

GY-FLC300SL

User Manual of Laser Cleaning Machine



security information

A.Security Labeling

	It may cause serious personal injury or even life-threatening injuries.
	It may cause general personal injury or damage to products and equipment.

B.Laser safety level

According to European Standard EN 60825-1, Clause 9, the internal laser of this device is classified as a Class 4 laser. The product emits laser radiation with wavelengths around 1064nm or 1080nm, which can cause harm to the eyes and skin when exposed directly or indirectly to such light intensity. Although this radiation is invisible, the beam can still cause irreversible damage to the retina or cornea. Proper and certified laser protection goggles must be worn during laser operation.

	<u>When operating this product, always wear laser safety goggles throughout the process. These goggles provide selective protection against specific laser wavelengths, so users must select goggles compatible with the product's laser output spectrum.</u> <u>While the laser cleaning machine is powered on, never point the laser output head toward people or direct it at highly reflective surfaces.</u>
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C. safety signs



Figure 1.1 Laser marking Figure 1.2 Fiber optic non-breakage marking Figure 1.1 Laser marking Figure 1.2 Fiber optic non-breakage marking

D.Electrical Safety

① Connect the product to ground using the PE wire in the power cord, ensuring a secure and reliable connection.

	A ground fault may cause the product casing to become live, potentially leading to personal injury to operators.
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② Ensure the AC power supply is normal.

	The wrong wiring or power supply voltage will cause irreversible damage to the laser.
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1. Preface

1.1 Welcome

Thank you for choosing our GY-FLC300SL handheld laser cleaning machine. This user manual provides essential safety, operation, and maintenance guidelines. Before using the product, please read this manual carefully and keep it properly. To ensure safe operation and optimal performance, please follow the precautions and warnings below.

This user manual is not a quality guarantee. Our company reserves the right to correct printing errors, modify the information, or improve the product without prior notice. The corrections will be included in the revised version of the user manual.

2 Product Introduction

Laser cleaning is a novel technology based on the interaction between laser and materials, capable of effectively removing surface contaminants and adherent substances. Compared to traditional cleaning methods, laser cleaning offers advantages such as non-contact operation, substrate integrity preservation, precise cleaning, environmental friendliness, and online feasibility, making it particularly suitable for high-speed online cleaning in designated areas.

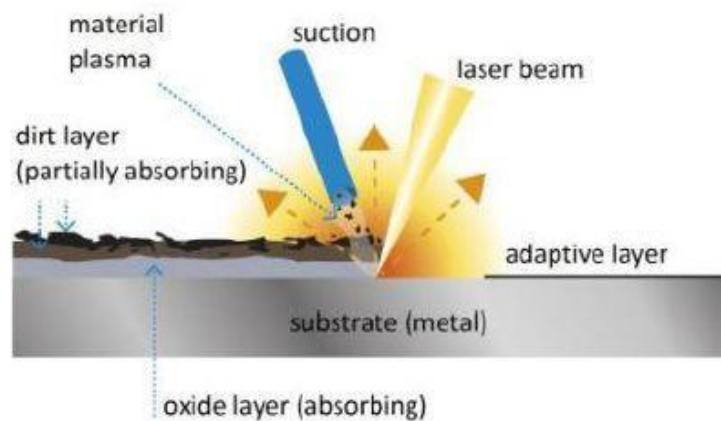


Figure 2.1 Schematic diagram of laser cleaning

Our company's laser cleaning equipment represents the latest generation of high-tech surface treatment solutions, featuring easy installation, intuitive operation, and automated functionality. With a simple power-on procedure, the system performs chemical-free, medium-free, dust-free, and water-free cleaning while adapting to curved surfaces. It delivers exceptional surface cleanliness, effectively removing resins, paint, oil stains, dirt, rust, coatings, plating layers, and oxide deposits. Widely used in industries such as shipbuilding, automotive repair, rubber molds, precision machinery, rail systems, and environmental protection, this equipment meets diverse industrial demands.

2.1 Equipment Features and Implementation Standards

(1) Equipment Features

- ©Non-contact cleaning without damaging the component substrate;

- ◎Precision cleaning enables targeted cleaning at exact positions and dimensions;
- ◎No chemical cleaning agents required, no consumables needed, safe and eco-friendly;
- ◎Easy to operate, suitable for manual handling or automation with robotic arms for cleaning;
- ◎Ergonomic design significantly reduces operational labor intensity;
- ◎High cleaning efficiency and time-saving;
- ◎The laser cleaning system operates stably with minimal maintenance requirements;
- ◎Optional mobile battery module;

(2) Product Implementation Standards

Our company has obtained ISO 9001 international quality management system certification, establishing a comprehensive quality assurance system for the design, production, and service of small and medium power laser processing equipment.

Our company has established detailed standards for the working environment and conditions, basic technical requirements, cooling requirements, laser radiation safety, electrical safety, test methods, inspection and acceptance, as well as packaging and transportation during the production process. The national standards referenced in these standards include:

GB10320 Electrical Safety of Laser Equipment and Facilities

GB7247 Radiation safety, equipment classification, requirements and user guide for laser products

GB2421 Basic Environmental Test Procedure for Electronic Products

GB/TB360 Specification for testing instruments for laser power and energy measurement

GB/T13740 Test method for divergence angle of laser radiation

GB/T13741 Test method for laser beam diameter

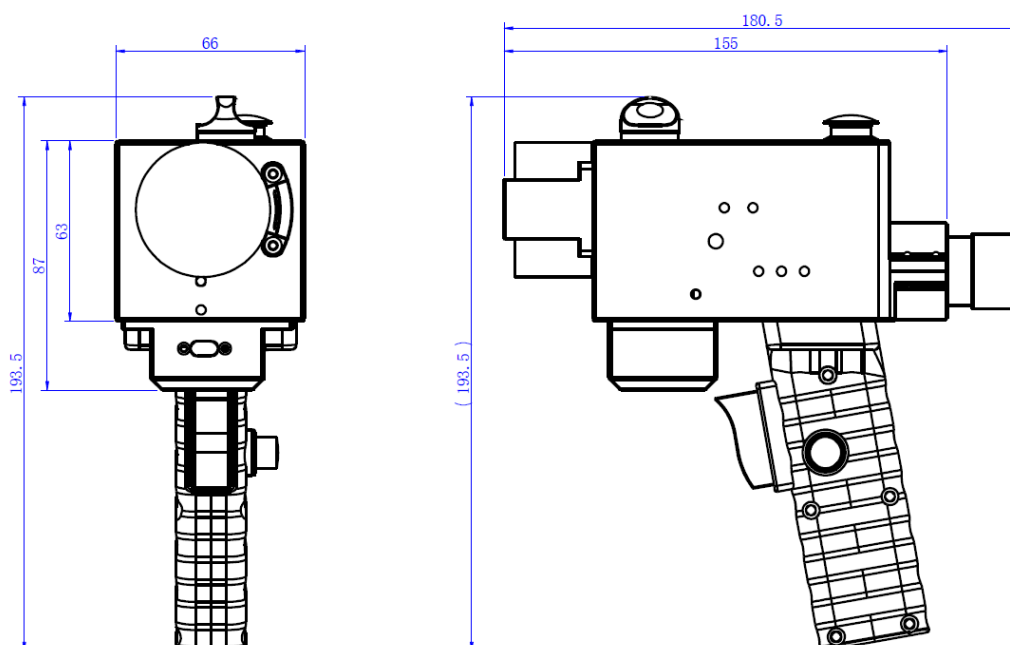
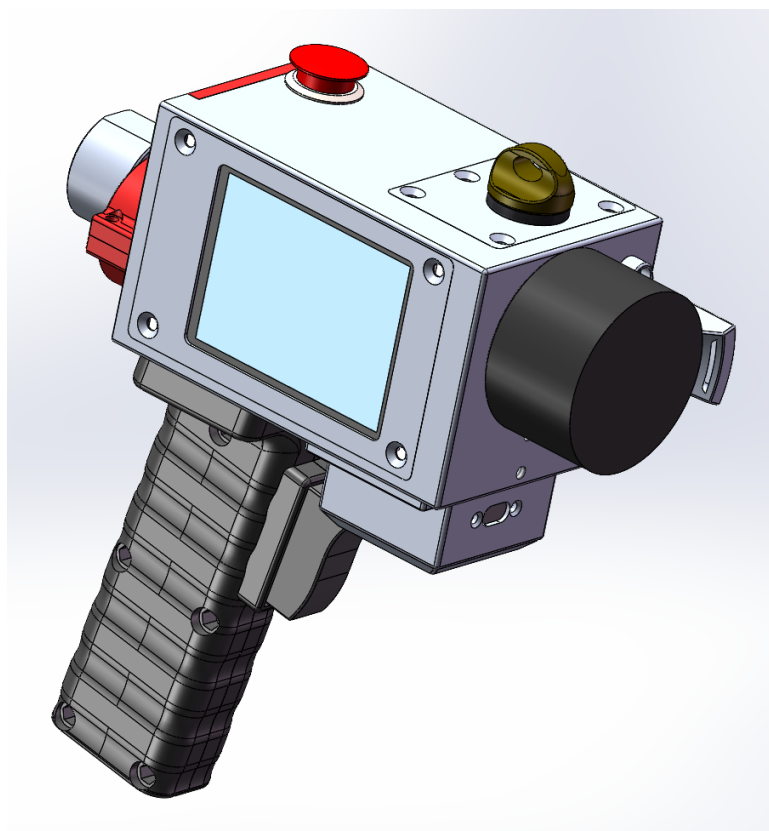
GB/T13862-92 Test method for laser radiation power

GB2828-2829-87 Batch Cycle Inspection Count Sampling Procedure and Sampling Table

2.2 Operating Environment and Related Parameters

Java runtime environment Java	
content	GY-FLC300SL
service voltage	Single-phase 220V $\pm 10\%$, 50/60Hz AC
Total power consumption	$\leq 1100\text{W}$
operating ambient temperature	$0^{\circ}\text{C} \sim 40^{\circ}\text{C}$
Humidity of the working environment	$\leq 80\%$
optical parameters	
content	parameter
laser average power	$\geq 300\text{W}$
power instability	$< 5\%$
laser mode of operation	impulse
pulse length	13-500ns
maximum single pulse energy	2mJ
Power adjustment range (%)	0-100
Frequency range (kHz)	1-4000
fiber length	5m
cooling-down method	air cooling
Cleaning head parameters	
Scan range (length*width)	0-300mm, continuously adjustable; The dual-axis supports 13 scanning modes;
Field lens focal length (mm)	210mm (optional 160mm/254mm/330mm/420mm)
mechanical parameter	
content	parameter
Machine dimensions (length, width, height)	Approximately 617mm*469mm*291mm
Packaged dimensions (length, width, height)	Approximately 770mm*570mm*470mm
Total weight of the machine	Approximately 27.5Kg
packaged weight	Approximately 50.0Kg
Cleaner head weight (excluding optical head)	$< 1.25\text{Kg}$
mode of operation	Handheld/Automatic

2.3 Cleaning Head Structure and Dimension Diagram



graph 2.3GY-QCFXYP300

Complete machine size structure diagram



Figure 2.3 Dimensional diagram of GY-FLC300SL laser cleaning machine

2.4 Configuration List

Table 2.1 GY-FLC300SL Laser Cleaning Equipment Configuration List

name	ts	unit	quantity	remarks
laser cleaning host	GY-FLC300SL	tower	1	
laser cleaning head	GY-QCFXYP300	individual	1	
Process Database	built-in	cover	1	
lasering protective eyeglass	SD-3	Pay	1	
protective lens	43*2	a flat	5	
Lens Cleaning Kit	Zeiss	a flat	10	

3 Installation and Use of Laser Cleaning Machine

Precautions before use:

- Inspect the product appearance for abnormalities and check for damage to output cables or other related phenomena.
- Connect the quick connector correctly according to the control box label.
- Connect the power supply correctly and ensure proper wiring contact.
- Inspect and ensure that the cleaning head protective lens is free of dust and contaminants inside and outside.

3.1 Operation Steps

Step 1: Remove the handheld cleaning gun, ensure the button switch on the handle is released, and remove the dust cover from the front lens of the laser cleaning gun.

Step 2: Connect the external power cord to power on and activate the emergency stop switch;

Step 3: Press the 'Start' button to power on and initialize the system.

Step 4: After system startup, configure laser cleaning parameters via the touchscreen interface.

Step 5: After completing the laser parameter settings, press the laser enable button on the laser cleaning operation screen (make sure the button switch on the handheld head handle is released before pressing).

Step 6: Put on laser safety goggles, align the laser head with the workpiece, press the orange button on the handheld handle, and the laser will emit light to start cleaning.

Step 7: After use, sequentially close the enable button, cover the field lens dust cover, pop up the 'Start' button, turn off the emergency stop switch, return the cleaning nozzle to the main unit storage box, and disconnect the main power supply.

3.2 Software Control Interface

3.2.1 Startup Interface

When powered on, the system displays the startup interface as shown in Figure 3.1. This interface indicates that the screen and control board are being connected. If the connection is successful (the process takes approximately 5 seconds), the system will transition to the operation interface. If the interface does not appear within this time, the connection may be unstable. In this case, power off the device and check whether the connectors are properly and securely connected.



Figure 3.1 Software startup interface

Note: The software interface LOGO, device model, and company information are customizable. This image is for illustrative purposes only (the same applies below).

3.2.2 Setup Interface

After completing the system initialization, the user enters the operation interface. Before using the cleaning equipment, click the "Settings" button in the lower-left corner to access the cleaning system configuration interface (Figure 3.2). This interface displays the control card version and touchscreen version number. Users can configure parameters including safety distance, laser type, and temperature settings.

Double-clicking activates laser output control mode, while single/double-axis operations specify galvanometer type.



- Enable auto-shutdown: Set the auto-shutdown time in minutes. Click to enable until the scheduled time is reached without laser operation. Click to cancel.
- Timed laser stop: Set the duration of a single laser emission in seconds. The laser will stop emitting when the set duration is reached.
- Safety distance: The range of the distance sensor is set to a minimum of 10CM and a maximum of 50CM. If the distance is less than 10CM or greater than 50CM, the distance sensor will not emit a laser. It emits a laser normally within the range of 10-50CM.
- Single-click mode: The laser emits upon pressing the cleaning head button. Clicking "Single-click" switches to double-click mode. Dual-axis operation: The cleaning head operates on both X and Y axes. For single-axis cleaning heads, select "Dual-axis" to switch to single-axis mode. Distance: Activates the distance sensor. Shaker: Enables shaker alarm. Chiller: Activates chiller alarm. For devices without a chiller, click "Chiller On" to disable the alarm.
- X/Y coefficients: For field lens/focusing lens configurations with inconsistent focal lengths or working distances, the field lens coefficient corrects the actual scanning width and height. Modify password: 123.

Field lens model	X coefficient	Y coefficient
F160	84	84
F210	110	110
F254	135	135
F330	150	150
F420	195	195

- Language switch: Set the system language mode. Currently supports Chinese, Traditional Chinese, English, French, German, and Polish. Other languages can be customized.
- Distance: Enabled by default
- Temperature: 50°C by default

3.3 Operation Interface

3.3.1 Scanning Method

The interface provides 13 cleaning modes, which can be switched by clicking the scanning mode options (cyclically): straight line mode, rectangle one mode, rectangle two mode, circular mode, sine mode, spiral mode, free mode, ring mode, rotation mode, triangle mode, rotating circle mode, rotating straight line, and linear rotating circle.

(1) Linear mode

The scanning mode in this mode is straight line, as shown in Figure 3.3.

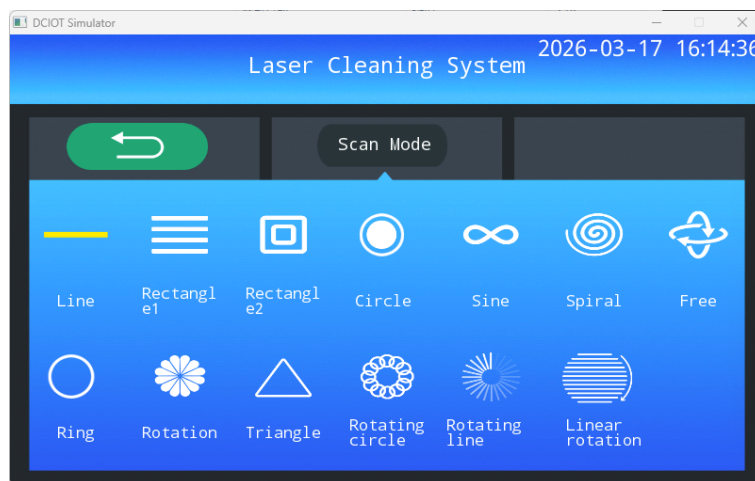


Figure 3.3 Linear Scanning Mode Operation Interface

- Laser power: The average output power of the laser is set within a range of 10% to 100%.
- Frequency: The laser pulse repetition frequency is set within the range of 1 to 4000 kHz.
- The scanning speed is the speed of the laser spot moving on the workpiece surface. The upper limit of the scanning speed is related to the scanning width.

run-length (mm)	Scanning speed (mm/s) (upper limit)
More than 50	30000
40-49	18000
30-39	14000
20-29	12000
10-19	6000
5-9	3000
3-5	2000
1-3	1000

- Scan width: Set the linear scan width, ranging from 5mm to Mx (where Mx value depends on the size of the field lens/focusing lens).

Field lens type	Scan range Mx (mm)
F160	105
F210	140
F254	160
F330	185
F420	300

- Scans: For special use, set the number of scans to reach a specified limit. The light will stop after reaching the limit. Default: 0.
- Enable: After completing parameter settings, click the Enable button to prepare the system and laser for light emission.
- Pulse width: Set according to actual field requirements, ranging from 1 to 1000 nanoseconds (ns).
- Edge coefficient: Eliminates edge extinction to reduce intensity spikes at laser beam ends. Default value is 0, with a maximum setting of 2000. Adjust according to actual field requirements. For optimal performance, set to 500. Password: 123.
- Extinction delay: Works with edge coefficients to effectively eliminate strong points on both sides. Default is 0. We recommend setting it to 0.5 when using this feature. Password: 123.
- Chiller alarm: The fault output signal from the chiller is connected to the control card. When an alarm occurs, the interface will display this signal. For air-cooled equipment, please short-circuit this signal to ground.

(2) Rectangle-1 pattern

In this mode, the scanning method is rectangular, as shown in Figure 3.4. The definitions and ranges of power, frequency, pulse width (duty cycle), scanning speed, scanning width, and scanning frequency are identical to those in the linear mode, and will not be repeated here (the same applies below).



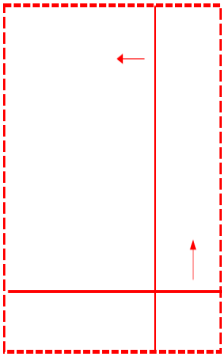
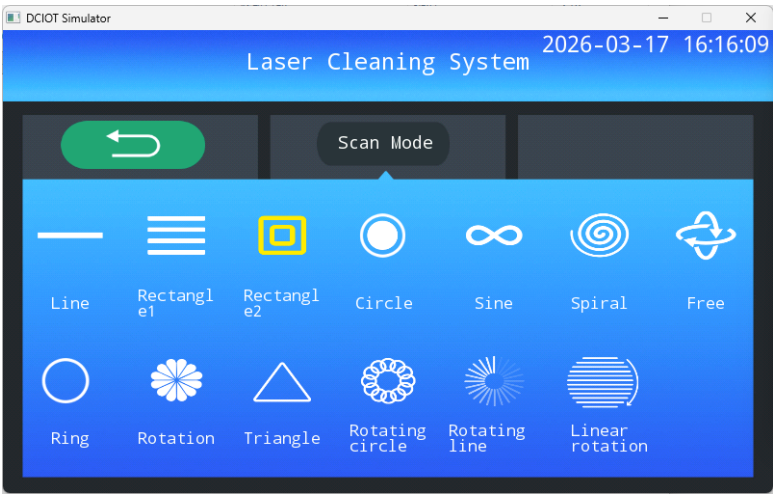
Figure 3.4 Rectangular Scanning Mode Operation Interface

- Fill spacing: Sets the laser fill distance within the rectangle, ranging from 0.01 to 1 mm. It affects the Y-axis spot overlap rate, with a default value of 0.1.
- Scan height: Set the scanning height of the rectangle, ranging from 1mm to Mx (where Mx depends on the field lens coefficient).

Field lens type	Scan range Mx (mm)
F160	105
F210	140
F254	160
F330	185
F420	300

(3) **Rectangular two-mode**

The second mode is similar to the first one, i.e. the second mode is the vertical cleaning mode plus the horizontal cleaning mode.



(4) **Circular Mode**

In this mode, the scanning shape is circular (as shown in Figure 3.5), with the scanning range set to include only the circular diameter and fill spacing.

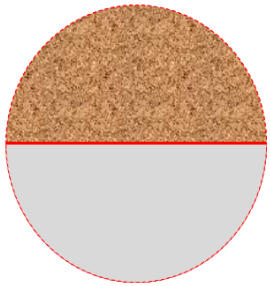
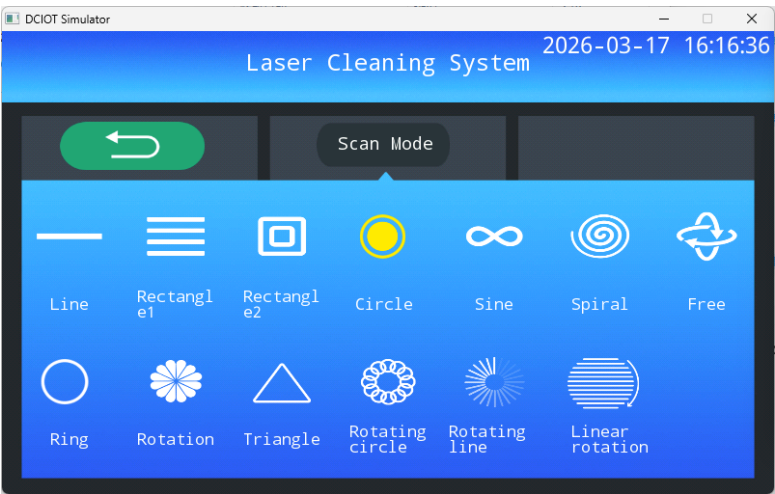


Figure 3.5 Circular Scanning Mode Operation Interface

(5) Sine mode

In sinusoidal mode, the scanning waveform displays a sine curve, as shown in Figure 3.6. The sinusoidal period must be set to determine the X-axis oscillation frequency. A smaller value indicates higher frequency, with a range of 1mm to 100mm.

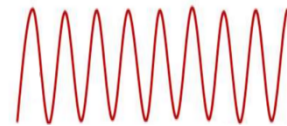
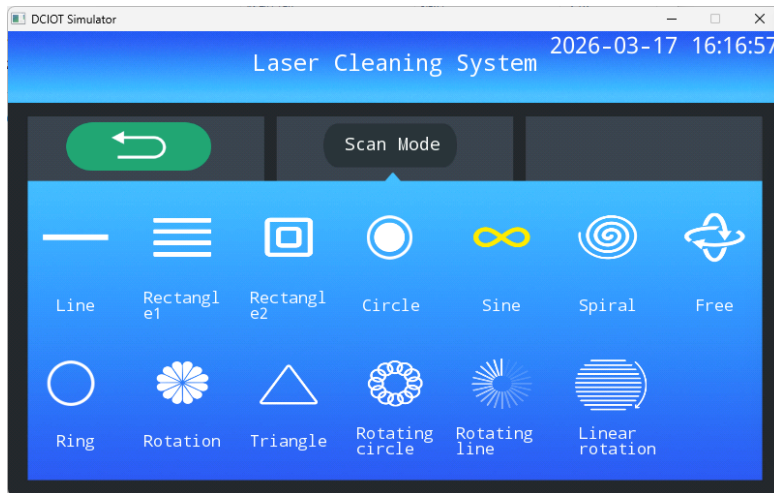


Figure 3.6 Operation interface for sine scan mode

(6) Spiral pattern

In spiral mode, the scanning waveform appears as a spiral curve, with the operation interface shown in Figure 3.7. Parameter settings are consistent with those in sine mode.

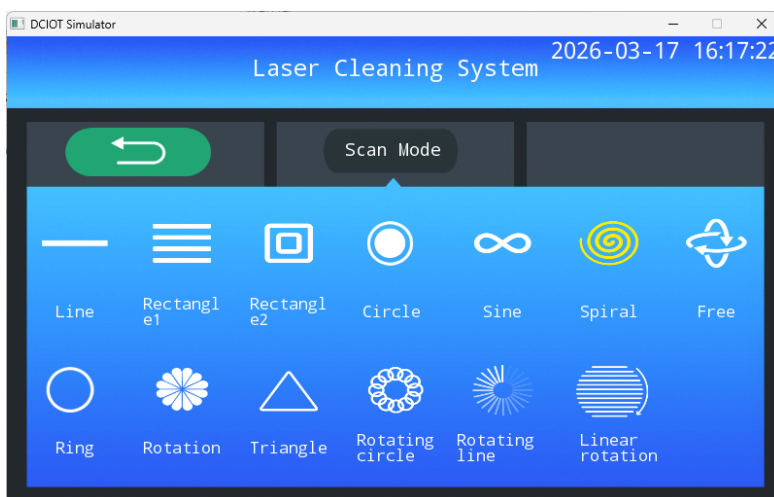


Figure 3.7 Operation interface of spiral scanning

- Series: Number of waveforms in spiral mode, range 1 -- --,

(7) Free Mode

In free mode, the motor width and frequency of the X-axis and Y-axis can be freely set within a specified range. The scanning speed is not constant and may even be inaccurately calculated, with multiple possible scanning waveforms. This mode serves as a supplement to the aforementioned five modes, accommodating a wider range of application scenarios.

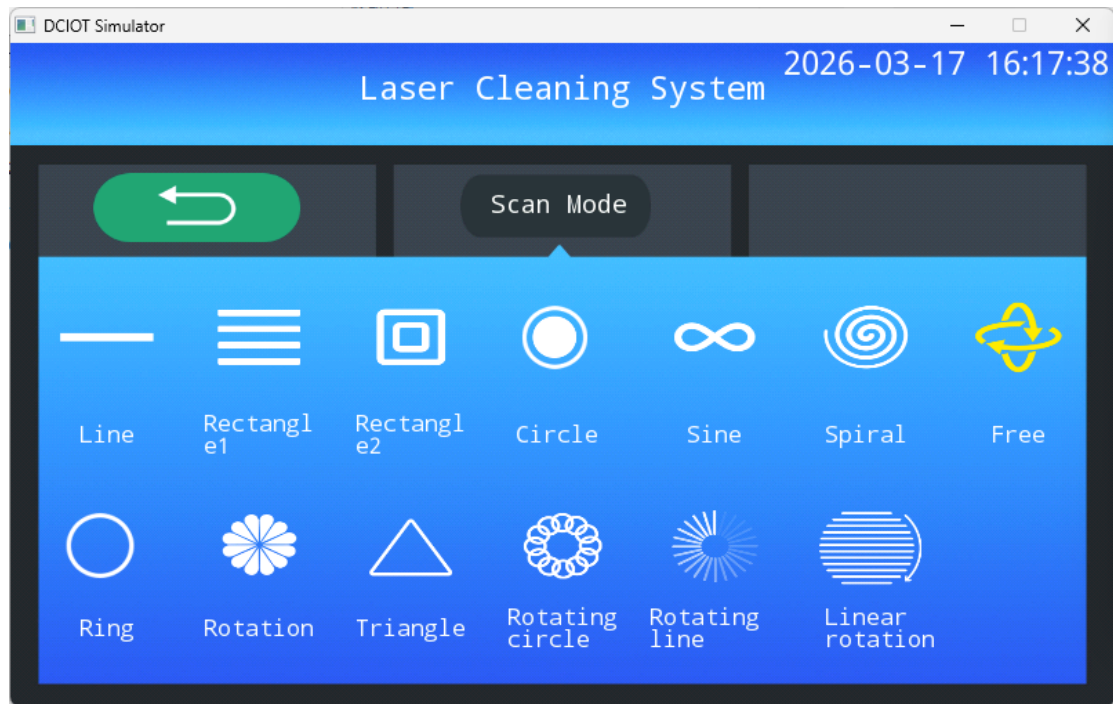


Figure 3.8 Free Scan Mode Operation Interface

- X\\Y frequency: less than 100Hz;
- Scan height: Set the scanning height in free mode, ranging from 1mm to 50mm.

(8) Circle

This pattern features a gradually inward contracting circular ring, as shown in Figure 3.9, where the filling spacing represents the contraction rate of the ring.

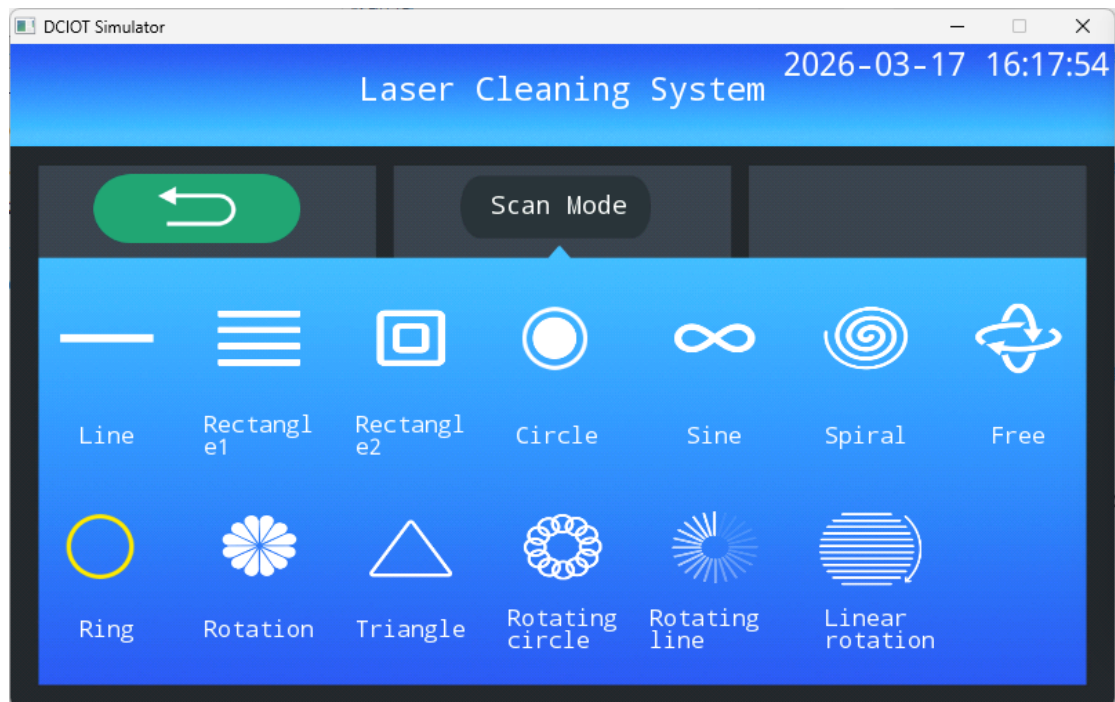
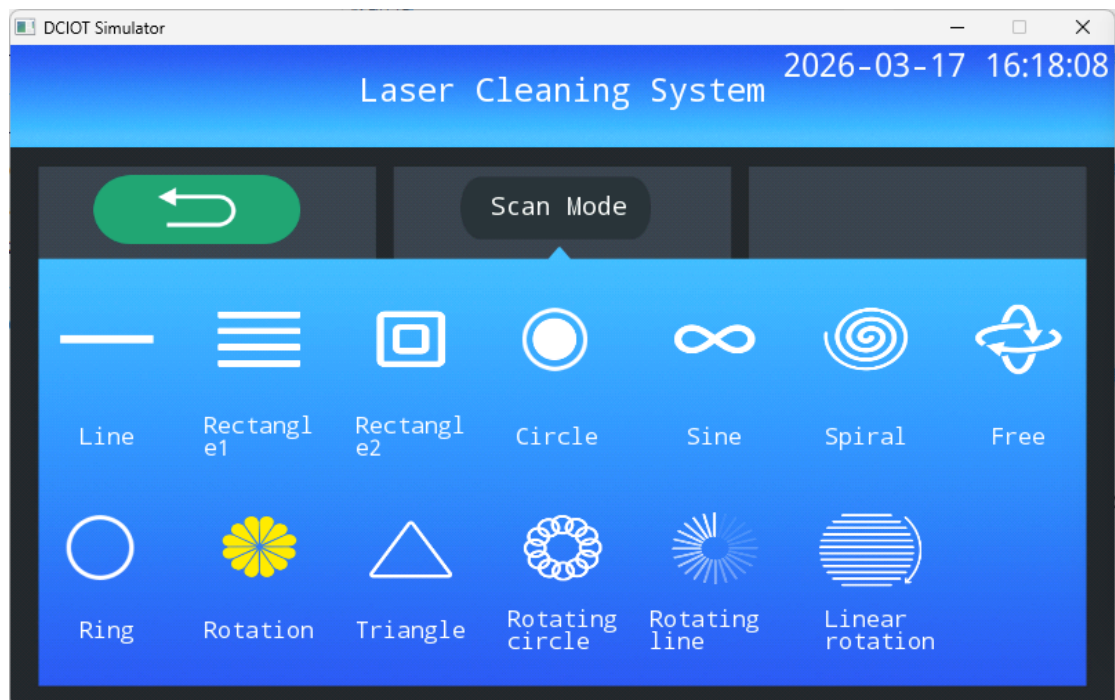


Figure 3.9 Ring Mode Operation Interface

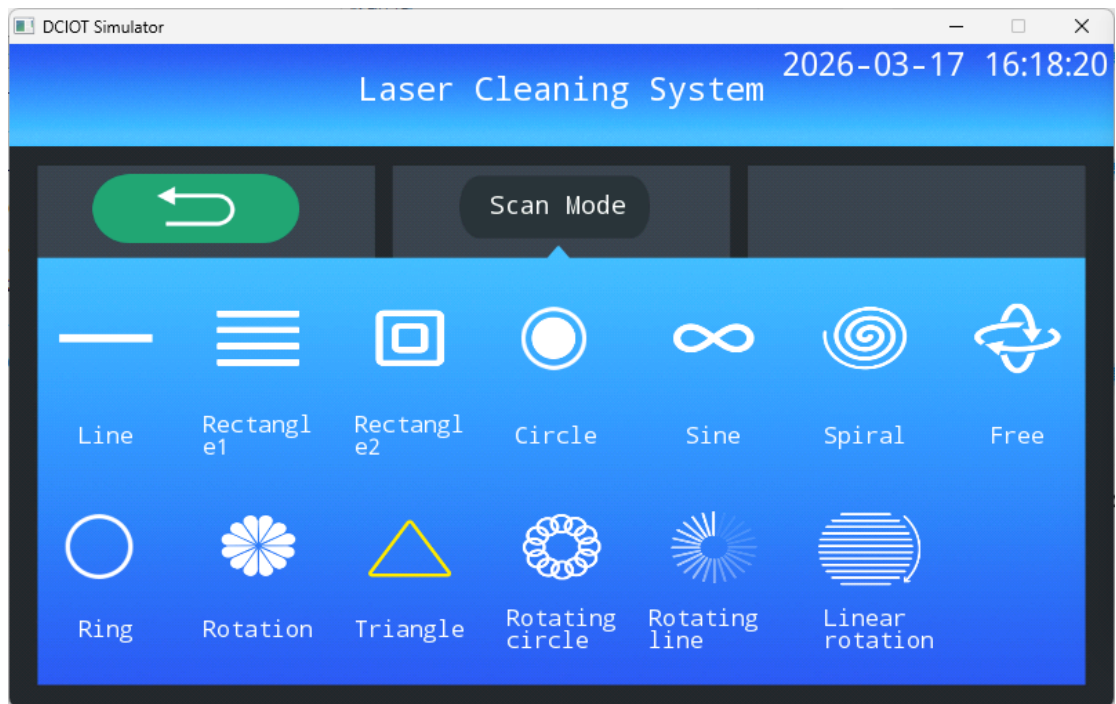
- Edge coefficient: Adjust inner circle size (range: 0~100%);

(9) Rotation



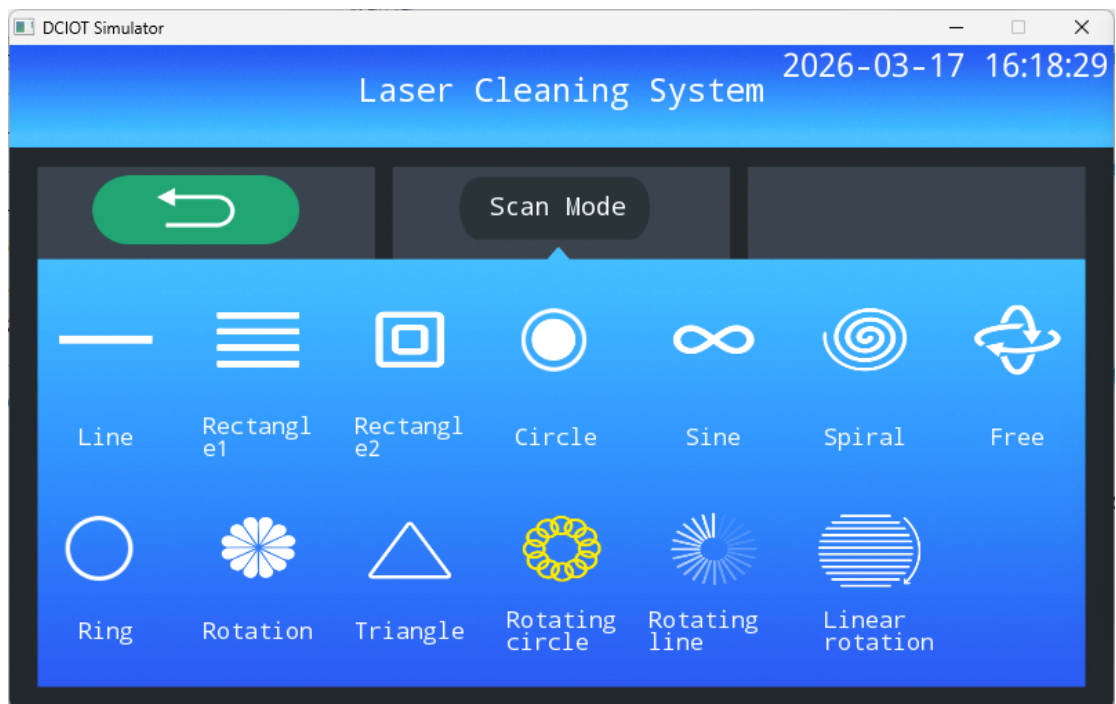
- You can adjust the chart by parameters such as cycle and series.

(10) **delta**



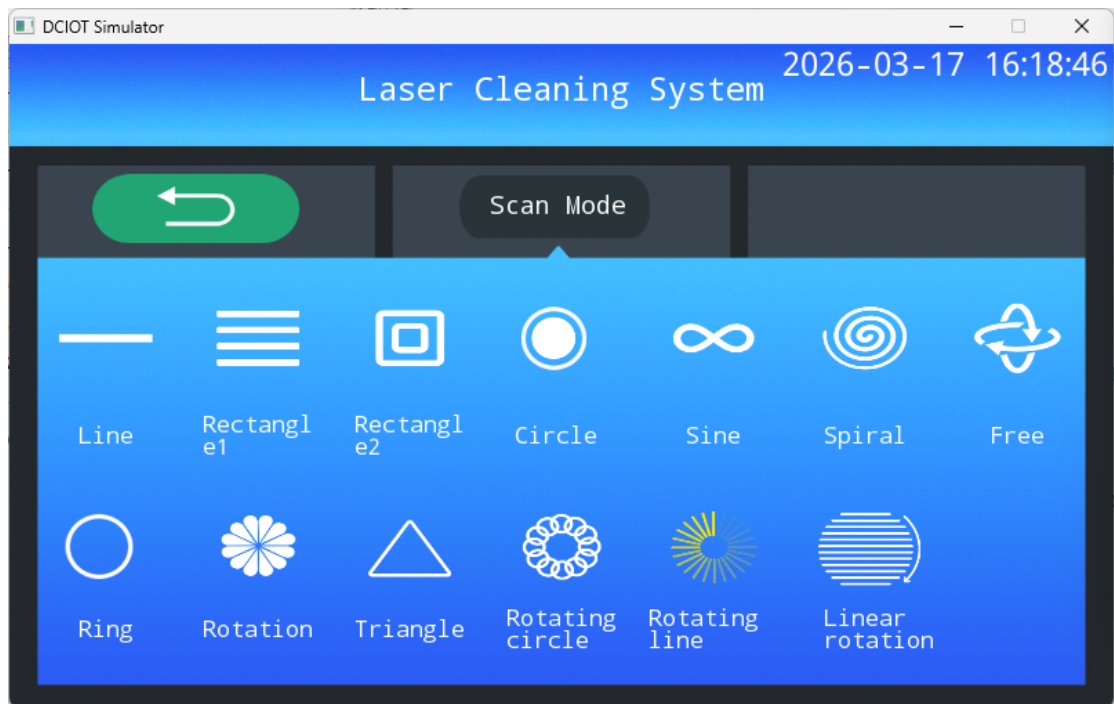
- Adjust the triangle size in the scan parameter interface.

(11) **Rotating Circle**



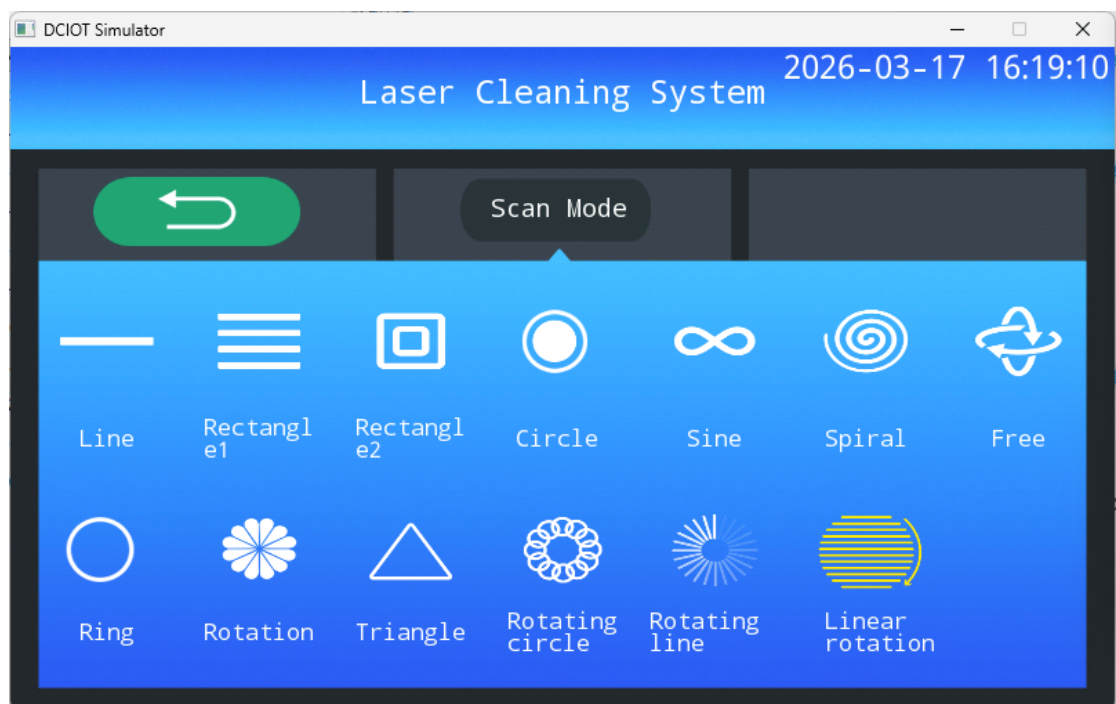
- Multiple circles are connected in a 360° loop, with adjustable dimensions on the scanning interface.

(12) **Rotate line**



- The endpoints of the linear segment face the center, enabling a 360° rotation for rotational scanning and cleaning.

(13) Linear Rotation Circle

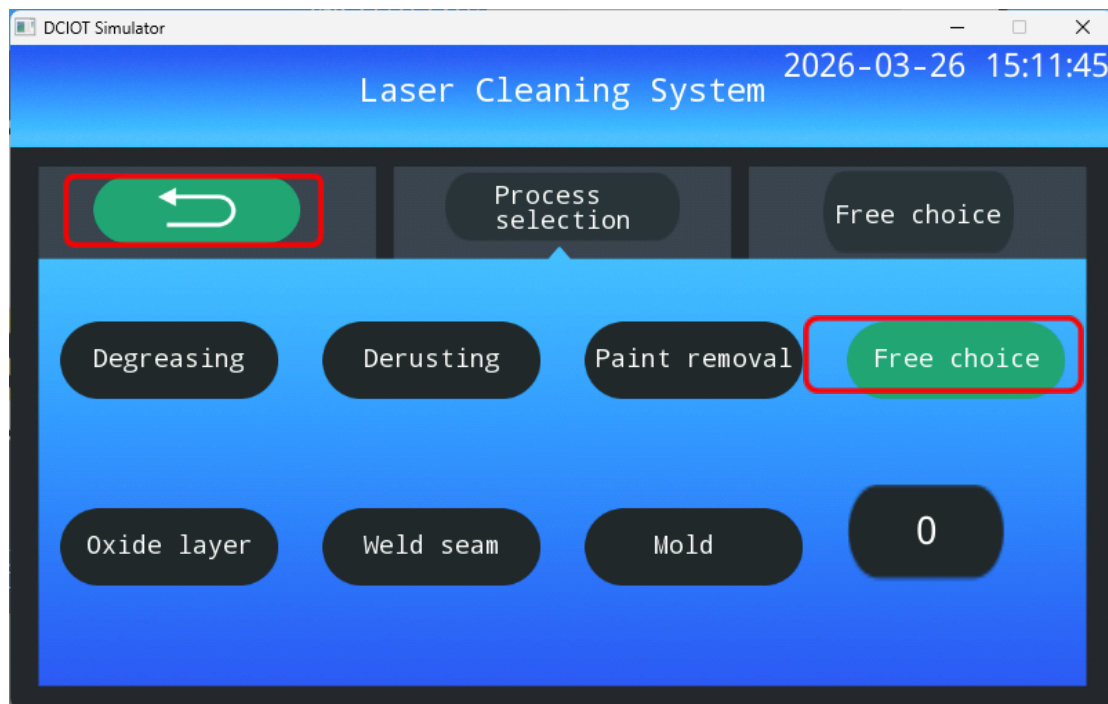


- The line performs multi-angle circumferential scanning. No fill spacing is required in this mode.

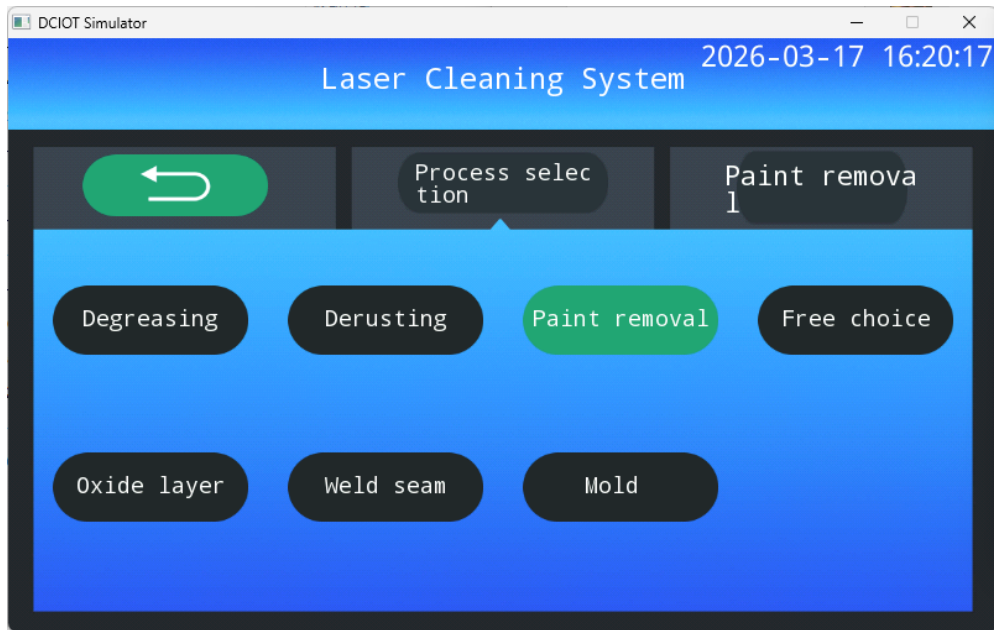
3.3.2 Database

(1) Custom database

Customize cleaning parameters in this system, which offers 100 configurable parameter groups (1-100). The first group serves as the default, while Groups 2-21 support custom parameter labels (Chinese/English, other languages not supported). By configuring different process group parameters, you can quickly select the appropriate group for specific cleaning requirements, eliminating the need for repeated adjustments.



- Go to the 'Process Selection' menu, click the free selection button, and enter the custom parameter group in the numeric input field below. Based on the actual cleaning condition, adjust the parameters to suit your needs, then input them sequentially. Finally, add the process label 'wood' in the process label column (currently supports Chinese/English).



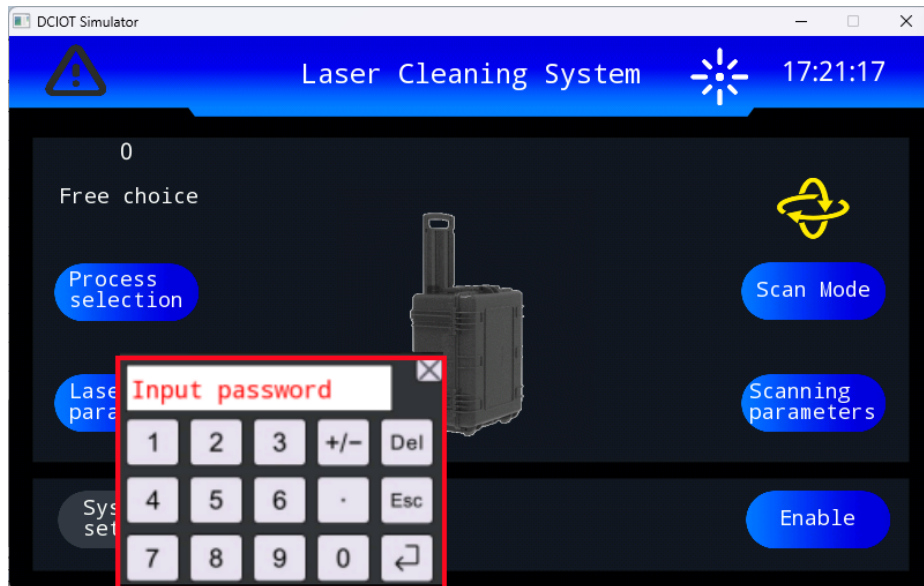
(2) Default process library

- The default process library is the system-built process database, which matches lasers of different brands and specifications. By selecting and invoking parameters, the parameter adjustment process can be effectively reduced, equipment compatibility improved, and operational difficulty for personnel minimized.
- Select the database number to retrieve the corresponding process data. The default is 1. Change the password to 123.
- Step 1: Before using the device, verify the laser's brand, single-pulse energy, and other parameters according to the supplier's data. Refer to the JPT laser example to confirm the relevant laser parameters.

指标 \ 型号		YDFLP-CL-200	YDFLP-CL-300	YDFLP-CL-200	YDFLP-CL-300	YDFLP-CL-300
		-1	-1	-5	-5	-10
M ² 典型值		2		5		12
输出铈缆长度	m	5				
平均输出功率	W	>200	>300	>200	>300	>300
最大脉冲能量	mJ	1.5		5		15
频率可调范围	kHz	1-4000				
脉冲宽度	ns	2-500				

- Step 2: After powering on the equipment, access the laser cleaning system. Click "System Settings" to open the password entry window. Enter the

primary password (123) to access the device management interface. Select the laser option to enter the laser selection page. Choose the corresponding laser model based on the supplier's data. The selected laser model is displayed in the upper-right corner, and the default parameters (rust removal, degreasing) will automatically activate, with all data prepared. (For automatic process library switching, directly click the "Process Selection" button to return to Custom Process 1.)



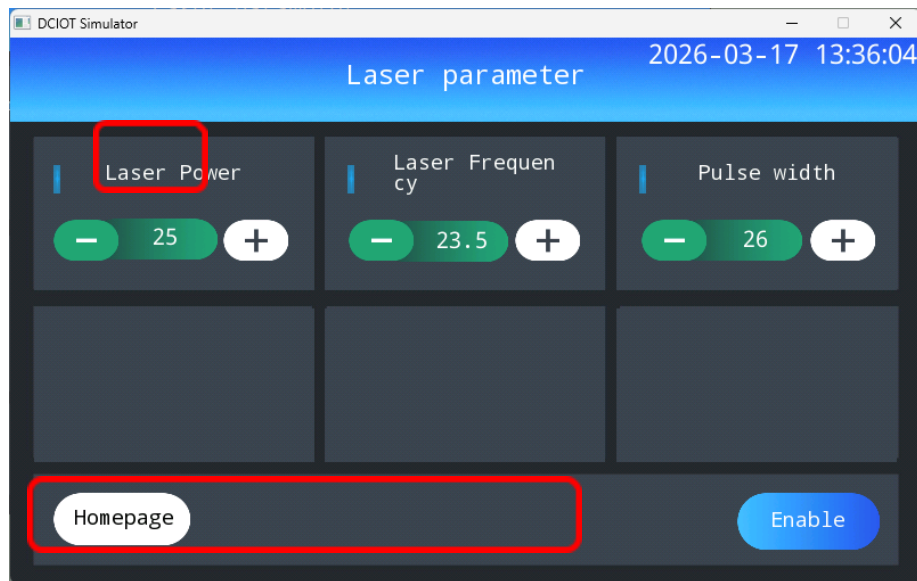
Select the appropriate laser type

- Step 3: Go back to "Process Selection". Depending on the object, click the "Rust Removal" button to display the corresponding process label. The

system will then show the pre-configured parameters for rust removal. Return to the "Main Page", enable the function, and press the light button to start the process. Other default operations follow the same procedure.

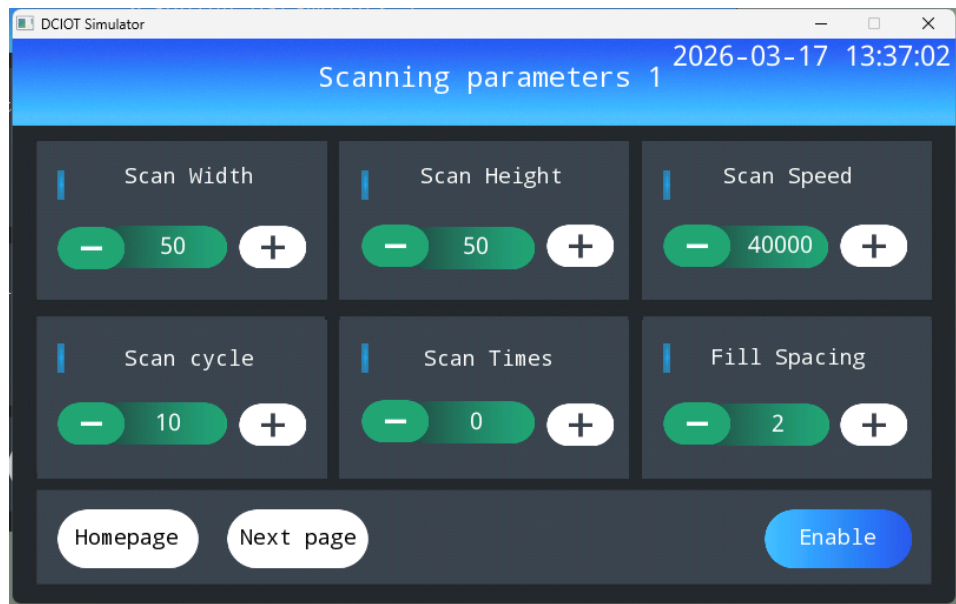
3.3.3 Parameter Settings

(1) laser parameter



- Laser power: The average output power of the laser is set within a range of 10% to 100%.
- Frequency: The laser pulse repetition frequency is set within the range of 1 to 4000 kHz.
- Pulse width: adjustable from 30 to 500 nanoseconds (ns);

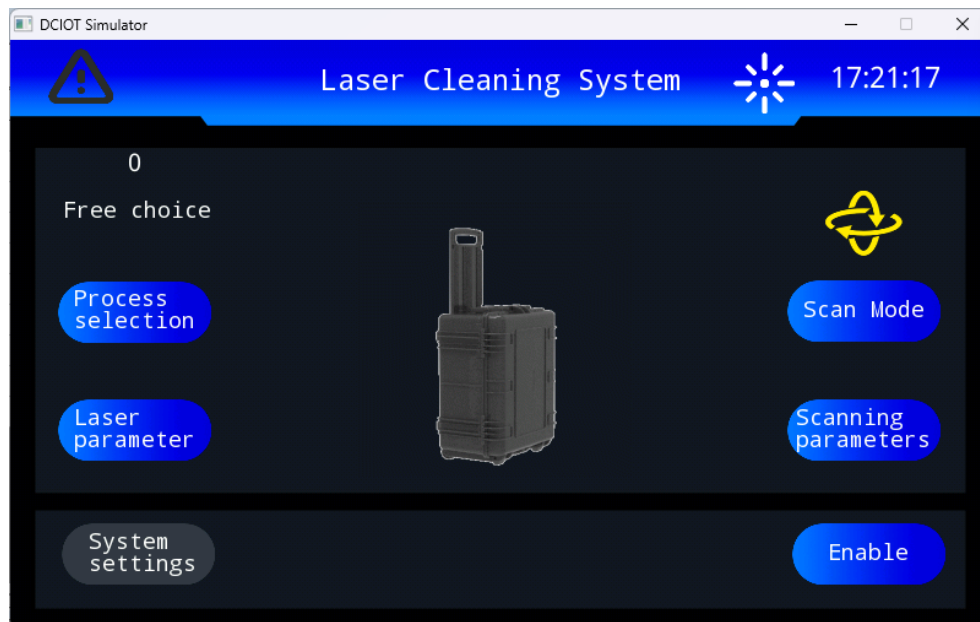
(2) Scanning parameters

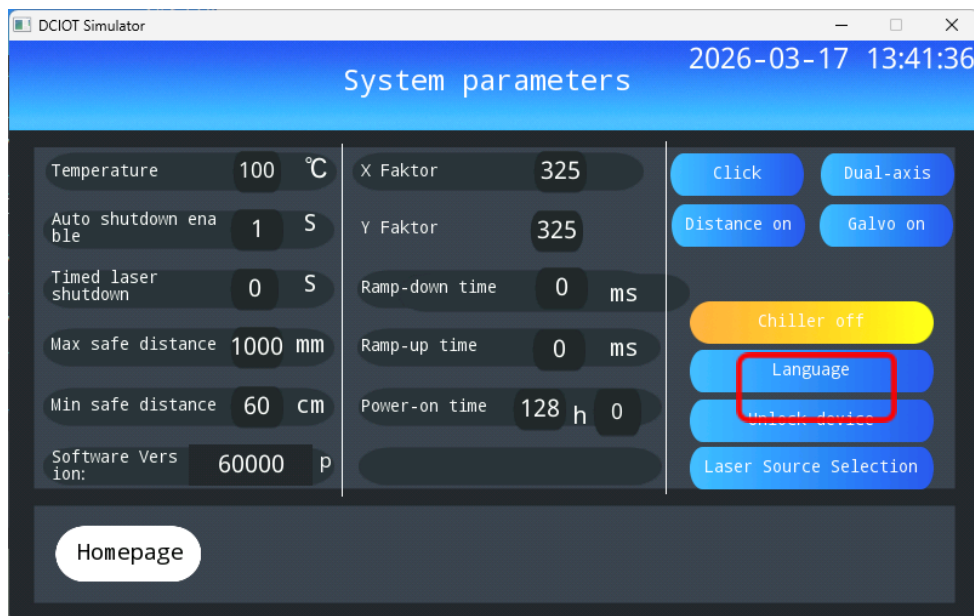


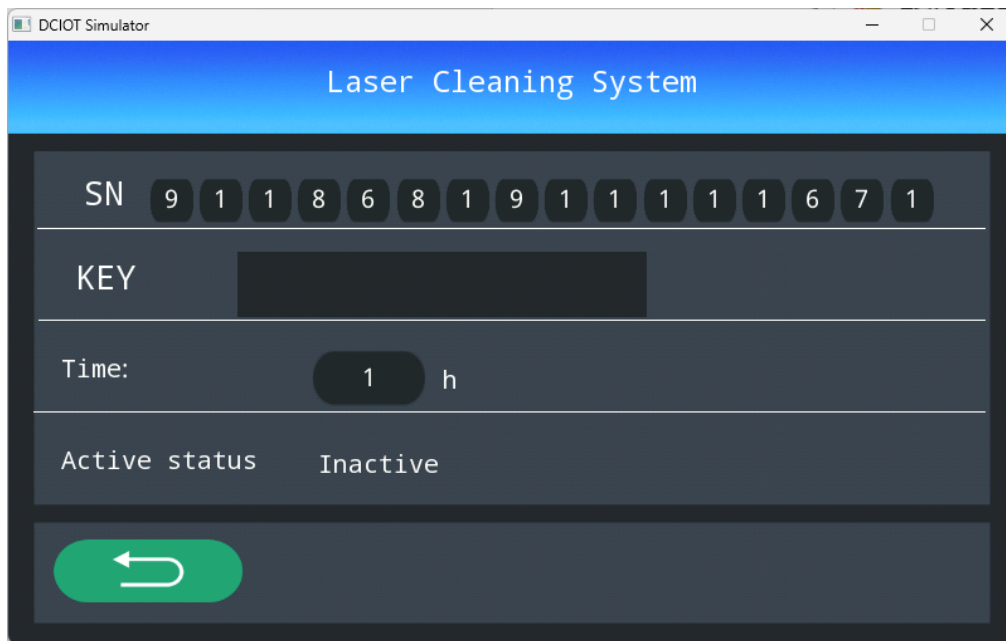
- Scan parameters: This interface allows you to set scan width, scan height, scan speed, scan cycle, scan count, fill spacing, and other parameters.

3.3.4 Decryption and Password Settings

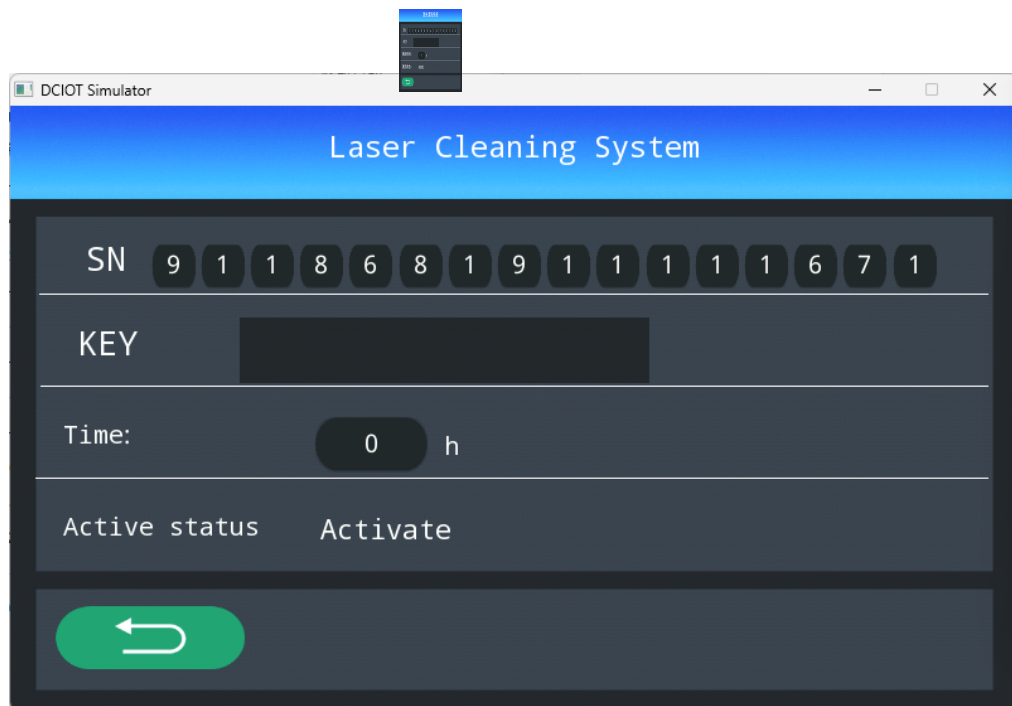
- The "Please activate" message appears in the top-right corner during the trial period, indicating that the trial has expired and requires decoding.







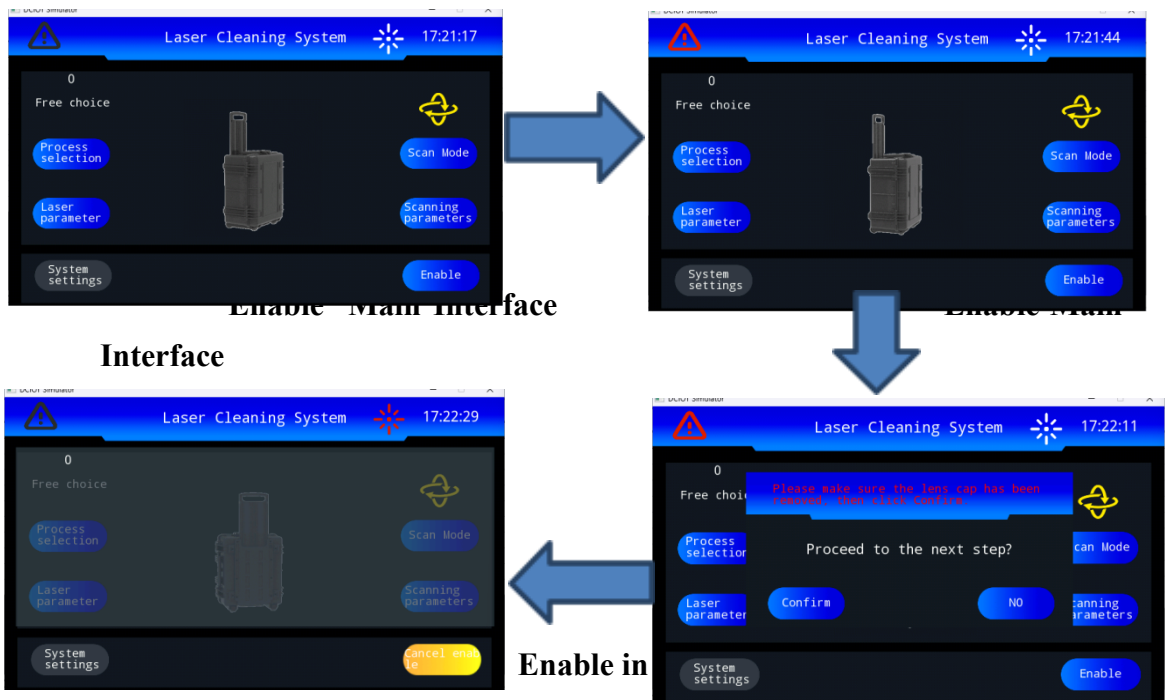
1 hour (inactive)



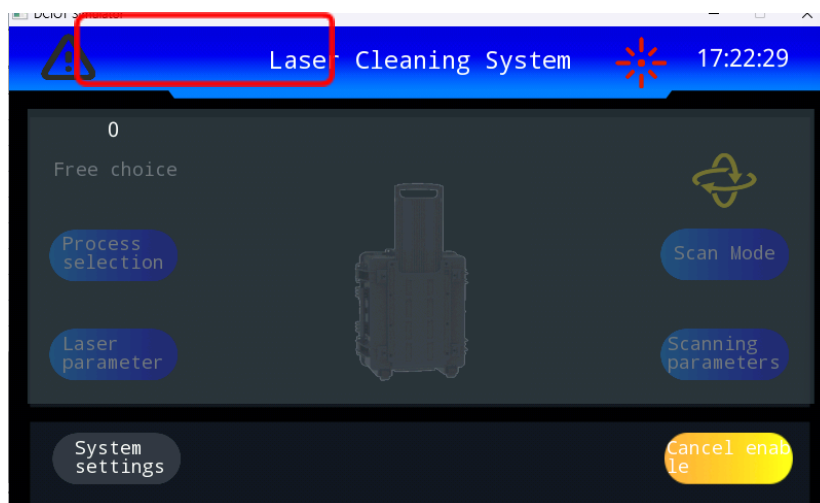
Permanent active status

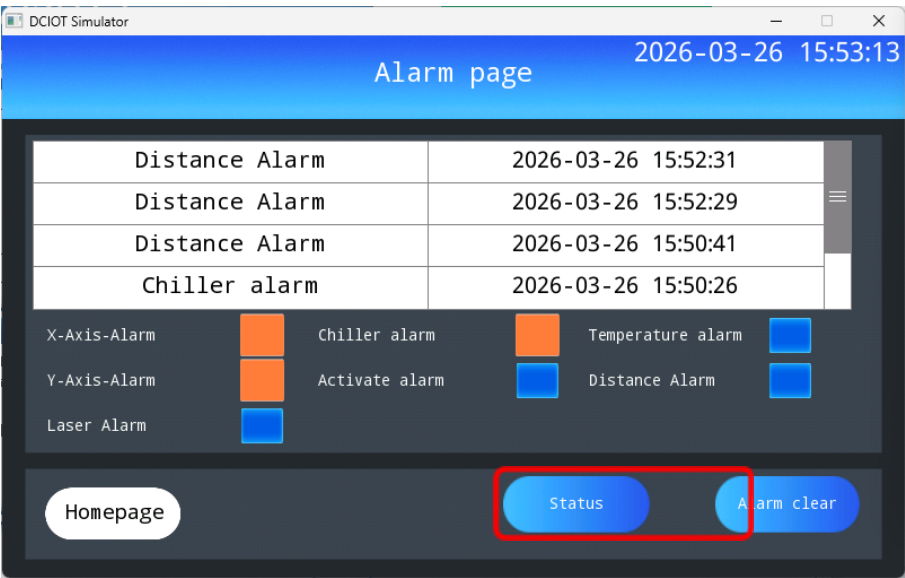
- Users can set trial periods or enable permanent decryption based on site conditions.

(12) Others (Light emission step)

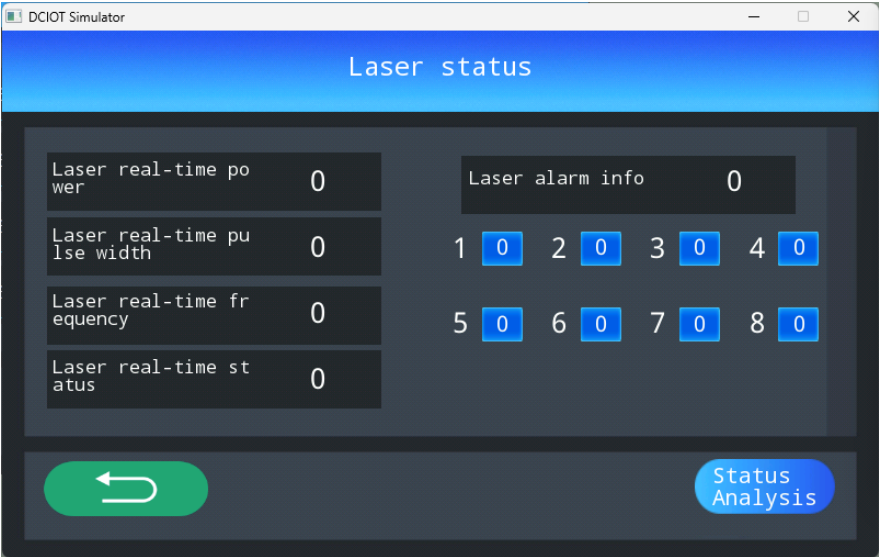


(14) Report to police





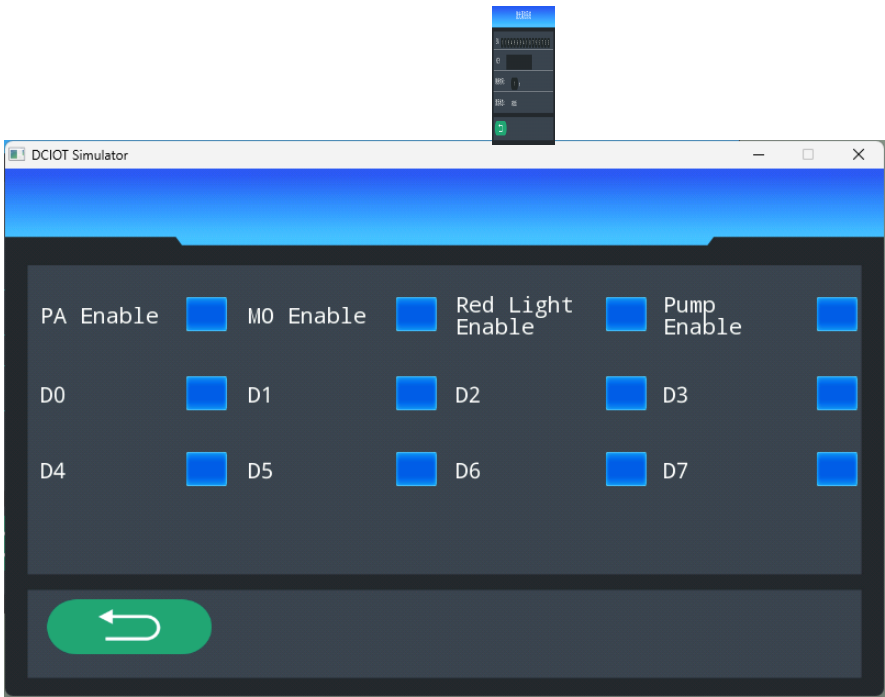
- This interface displays alarm statuses for each component. Red indicates alarm, while blue indicates normal.



- The interface can also check the laser operation status in the light output,

and display the laser power, pulse width frequency and laser signal status in real time.

Byte	中文描述	英文描述	单位
1	传感器 2 (L_Byte)	Sensor 2 (Low Byte)	0.1°C
2	传感器 2 (H_Byte)	Sensor 2 (High Byte)	0.1°C
3	传感器 1 (L_Byte)	Sensor 1 (Low Byte)	0.1°C
4	传感器 1 (H_Byte)	Sensor 1 (High Byte)	0.1°C
5	种子源 TEC 温度 (L_Byte)	Seed Source TEC Temperature (Low Byte)	0.1°C
6	种子源 TEC 温度 (H_Byte)	Seed Source TEC Temperature (High Byte)	0.1°C
7	二级电流 (L_Byte)	Secondary Current (Low Byte)	0.1A
8	二级电流 (H_Byte)	Secondary Current (High Byte)	0.1A
—	举例：读取激光器的传感器 1	Example: Read Sensor 1 of the Laser	—



- You can view the operational status of each laser signal function directly on this interface without connecting the laser.

4 Pre-sales and After-sales Services

4.1 Service Commitment

Our company is committed to a customer-centric approach, thoroughly understanding clients' cleaning requirements, and providing comprehensive, personalized services including installation, commissioning, training, and maintenance, both pre-sales and post-sales.

(1) Pre-sales service

Prior to contract execution, the company provides clients with comprehensive production process solutions, technical consultation on laser cleaning equipment, sample testing, and equipment selection services.

(2) Installation and Commissioning

In accordance with the contract, our company will safely deliver the equipment to the user's designated installation site free of charge within the stipulated timeframe, with technical service engineers on-site for installation. Once the user has prepared the necessary spare parts for installation and commissioning, the engineers will complete the machine setup and debugging within two working days, ensuring the installation site remains tidy, clean, and well-organized throughout the process.

(3) After-sales training

The company provides complimentary technical training. Upon completion of installation and commissioning, the buyer's operators will receive on-site training at the buyer's location or at the seller's domestic training and maintenance center, continuing until they achieve basic operational proficiency with the equipment.

(4) After-sales Commitment

- The device comes with a one-year free warranty (excluding damage caused by human error or lens failure).
- Free technical consultation, process and software upgrade services;
- The response time for customer service is within 8 hours;
- Lifetime maintenance service, with only accessory replacement fees charged.
- Provide extensive software and hardware support throughout your lifetime.

4.2 Limitations of Warranty

The warranty does not cover product or component damage caused by unauthorized tampering, opening, disassembly, improper installation, or modifications by non-company personnel; damages resulting from misuse, negligence, or accidents; or damage caused by exceeding specification ranges, improper installation, maintenance, abuse, or failure to follow user manual instructions and warnings. Customers are responsible for understanding and operating in accordance with the user manual and operational guidelines. Damages caused by incorrect operations are not covered. Accessories and other components are excluded from warranty coverage.

Within the warranty period, if the buyer identifies any issues, they must submit a written request within 30 days from the date of discovery. This warranty does not cover third parties (including the specified buyer, end-user, or customer), nor does it include parts, equipment, or other products not manufactured by our company.

4.3 Technical Support and Product Maintenance

This product does not include any built-in maintenance accessories for user servicing. Therefore, all repairs outside the provided accessories must be performed by our company's technical personnel.

If any malfunction occurs during product use, please notify our technical team immediately for troubleshooting.

All repair and replacement products must be placed in the original packaging provided by our company. Otherwise, we reserve the right to refuse free repairs for

any product damage caused by improper handling.

Upon receiving our products, please verify their integrity and complete accessories. Should any abnormalities be detected, please contact both the carrier and our company immediately.

Our company will continue to develop new products. The product information listed in the manual may change without prior notice. All technical specifications shall be subject to the terms of the contract.

The warranty and service terms provided by our company are for reference only. The official service and warranty terms shall be subject to the provisions in the contract.