# ND18Q (temperature measuring version) operation manual

## Contents

Kindly reminder:

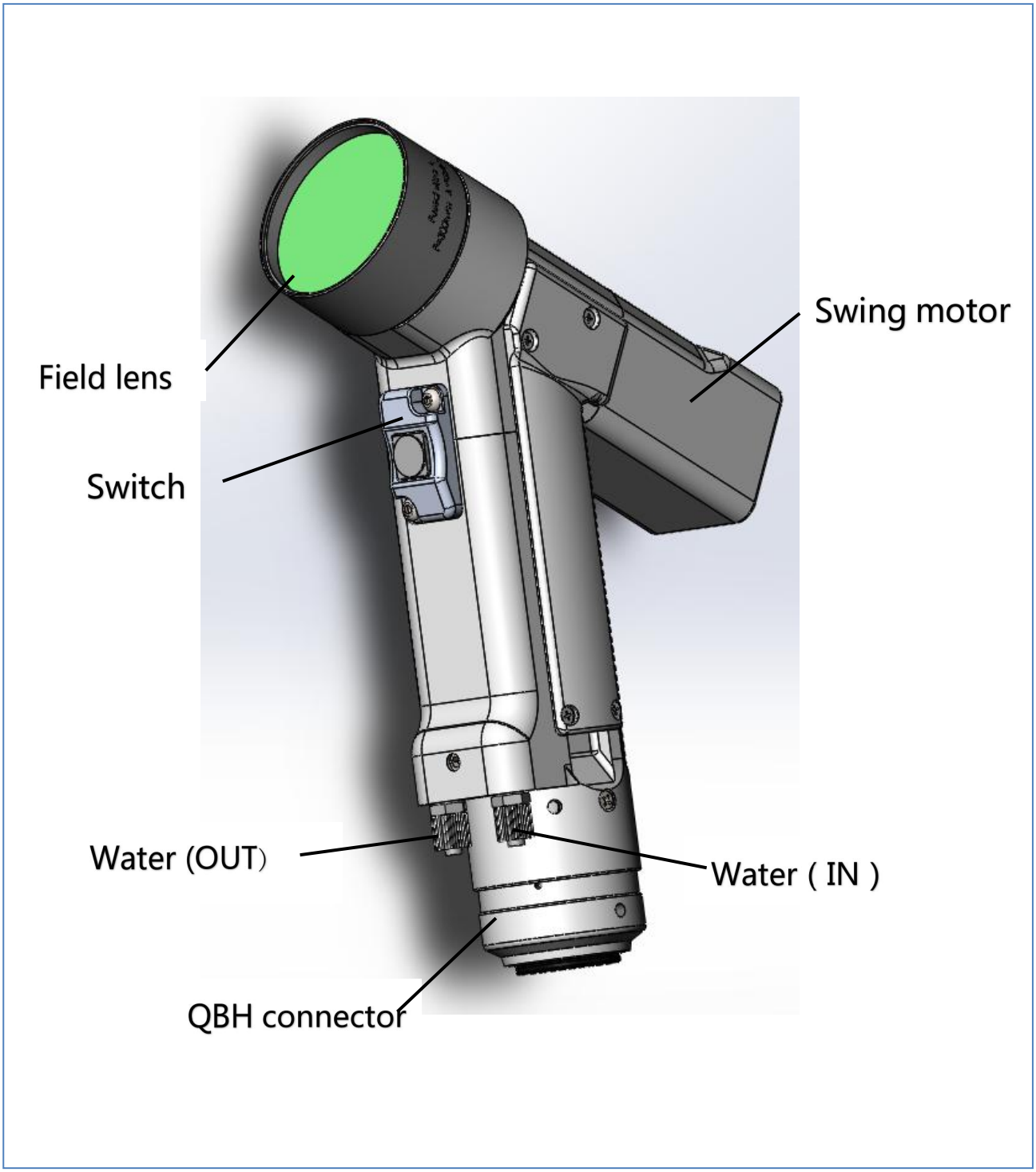
Please read this manual carefully before using the product!

Please keep this manual properly for future operation and maintenance!

# 1. Product description

## 1.1. Product schematic diagram

ND18Q Hand-held cleaning head




Note:

1. Water pipe connection, please ensure sufficient water quantity, and the water pressure should be above 0.4MPa.

## 1.2. Main functions

1.Non-contact cleaning with a maximum cleaning width of 150mm without damage to the part base.

2.No need for any chemical cleaning liquid, no consumables, safe and environmental protection.

3.The operation is simple, it can be used after power on, and it can be hand-held or cooperated with a robot to realize automatic cleaning.

4.Fast cleaning, high efficiency, time saving.

5.The laser cleaning system is stable and requires almost no repair.

## 1.3 Technical parameter

Connector type: QBH

Laser incident mode: coaxial

Working power: ＜3000W

Laser wavelength range: 1070±20

Collimation length: 50mm

Focusing length: 300mm

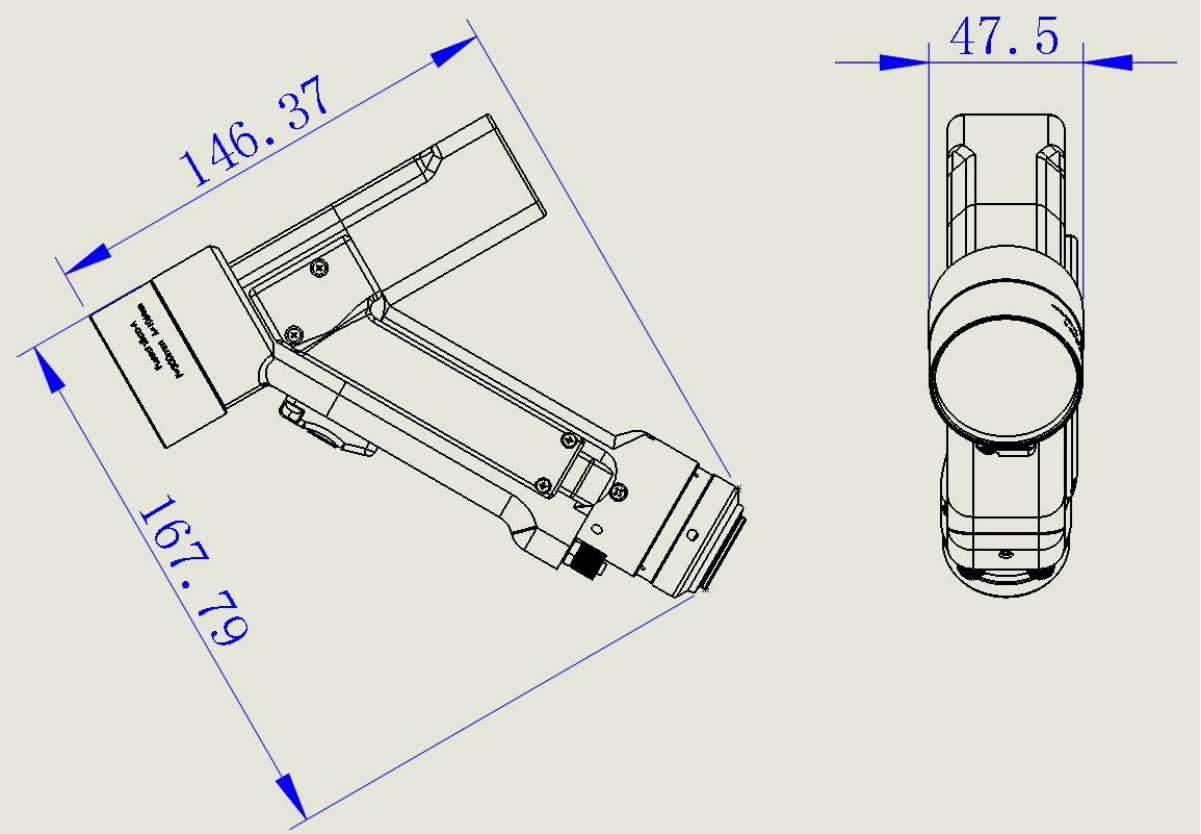
Operating distance: 450mm

Adjustable surface:80-150mm

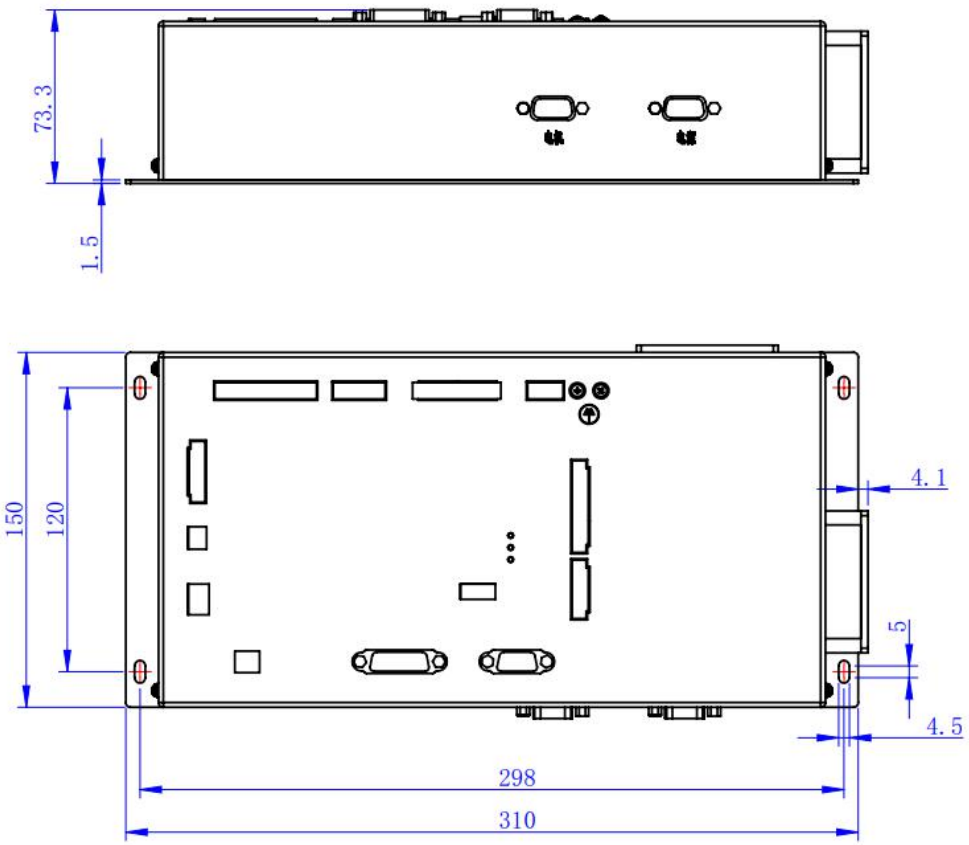
Weight: 0.8kg

## 2. Main components

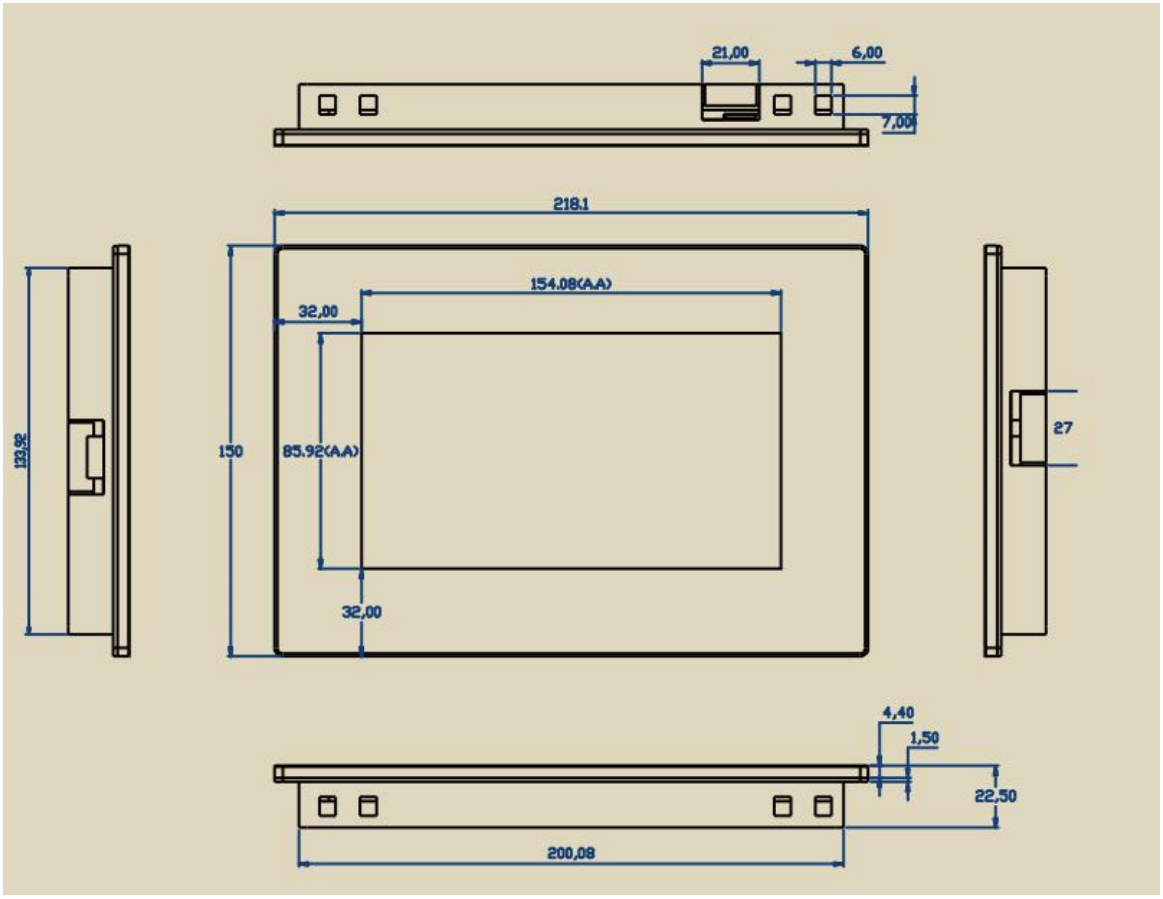
### 2.1. Cleaning gun



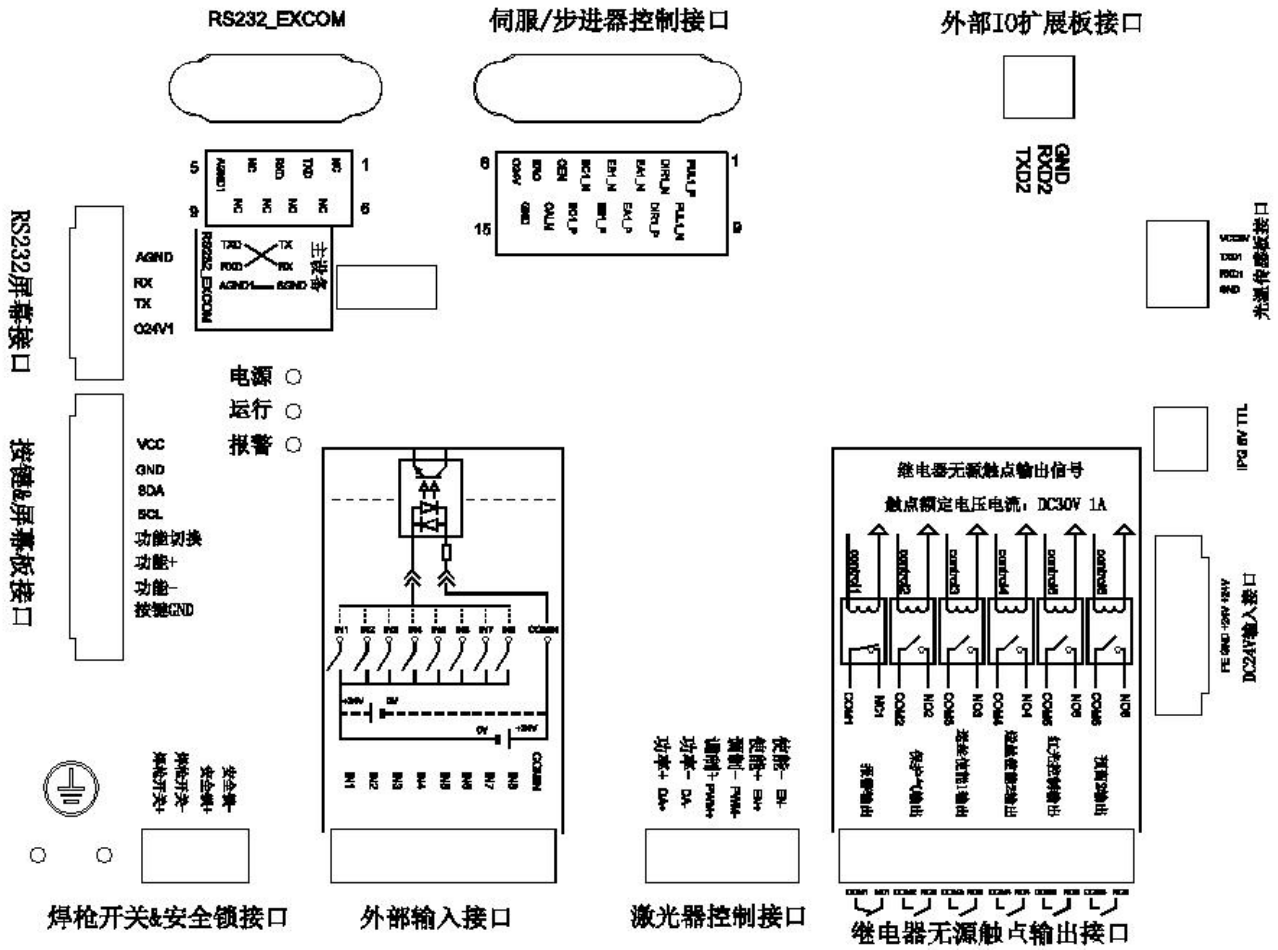

### 2.2. Control box



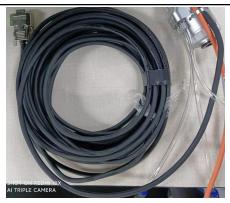
## 2.3. Screen




2.3.1. Schematic diagram of the external port wiring



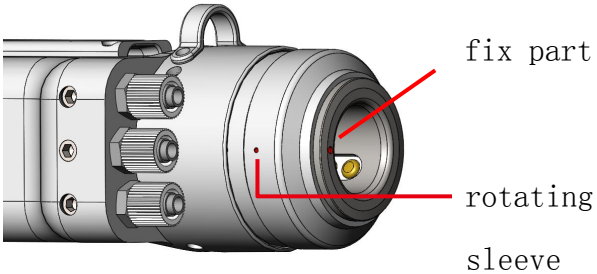
# 3. Components list

| No. | Item | specifications and models | Qty | picture | Note |
|---|---|---|---|---|---|
| 1 | Hand-held cleaning head | ND18Q | 1 |  | |
| 2 | Power Supply 1 | HF55W-SE-24 | 1 |  | |
| 3 | Power Supply 2 | ±15V.3A | 1 |  | |
| 4 | DC power cord | ND18-DYWXS-2MT | 1 |  | |
| 5 | ND18A motor cord | ND18A-DJYCYC-A-10M/T2 | 1 |  | |
| 6 | Switch cord | ND18Q-KGYCX-10MT | 1 |  | |
| 7 | Control box mounting bracket | YW52-240L | 4 |  | |
| 8 | Screen + four-core shielding wire | 7.0 inch+Four cores four pins 2.54mm to four cores 8 needles 2.0mm | 1 |  | |
| 9 | Screen mounting buckle | / | 4 |  | |
| 10 | User manual | ND18A | 1 |  | |

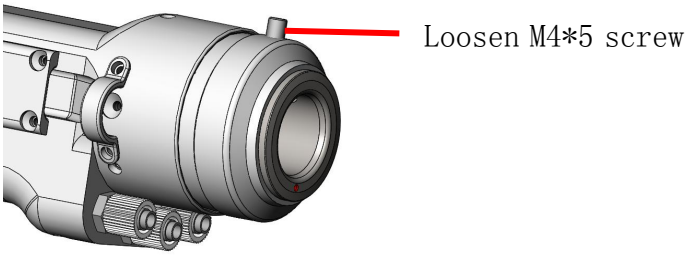
# 4. Installation

## 4.1. QBH connection

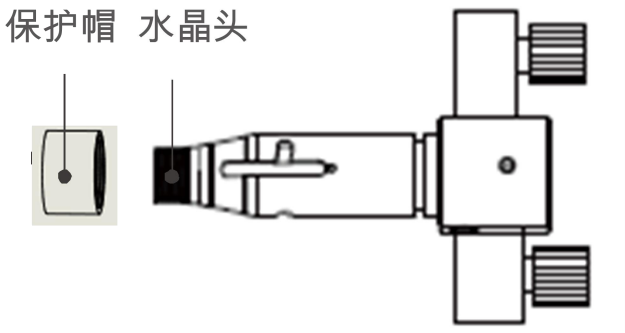
1) Before turning the sleeve as below, make sure the red marks are aligned to the white marks.



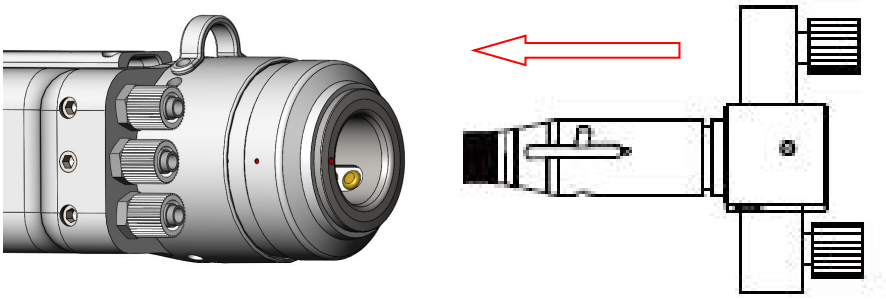

2) Loosen the rotating sleeve locking screw (it is at the 180 degree position of the rotating sleeve red dot), otherwise the QBH cannot be rotated and the optical fiber cannot be locked.




3) 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.




4) 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.



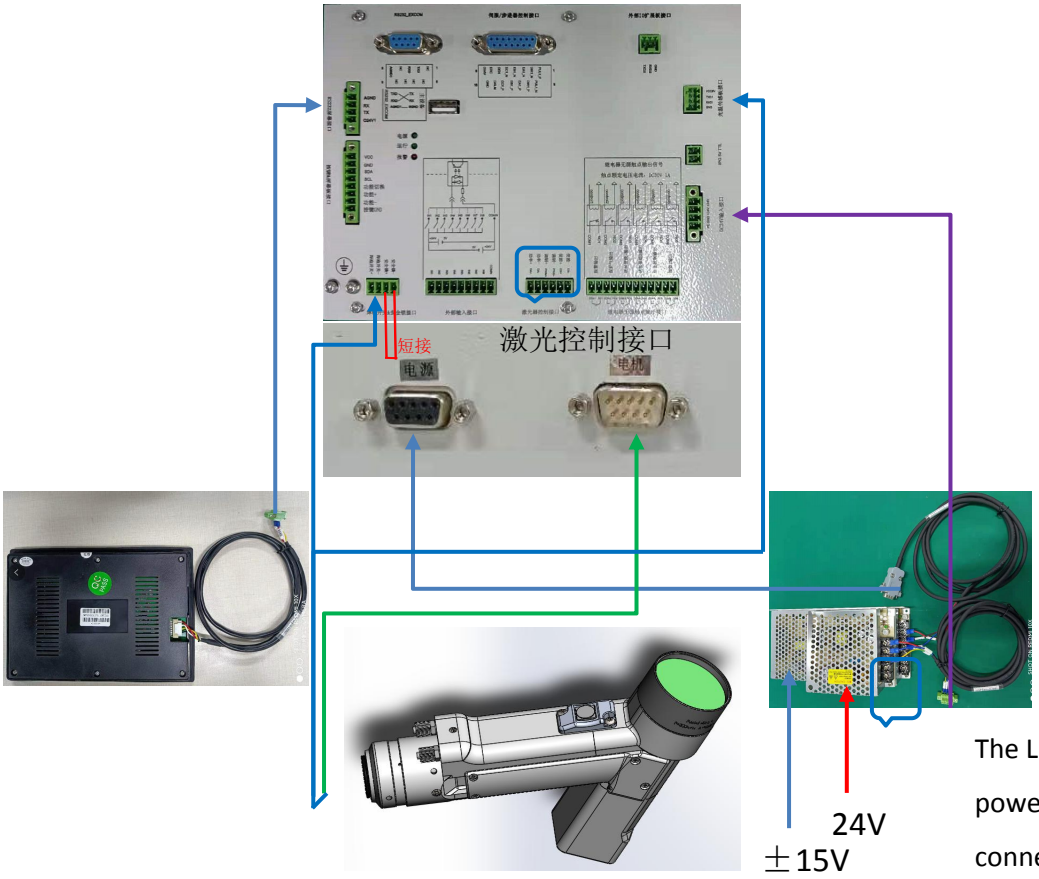
5) After inserting the fiber rod into QBH, press the sleeve gently and turn it about 15 degree along the arrow on the sleeve. Then pull the sleeve until its underside is parallel with the top of QBH, turn the sleeve at the same direction till the limit.

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.

6) After inserting the fiber rod into the QBH, turn and lock the rotating sleeve tightly.

## 4.2. Electrical connections




The L and N of the switching power supply need to be connected to a 220V AC power supply, and ⏚ a grounding wire is required

# 5. Control board port definition

## 5.1 Indicator

| The position of the indicator light from the end of the power source is as follows: | |
|---|---|
| Power Indicator | This light is on when 24V power supply is normal. |
| Operation Indicator | It flickers when the 24V power supply is normal, and it flickers faster when the galvanometer is turned on. |
| Alarm Indicator | This light will be on when the control card system detects an abnormal and stop output. The abnormal conditions: 1 receiving alarm signal, such as from the chiller; 2 control card system abnormal. |

## 5.2 Cleaning head switch & safety lock interface

| port | function | description |
|---|---|---|
| Switch+ | Switch+ | Connect to the side of the cleaning gun button through the switch cord. |
| Switch- | Switch- | Connect to the side of the cleaning gun button through the switch cord. |
| Safety lock+<br>Safety lock- | Safety lock+<br>Safety lock- | Short connect both ends with a short line |

**Sample operation:** (Before operation, make sure that all machines are turned on and everything is normal, and the red light is in the center of the field lens)

① Remove the field lens protection cover;

② After setting the laser parameters on the operation screen, press "Save", and press "Laser" to activate the button (input 666666 to enter the advanced parameters, confirm that the DA voltage range is not "0"; if it is set to 0, it must be selected manually 0-10V and press "Save" to return to the main page);

③ Point the field lens of the laser cleaning head at the cleaning objects and press the button of the cleaning head.

## 5.3 External input interface

All input signals of this interface must be DC 24V level signal, each input port driving

current greater than 1mA; support leakage input or source type input.

| Port | Function definition | Functional description |
|---|---|---|
| IN1 | Laser alarm | External laser alarm signal input port; when the alarm input of this port is detected, all external output are stopped, and the screen displays the alarm status for it. |
| IN2 | Water cooling alarm | External water cooler alarm signal input port; when the alarm input of this port is detected, all external outputs are stopped and the screen displays the alarm status. |
| IN3 | Air pressure alarm | The alarm signal input port of the external gas pressure detector; when the alarm input of this port is detected, all external outputs are stopped and the screen displays the alarm status. |
| IN4 | Reserved 1 | Reserved for further development. |
| IN5 | Reserved 2 | Reserved for further development. |
| IN6 | Reserved 3 | Reserved for further development. |
| IN7 | Reserved 4 | Reserved for further development. |
| IN8 | Reserved 5 | Reserved for further development. |
| COMIN | Common | External input interface public port, according to the external environment, use NPN interface or PNP input, this port can use +24V or 0V as a public signal return, choose one of 24V and 0V. The DC24V power supply is a choice between 24V and 0V),！！！This terminal is often connected to 24V. |

5.4 Laser control interface

（The default standard model supports laser power DA voltage 0-10V, modulation and enable signal level 24V. If the user uses a special laser that only supports power DA voltage 0-4V, there is a spare 2.0mm jumper cap in the box, open the control box, and short the jumper cap to the blue board JP2 position. If the modulation signal and the enable signal only support 5V TTL level, also in the JUP1 position of the board, short the jumper to the positions of VCOM and V5V.）

| Port | Function definition | Functional description |
|---|---|---|
| DA+ | Laser power + | The laser power setting signal is output; the specific power setting can be set on the screen interface, and it can be output only when the screen interface activates "Laser". |
| DA- | Laser power - | |
| PWM+ | Modulated signal + | Output laser light modulation signal; specific settings can be set on the screen interface, and only when the screen interface activates "Laser" can it be output. |
| PWM- | Modulated signal - | |
| EN+ | Laser enable + | Output laser light emission enable signal; it can be output only when "Laser" is activated on the screen interface. |
| EN- | Laser enable - | |

**5.5 Relay passive contact output interface**

This interface is a passive contact, and each signal port is equipped with 2 passive contacts. When wiring, the corresponding COM port needs to be powered from an external independent power supply as the positive signal, the NO port is connected to the positive electrode of the external signal, and the negative electrode of the external signal is connected to the 0V of the corresponding external independent power supply to complete the power supply loop. All the following relay contacts are rated with load: contact rated voltage and current: DC30V 1A. (If user needs to drive higher voltage and higher current equipment, please make the relay transfer process outside, and the positive and negative ends of the external relay coil must be connected with bypass diodes in reverse, such as 1N4007 high-power high-voltage diodes, the cathode of the diode should be connected to the anode of the relay coil, and the anode of the diode should be connected to the cathode of the relay coil.)

| Port | Port name | Function definition | Functional description |
|---|---|---|---|
| COM1 | Contact common port 1 | Alarm output | When an alarm occurs, COM1 and NC1 are connected, and when normal, COM1 and NC1 are disconnected; after the system receives an external input alarm signal or |
| NC1 | Contact normal closed | | |

| | | | |
|---|---|---|---|
| | port1 | | other alarm signals, it will generate an alarm contact passive output signal. |
| NO4 | Contact normal open port 4 | | |
| COM5 | Contact common port 5 | Red light control output | Some lasers can be connected to this interface if they must be connected to the red light control signal to allow light to be emitted. When welding is started and the screen activates "Laser" and there is no alarm, COM5 and NO5 are connected; when welding is not started, COM5 and NO5 are disconnected. |
| NO5 | Contact normal open port 5 | | |
| COM6 | Contact common port 6 | Reserved 2 output | Reserved for further development. |
| NO6 | Contact normal open port 6 | | |

**5.6 DC24V input interface**

Please correctly connect the power and the corresponding ground line according to the port number. Do not connect to the DC power supply and mains power exceeding 24V to avoid damage!

| Port | Function definition | Functional description |
|---|---|---|
| PE | Protecting earthing | Leakage discharge safety ground stake or protective ground. |
| GND | Power 24V reference ground | Power input port, DC 24V switching power supply reference ground 0V. |
| +24V | Power 24V + | Power input port, DC 24V switching power supply positive |
| +24V | Power 24V + | Power output port, DC voltage fixed output +24V, |

| | | |
|---|---|---|
| | | internally connected to the positive port of DC 24V switching power supply. |

5.7 IPG 5V TTL

**Conditions of Use: Special customized reserved interface for the customer uses the laser controlled by 5V TTL level**

Function: 5V TTL fixed output signal

Signal type: fixed output

Standby operation: When external equipment, such as some TTL level controlled lasers, this type of equipment is only suitable for 5V TTL level control signals, it needs to be level converted, such as the "red light control" signal of this type of laser only supports 5V input signal to control it. User can use the connecting wire to lead the "IPG 5V TTL" interface to the COM5 port of the "relay passive contact output interface", and use another wire from the NO5 port to connect to the "red light control" interface positive port of the laser, and the negative port of the "red light control" are connected to the GND port of the "DC24V input interface" to complete the control of the red light control using the 5V TTL level.

**Do not connect other voltage signals to this interface, and do not short-circuit this interface to GND.**

5.8 External IO expansion board interface

Reserved interface for further development.

5.9 RS232_EXCOM

**The interface needs to be customized before it is open to use.**

5.10 RS232 screen interface

This interface is an RS232 level screen interface, which only connects to the screen equipped by our company. The user cannot access other screens or modify the wiring without authorization. (Depending on the actual design environment of the customer's equipment, 15 the length of the wire can be extended, and the length is recommended to be less than 5 meters).

| Port | Function definition |
|---|---|
| AGND | Signal ground |
| RX | Data reception |

| | |
|---|---|
| TX | Data sending |
| 024V1 | Output 24V power supply (voltage range 22V-24V) |

5.11 Button & screen board interface

(This interface is only used for the spare port of other models)

# 6. Software description

## 6.1 Main interface


## 6.2 Main interface function description

1、Galvo control

Turn on/off galvo output



On: turn on the galvanometer output; note: if there is no laser output, this switch will automatically turn off in 5 minutes.

Off: stop the galvanometer output.

Touch action: on / off

## 2、Save

Press "Save" to save the currently modified data.

The red dot in the parameter box of the successful save will disappear. If the red dot does not disappear, it means that the communication between the screen and the control board is abnormal and needs to be repaired!

## 3、Advance

Enter advanced settings or temperature control settings.

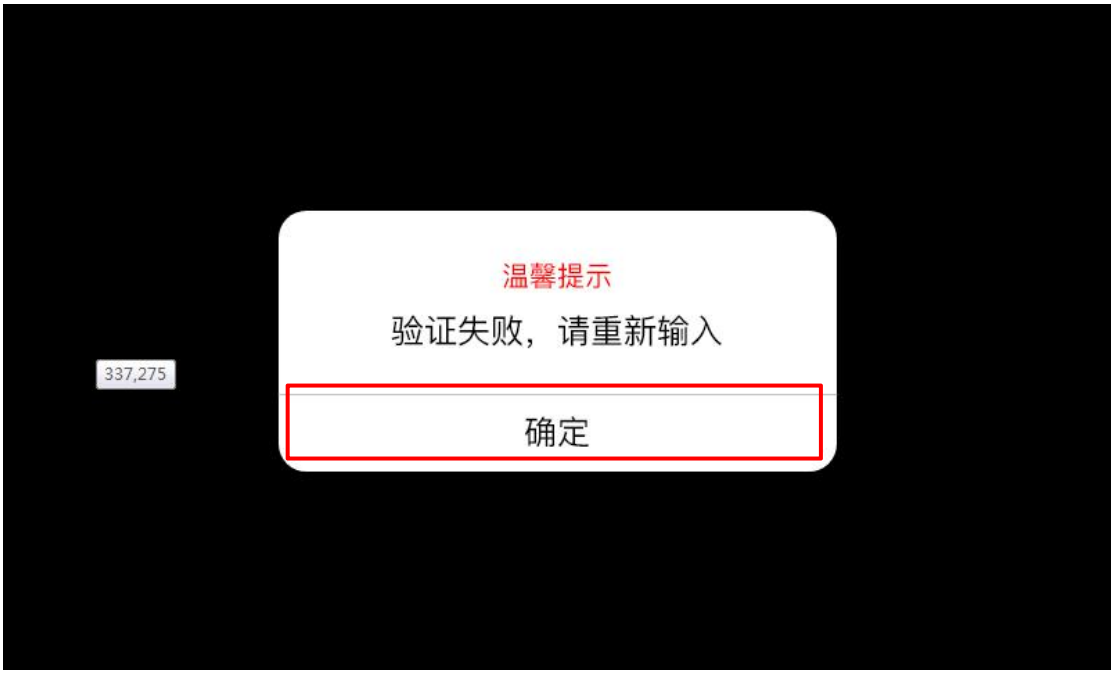
Note:

1) Enter the password 666666 to enter the advanced setting page, and enter the password 55555 to enter the temperature control setting page;

2) Enter other passwords, it will jump to [Verification failed] prompt: verification failed, please re-enter.

Touch action:

The password keyboard pops up, and the verification is performed according to the password entered by the user. If the verification succeeds, it will jump to [Advanced Settings] or [Temperature Control Settings]. If the verification fails, it will jump to [Verification Failure].




The prompt message after the verification fails, press "OK" to jump to the [Main Menu]

4、Lock screen

Jump to the lock screen page to prevent accidental touch


【Main Menu】Lock screen information, click on the above area page to jump to [Main Menu]

## 5、Swing frequency

Set the swing speed of galvanometer

Note:

1) The minimum speed is 1Hz, and the maximum default is 110Hz (according to the maximum speed of the galvanometer in the advanced settings page), and the unit precision is 1Hz.

Touch action: the keyboard pops up, and the user can enter custom data.

## 6、Swing Width

Set the size of the swing figure (straight line)

Range and accuracy: the minimum width is 0.1mm, the maximum is set according to the advanced parameters, and the unit precision is 0.1mm;

Touch action: the keyboard pops up, and the user can enter custom data.

## 7、Laser duty cycle

Set the output value of the laser duty cycle

Setting range and description:

1) 1The minimum value of the laser duty cycle is 0, the maximum value is 100,(set according to the laser power range in the advanced settings page), unit precision is 1

2) Factory default 0~10V, corresponding to this value 0~100,10%= 1V (actual output)

Touch action: the keyboard pops up, and the user can enter custom data.

## 8、Laser center

Adjust the red light position

Note:

1) Correction value> 0, the red light moving to the left;

2) Correction value <0, the red light moving to the right;
3) Correction value range: -10.0 to 10.0 mm;
4)  correction value +1, support long press;  correction value -1, support long press;

Touch action: the keyboard pops up, and the user can enter custom data.

## 9、Laser output

Turn on/off laser output

Note:

1) This function will only take effect when used in conjunction with the "switch" of the control box input port to prevent the screen from being accidentally triggered by the operator, injuring people and workpieces.
2) It is recommended that the allowable laser output of the screen is kept on, and the laser output is controlled by the"switch" of the input port of the control box. Use NPN connection to connect the control box input port"switch" to the external console. Short the port "switch" signal to AGND (common signal ground with the console) to start laser output, otherwise stop laser output.

Laser output:

1、Turn on "Allow laser output" on the screen

2、Use NPN connection to connect the input port "switch" of the control box to the external console, and the signal of the port "galvanometer switch" is shorted to AGND (common signal ground with the console).

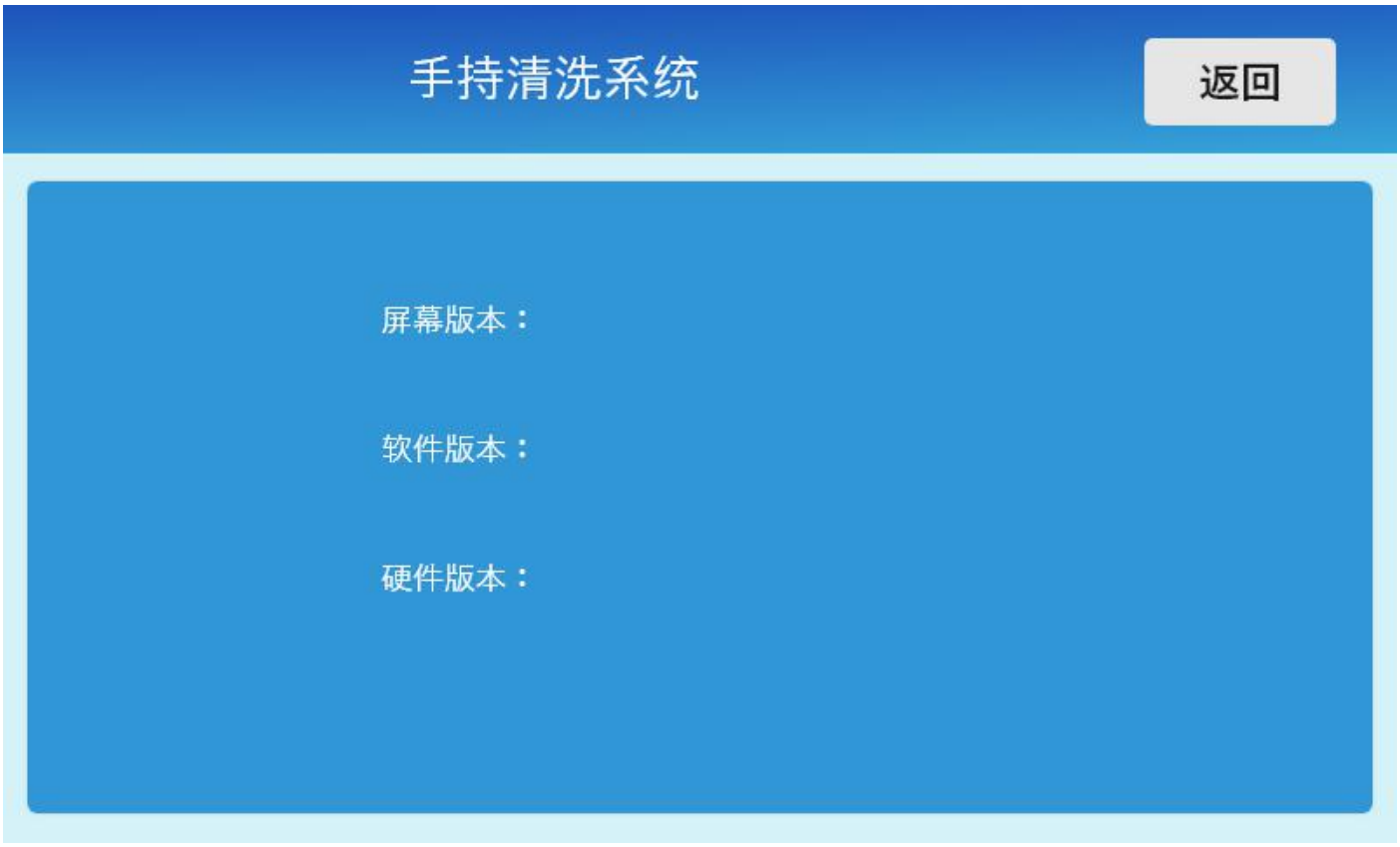
Laser off: the screen's allowable light function is off or the control box input port "welding switch" is disconnected from AGND.

Touch action: turn on/off.

## 10、Version information (at the top left corner)

Press on the top left corner to view the company's contact information and version

information




Press "Back" to jump to the [main menu].

## 11、Signal monitoring

1) Press “ 

” to enter the interface below:


Display input and output IO and color different states, as follows

1) The gray mark corresponds to the external IO not working

2) The green indicator corresponds to the external IO working normally

3) The red indicator corresponds to the external IO working abnormal

Press the "Back" button to return to the main menu.

## 6.3 Advance parameter interface


## 6.4 Description of advance parameter function

1、Speed threshold

Set the speed threshold of the galvanometer

Note:

1) When setting the threshold, only downward setting is allowed, but upward setting is not allowed. That is, the set value will not be greater than 600Hz or 2400mm/s;
2) After this value is set, the speed parameter of the galvanometer will be limited according to the maximum value of this value.

Touch action: the keyboard pops up, and the user can enter custom data.

2、Width correction

Correct the size of the current graphic

Note:

1) If the width correction value is >0, the current graphic size will be enlarged;

for example, if the setting is 1mm, the actual output is 0.5 mm. At this case, the width correction value needs to be set to 50, and the enlargement will be doubled. Specific can be adjusted according to actual conditions.

2) If the width correction value is less than 0, the current graphic size will be reduced; for example, if the setting is 1mm, the actual output is 2 mm. At this case, the width correction value needs to be set to -50, which is doubled. Specific can be adjusted according to actual conditions.

3) Width correction value range: -100 ~ 100.

4)  Width correction value +1, support long press;  Width correction value -1, support long press;

Touch action: the keyboard pops up, and the user can enter custom data.

### 3、Laser duty cycle

Set the output value of the laser duty cycle

Setting range and description:

1) The minimum laser duty cycle is 0, and the maximum is 100;

2) The higher the duty cycle, the stronger the laser output at the same power frequency

Touch action: the keyboard pops up, and the user can enter custom data.

### 4、Laser frequency

Set the output value of the laser frequency

Setting range and description:

1) Minimum Laser frequency is 1Hz and the maximum is 10,000 H z (10kHz);

2) The higher the frequency value, the stronger the laser output under the same power duty cycle.

Touch action: the keyboard pops up, and the user can enter custom data.

### 5、Laser output delay time

Set the delay time of laser output after gas output

Note:

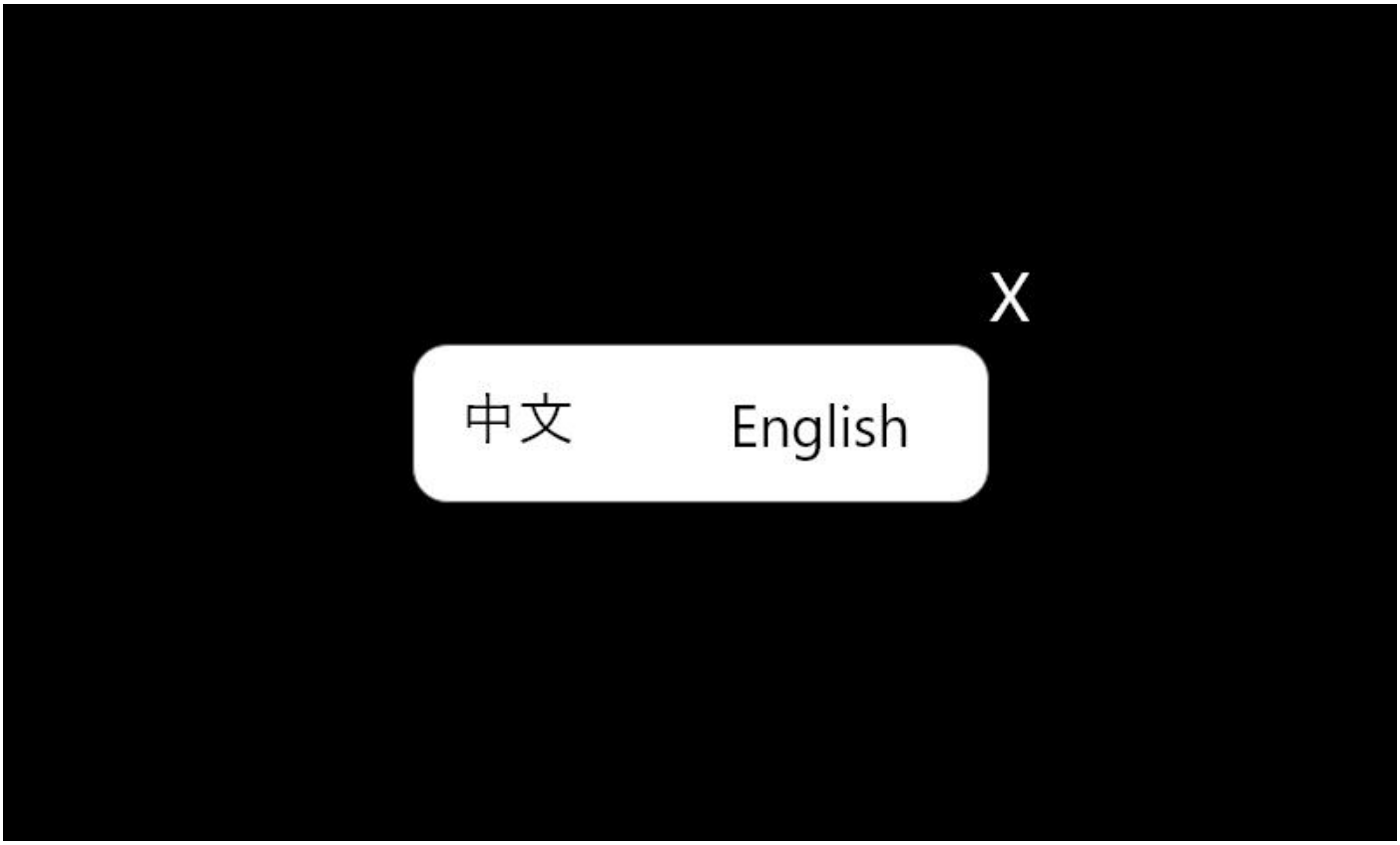
1) Parameter value range: 0~10000ms;

2) If the value is set to 0, the gas and laser will be output at the same time.

Touch action: the keyboard pops up, and the user can enter custom data.

## 6、Language selection

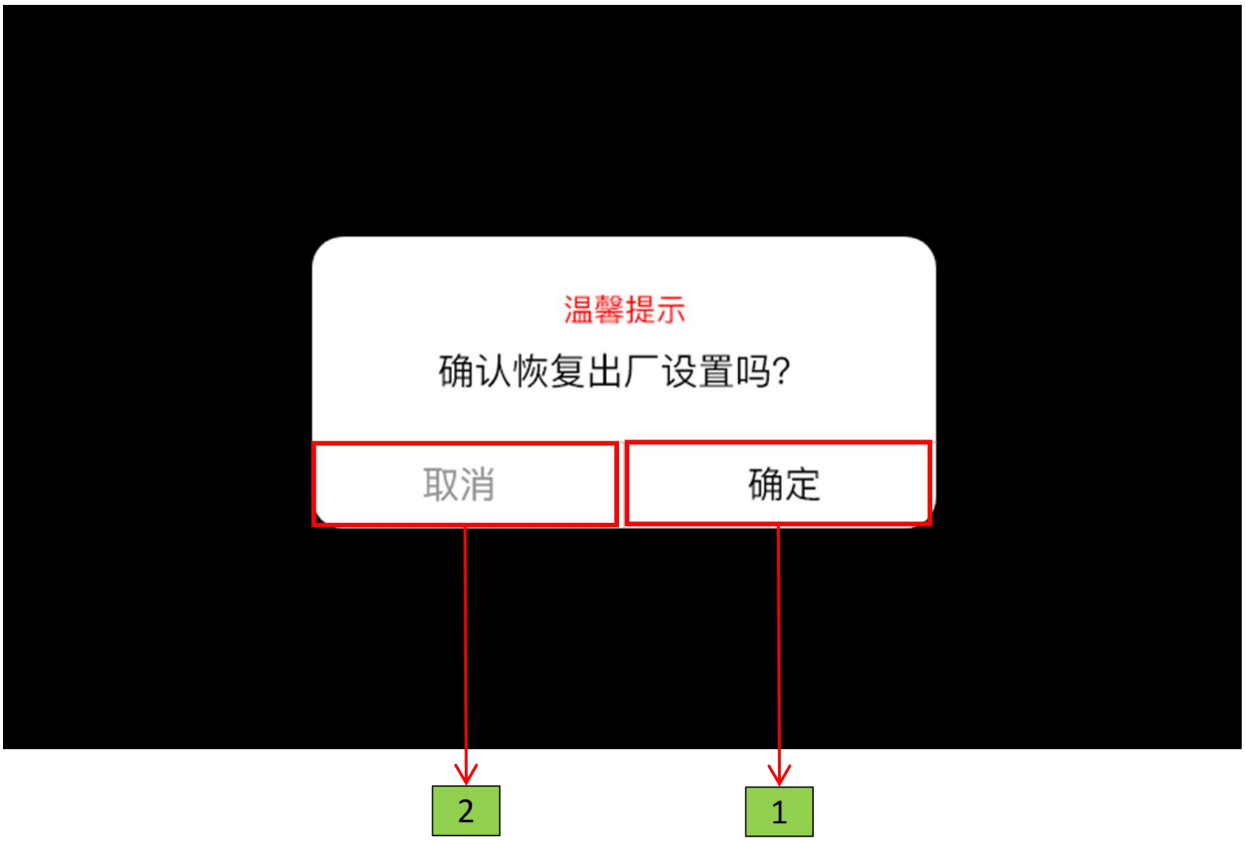
Language selection




Select and switch language.

## 7、Reset

To reset the parameters, restore the factory parameters and press OK.




1) Press OK

页面跳转如下：


After reset finished, the page will jump to [Main Menu]

Note: in this process, do not cut off power!

2) Press "Cancel", the page will jump to [Advanced Settings]

8、Save

Save the modified data

Note: the red dot in the parameter box will disappear if saved successfully! ! If the red dot does not disappear, it means that there is an abnormality in the communication between the screen and the control board, and it needs to be repaired!

# 7 Use and maintenance

## 7.1 Precautions

Any parts installed in the laser head must be carefully dust-removed!

If the lens must be replaced, the related work must be carried out in a clean environment!

Any assembly or component replacement must be carried out in a clean environment!

Before removing the old lens, please prepare the new one. If there is no spare lens, it is recommended to purchase from our company!

When the conditions are difficult to meet the requirements, apply a non-adhesive protective film to seal the opening after the lens is removed!

Minimize the exposure time of the laser head path to the air to prevent dust and dirt from entering!

After any safety or protection equipment is removed, it must be reinstalled before the equipment is operated or debugged. Check and confirm the equipment is in good condition.

## 7.2 Maintenance of QBH and fiber connectors

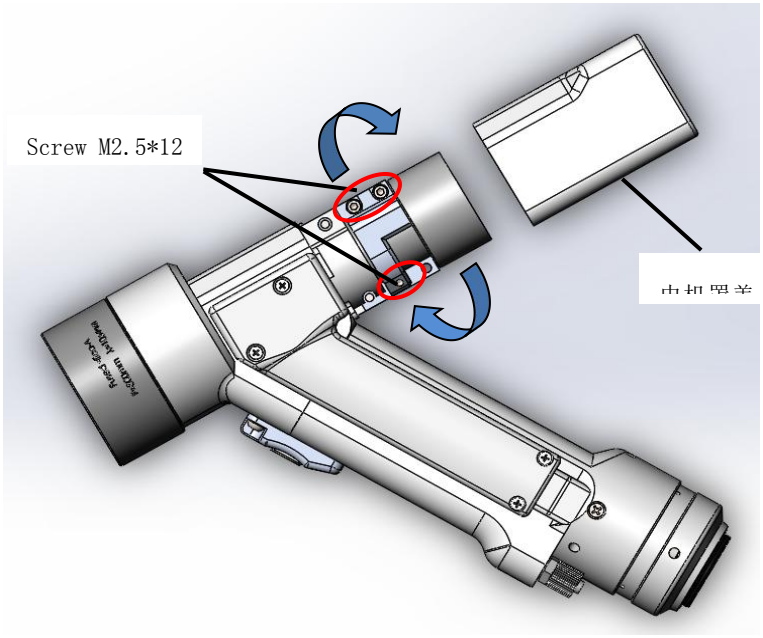
1、The connection between the QBH and the optical fiber connector is covered with adhesive paper to avoid dust from entering, which will increase the maintenance difficulty;

2、The cooling water pipe of the optical fiber connector is connected

well and no water leaks. If the QBH accidentally enters water, please stop using it immediately and return Our company handles it.

## 7.3 Polarization adjustment

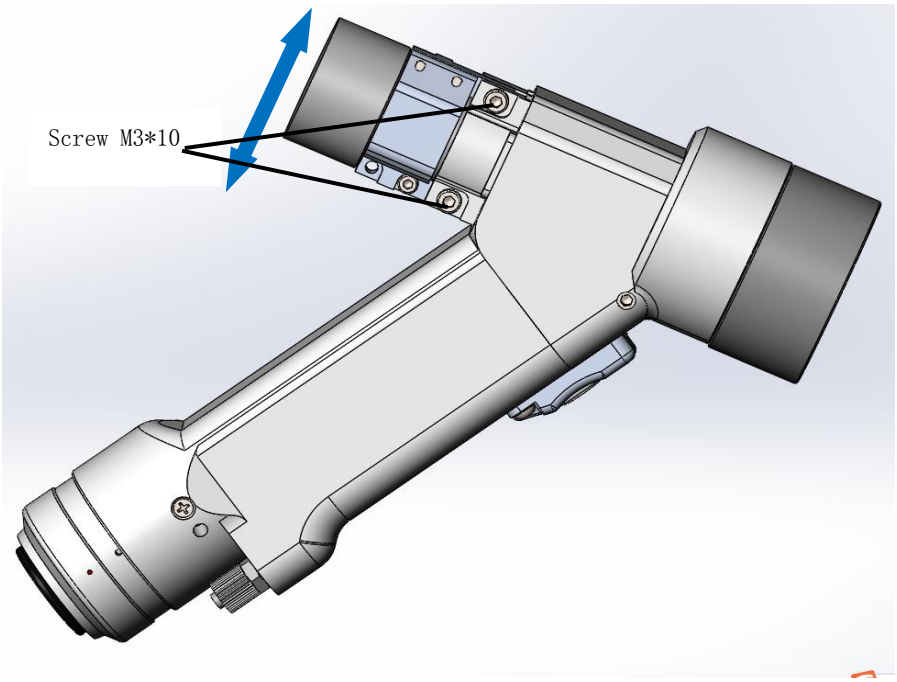
### 7.3.1 Adjust left and right polarization




1) Remove the two M3×60 hexagon socket screws on the motor cover, and remove the motor cover;

2) Loosen 4 M2.5×12 hexagon socket head cap screws to twist the motor. The motor rotates "slightly" left and right, and the red light can be adjusted left and right, and the red light can be adjusted to the center.

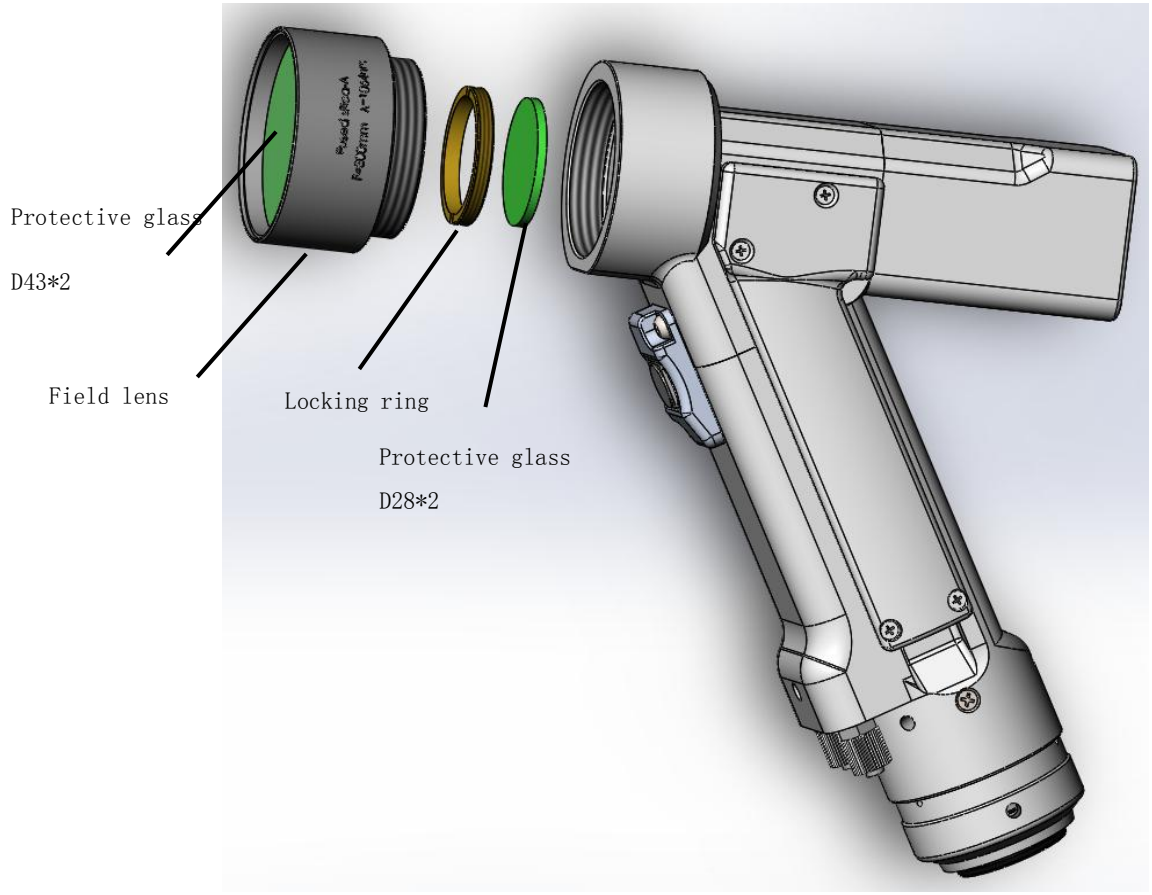
### 7.3.2 Adjust the up and down polarization




Loosen the two M3×10 hexagon socket screws on the reflector, and adjust the up and down deviation of the light spot according to the method shown in the figure.

## 7.4 Replace the protective glass

Specification of protective glass: D28×2




1）Remove the field lens;

2）Unscrew the lock ring with the lock ring clamture;

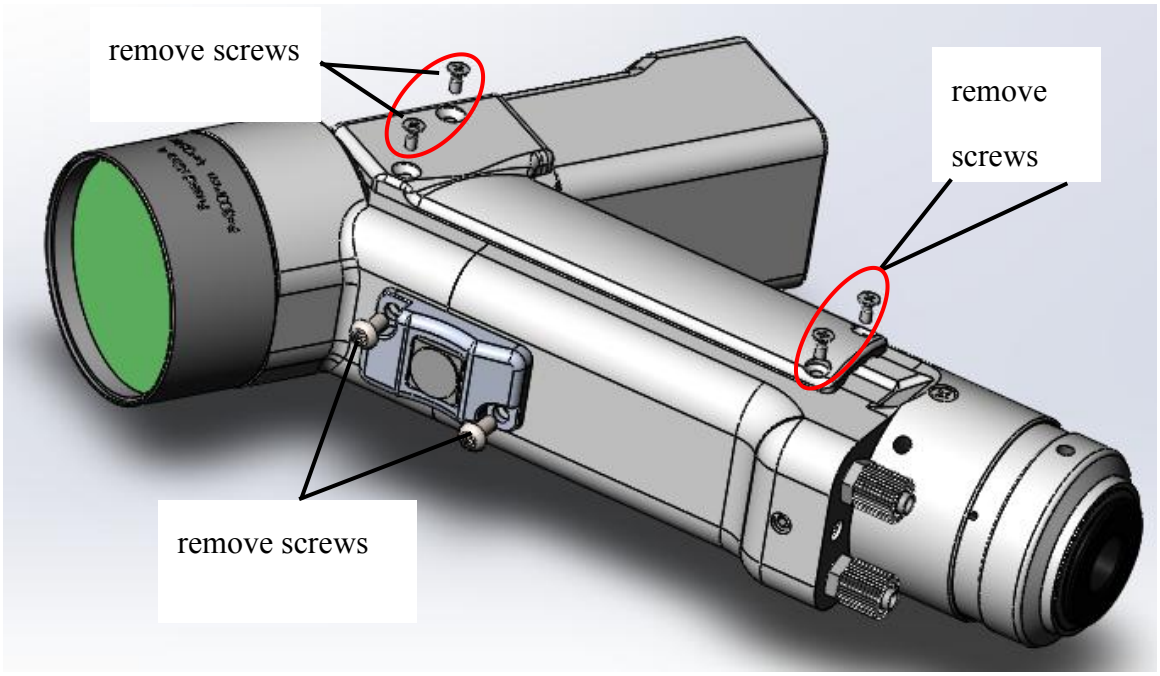
3）Remove the protective lens;

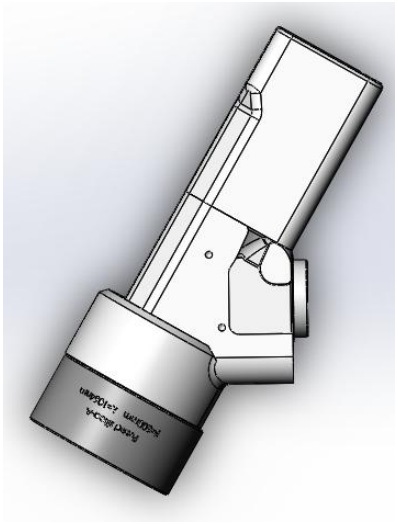
4）In the same way, install the new protective glass back to the reflection seat, tighten the lock ring with the clamp, and manually install the field lens.

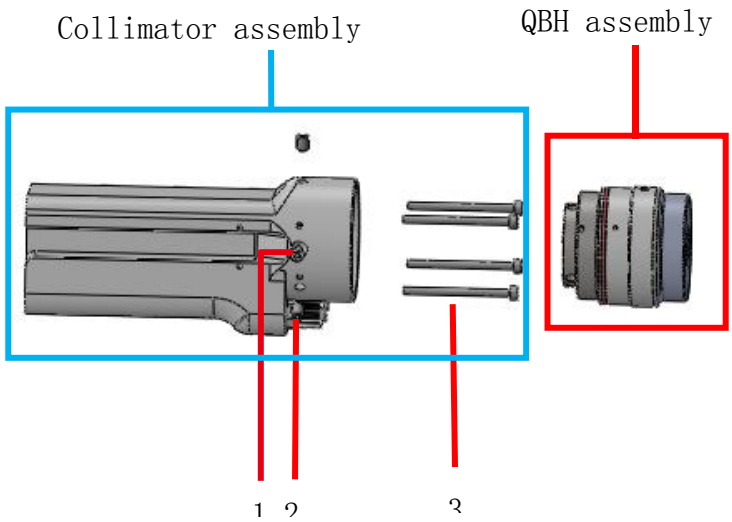
## 7.5 Replace the collimator lens

Specification of collimator lens:D20×F50

1）Remove the screws marked in the figure below;

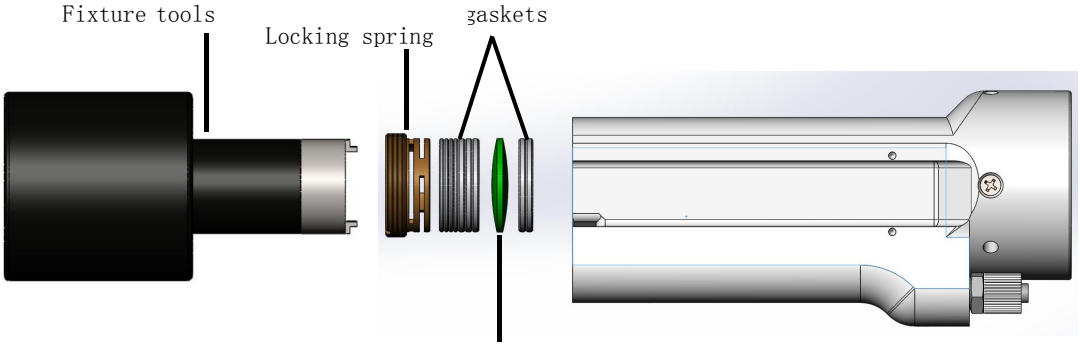





2) Remove the two M2.5*8 hexagon socket flat head screws (No. 1) and three screws (No. 2) from the collimation assembly, and take out the QBH connector module;

3) Remove the four M2.5*35 hexagon socket head cap screws (No. 3) in the QBH conversion seat, separate the entire collimator assembly from the welding head, and quickly seal the reflective assembly with adhesive paper to prevent dust from entering .




4) In a dust-free environment, use a fixture tool to take out the locking spring and record the thickness of the gaskets;

5) Take out the old lens and replace it with a new, clean collimating lens (the collimating lens does not distinguish the direction), then put in the gaskets, and lock it with the locking spring.

6) Then follow the steps to reversely install the welding head.

## 7.6 Precautions for regular maintenance of cleaning head

1. Regularly check whether the protective glass is contaminated, and replace it in time (daily check) if contaminated;

2. Regularly check whether the QBH connector is loose (check every 3 days);

4. Do not allow water to enter the connecting line, pay attention to protect the interface part; if the galvanometer is abnormal, check whether there is water droplets in the interface (such as an aviation plug).

## 7.7 Common problems and solutions

| No | problems | reasons | solutions | note |
|---|---|---|---|---|
| 1 | The power indicator does not light up | 24V power supply reversed | Please check if the 24V power cable is wired properly | |
| | | Poor contact of 24V power supply | Check whether the wiring is good | |
| 2 | No laser | Safety lock-welding platform wire is not connected or has poor contact | Put the safety lock-wire and the welding platform in good contact with the clamp | |
| | | The laser is not connected or the connection of the laser line is poor | Please connect the control wire of the laser with a shielded wire and check whether the laser is in good condition | |
| | | The power voltage is abnormal | select laser power 0-10V soft button | |
| 3 | The galvanometer motor does not swing | The galvanometer control is not turned on | Turn on the galvanometer motor control in the main interface | |
| | | The motor wire is not well connected | Check and connect the motor wire | |
| | | | | |