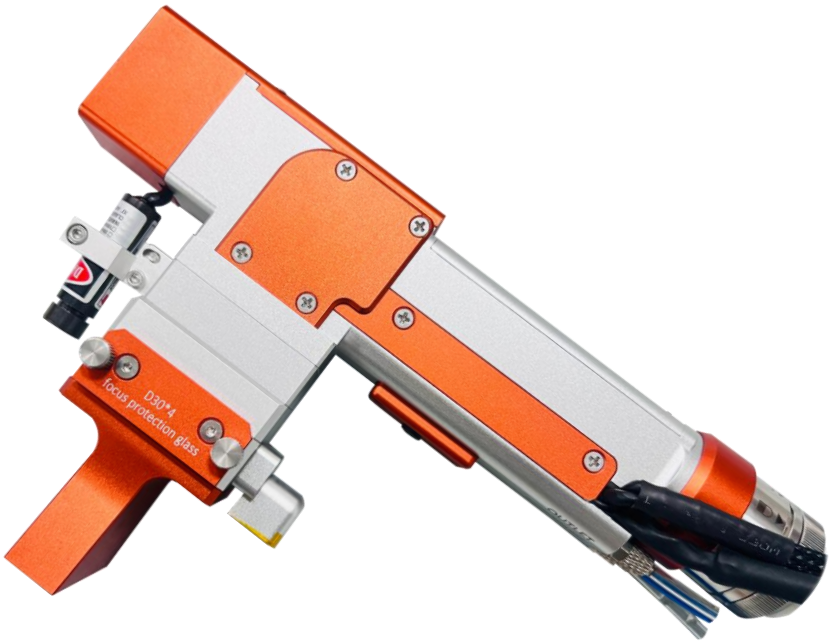
HS Series

HS12 Fiber optic hand-held cleaning head user's manual



Wuhan Xinghong Photoelectric Technology Co., Ltd.

2022. 08. 03

Catalogue

Revision History

Be sure to read the product manual in detail before

before installing and using the product

You must wear safety glasses when operating the laser equipment. Safety glasses should be selected appropriately for the wavelength of the laser emitted by the laser. If the device is a laser tunable or Raman product, it emits laser light outside the normal output wavelength range of the device's laser and requires appropriate safety protection for this phenomenon. Laser safety glasses should be selected to shield the laser from the entire wavelength range emitted by the laser device.

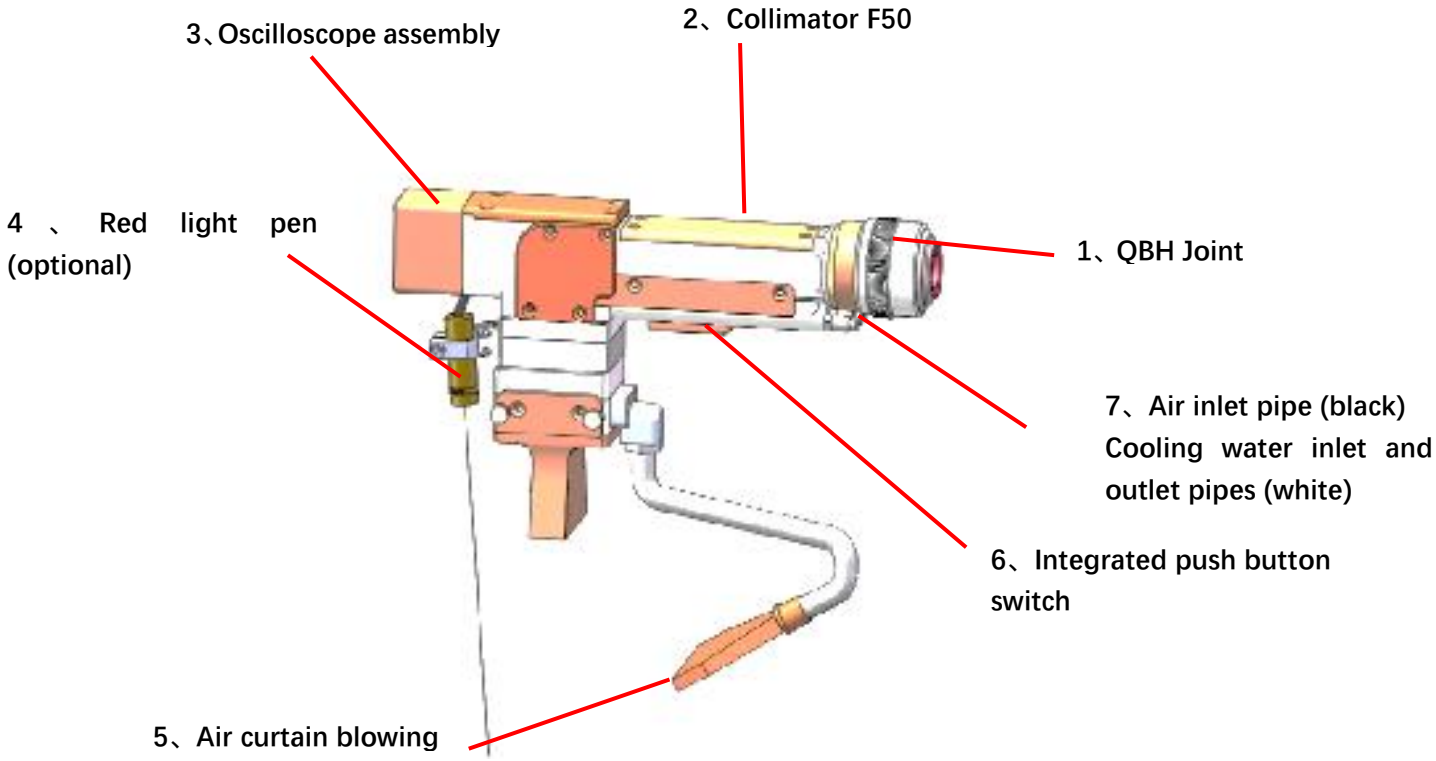
Chapter 1 Product Introduction and Display

1.product description

Laser cleaning is a process that uses the unique characteristics of high directionality, monochromaticity, high brightness and high coherence of the laser to focus the energy into a small spatial and temporal range to act on the combination of dirt and substrate, so that the dirt is separated from the substrate and thus cleaned.

Our "CL handheld swing cleaning head" consists of a "CL continuous cleaning controller" and a "handheld swing cleaning head". The frequency of the mirror is 100Hz and the cleaning width is 300mm.

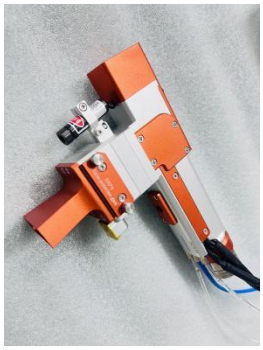
When you receive the product, open the box, it contains: a set of hand-held cleaning head, a drive control box, a touch screen, a motor control cable, and several other accessories.



Hand-held vibrating mirror cleaning head (sample)

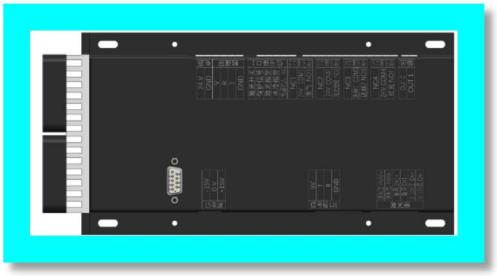
Note: The water pipes are transparent pipes on the left and right respectively, please read the logo and then pass the water, the gas pipe is in the middle of the two water pipes, the default is the black pipe, part of it will be a transparent pipe, please read the logo and then pass the gas, if the water line to the gas line orifice will cause very serious losses, please be sure to pay attention to do not connect the wrong.

2.Accessories display



Hand-held vibrating mirror cleaning head (sample)

Touch screen (sample image)



Control Box (Sample)

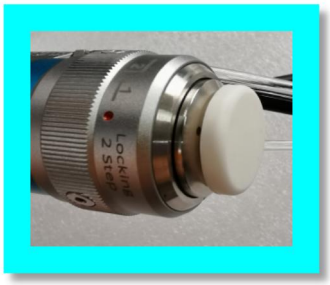
Galvo Control Line (Sample)

3-core switch wire (sample picture)

3.Special attention: 5 steps for inserting and unplugging optical fiber

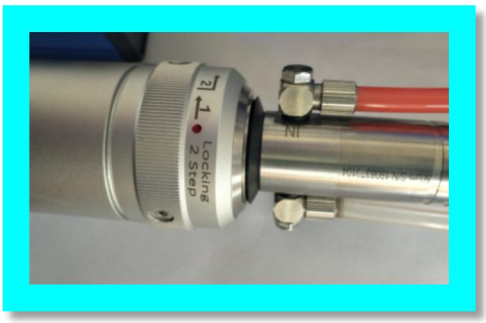
Note: when inserting optical fiber, the laser head shall be placed horizontally; Ensure that the optical fiber is inserted horizontally

3.1 Check whether QBH connector and optical fiber plug are dirty, and wipe them with alcohol and cotton swab (cotton paper) in time


3.2 QBH homing "two points and one line" 3.3 alignment insertion of optical fiber plug


3.4 secondary locking clockwise 3.5 optical fiber protective jacket for complete protection

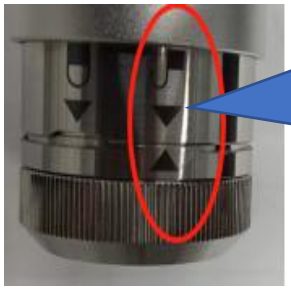


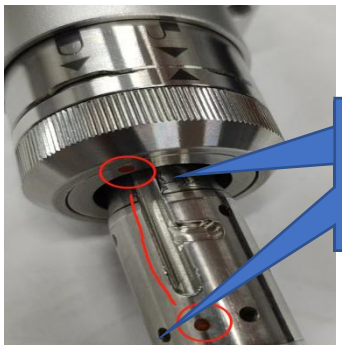

Note: when inserting optical fiber, the laser head shall be placed horizontally; Ensure that the optical fiber is inserted horizontally

4.Special note: Steps for plugging and unplugging optical fibres (new QBH connectors)

4.1 Inspect QBH connectors and fibre plugs for dirt and wipe them clean promptly with alcohol and cotton swabs (cotton paper).


4.2 The QBH is in the unlocked position (arrow pointing to the unlocked logo) and the red dot of the fibre optic plug is inserted into place against the red dot on the end of the QBH.





4.3 Turn the ring with the lock mark on the QBH connector clockwise until the QBH is in the off-lock position (arrow pointing to the off-lock mark) and finally twist the locking ring to tighten it.

Chapter 2 Cleaning head principle and comparison of focusing methods

1.Introduction to the principle of hand-held swing cleaning head

The actual process of laser cleaning is a very complex physical and chemical process, which is the result of a combination of multiple interactions. Generally, the mechanism of laser cleaning can be roughly classified into three types:

2.1.1Using pulsed Q-switching technology, the energy of the laser can be highly concentrated in time and space, and a high temperature of thousands of degrees Celsius can be generated near the focus of the laser beam, causing the dirt to evaporate or gasify and decompose in an instant, as shown in Figure 2.1 below.

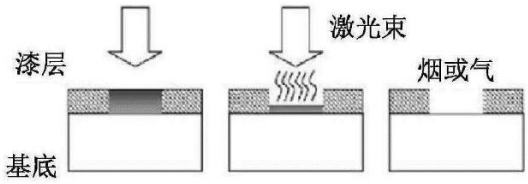


Figure 2.1. Schematic diagram of high temperature gasification and decomposition of laser-induced fouling

2.1.2The laser beam can control the laser energy density at the focus point by adjusting the focusing system. Under a suitable laser energy density, the dirt will expand after absorbing energy and expand when heated. When the expansion effect of the dirt is greater than the adsorption effect of the substrate on the dirt, the dirt will loosen. off the substrate surface, see Figure 2.2 below.

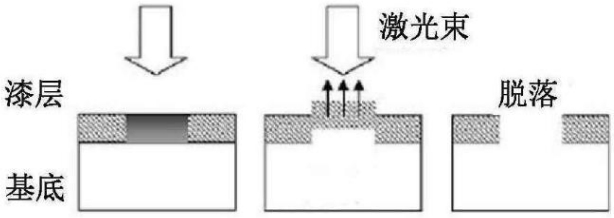


Figure 2.2. Schematic diagram of laser-induced dirt expansion and shedding due to heat

When the laser beam interacts with the surface of the object through the laser pulse, ultrasonic waves will be generated, and a mechanical resonance will be formed, so that the dirt will fall off after being broken, as shown in Figure 3.

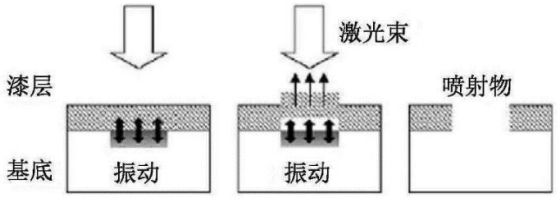


Figure 2.3. Schematic diagram of laser-induced fouling mechanical resonance shedding

Of these three mechanisms, the first two mainly rely on the material's absorption of laser energy to generate heat to achieve the purpose of cleaning. The third is mainly based on the mechanical process of laser pulses and materials.

2.Comparison of focusing methods of cleaning heads

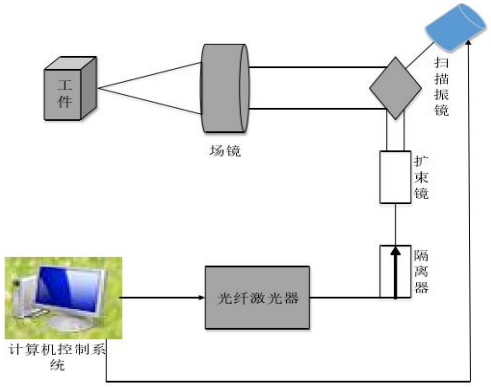
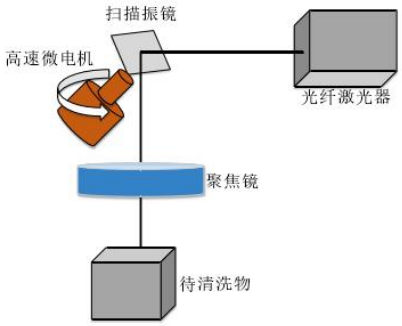


Figure 2.4. Schematic diagram of laser cleaning device (field lens)



Schematic diagram of laser cleaning device (focusing mirror)

The full name of the field lens is the flat field focusing lens, also known as the F-THETA mirror, because after the laser passes through it, a focused light spot with uniform size and consistent focal depth will be formed in a certain working format. For an ordinary convex lens, a uniform focusing spot will be formed only when the light passes through the lens vertically. When the light is incident obliquely, the focusing spot must be deformed, and the position of the focal point is also different from that of the vertical incident, which will cause the center of the web and the The power density of the edge focus spot is not the same.

The field lens is specially designed for different incident angles, and the focused spot and position of different angles are uniform.

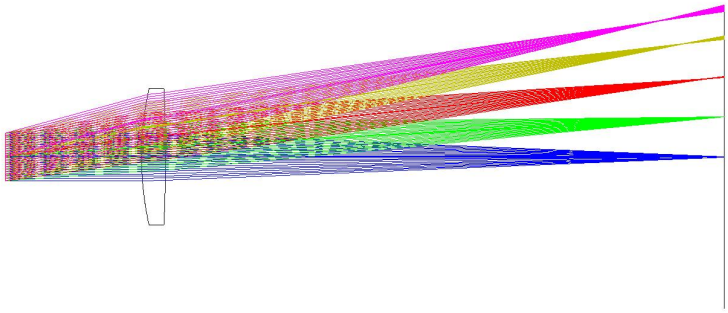


Figure 2.5. Schematic diagram of the focusing optical path of the convex lens

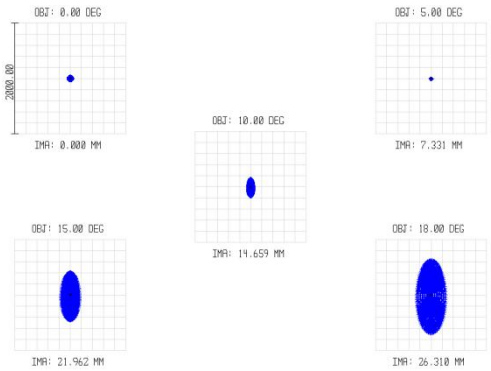


Figure 2.6. Schematic diagram of the focusing spot of the convex lens

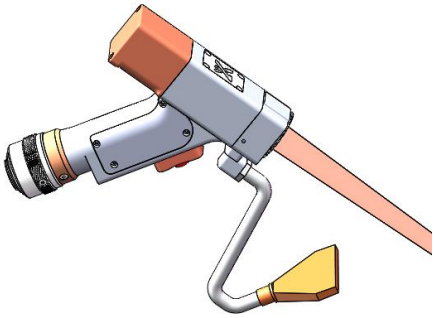


Figure 2.7 Xinghong handheld cleaning head (focusing mirror model)

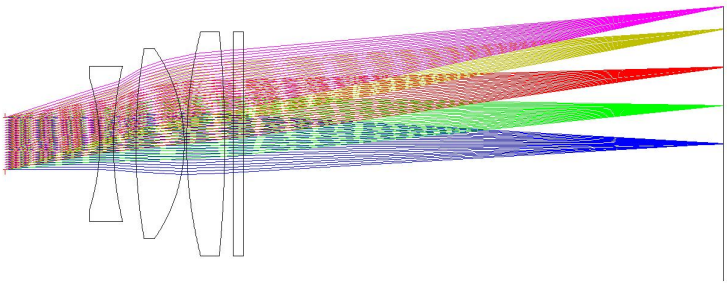


Figure 2.8. Schematic diagram of the focusing optical path of the field lens

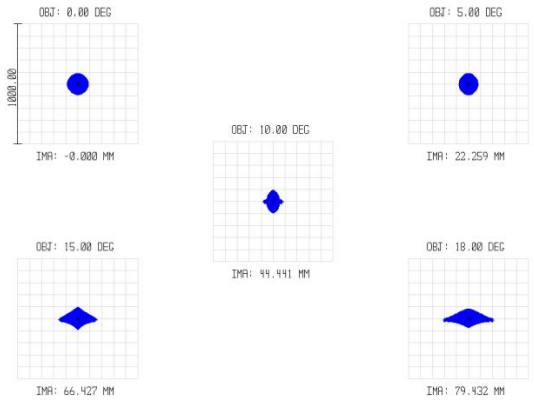


Figure 2.9 Schematic diagram of field lens focusing spot

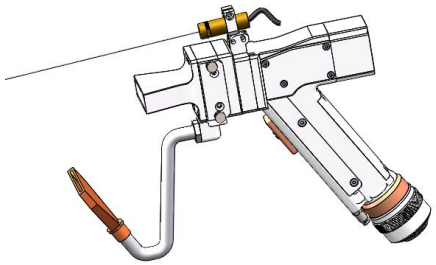


Figure 2.10 Xinghong handheld cleaning head (field mirror model)

Single-focus scanning cleaning head, the lines scanned will have different focal planes in the center area and the edge area, and the edge cleaning effect will be different from the center effect. The effect of this cleaning is not very good, mainly because the center and edge of the format. The power density of the focused spot is not the same.

Field lens cleaning head: The focusing in the entire range scanned by the field lens will be smooth, the position of the focus will not be shifted, the focusing spot will be more uniform, the power density will be uniform, the cleaned surface will be finer, and the cleaning range will be less The effect is more optimized and beautiful, and it is convenient for spraying.

3 Advantages of Xinghong cleaning head:

1.The specially designed cleaning head field lens has small field curvature, and the position of the focal point will not be shifted; the coma and other off-axis aberrations are small, the focusing spot of different incident angles is more uniform, the power density is uniform, and the cleaned surface layer will be more uniform. Fine, the cleaning range and effect are more optimized and beautiful, and it is convenient for spraying.

2.The cleaning head field lens uses a multi-lens design to achieve better flat field, with high transmittance, high loss threshold and other characteristics. The design and manufacture adopts various measures such as glass material with low absorption rate, low surface roughness, high finish, internal reflection elimination, high transmittance coating, etc., to enhance heat dissipation and reduce absorption.

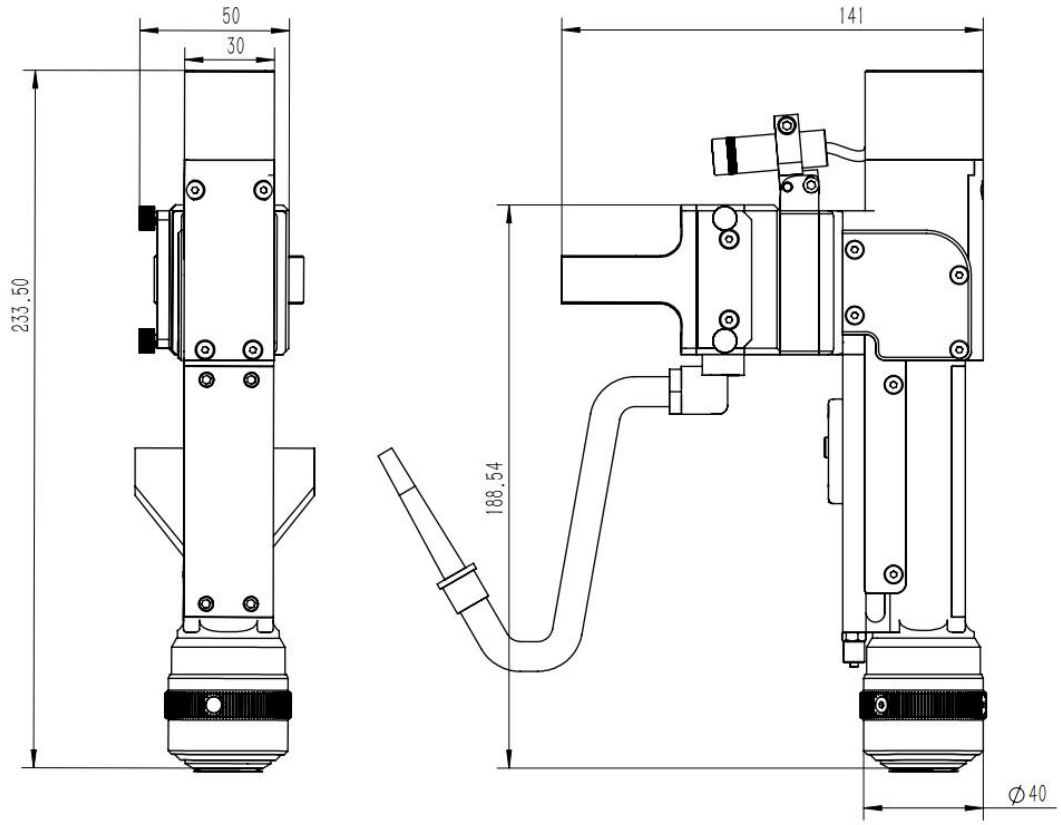
3.In the design of the overall shape and structure, it absorbs the advantages of the commonly used hand-held welding head, makes a new lightweight design, enhances the comfort of the customer's hand-held use, the switching is smooth, and the new air curtain blows air, which can better clean

the workpiece after treatment. Spatter, secondary protection Field lens.

4.In the design of the front-end focusing method, the switching of the focusing lens cleaning method and the field lens cleaning head can be realized to meet the customer's different process requirements and usage needs.

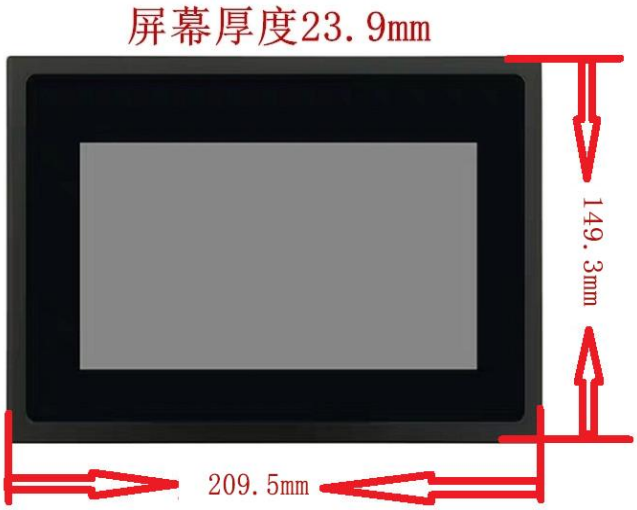
4 Cleaning head size process parameters:

High power cleaning, the maximum power value can reach 2000w, cleaning width 300mm, focal length F500/F1000 optional, focal depth 0-1mm, can meet the absorption characteristics of different materials to the laser

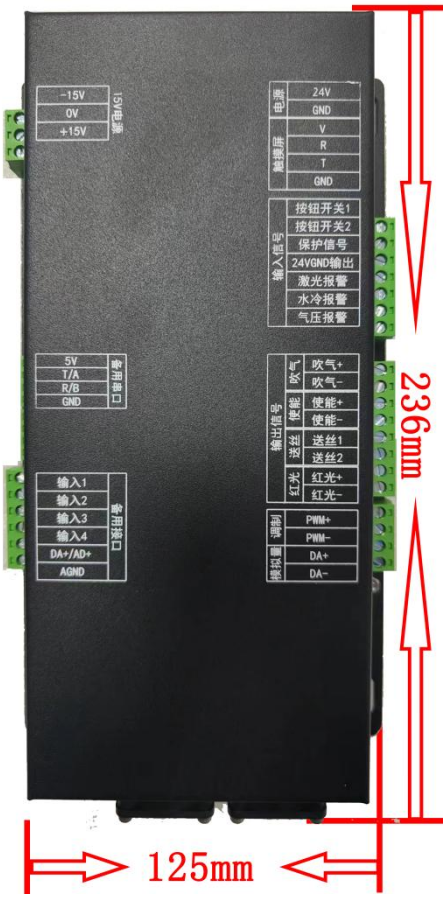


Chapter 3 Control System Manual

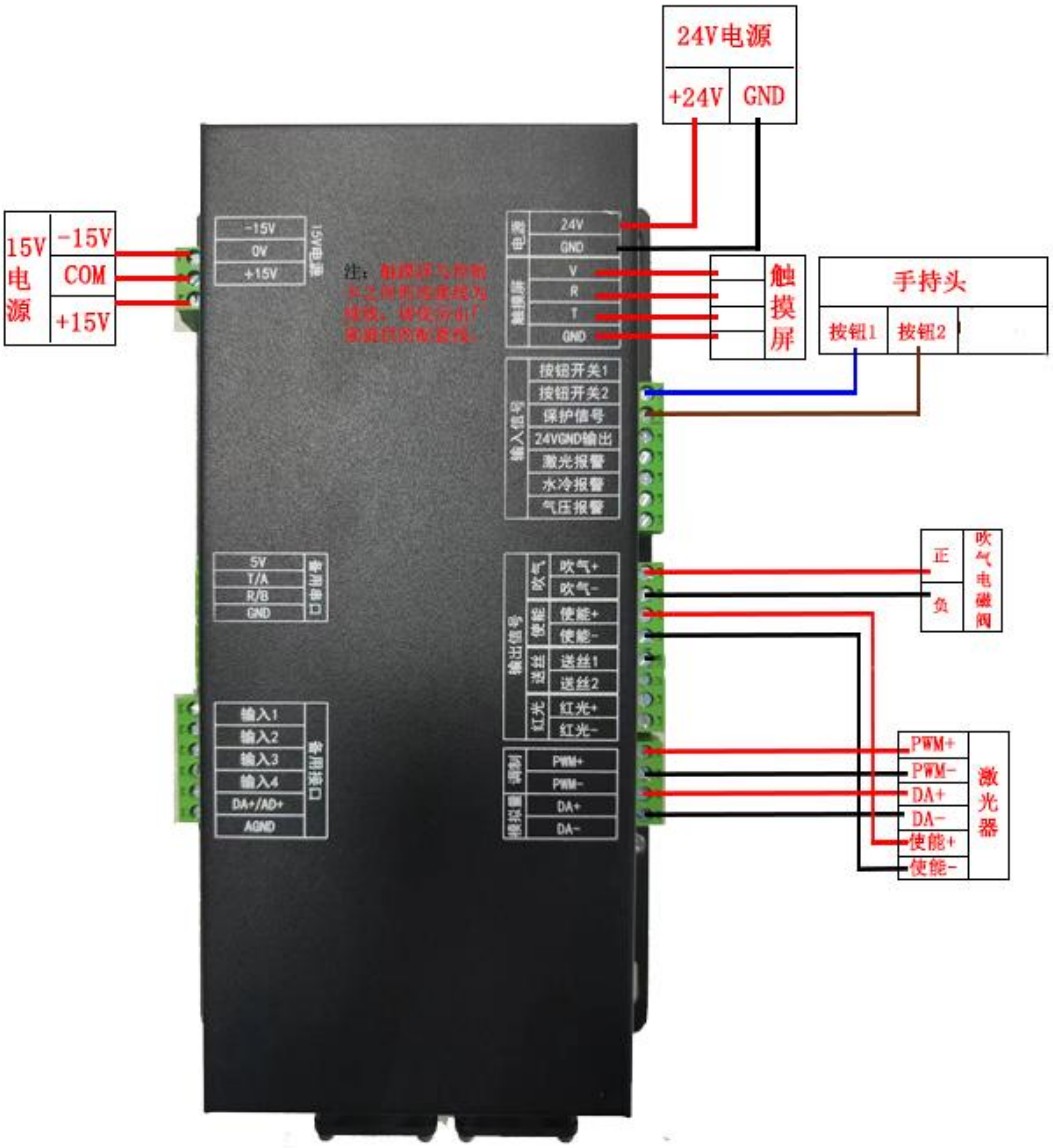
1. Control panel and control box reference dimensions and wiring diagram

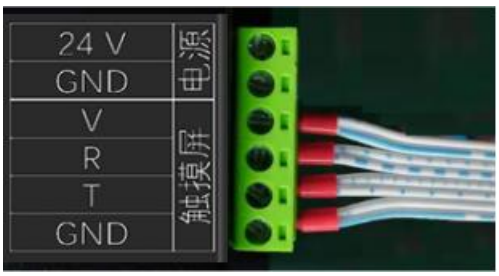


屏幕安装开孔尺寸
197.4mm*137.1mm



Shell thickness 39mm





Correct connection of touch screen matching cable

2. Control card terminal definition description (below)

Left:

Name	Definition	Explanation
15V power supply	-15V	-15V
	COM	COM
	15V	+15V
Alternative serial port	5V	Alternative serial port
	T	
	R	
	GND	
Alternative interfaces	input1	standby
	input2	standby
	input3	standby
	input4	standby
	DA+/AD+	standby
	AGND	standby

Right:

Name	Definition	Explanation
power	+24V	+24V
	GND	24VGND
Touch screen	V	For cable connections, please use the matching cable provided by the manufacturer
	R	
	T	
	GND	
Input signal	Push button switch 1	Hand-held switch button 1
	Push button switch 2	Hand-held switch button 2
	Protect Signal	Connection to isolation module control card protection signal
	24VGND Output	Connected to isolation module 24VGND
	Laser ERR	Laser alarm signal connected, 24v ground active
	Cool ERR	Water-cooled alarm signal connected, active 24v ground conduction
	Stop	Air pressure alarm signal connected, 24v ground active
Blow	Blow+	Positive air connection valve
	Blow-	Negative air connection valve
Laser-EN	Laser-EN+	Connect laser enable positive
	Laser-EN-	Connect laser enable negative
Wire Feeding Switch	Wire Feeding 1	Wire feeding ss1
	Wire Feeding 2	Wire feeding ss2
Red Light	Red Light+	Connected to red light positive
	Red Light-	Connected to red light negative
Modulated Analogue	PWM+	Connected to laser modulation +
	PWM-	Connected laser modulation-
	DA+	0-10V signal 0-10V analogue signal to laser positive
	DA-	0-10V signal ground 0-10V analogue signal to laser negative

3.main operation interface

After the power is turned on, the touch screen will enter the main operation interface (as shown in Figure A).

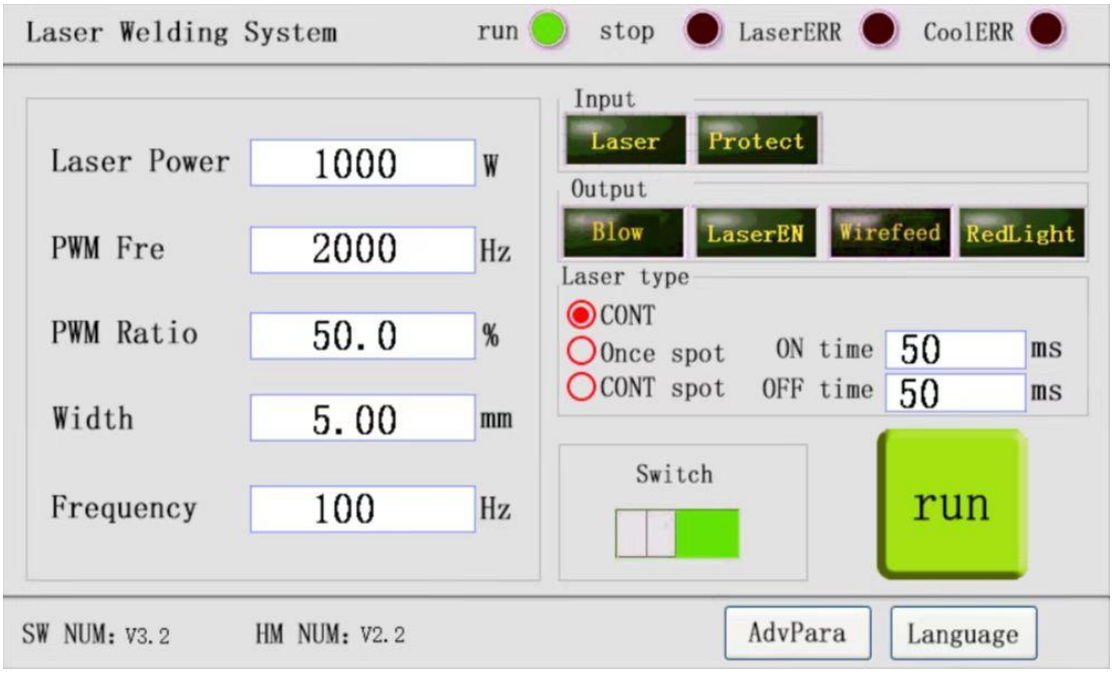


Figure A

● **Sequential display on the interface status bar: communication indication, air pressure alarm, laser alarm, water cooling alarm**

1. Communication indication: if the light is green and flashing, it means that the touch screen and the main control card are connected normally, and if it does not flash, it means that the communication between the control card and the touch screen is abnormal.

2. Air pressure alarm: When the red light is displayed, there is a problem with the laser, and the dark green is disconnected or the function is not connected to the signal.

3. Laser alarm: When the red light is displayed, there is a problem with the laser, and the dark green is disconnected or the function is not connected to the signal.

4. Water cooling alarm: The red light shows that there is a problem with the water cooler, and the dark green is disconnected or the function is not

connected to the signal.

5. Run/Stop: Click the button to start/stop the welding program. When the button is green, the program is running, and when the button is red, the program is stopped.

6. Advanced parameter: Click to enter the advanced parameter setting interface as shown in Figure B.

7. Language: Click to switch language.

●parameter bar

1. **Laser power:** Set the current output power, which should not be greater than the laser power.
2. **PWM frequency:** set the frequency of PWM modulation signal, 0-200000HZ adjustable.
3. **PWM duty cycle:** set the duty cycle of the PWM modulation signal period, 0-100% adjustable.
4. **Galvo width:** set 0-5 (0-5 for welding mode, 0-120 for cleaning mode).
5. **Galvo frequency:** frequency can be set from 0-200.
6. **Galvanometer switch:** control the on and off of the galvanometer swing.

●Input status bar

1.Button switch: Display the on/off state of the hand-held switch signal, dark green is the off state, green is the on state, and the default is off

2.Protection signal: display the on/off state of the protection signal, dark green is the off state, green is the on state, and the default is off

● Output status bar (you can click to output the corresponding signal when the welding program is stopped. It is used for testing)

1. Blowing: Start/close the blowing signal function to test the on/off of the blowing electronic valve

2. Laser enable: enable/disable the laser enable signal, test the laser enable

of the laser

3. Wire feed: wire feed signal function tests the wire feed of the laser wire feeder.

4. Red light: turn on/off the red light signal, test the on/off of the red light function.

●light mode

1.Lighting time: This parameter is valid only in single spot welding and continuous spot welding. By setting this parameter, the light-emitting time of the laser can be controlled.

2.Interval time: This parameter only takes effect during continuous spot welding. By setting this parameter to match the light output time, the laser continuous spot welding light output is controlled.

3.Continuous: After triggering, the laser emits light continuously.

4.Single-shot spot welding: After triggering, the laser emits light according to the set light-emitting time.

5.Continuous spot welding: After triggering, the laser continuously spot welding light according to the set light output time and interval time.

●

1.Software version number: Display the current board software version number.

2. Firmware version number: Display the current board firmware version number.

3. Click the "Language" button in the lower right corner of the main interface to enter the English interface.

4. Click the "Advanced Parameters" button in the lower right corner of the main interface to enter the advanced parameter interface.

4. Advanced parameter interface

After clicking the advanced parameters on the main interface, enter the advanced parameter interface (the Chinese interface is as shown in Figure B below)

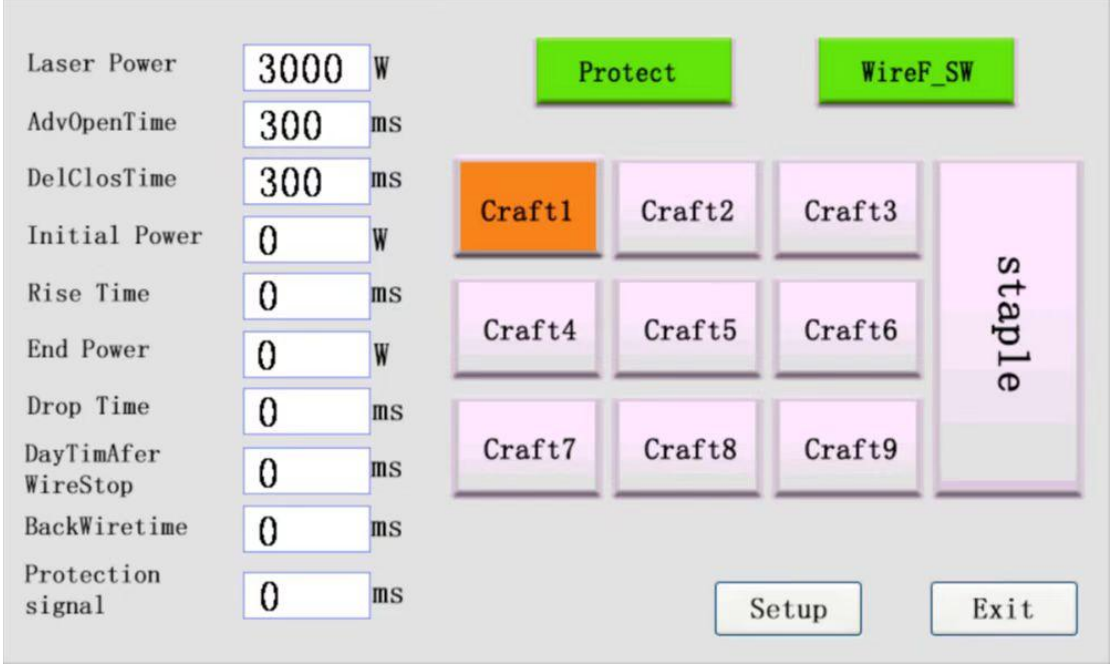


Figure B

●parameter bar

1. Laser power: Set the maximum power of the laser, in W.

2. Air-on delay: Set the air blowing time in advance before welding starts, in ms.

3. Air off delay: Set the time to keep air blowing after welding, the unit is ms.

4. Optical power: set the initial power of the laser when it emits light, the unit is W.

5. Ramp-up time: Set the ramp-up time at the beginning of the light-emitting stage, in ms.

6. Off optical power: Set the end power when the laser is receiving light, the unit is W.

7. Slow down time: Set the slow down time at the end of welding, in ms.

8. Advance wire feeding time: If you need to advance wire feeding before laser welding, set the corresponding advance wire feeding time, if not, change it to 0, the unit is ms.

9. Light-off delay: Set the time for the laser to keep emitting light during the process of drawing back the wire at the end of the wire feeding welding, the unit is ms.

10. Protection signal disconnection time: the maximum time that the protection signal is allowed to be disconnected during the program running process to prevent hand shake and light interruption.

●

1. Protection signal: enable/disable protection signal, red is off state, green is on state, default on

2. Wire feed switch: enable/disable the wire feed switch signal, red is the off state, green is the open state, and the default is on.

●craft library

Calls of different parameters can be set separately by selecting different technology libraries

●

1. Click the "Galvanometer Setting" button in the lower right corner of the advanced parameter interface to enter the galvanometer setting interface.

2. Click the "Exit" button in the lower right corner of the advanced parameter interface to return to the main interface.

5. Galvo setting interface

Click the "Galvanometer Setting" button at the bottom left of the advanced parameter interface to enter the galvanometer setting interface as shown in Figure C below.

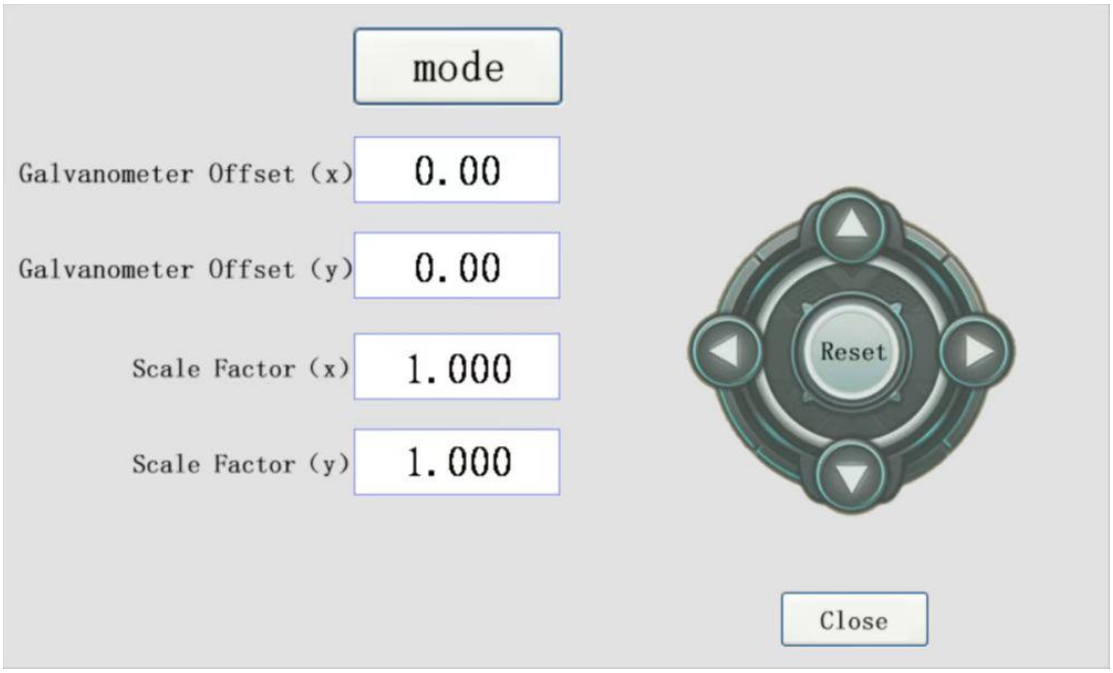


Figure C

●Galvo Settings

1. Galvanometer offset: The galvanometer offset button can control the offset of the light-emitting origin of the galvanometer. The galvanometer offset (x/y) respectively controls the offset of the horizontal axis and the vertical axis of the origin. The range is -5- 5 mm

2. Back to the center: the adjusted offset can be reset to zero

3. Scale factor: Adjust the magnification of the adjustment, the range is 0-5

4. Close: go back to the upper interface

5. Mode: Click to enter the mode selection interface, as shown in Figure D

6.Mode selection interface

Click the mode button on the upper left of the galvanometer settings to enter the mode selection interface, as shown in Figure D

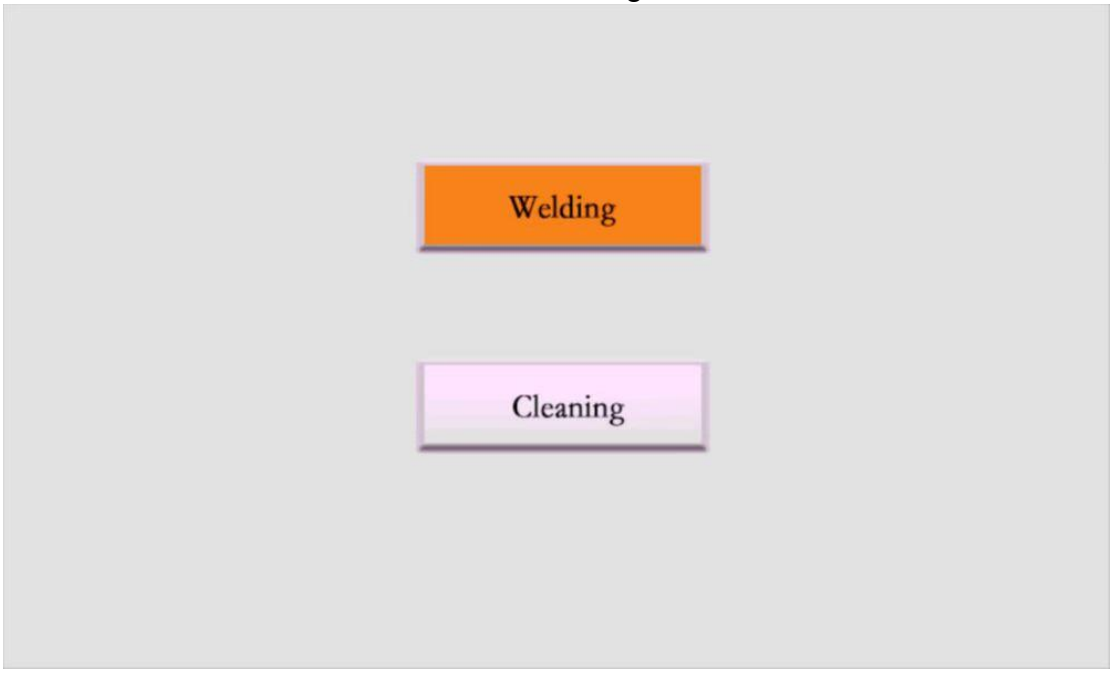


Figure D

●Mode selection

The current mode is welding mode, click to enter the welding main interface as shown in Figure A.Click the cleaning button, then jump to Figure E

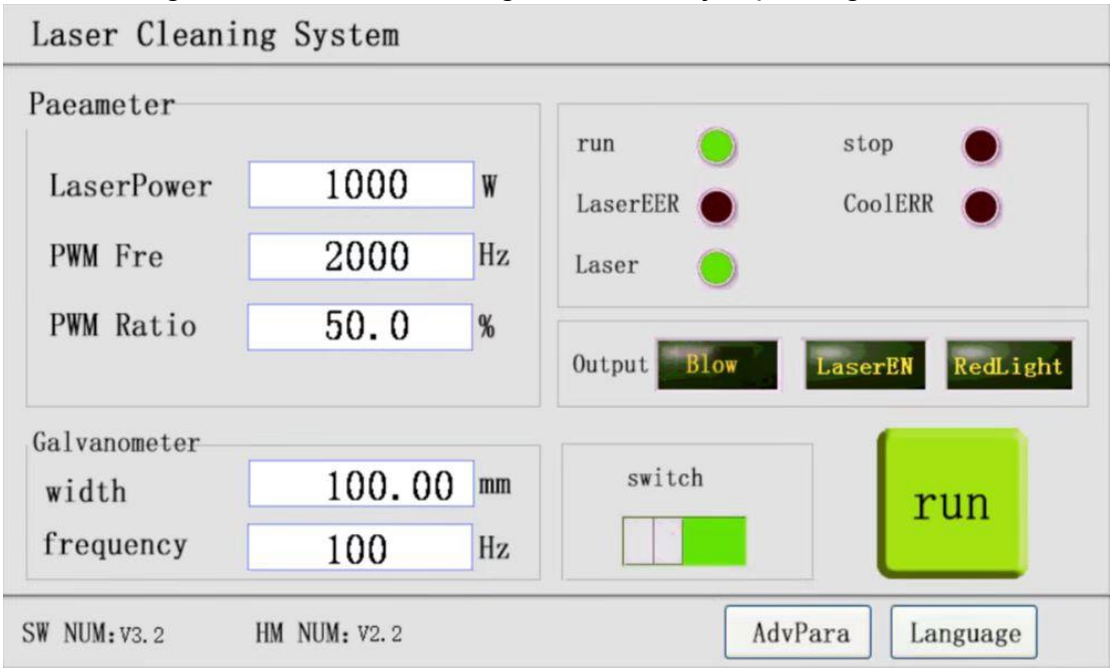


Figure E

7. Password change interface

Click the hidden button in the red box at the upper left of the advanced parameter interface as shown in Figure F to enter the password modification interface as shown in Figure G.

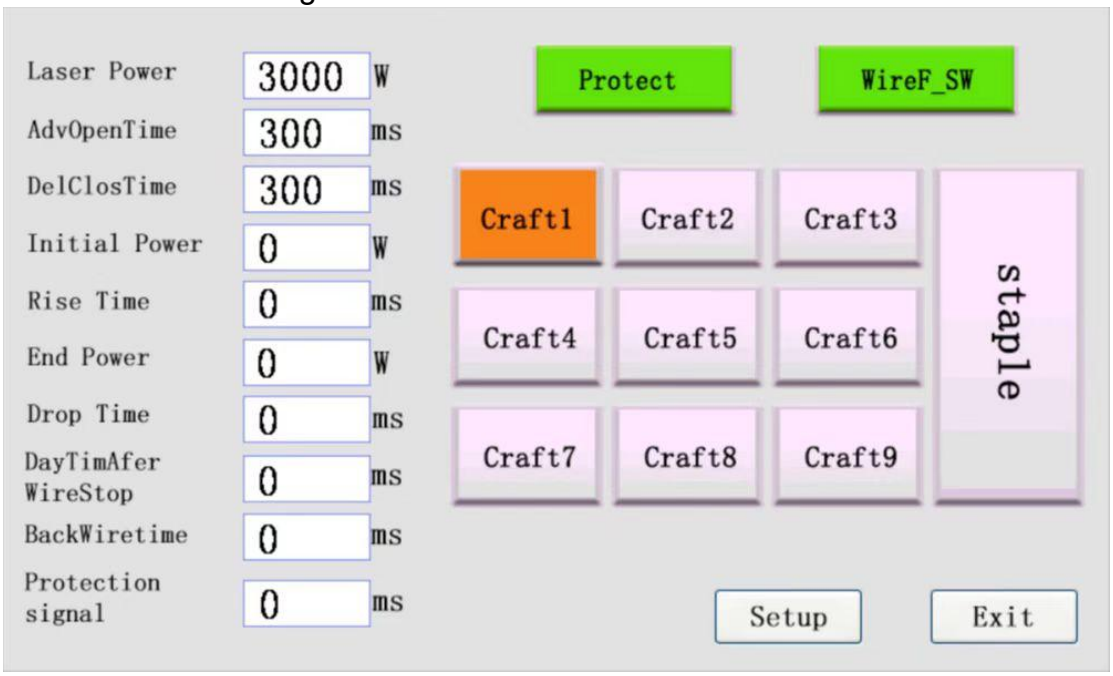


Figure F

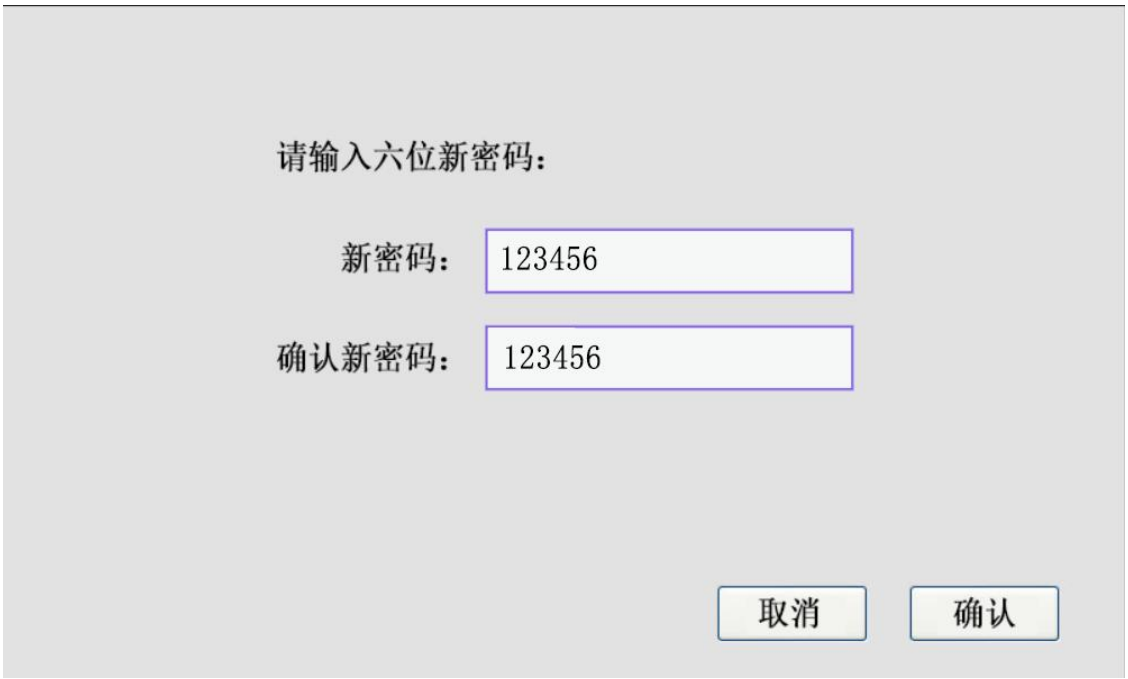


Figure G

●Change Password

To change the password, first enter the new password, then enter the new password to confirm, click OK to change the password, click Cancel to return to the upper interface.

Revision history

Date	Modify the content	Software version
20211101	First Edition (First Release)	V1.0
20220422	The second version (remove the focusing mirror type; better air blowing, 3 auxiliary air blowing methods, protect the lens for a longer time. The focus is increased to F500/F700/F1000 optional; the galvanometer controller system is upgraded to V3.0)	V1.1

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