



# AIR-COOLED CONTINUOUS LASER CLEANING MACHINE

**ALC-1500**

**OPERATION MANUAL**







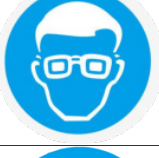





LUOYANG XINCHENG PRECISION MACHINERY CO.,LTD.



# Notice

Before using this product, please ensure that the following items are in compliance with the product safety operation requirements. Otherwise, it is forbidden to turn on the system and perform cleaning operations.

	<b>It is prohibited to use this product in places with flammable and explosive materials.</b>
	<b>When cleaning highly reflective materials (copper, aluminum, etc.), it is forbidden to have people stand around to avoid damage caused by reflected light.</b>
	<b>It is forbidden to aim the cleaning head at the human body to avoid injury.</b>
	<b>It is forbidden to make the tip of the cleaning head upward. Pay attention to the dustproof of the lens.</b>
	Make sure that the equipment is reliably grounded.
	Clean combustible items carefully and equip with fire-fighting equipment.
	This product is a Class IV radiation laser. Goggles must be worn.
	Ensure that the dust-proof air blower works normally to keep the lens clean.
	The minimum bending radius of the integrated cable should be more than 200mm.
	<b>If the operating temperature exceeds the specified limit, a gas source with a pressure of <math>\geq 0.4</math> MPa must be used for cooling. Otherwise, a high-temperature alarm may be triggered.</b>

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## I Scope of application

Continuous laser cleaning machines offer high efficiency, environmental friendliness, and precision. They are widely used across various industries for cleaning tasks ranging from delicate precision parts to large structural components. Typical applications include the removal of oil, rust, paint, and weld residues from metal surfaces. As non-contact, non-destructive, and automated systems, they provide advanced and reliable cleaning solutions.

## II Product Description

### 1. Equipment structure diagram



Figure 1 ALC-1500 structure diagram

## Cleaning head

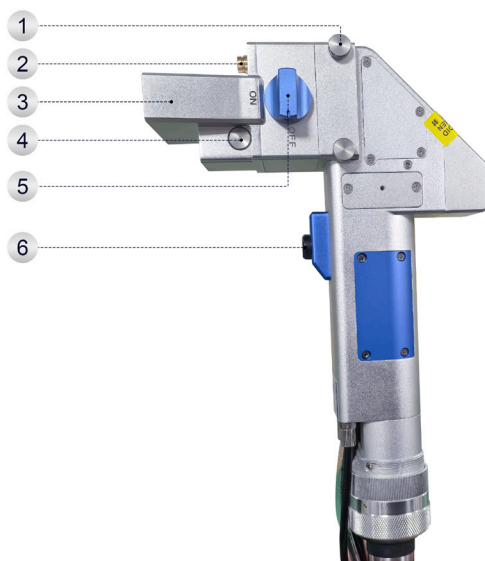


Figure 2 Cleaning head structure diagram

1. Protective lens drawer
2. Focus indicator
3. Air outlet
4. Airflow adjustment valve
5. Dust protection knob
6. Laser output button

## 2. Main technical parameters

Model	ALC-1500
Laser Power	1500W
Laser Wavelength	1080±10nm
Operating Mode	Continuous/Modulation
Maximum Modulation Frequency	10KHz
Integrated Cable Length	10m
Scanning Width	10-250mm(Standard F500 focusing lens)
Power Configuration	AC220V±10%
Input Power	5KW
Rated Current	21A
Cooling Method	Air cooling
Ambient Temperature	0°C ~ 35°C
Ambient Humidity	40% ~ 80%
Machine Size	580*430*630mm
Package Size	700*500*850mm
Net Weight	51kg
Gross Weight	70kg

### **III Installation and use instructions**

#### **1. Use requirements**

- 1.1. This machine operates on AC 220V. If your power supply does not meet this requirement, please use a suitable transformer.
- 1.2. The bending radius of the integrated cable must not be less than 200 mm.
- 1.3. Ensure proper ventilation. Maintain a clearance of more than 60 cm around the unit to allow for adequate heat dissipation and to prevent performance issues.
- 1.4. Keep the area around the air inlet of the laser scanning field clean to avoid foreign objects or large dust particles from being drawn into the chassis.
- 1.5. When the operating environment temperature is between 0–35 °C, the standard equipped air pump can be used to blow away dust. If the temperature exceeds this range, the air flow rate must be increased to prevent system alarms caused by high temperatures.

#### **2. Precautions for Use**

- 2.1. Before installing or removing any laser cleaning components, ensure that the equipment is completely powered off.
- 2.2. During installation and operation, ensure the equipment is placed securely to avoid damage caused by impacts such as tipping or falling.
- 2.3. After each use, it is recommended to use clean, dry air to remove dust from the field lens and cleaning head. Alternatively, use a lens cloth for wiping. When the cleaning head is not in operation, turn the dust protection knob to the closed position.
- 2.4. If any abnormality is observed during operation, troubleshoot the issue or contact after-sales support. Do not continue operating the equipment in a faulty state to avoid further damage or loss.
- 2.5. Inspect the protective lens before each use. If contamination is found, clean it promptly using a dust-free cotton swab or lens-cleaning stick dipped in anhydrous alcohol or isopropyl alcohol. Wipe from the center outward in a counterclockwise motion. Be cautious to avoid scratching the lens surface.
- 2.6. Handle the handheld cleaning gun carefully during use. Avoid any strong impact or collision, which may cause malfunction or damage.

#### **3. Replacement of Protective Lens**

- 3.1. Important: Replace the protective lens in a dust-free environment to prevent contamination of the field lens.
- 3.2. Loosen the screw on the protective lens drawer and carefully pull it out (refer to Figure 2, Item 1).
- 3.3. Unscrew the protective lens retaining ring counterclockwise and remove the soiled protective lens.
- 3.4. Insert a new protective lens (there is no directional requirement). Handle the lens only by its edges; do not touch the center surface to prevent contamination from skin oils.
- 3.5. Reverse the steps above to complete the reassembly process.

### **IV Operation Process**

#### **1. Start-Up and preparation**

- 1.1. Connect the power cord, ensuring proper grounding. Connect the L (live), N (neutral), and PE (ground) wires to their corresponding terminals on the main power supply. Refer to Figure 3.

## 1.2. Power Wiring Diagram

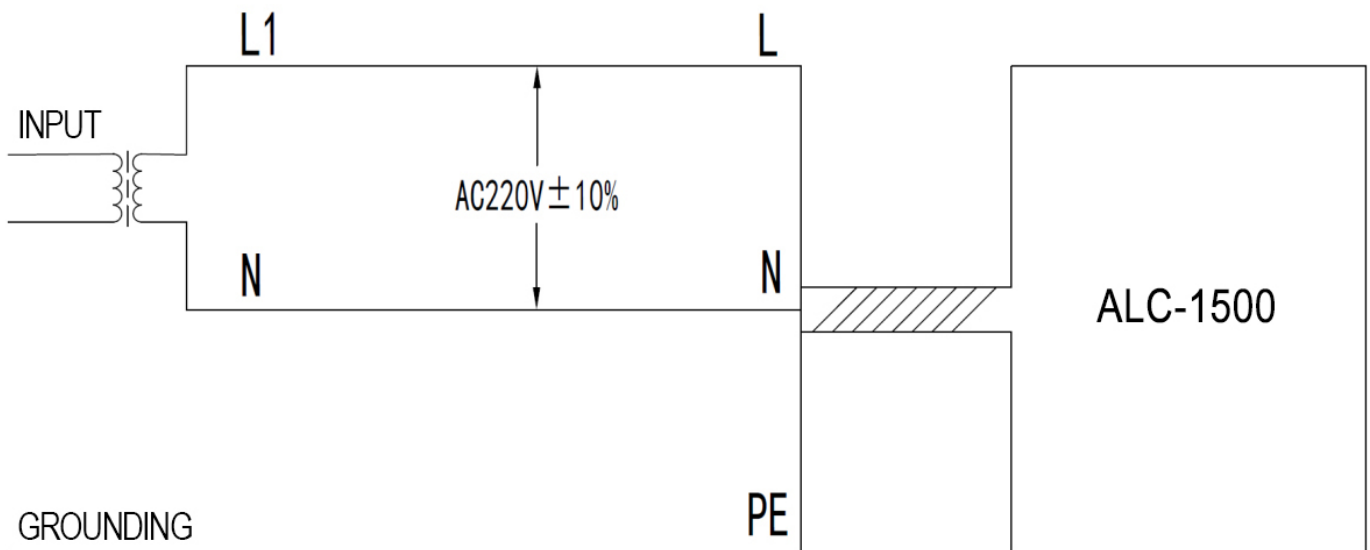



Figure 3: Wiring Diagram of ALC-1500

1.3. Turn on the emergency stop switch and key switch to start the equipment.

1.4. To shut down, turn off the key switch and press the emergency stop switch.

## 2. Swing parameter setting

2.1. After powering on, the control screen performs a self-test, which takes approximately 20 seconds. Then the system will display the "Prompt Interface." Please read the prompt content carefully, then click  to proceed to the "User Management" interface.

The screenshot shows a 'Precautions' screen with a back arrow icon in the top left corner. The text reads: "Before using this product, please ensure that the following items are in compliance with the product safety operation requirements, Otherwise it is forbidden to turn on the system and perform cleaning operations." Below this are eight safety instructions, each with an icon:









-  It is prohibited to use this product in places with flammable and explosive materials.
-  It is forbidden to make the tip of the cleaning head upward. Pay attention to the dustproof of the lens.
-  When cleaning highly reflective materials (copper, aluminum, etc.) it is forbidden to have people stand around to avoid damage caused by reflected light.
-  Clean combustible items carefully and equip with firefighting equipment.
-  It is forbidden to aim the cleaning head at the human body to avoid injury.
-  This product is a Class IV radiation laser. Goggles must be worn.
-  Check and ensure that the lens is clean before use to avoid damage to the cleaning head.
-  The minimum bending radius of the integrated cable should be more than 200mm.

Figure 4 Prompt interface

## 2.2. User management

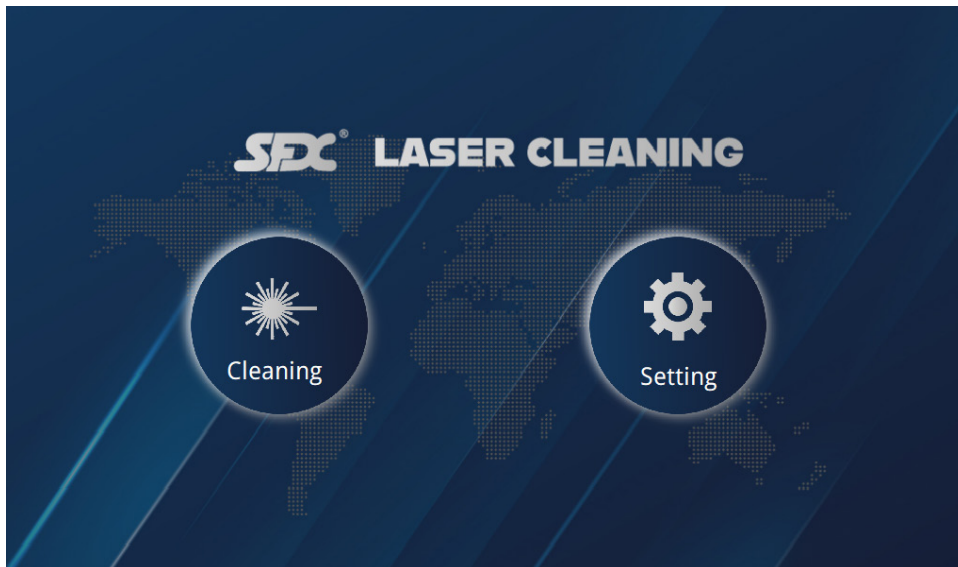


Figure 5 User management interface

Click "Cleaning " to access the cleaning parameter settings interface.(Default Password: 1)

Click "Setting" to access the system settings interface. (Default Password: 6)

2.3. Click "Cleaning" and enter password 1 to enter the cleaning management interface

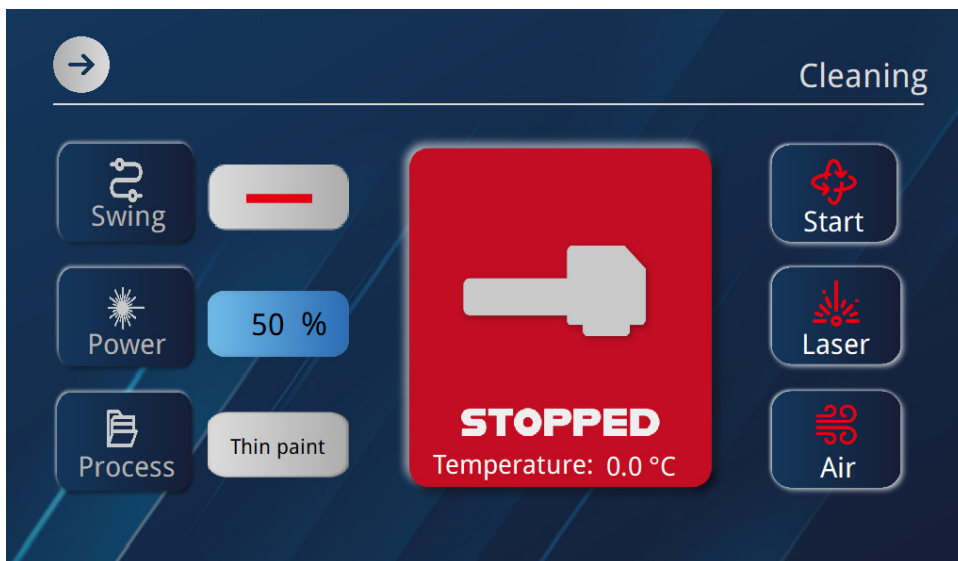


Figure 6 Cleaning management

Swing: Set the red light and laser graphic parameters (refer to section 2.4).

Power: Set the laser energy parameters (refer to section 3.1).

Process: Save both "Swing Parameters" and "Laser Parameters" for quick access and reuse (refer to section 4: Process Files).

Start: Click and the red light will change to the set graphic.

Laser: Click to put the device into light-emitting preparation state.

Note:At this point, double-click the trigger button on the cleaning gun head to activate laser emission. Ensure the dust protection cover is fully opened before emitting light. If it is not completely open, the laser will not activate.

2.4. Click "Swing" to configure appropriate scanning width and scanning speed.

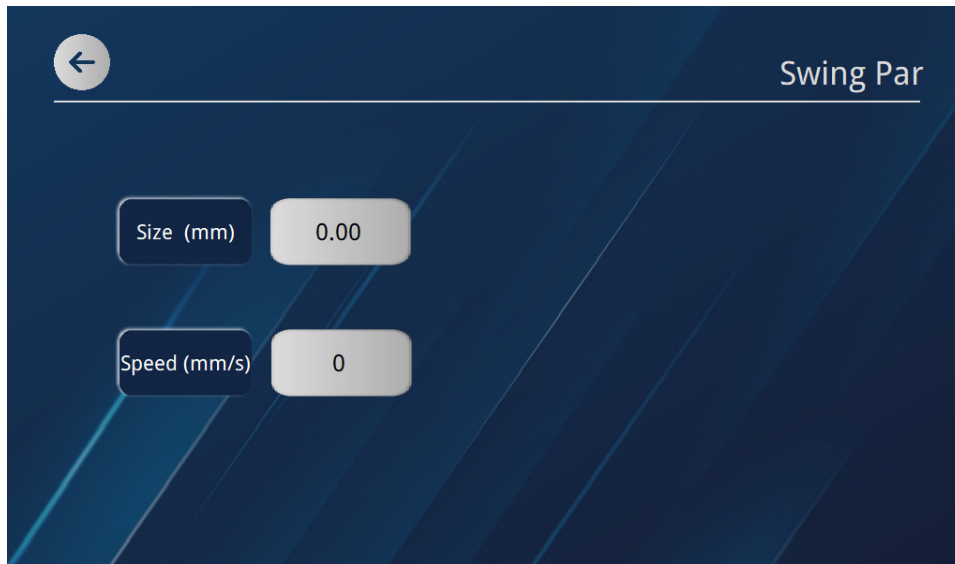


Figure 7 Swing parameters

Scanning Width: Sets the width of the laser beam. The available range is 10–250 mm.

Scanning Speed: Sets the movement speed of the laser spot. The adjustable range is 1–25,000 mm/s.

#### 2.5. Swing parameter reference

Scanning Width(mm)	Scanning Speed(mm/s)
40	2000
50	3000
60	4000
70	5000
80	6000
90	7000
100	8000
110	9000
120	10000
130	12500
150	13500
200	25000
250	25000

Table 2: Swing Parameter Reference Table

Note: The scanning width is proportional to the scanning speed. When using a narrower scanning width, the scanning speed should be reduced accordingly to maintain optimal cleaning intensity. It is recommended to adjust the scanning width and speed based on the reference values in the table. Improper settings may cause the galvanometer motor to produce abnormal noise (howling) or lead to damage.

### 3. Laser Parameter Setting

3.1. After setting the Swing Parameters, return to the Cleaning Management interface. Click on Laser Parameters to configure the appropriate laser settings.

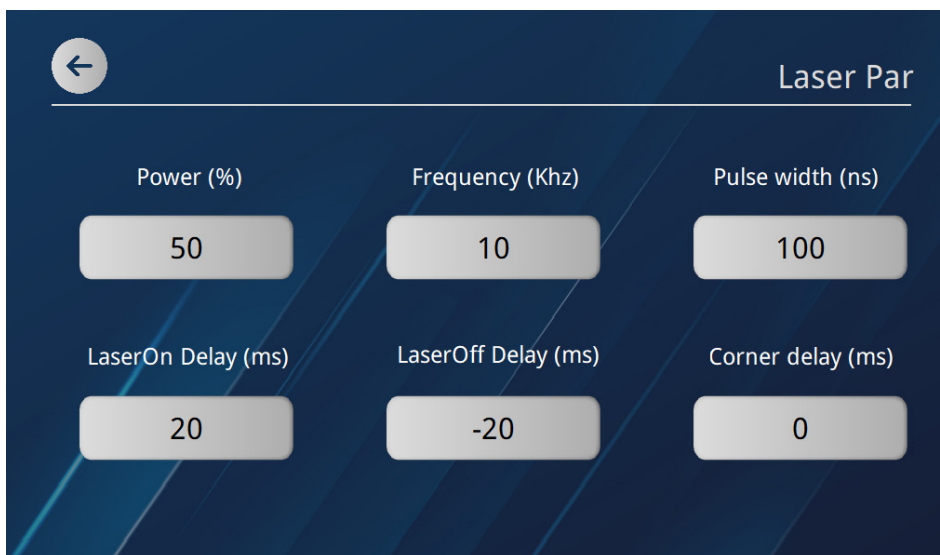


Figure 8 Laser parameters

Function description for laser parameter:

Item	Name	Function	Note
Laser Par.	Power (%)	Set laser power percentage	10-100%
	Duty (%)	Sets the duty cycle of the modulation signal period	0-100%
	Frequency (KHz)	Set the frequency of the modulating signal	0.001-10
	Laser On Delay (us)	Adjust the delay time before and after the graphics are turned on	-100-100
	Laser Off Delay (us)	Adjust the delay time before and after the graphics are turned off	

Table 3 Laser parameter function introduction table

3.2. Laser parameter setting instructions:

- (a) Power: Adjust the laser output power. The higher the power, the higher the output energy.
- (b) Duty cycle: The larger the percentage, the higher the output energy, and vice versa.
- (c) Frequency: the higher the frequency, the lower the energy of the fixed area per unit time. When the duty cycle is 100%, the frequency adjustment has no effect.
- (d) Generally the duty cycle is 100% and the frequency is 10KHz. You only need to adjust the power. For thin materials, it is easy to deform due to the heat caused by cleaning. You can decrease the duty cycle and increase the frequency if the power reduction cannot meet the demand.

#### 4. Process File Management

4.1. Click "Process Documents" in the "Cleaning Settings" interface to open the process preset interface. There are 6 preset cleaning processes designed for common cleaning conditions. These presets can be applied but not modified.

"Current parameters" reflect the equipment's parameters when it is currently emitting laser. These values can be modified directly in the "Cleaning Settings" interface.

"Setting parameters" show the parameter settings for the selected process file. Clicking "Apply" transfers these settings to the "Current parameters."

The "Setting parameters" for presets (e.g., 123) can be modified and saved as needed.

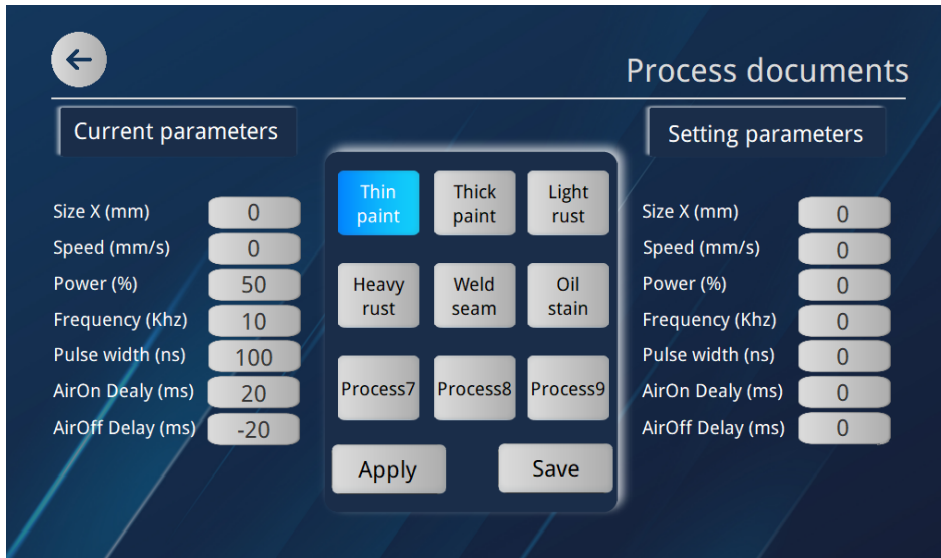


Figure 9 Process parameters

#### 4.2 Process parameter pre-set table

Process	Function	Description
Thin Paint	Cleaning thin paint on metal surface (such as self-spray paint)	1.Avoid cleaning with the gun head pointing vertically upward, as falling dust can dirty the protective lens. 2.If excessive smoke and dust are produced during cleaning, ensure proper ventilation to optimize the working environment and extend equipment life. 3.Pay attention to the movement speed of the cleaning head: Moving too quickly may result in incomplete cleaning. Moving too slowly may cause substrate discoloration or deformation due to heat.
Thick Paint	Cleaning thick paint on metal surface (such as anti-corrosion paint)	
Light Rust	Cleaning light rust on metal surface (easily brushed off)	
Heavy Rust	Cleaning heavy rust on metal surface (with peeling)	
Weld Seam	Cleaning Oxidation layer and thermal discoloration from metal welding	
Oil Stain	Cleaning oil stains on metal surfaces (e.g., engine exteriors)	
Preset 1	Custom settings as per customer requirements	
Preset 2		
Preset 3		

Table 4 Process parameter pre-set table

## 5. Laser-emitting operation

- 5.1. After setting the Swing Parameters and Laser Parameters, return to the Cleaning Settings interface. Take the handheld cleaning gun head and ensure the bending radius of the integrated cable is greater than 200 mm.
- 5.2. Open the dust protection cover of the handheld cleaning gun head. On the screen, click Swing—the red dot will change to a swing parameter setting graphic. Then click Start and Laser to prepare the gun head for light emission.

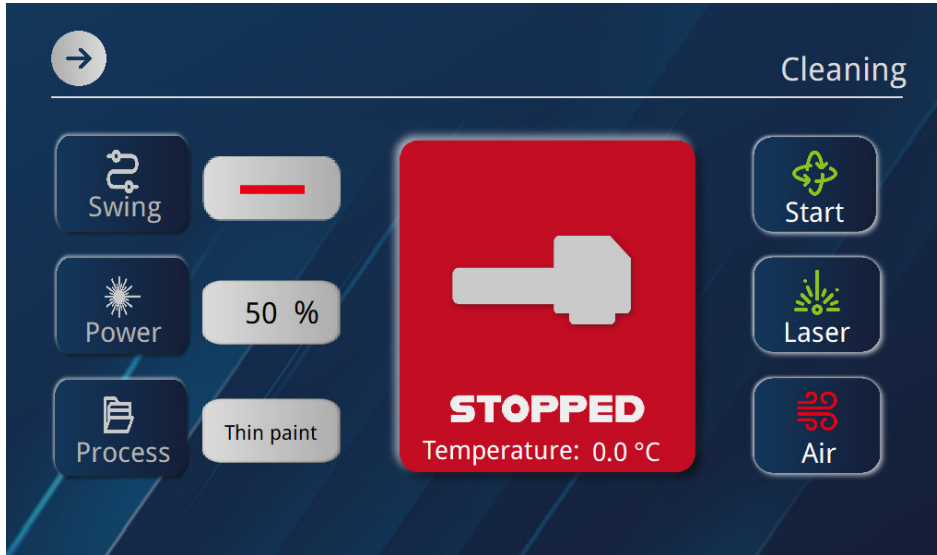


Figure 10: Button Trigger Interface.

- 5.3. Aim the handheld cleaning head at the target surface, maintaining a distance of 450–500 mm (for an F500 field lens), and double-click the trigger button on the cleaning head to begin cleaning.
- 5.4. If the device is idle (no light emission) for more than 2 minutes, the Laser function will automatically turn off to prevent accidental activation. Click Laser again to resume operation.

## 6. Shutdown Operation

If the device will not be used for an extended period, disconnect the power supply. To shut down: On the screen, turn off the Swing function. Press the Emergency Stop button. Disconnect the device's main power supply. Close the dust protection cover of the handheld cleaning gun head and store it securely. For detailed steps, please refer to the video tutorial.

## 7. Emergency Stop and Safe Operation

- 7.1. To emit the laser, double-click the trigger button on the handheld cleaning gun head. Releasing the button will immediately stop the laser. Refer to Figure 2.
- 7.2. The machine includes an Emergency Stop button. In the event of an emergency, press this button to halt all operations. After the situation is resolved, release the button to restore power and restart the system. Resume laser operation by following the steps in section 5.

## V System Setting

1. In the "User Management" interface, click "System Settings" to enter the system settings interface

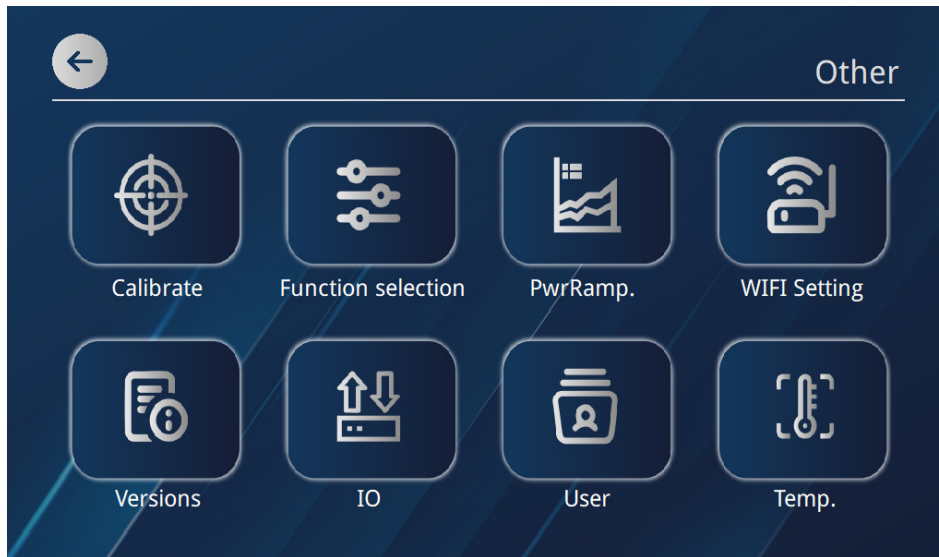


Figure 11 System settings








Item	Description	Description	Description
	Calibrate	Correction of scan width	Operation should be performed under the guidance of the manufacturer.
	IO	Set IO input and output signals	
	Temp.	Monitor cleaning head temperature	
	User	Create users and modify user passwords	
	Function Selection	External I/O functions	
	Versions	Display device version,expiration time	
	PwrRamp.	Optimize the strong light area on both sides of the laser.	

Table 5: System Setting Function Table

### 3. User Management

The default username is "admin", and the default password is "1". You may modify the username and password or register a new user account. It is recommended to retain the default account to avoid the risk of forgetting login credentials.

To register a new account: Click on "Username", enter the desired username, and confirm. Click on "Password",

enter the chosen password, and confirm. Click "Register" to complete the process. The new account will be available for use immediately after registration.

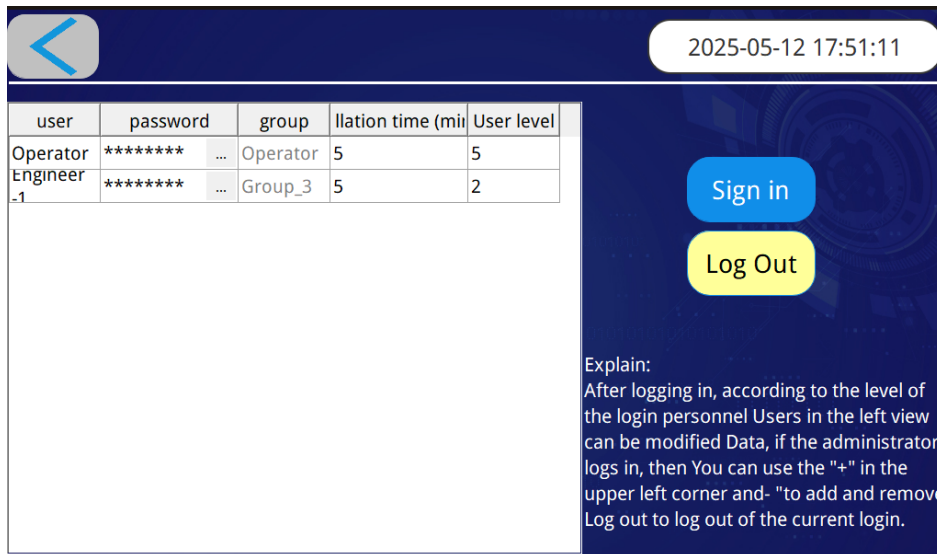


Figure 12: User Management

#### 4. Other Settings

The system includes 15 built-in mainstream languages. Customers can customize the interface language by clicking "System Language" and selecting their preferred option.

Modifications to other system functions must be carried out under the guidance of the manufacturer.



Figure 13 Other settings

Website: Scan the QR code to visit the official website.

Driver Version / Touch Screen Version: Displays the current software versions of the device.

Authorization Status: Shows the remaining usage time. A value of 0 min indicates permanent authorization.

Expiration Time: Displays the device's authorization expiry date. If authorization is permanent, this field is not applicable.

Touch Screen Wi-Fi Settings: Configure the device's Wi-Fi connection. Once connected, remote operation becomes available. For detailed instructions, refer to section 6: Wi-Fi Settings.

**5. Version Information**

1. External Laser Output: This function can be activated by connecting the control box to an external laser output device, if required.
2. Air Follow Laser: Off by default. When on, air will be automatically out when "Start" and "Laser" are working (it will not be saved when the power is turned off)



Figure 14 Version information

**6. Wi-Fi Setting**

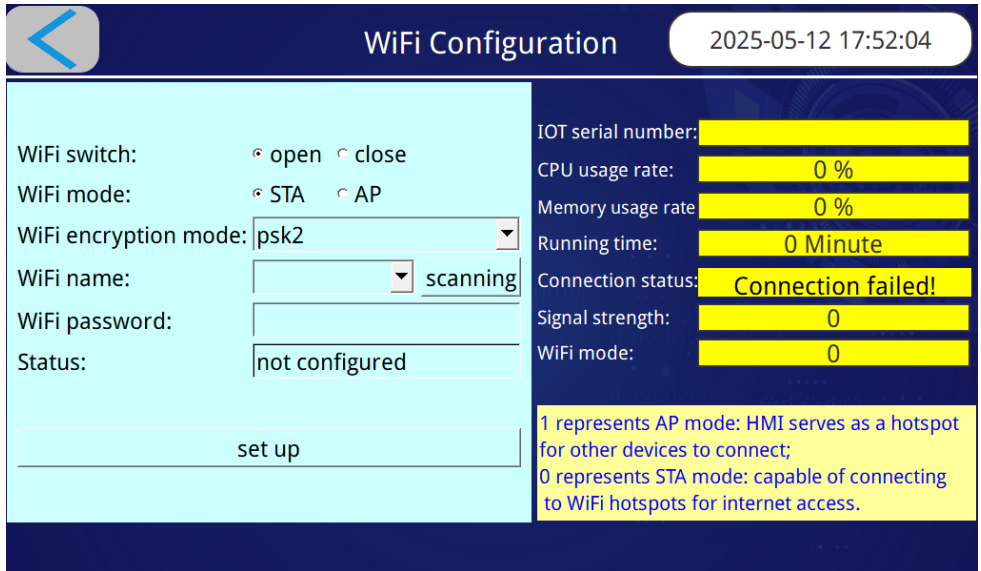


Figure 15: Wi-Fi Setting Interface

The system defaults to Wi-Fi enabled. Click "Scan" to search for available networks, select the appropriate Wi-Fi name, enter the password, and click "Set". Wait for the connection to complete.

7. Scan the QR code below to download the APP. Please contact the manufacturer to obtain your account and password.



Figure 16: Wi-Fi Setting

### VI Fault analysis and troubleshooting

Fault phenomenon	Cause Analysis	Troubleshooting method
The spot does not swing	<ol style="list-style-type: none"> <li>1. The control cable connector of the cleaning head is loose.</li> <li>2. The motor or control card is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten loose joints</li> <li>2. Please contact us</li> </ol>
Cleaning power gets weak or cleaning head gets hot	<ol style="list-style-type: none"> <li>1. There are foreign objects or damage to the optical lens.</li> <li>2. Optical path deflection</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the optical path, clean the lens or replace it.</li> <li>2. Please contact us.</li> </ol>
The cleaning head motor whistles	<ol style="list-style-type: none"> <li>1. The scanning width is narrow and the scanning speed is too fast.</li> <li>2. The galvanometer motor is damaged</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to 2.2 parameter table to set the parameters.</li> <li>2. Please contact us.</li> </ol>
Red light is normal but no laser	<ol style="list-style-type: none"> <li>1. The Start switch of the operation panel or the switch of the cleaning head is damaged.</li> <li>2. Laser damage</li> </ol>	<ol style="list-style-type: none"> <li>1. Click the switch repeatedly to observe the response of the laser or controller.</li> <li>2. Install the laser detection software on the computer to check the cause of the failure.</li> <li>3. Please contact us.</li> </ol>
Inconsistent cleaning results under the same conditions	<ol style="list-style-type: none"> <li>1. power attenuation</li> <li>2. excessive bending of the integrated cable</li> </ol>	<ol style="list-style-type: none"> <li>1. Power attenuation is normal within acceptable limits.</li> <li>2. The bending diameter of the integrated cable must not be less than 200 mm.</li> </ol>

Table 6 Fault Analysis Table

## VII Maintenance

**Note:** In order to avoid personal injury and man-made damage, the maintenance of the handheld laser cleaning machine must be carried out by professionals.

### 1. Handheld cleaning head

**1.1. Daily inspection:** Check the protective lens. If there is foreign matter, clean with a lint-free cotton swab or wiper dipped in absolute alcohol or isopropyl alcohol. If there is coating damage or lens damage, please replace the protective lens in time to avoid other optical lenses being burned.

**1.2. Regular inspection:** When the machine is used or not used for some time (every week is recommended), first check the laser module, and make sure that each optical component is free from dust pollution, mildew, and other abnormal phenomena before turning it on.

**1.3. Observing the light spot:** The operator can check the laser output light spot with black image paper. Once the spot is found to be uneven or skewed, it should be repaired in time.

## VIII Warranty terms

### 1. The warranty for the entire machine is 1 year, and the warranty for the laser is 2 years.

1.1. From the date of purchase, we offer a one-year free warranty (excluding non-warranty items). If it is required to return to the factory, the user is responsible for round-trip transportation costs.

1.2. The product is repaired for free lifetime, with users only responsible for the cost of spare parts and round-trip transportation.

Note: The purchase date is based on the invoice date or the product delivery date.

Exclusions: The warranty for the entire machine does not cover optical accessories, including laser fiber cable, output head, collimator, galvanometer, lens, etc.

### 2. The following are not covered under the warranty and may require paid repair:

2.1. Damage caused by improper installation, use, storage, or self-transportation.

2.2. Damage from external factors such as abnormal voltage, fire, etc.

2.3. Unauthorized disassembly, replacement of electrical components, or modification of electrical circuits.

**2.4. Optical accessories and consumables (including laser fiber cable, output head, collimator, galvanometer, lens, etc.) are not covered by the warranty.**

2.5. Failure due to improper use contrary to instructions, labels, or precautions.

2.6. Force majeure events (e.g., earthquakes, floods, typhoons) causing product damage.

2.7. If a product fails due to user error or requires repair after the warranty has expired, Party B will repair it free of charge, while Party A will bear the cost of spare parts and round-trip transportation.

※ The relevant technical parameters listed in this manual are for reference only. The relevant product information is subject to change without prior notice. All technical parameters and agreements are subject to the terms of the sales contract.





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