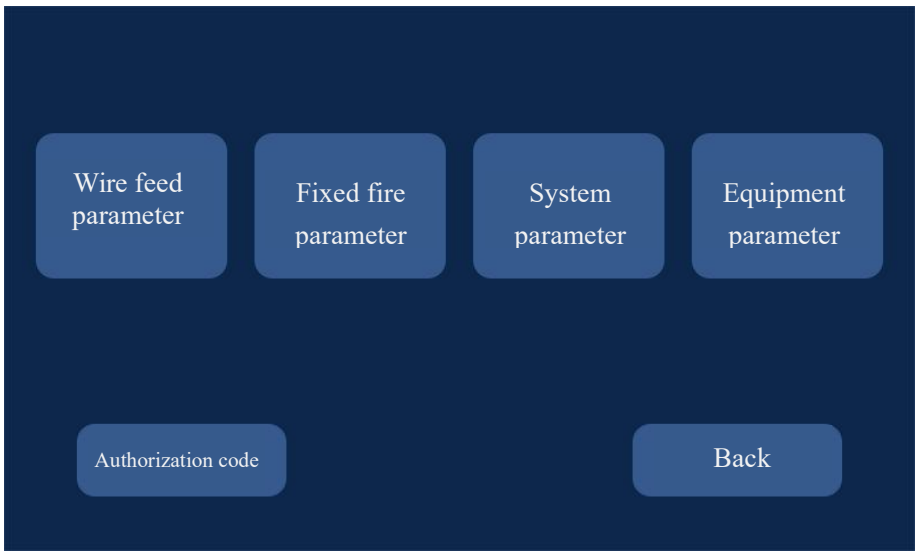


[Setting]: Click the < Setting > touch button to enter the parameter setting page, where you can configure < wire feed parameter >, < fixed fire parameter >, < system parameter >, < device parameter >, and < authorization code >.

7.2 Introduction to HMI operation

7.2.1 Parameter setting:

The parameter setting covers: Main interface process parameters, wire feed parameters, fixed fire parameters, system parameters, equipment parameters.



7.2.2 Process parameter: It is used to set laser control, swing type and wire feed parameters during welding.

Parameter number: The system supports nine parameter storage as well as the mode of "Current Parameter Number" and "Linkage Parameter Number".

Laser power: The optical output power is set for welding.

Laser frequency: Set the laser PWM modulating signal frequency.

Duty ratio: Set the duty ratio of PWM modulating signal, with setting range: 1%~100%.

Swing type: It supports a variety of swing types, including: '—',' | ','○','8','∞','◎','△','·'.

Swinging frequency: It is to set the swing frequency of motor.

Swing length: It is to set the swing width of motor.

Wire feed speed: It is to set the speed of wire feed for welding.

7.2.3 Wire feed parameter: It supports wire feed and wire withdrawal control, and can also set automatic wire filling parameters and wire retreat parameters.

Wire withdrawal speed: The speed at which the motor automatically withdraws after the light is stopped.

Time of wire withdrawal: It refers to the time of automatic wire withdrawal of motor.

Wire filling speed: It refers to the speed of automatic wire filling of motor.

Time of wire filling: Time of automatic wire filling of motor.

Manual wire feed: Press the manual wire feed to start, and stop when it is released. It is used for relatively short length of wire feeding.

Manual wire withdrawal: Press the manual wire withdrawal to start, and stop when it is released. It is used for relatively short length of wire withdrawal.

Continuous wire feed: Click continuous wire feed to start, and click again to stop. It is used for relatively long length of wire feeding.

Continuous wire withdrawal Click continuous wire withdrawal to start, and click again to stop. It is used for relativel long length of wire withdrawal.

7.2.4 Fixed fire parameter: It is used for the laser parameters of the light emitted by fixed fire.

Fixed fire time: It is used for the light extraction time of the light emitted by fixed fire.

Fixed fire pwoer: It is used for the light extraction power of the light emitted by fixed fire.

Fixed fire frquency: It is used for the light extraction frequency of the light emitted by fixed fire.

Fixed fire duty ratio: It is used to set the duty ratio of the light emitted by fixed fire.

7.2.5 System parameter: It is used to set relevant parameters of the equipment.

Initial power: It is used to set the initial power of the laser when the laser analog voltage is started.

Closing power: It is used to set the closing power of the laser when the laser analog voltage is stopped.

Slow rise time: It is used to set the time from the initial power to the maximum power when the laser analog voltage is started.

Slow down time: It is used to set the time from the initial power to the closing power when the laser analog voltage is stopped.

Open air in advance: At the start of processing, first blow air for a period of time, and then begin to laser processing.

Close air in delay: Stop blowing after stopping laser emission, and then delaying for a period of time when processing is stopped.

Automatic swing: Used for automatic swing when the galvanometer is set; Enable the automatic swing. When the breakover of the safety lock arises, the automatic swing of the galvanometer will happen. In case of no breakover of the safety lock, the galvanometer motor won't swing automatically after delay for a period of time.

Language: It is used to switch languages.

Job category: This parameter is used to set the parameter setting mode. The value can be "Current Mode" or "Linkage Mode". **Current mode:** Parameter number can be selected by touch screen. **Linkage mode:** The parameter number is selected by the external input signal, and the corresponding relationship between the external output state and the parameter number is as follows:

Linkage parameter number	Input1	Input2
Linkage parameter number 1	High level	High level
Linkage parameter number 2	Low level	High level

Linkage parameter number 3	High level	Low level
Linkage parameter number 4	Low level	Low level

7.2.6 Equipment parameter: It is used to set basic parameters of equipment, and the password is required to be entered to enter device parameter configuration.

Rated power of laser: Used for setting the rated power of the laser.

Wire feed step: Step at the time of motor wire feed.

The maximum swing frequency: It is to set the maximum swing frequency of motor.

Maximum swing length: Set the maximum length at the moment of swinging. When the set length of welding parameter exceeds the maximum length, the length will be restricted to the maximum length.

X correction coefficient: When the set length of the X-axis is inconsistent with the actual length and there is a slight difference, it can be modified by this parameter; when no modification is required, it is generally set to 1.

Y correction coefficient: When the set length of the Y-axis is inconsistent with the actual length and there is a slight difference, it can be modified by this parameter; when no modification is required, it is generally set to 1.

Laser alarm enabling: Enable the laser alarm. When the laser gives an alarm, an alarm signal will be produced.

Laser alarm level: Laser alarm logic level.

Air pressure alarm enabling: Enable the gas alarm. When an alarm is given due to the gas underpressure, an alarm signal will arise.

Air pressure alarm level: Under pressure alarm logic level.

Cooling-water machine alarm enabling: Enable the cooling-water machin alarm. When the cooling-water machin gives an alarm, an alarm signal will be produced.

Cooling-water machine alarm level: Cooling-water machine alarm logic level.

Warning value of collimating protective lens: In terms of collimating protective lens

temperature alarm value, when the temperature of the lens exceeds the warning value but is less than the alarm value, the system will give a warning but not generate an alarm.

Warning value of collimating protective lens: In terms of collimating protective lens temperature alarm value, when the lens temperature exceeds the warning value, which will trigger an alarm, following by stopping processing.

Warning value of collimating lens: In terms of collimating lens temperature alarm value, when the temperature of the lens exceeds the warning value but is less than the alarm value, the system will give a warning but not generate an alarm.

Collimating lens alarm value: In terms of collimating lens temperature alarm value, when the lens temperature exceeds the warning value, which will trigger an alarm, following by stopping processing.

Focus lens value: In terms of focus lens temperature alarm value, when the temperature of the lens exceeds the warning value but is less than the alarm value, the system will give a warning but not generate an alarm.

Focus lens alarm value: In terms of focus lens temperature alarm value, when the lens temperature exceeds the warning value, which will trigger an alarm, following by stopping processing.

Drawer protective glass value: In terms of drawer protective glass temperature alarm value, when the temperature of the glass exceeds the warning value but is less than the alarm value, the system will give a warning but not generate an alarm.

Drawer protective glass alarm value: In terms of drawer protective glass temperature alarm value, when the glass temperature exceeds the warning value, which will trigger an alarm, following by stopping processing.

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