



**HANDHELD LASER CLEANING MACHINE**  
**(1000W/1500W/2000W)**

**USER GUIDE**

**Shenzhen Horizon Laser Technology Co.,Ltd.**

## Company Profile

Shenzhen Horizon Laser Technology Co., Ltd is a new high-tech enterprise integrating technical services, technology promotion, laser equipment modular design, sales and integration services. Horizon Laser has many senior technical experts (Covering machine tool design, optics, automation integration, laser process development) from well-known laser companies. Horizon laser is mainly committed to promoting laser processing technology, popularizing laser applications, and reducing the asymmetry of client information through modular sales and integration services of laser equipment, and strives to achieve an satisfaction for customers to buy and use.

More information, please visit our website:

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## 1-General Safety Information

Thank you for choosing a handheld fiber laser cleaning machine from Horizon Laser Technology Co., Ltd. This user guide provides you with important safety, operation, maintenance and other information. Therefore, please read this user guide carefully before using this product. To ensure safe and optimum operation, please note the following cautions, warnings and other information in this manual.

### 1.1 Laser Safety Class

This device is built-in 1000W/1500W/2000W CW fiber laser generator which is classified as a high power Class IV laser instrument. It is water cooling, emit 1060~1100nm wavelength, the average power is above 1000W((depending on the model)). This level of light may cause damage to the eye and skin. Despite the radiation being invisible, the beam may cause irreversible damage to the retina. Laser safety eye-wear is not provided with this instrument, but must be worn at all times while the laser is operational. Use appropriate laser safety eye-wear when operating this device.



laser safety eyewear or glasses must be worn

### 1.2 Optical Safety

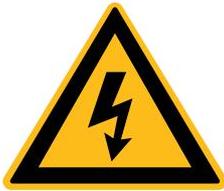
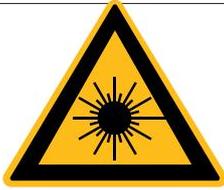
If there is dust on the end cap or protective lens of the laser output head (QBH), the end cap or lens will be burned when the light is emitted, and even the fiber cable will be damaged.

### 1.3 Electrical Safety

- 1) Any interruption of the protective ground conductor from the earth terminal can result in personal injury;
- 2) Make sure the instrument is properly grounded through a protective conductor of the AC power cable, or else some fault may be caused including laser alarm, light malfunction or unsteady working.

3) Do not work in a high moisture/high temperature environment, or else short circuit or alarm of high moisture/high temperature will be caused and the normal service life of the Laser Eraser will be shortened.

### 1.4 Safety Conversions

| Symbols   | Description   |
|---|---|
|    | <p><b>WARNING:</b><br/>Refers to a potential Electrical Hazard to human body; It requires a procedure that, if not correctly followed, may result in bodily harm to you and/or others. Do not proceed beyond the WARNING sign until you completely understand and meet the required conditions.</p> |
|   | <p><b>CAUTION:</b><br/>Refers to a potential hazard on product. It requires a procedure that, if not correctly followed, may result in damage to the product or components. In order to ensure normal use of equipment, do not violate the requirement of the CAUTION sign.</p>                     |
|  | <p><b>WARNING:</b><br/>Refers to a potential Laser Hazard.<br/>The symbol represents laser radiation. The symbol is pasted on laser output end.</p>   |
| NO SYMBOL   | <p><b>IMPORTANT:</b><br/>Refers to any information regarding the operation of the product. Please do not overlook this information.</p>   |

### 1.5 Additional Safety Information

- (1) When the equipment is running, do not look directly at the output head of the cleaning machine;
- (2) Do not use the device in dim or dark environments;
- (3) Please strictly follow the operation manual of the product, otherwise any damage to the equipment will not be covered by warranty;
- (4) There are no built-in and usable accessories in this product, all repairs should be carried out by professionals, in order to prevent electric shock, please do not damage the label and open the cover,

otherwise any damage to the product will not be covered under warranty.

## 2-Product Description

### 2.1 Product Features

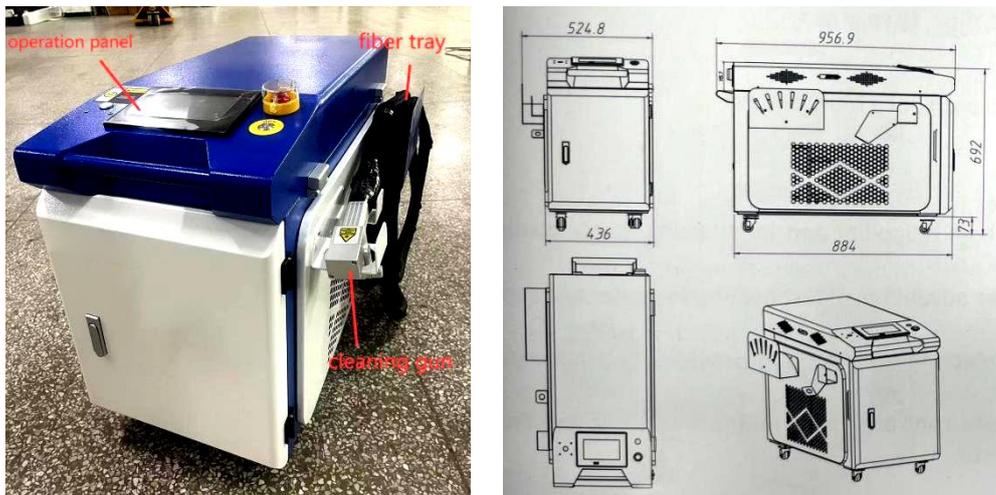
The handheld fiber laser cleaning machine is a high power fiber laser device launched by Horizon Laser which subverts the working mode of the previous laser cleaning machine. Handheld cleaning is flexible and convenient, and the cleaning range is wider.

The complete set of handheld fiber laser cleaning machine is mainly composed of CW fiber laser source, handheld cleaning head, chiller, laser control system and safety light-emitting system.

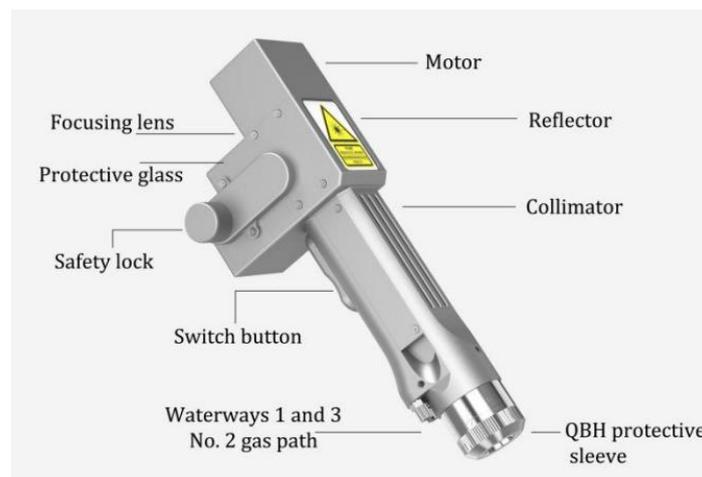
#### Advantages:

- Using fiber laser as the cleaning light source, it has a lifespan of 100,000 hours and no power attenuation;
- Safe and reliable, multiple light protection measures, worry-free operation;
- The adjustable width of the cleaning seam is 0~300 mm@F800 to meet different cleaning seam requirements;
- Multiple sets of cleaning processes can be stored in advance and can be applied to cleaning different materials by directly calling them;
- The cleaning gun has a lightweight, ergonomic design and a comfortable grip, making it suitable for long-term handheld cleaning operations;
- Unique air knife design, Unique exit "air knife" design can greatly increase the outlet to protect the gas flow rate, and better prevent lens pollution from pollution
- Gas detection, if the gas bottle is not opened or the gas flow is low, alarm indication to avoid damage to the gun head lens;
- Multiple alarm detection for lasers, chillers, and air pressure to monitor equipment status in real time;
- Support multiple languages including Simplified Chinese, Traditional English, English, Japanese, Korean, Russian, German, French etc.

## 2.2 Machine Structural Layout



## 2.3 cleaning Head Structure



## 2.4 Technical Parameters

| Model                  | DPX-W1000                                    | DPX-W1500   | DPX-W2000 |
|------------------------|--|-------------|-----------|
| Laser Source Type      | CW fiber laser source (Wavelength: 1080±3nm) |             |           |
| Output Power           | 1000W  | 1500W       | 2000W     |
| Power Adjustment Range | 10% ~ 100%                                   |             |           |
| cleaning Mode          | Continuous cleaning                          |             |           |
| Adjustable clean Width | 300 mm@F800                                  | 150 mm@F400 |           |
| Torch Cable Length     | About 10m                                    |             |           |
| Torch Weight           | 0.7kg  |             |           |
| Dimensions (L*D*H)     | L*W*H: 957*525*692mm                         |             |           |
| Net Weight             | 100kg  | 107kg       | 113kg     |

|                                     |   |        |        |
|-------------------------------------|---|--------|--------|
| <b>Power Consumption</b>            | <5.2kw  | <6.7kw | <8.4kw |
| <b>Operating Voltage</b>            | Single-phase three-cable 220VAC   |        |        |
| <b>Working Environment</b>          | Temperature: 0 ~ 40°C、 Humidity<70%   |        |        |
| <b>Safety Light Emission System</b> | 1. Gas detection: The alarm red light will indicate when the gas cylinder is not opened or the gas flow is low.<br>2. cleaning gun firing button and laser shutter, double insurance to emit light. |        |        |

## 2.5 Product Details

### 2.5.1 Operation panel of device



- Emergency stop: Press the "Emergency Stop" switch to turn off the power supply of the whole machine; after releasing the emergency stop, press the "Start" button to power on the whole machine;
- Start: Turn on the power supply system of the whole machine. Press the "Start" button, and after about 20 seconds the left indicator light will turn green, indicating that the device is ready;
- Indicator light: When the power supply of the whole machine is ready, the indicator light will show green;
- Operation screen: used to set the laser power, frequency, duty cycle; cleaning seam width and swing speed of the cleaning gun; the opening or closing delay of the protective gas, etc.

## 2.5.3 Chiller Panel



Add water steps:

- (1) Turn off the equipment;
- (2) Unscrew the cap of the water inlet, add purified water, distilled water or deionized water to the water inlet, wait until the water level reaches the middle and upper range of the green NORMAL scale, then screw on the cap;
- (3) Under cold conditions in winter, antifreeze needs to be added to the chiller,  $-2\sim-5^{\circ}\text{C} \rightarrow \text{Water} : \text{Antifreeze} = 8 : 2$ ,  $-12\sim-15^{\circ}\text{C} \rightarrow \text{Water} : \text{Antifreeze} = 7 : 3$ ,  $-22\sim-25^{\circ}\text{C} \rightarrow \text{Water} : \text{Antifreeze} = 6 : 4$ . After the temperature warms up, the water in the chiller needs to be replaced and pure water added again.

Notice:

- (1) Untreated tap water or well water must not be added to the chiller;
- (2) It is recommended to change the water inside the chiller every 3 to 6 months;
- (3) Chiller operation button: Set the temperature of low-temperature water and normal-temperature water. Low-temperature water supplies the laser, and the recommended setting is  $24\sim 26^{\circ}\text{C}$ ; normal-temperature water supplies the laser output head and cleaning gun head, and the setting temperature is recommended to be  $27\sim 28^{\circ}\text{C}$  (cleaning The equipment has been set at the factory. If the laser has a high humidity alarm, the low temperature water should be appropriately increased by  $1\text{-}2^{\circ}\text{C}$ ).

## 3-Operation Steps

### 3.1 Installation

The laser cleaning machine is a valuable item, and Horizon Laser recommends you to disassemble and assemble the box according to the following steps.

- 1) Open the main packing box, remove the foam cover, and take out the supporting items;
- 2) Check the accessories against the "packing list";
- 3) There are cleaning heads and optical fiber armored cables placed on the top plate of the equipment. Please take them out carefully to ensure that the minimum bending radius of the optical fiber armored cables is greater than 200mm. Use qualified equipment to lift the cleaning machine out of the packing box, or gently fork out the forklift, release the caster brake, push the equipment to the installation position on a flat ground and fix the caster brake;
- 4) Please ensure that the equipment is located in a dry, well-ventilated location with no obstacles around, the front of the equipment and the operator's location are unobstructed, the vision is not blocked, there is no falling objects above the equipment, the equipment is located where the drainage is smooth and convenient, and there will be no accumulation of water situation.

Notice:

- If you find any damage to the outer packaging and internal components when you receive the product, please contact Horizon Company or the designated agent immediately.
- When the hand-held laser cleaning machine is transported, hoisted and used, it is strictly forbidden to lay it down, and it must be kept upright (if it is placed, it will cause the risk of outflow of the coolant of the chiller). If the above situation occurs, please contact Horizon Company or the designated agent contact.
- Place the equipment away from the vibration source.

Recommendation: Change the working environment temperature or humidity of the laser to keep the laser away from the dew point.

### 3.2 Startup Steps

- (1) Connect the gas cylinder to the equipment protective gas interface. Clean air, argon and nitrogen are recommended as protective gases, and the gas flow rate is greater than 10L/min. First, check the nameplate on the special gas cylinder for cleaning to see if it meets the requirements for the gas used, such as purity and pressure;
- (2) Connect the power cord correctly. Single-phase three-wire AC 220V 50Hz, be sure to ensure that the live and neutral wires are correctly connected according to the line markings, and the ground

wire is well connected. Poor contact of the ground wire may cause electric shock to the equipment, interfere with equipment operation and other abnormal situations.

(3) Release the "Emergency Stop" switch on the front panel and press the "Start" button. After about 20 seconds, the left indicator light turns green, indicating that the equipment starts normally (ensure the normal operation of the chiller);

(4) Confirm that there is no alarm display on the software interface, and the device is ready;



(5) After setting parameters such as laser power, cleaning width, and swing speed on the operation screen, open the software "Laser Enable";

### 3.3 Shutdown Steps

(1) Press the "Emergency Stop" button to turn off the equipment power;

(2) Turn off the gas switch of the protective gas cylinder;

(3) Put away the cleaning gun.

### 3.4 Precautions

(1) The power wiring must be accurate and must be grounded to avoid electric shock damage to the case and damage to equipment components;

(2) The operator takes necessary protection and wears laser protective glasses;

(3) When the optical cable is hung, the bending radius must be greater than 200mm;

(4) The cleaning gun is a precision part, handle it with care and avoid strong bumps;

(5) Necessary protection should be provided for regional work, and it is recommended to conduct necessary isolation of the work area. Especially when cleaning highly reflective materials such as

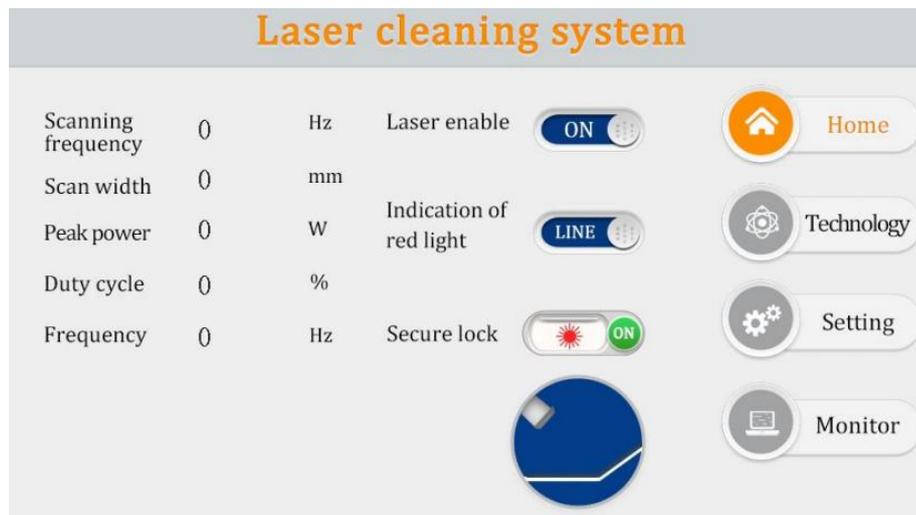
copper or aluminum, the cleaning gun should be tilted to avoid being perpendicular to the workpiece, and no one is allowed to stand on the opposite side of the cleaning.

## 4-Control Panel Settings

The control operation interface is divided into four parts: home page, technology, settings, and monitoring.

### 4.1 cleaning Operation Interface

#### 4.1.1 Home



- This interface can see the current process parameters (this page can not modify the process) and instant alarm information.;
- Power ault default ON, red light default LINE,When the display OFF will not send an enabling signal to the laser and can be used to test the vent function.Close the red light indicator and show that the "DOT" motor stops swinging, when the red light is a point to adjust the center;
- "Safety lock", when the gun body "safety lock" is opened, the displayed green."ON" can be normally illuminated, and the closed red "OFF" can not shine;

### 4.1.2 Technology



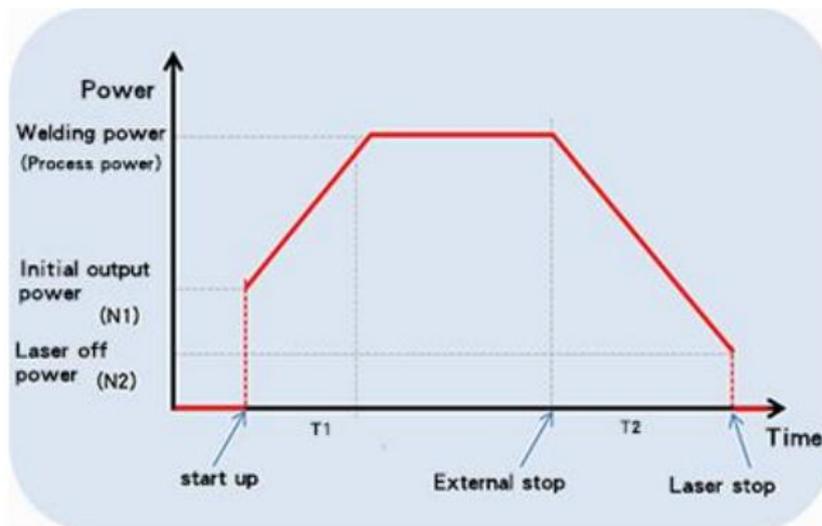
- The process interface contains the process parameters of debugging, click the box (red) to modify, click OK, and then save in the quick process, click import(modify-save-import);
- The scan frequency range is 30-100 HZ, and the scan width range is 0 ^ 300mm;
- The peak power should be less than or equal to the laser power of the parameter page (if the laser power is 1000W, this value is not higher than 1000);
- Duty cycle range 0 to 100 (default 100, usually not changed);
- The pulse frequency range is recommended from 5-5000Hz (default 2000, usually not changed);
- Click the HELP button on the top right to get more relevant parameter explanations;
- Endpoint optimization: range-30~30, which can eliminate the phenomenon of uneven light out at both ends of the cleaning track, and different scanning frequencies correspond to different optimal parameters. The default is 0, please adjust to the ideal state according to the actual situation.

### 4.1.3 Setting

To enter this interface, you need to enter the password 123456. Be careful when modifying the parameters on the setting page. The factory defaults have been set.



- The laser power is the power of the used laser, please fill in correctly;
- The default gas delay default 200ms, range 200ms-3000ms;
- From N1% of process power to 100%; from 100% of process power to N2;(as shown in the figure below.Generally, the preset switch light power is 20%, and the switch light step time is 200ms);

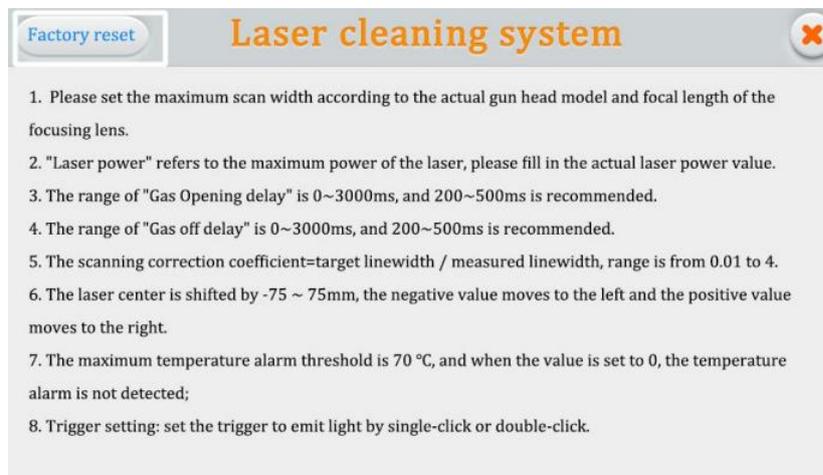


- The maximum temperature alarm valve value is 65 °C . When the value is set to 0, the temperature alarm is not detected;
- Scan correction coefficient range 0.01~4, coefficient target line width /measured line width: the default is 1.0;
- Laser center offset-75~75mm, reduced to the left, increased to the right shift, applied to adjust the red light center;
- The pressure / water cooler / laser alarm level signal is low level by default. When this alarm signal is used, if the external pressure alarm is installed, it will be changed to high level, otherwise abnormal alarm will appear, and other alarm signals should be the same;

- Click the "Chinese" button, you can switch to other languages in the language selection bar. Currently, the standard version supports eight simplified Chinese, traditional Chinese, English, Japanese, Japanese, Korean, Russian, German and French. Please contact us if necessary;



- This page is the setting page help page, long press "Restore factory Settings" for 3 seconds, can restore all set parameters to "factory parameters", long press "Save as factory settings" for 3 seconds, can set the current set parameters to "factory parameters";



- Click on the "Head Model" area to select the scan width corresponding to different focuses;



#### 4.1.4 Monitor

This page displays the status of each signal and the equipment information.



- Laser trigger signal: when the trigger is pulled, this state changes from gray to green;
- Laser / water cooler / air pressure alarm signal: the output signal is displayed in the middle of the high and low level page set for monitoring it, and when the signal is output, the green signal is displayed by gray;
- Equipment authorization: the equipment can be authorized for the use time, when the equipment is used for more than the set time, the authorization will be terminated;
- Light time: Click "Device Authorization", enter "FFFFFFBB001" on the password page to open the timing, enter "FFFFFFBB000" to clear the data and stop the timing;
- System version: three sets of numbers, the first group is hardware version, the second group is microcontroller program version, the third group is touch screen version;
- Click the Diagnostic-button to enter the diagnostic page. Under this page, the laser will not emit light, and can independently output "PWM", "laser enabling", "air valve enabling", "analog" through "switch control", compare the detection value to judge whether the control box and theoretical value function is normal.

**Laser cleaning system**

 diagnose

| Output signal        | Theoretical output value | Detection value | Switch control |
|----------------------|--------------------------|-----------------|----------------|
| PWM (V)              | 0                        | 0               |                |
| Laser enable (V)     | 0                        | 0               |                |
| Gas valve enable (V) | 0                        | 0               |                |
| Analog voltage (V)   | 0                        | 0               |                |



## 4.2 Maintenance

Maintenance and replacement method of related lenses:

- ① Before operation, please clean your hands and dry them, and then wipe them with cotton and alcohol again.
- ② Open the protective mirror in a relatively dust-free place, focus the mirror compartment cover, pull out the lens bracket, do a good job of protection (beautiful paper cover), check the protective lens, if there is an obvious burning point on the lens surface, should be directly replaced.
- ③ Then check the white storage seal ring under the lens.(If the storage sealing ring cannot be used, it must be replaced immediately.
- ④ Wipe the warehouse mouth and the inside of the warehouse cover with a cotton ball dipped in alcohol, quickly insert the protective lens bracket into the protective mirror compartment, and lock the screws.

## 5-Common Troubleshooting

| No. | Fault                 | Solutions   |
|-----|-----------------------|---|
| 1   | Alarm of laser source | <ol style="list-style-type: none"> <li>① Check whether the laser has red light. If there is no red light output, please contact the manufacturer;</li> <li>② Check whether the cooling temperature and water flow of the chiller are normal;</li> <li>③ Connect to the laser host computer software and check the alarm type. For temperature alarms, you need to check whether the chiller cooling and water flow are normal;</li> <li>④ In case of QBH installation alarm, you need to check whether the laser output head QBH and the cleaning gun are tightly connected;</li> </ol> |
| 2   | Alarm of chiller      | <ol style="list-style-type: none"> <li>① Check whether the chiller is on;</li> </ol>  |

|   |  |   |
|---|--|---|
|   |  | <p>② Check the alarm type on the chiller screen. If the chiller is short of water, pure water needs to be added to the normal scale;</p> <p>③ If the air conditioner of the chiller alarms, clean the dust on the filter inside the chiller;</p> <p>④ The chiller is leaking. Check the source of the leak and contact the manufacturer.</p>  |
| 3 | Alarm of gas pressure                      | <p>① Check whether the air source valve is open and whether the air pressure and flow rate meet the requirements (flow rate is greater than 10L/min);</p> <p>② If there is air leakage inside the equipment, check the source of the air leakage and contact the manufacturer.</p>  |
| 4 | No emission of laser beam                  | <p>① Check whether the equipment has an alarm and handle it according to the alarm type;</p> <p>② Check whether the cleaning gun lens is dirty, and remove the copper nozzle to confirm whether there is red light output;</p> <p>③ Enter the "Monitoring" page of the cleaning equipment software, and when pressing the switch button, check whether the input signal status "laser trigger signal" and "safety ground lock signal" are normal. Check whether the output signal status "PMW" and "Laser Enable" voltage are 24V, and whether the analog quantity has a voltage value.</p> |
| 5 | Weakening of laser energy                  | <p>① Check whether the protective lens of the cleaning gun is dirty and whether the copper nozzle blocks the laser output;</p> <p>② Readjust the focus of the cleaning gun to ensure that the cleaning energy is maximum when the gun tip touches the workpiece. Readjust the focus of the cleaning gun to ensure that the cleaning energy is maximum when the gun tip touches the workpiece.</p>   |
| 6 | The protective mirror is seriously damaged | <p>① It is recommended that the gas flow rate be greater than 10L/min;</p> <p>② It is recommended that the angle between the cleaning gun and the workpiece be less than 70 degrees, and vertical angle cleaning is strictly prohibited.</p>  |
| 7 | Device indicator light flashes randomly    | <p>① Check whether the equipment is well grounded, and measure the voltage between the live wire and the ground wire, and the voltage between the neutral wire and the ground wire;</p>   |

|  |  |   |
|--|--|---|
|  |  | ②Check whether there are large electrical equipment around the equipment, check whether the power supply voltage is stable and whether there is interference. |
|--|--|---|

## 6-Daily Maintenance

| No. | Maintenance parts                   | Maintenance content   | Maintenance cycle                                    |
|-----|-------------------------------------|---|--|
| 1   | Water lines, water pipes and joints | Check whether they are tight and whether they are damaged         | A month  |
| 2   | cleaning gun protection lens        | Replace it  | According to the actual situation                    |
| 3   | Laser center position               | Use red light to check whether it is in the center of the nozzle. | Start-up inspection; cleaning abnormality inspection |
| 4   | Chiller                             | Check water level and water quality                               | Replace pure water every 3 to 6 months               |

Maintenance and replacement of protective lenses:

- (1) The red light output by the cleaning gun is extended far away and illuminated on the white paper to check whether there are black spots in the red light;
- (2) Before replacing the protective lens, please clean your hands with detergent and wash your hands again with a lint-free cloth with absolute alcohol;
- (3) Loosen the two screws on the protective mirror compartment cover in a relatively dust-free place (office), pull out the protective mirror holder, cover the cleaning gun drawer opening with masking paper, and check the protective lens in a brightly lit place. If the lens has obvious black burning spots, it should be replaced immediately; if there is dust on the surface of the protective lens, use a lint-free cloth or lint-free cotton swab dipped in a small amount of absolute alcohol and wipe the lens clean in one direction;
- (4) After maintenance or replacement, use a lint-free cloth or lint-free cotton swab dipped in a small amount of anhydrous alcohol to wipe the cover and bracket. Finally, insert the protective mirror bracket into the cleaning gun drawer opening and tighten the two screws.