200W Portable Handheld Laser Cleaning Machine

CL2-200-1/5

manual

V01 version

深圳市杰普特光电股份有限公司
SHENZHEN JPT OPTO-ELECTRONICS CO., LTD.

Copyright Notice

We regularly check the contents of this manual, and necessary corrections will be made in subsequent versions, but there are inevitably some errors.

Any suggestions for improvements are welcome.

*We reserve the right to make technical improvements without prior notice

Company Profile

Shenzhen JPT Optoelectronics Co., Ltd. (stock code: 688025) was established in 2006. It is a research and development company

It is a national high-tech enterprise that develops, produces and sells lasers, laser/optical intelligent equipment and optical fiber devices.

After years of development, the company has established an international R&D and marketing platform, with products and services covering Asia, North America,

Many well-known customers in Europe and other regions. Based on laser research and development, the company creates laser and optics, testing and measurement,

Motion control and automation, machine vision and other technology platforms adhere to the path of independent intellectual property rights and have applied for more than 530

There are 200 patents and software copyrights, including 200 invention patents and 220 utility model patents. The company has a team of

Excellent consultants, management, and R&D team composed of a core of doctors who have returned from studying abroad and doctors and masters from well-known domestic universities.

and sales team, the company has 21 doctors and more than 50 masters, and has advanced production equipment and complete supporting facilities.

R&D testing equipment.

As China's first commercial manufacturer of pulse-width adjustable high-power fiber lasers, JPT has shouldered the mission since its establishment.

With the historical mission of "creating value and serving mankind with leading light technology", we always adhere to the principle of "achieving customers, respecting individuals,

Pursue excellence, collaborate and win-win" corporate values, continue to forge ahead, be realistic and innovative, operate with integrity, and strive to "become a global leader"

We strive to become the world's leading laser and intelligent equipment solution provider".

Security Information

Please read this user manual carefully before using this product.

In this user manual we provide you with important product safety operating regulations and other reference information.

In order to ensure your personal safety when operating this product and to ensure that this product achieves its best performance, please

During operation, follow the following precautions and warnings as well as other relevant operating specifications within this manual.

1. Laser protection safety

• The output wavelength of JPT portable handheld laser cleaning machine is 1064nm (invisible light), and the average output of the laser is

The power exceeds 200W (peak power exceeds 20KW), which is a Class IV laser. It can not only treat the retina and

The cornea causes irreversible damage and can also burn the skin. Its reflected and scattered light may also cause harm to the human body.

Therefore, please wear OD4+ grade laser protective glasses at all times during use (see Figure 1 for details).

2. Electrical safety

• Before connecting the power supply, please check the power supply voltage (100-240V) and the machine power interface to ensure that there are no abnormalities.

Only after everything is correct can you power on. Incorrect power connection may cause damage to the laser and cleaning machine.

• A ground wire is required during use. Disconnection of the ground wire may cause personal injury to the operator.

• Do not work in high temperature, high humidity and high pressure environment, otherwise it may cause short circuit and laser temperature alarm, affecting

The normal use of the cleaning machine and the life of the laser.

3. Operating specifications

(1) When the power is turned on, do not look directly into the light hole of the cleaning head;

(2) When performing cleaning operations, avoid placing the light outlet of the cleaning gun head at the same level as your eyes;

(3) Do not use the laser cleaning machine in a dark environment;

(4) When performing debugging calibration or focusing, please perform it under low power conditions first. After debugging is completed, increase the power to the highest level.

Power work.

* Please do not disassemble this equipment without permission. All maintenance and upkeep can only be performed within the JPT company.

Level work can be performed on-site by technical support personnel. If this device is disassembled without permission, it may cause damage.

Damage caused will not be covered by the warranty.

Table **1** Safety Label

Label image	Label Information
	Beware of laser tags (laser heads)
	Usage warning (on laser cover)
	Laser protection markings

Figure **1** Laser protective glasses

Table of contents

1. product description

1.1 Product description

JPT portable handheld laser cleaning machine is a laser cleaning tool launched by JPT. This cleaning machine has the characteristics of portability It is lightweight, has flexible and adjustable parameters, and has many advantages such as wireless control. It can efficiently remove rust, stains, oil, etc. from the surface of workpieces. Coating, etc., can be used in mechanical processing, cultural relic restoration, mold cleaning, food processing, electronic circuits and other industries, using precise The characteristics of accurate positioning can meet the processing of various shapes of workpieces and achieve efficient cleaning results.

This cleaning machine relies on the advantages of JPT's MOPA structure and is equipped with a 200W cleaning pulse fiber laser as a cleaning The light source and laser adopt the MOPA (Master Oscillator Power Amplifier) structure. The mid-main oscillation uses a semiconductor laser as a seed source, and the power amplification is achieved through a traveling wave fiber amplifier. This section MOPA fiber laser has the characteristics of independently adjustable pulse width and frequency. When the pulse width and frequency are changed, It can still maintain a high and stable peak power output to adapt to a wider range of cleaning scenarios.

The handheld laser head of the cleaning machine has a simple appearance, is small and lightweight, and can be used handheld for a long time. The buttons and handle are integrated. meter, simple and easy to use. The built-in scanning system uses a small high-speed motor and drive, and the main body is integrated and solid. Dustproof and stable and durable. The laser head adopts an innovative red light-assisted focus finding design, which can use red light indicators to easily find different The focus position under the field lens meets the auxiliary focus needs in different scenes.

The control system adopts the laser cleaning control card and program independently designed by JPT, which can control the laser parameters and scanning system at the same time. system parameters and equipped with a handheld wireless control card. The control card is connected to the cleaning machine wirelessly, enabling scanning Remote control of shape, scan length, laser output power, frequency, pulse width and other parameters. The power interface is a standard three-plug Head type 110-220V AC power supply, can be cleaned when powered on.

The cleaning machine is a portable integrated design with a super strong integrated injection molding chassis, buffer design, and is pressure-resistant, fall-resistant and wear-resistant. The trolley-type chassis can be carried on high-speed trains and air consignments.

The picture below is a physical picture of JPT's 200W portable handheld laser cleaning machine (the specific appearance is subject to JPT's actual shipment):

Figure **2 Actual picture of CL2-200** portable handheld laser cleaning machine

1.2 Product characteristics

ÿCan work offline and can be cleaned when powered on

ÿ Laser collimated output (6mm spot)

ÿThe laser cleaning head is extremely light, weighing only 750g (excluding armored cable), and can be operated by hand for a long time

ÿPatented red light auxiliary focus technology, which can adjust the focus position according to different field lenses

ÿ Free control, flexible parameter setting and light control, and parameters can be updated at any time

ÿPortable trolley case design, the entire machine weighs 20.2kg, and can be transported by high-speed rail or air consignment

ÿSuper integrated injection molded chassis, buffer design, stable structure, wear-resistant, shock-proof, and fall-resistant

1.3 General characteristic parameters of laser

Table **2 CL2 200W** cleaning series laser parameter indicators

model / index		YDFLP-CL2-200-1-A	YDFLP-CL2-200-5-A
M²		<1.5	5
Output armored cable length m		5	
Average output power W		>200	
Maximum pulse energy mJ		2	5
Frequency adjustable range kHz		1-3000	
Pulse Width	ns	13-500	
Output power is unstable Every time	%	<5	
cooling method		air cooling	
Supply voltage	IN	48V	
Maximum power consumption	IN	<700	
Environmental supply current A		>14.6	
central wavelength	nm	1064	
Spectrum width@3dB	nm	<15	
polarization direction		arbitrary	
Is it anti-reflective?		yes	
Luminous flux diameter	mm	6.0±1.0	
Power adjustment range %		0ÿ100	
Working temperature rangeÿ		0ÿ40	
Storage temperature rangeÿ		-10ÿ60	
Laser size mm		340*265*100	
Output head QCS size mm		153*ÿ17	
weight	Kg	Net 8.5 Gross 10.3	

Table **5 YDFLP-CL2-200** series laser power reduction frequency value (kHz)

Set pulse width (ns)	Reduction power frequency (kHz)		Maximum frequency (kHz)
	YDFLP-CL2-200-1	YDFLP-CL2-200-5	
13	1200	700	3000
20	900	460	
30	650	330	
45	400	250	2000
60	360	215	
80	280	150	
100	260	110	1000
150	170	75	
200	150	64	
250	130	55	900
350	110	45	600
500	100	40	500

*Above the reduced power frequency is the full power output range of the laser, and below the reduced power frequency is the reduced power output range of the laser.

That is, when the power reduction frequency is below the laser, the output power will be reduced synchronously to protect the laser. The laser marking frequency

The corresponding output power changes are shown in the figure below:

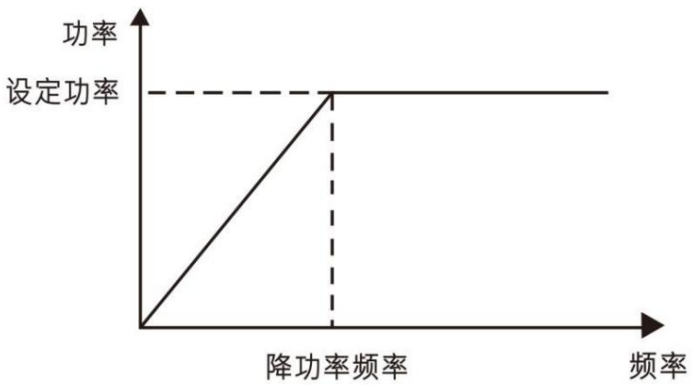
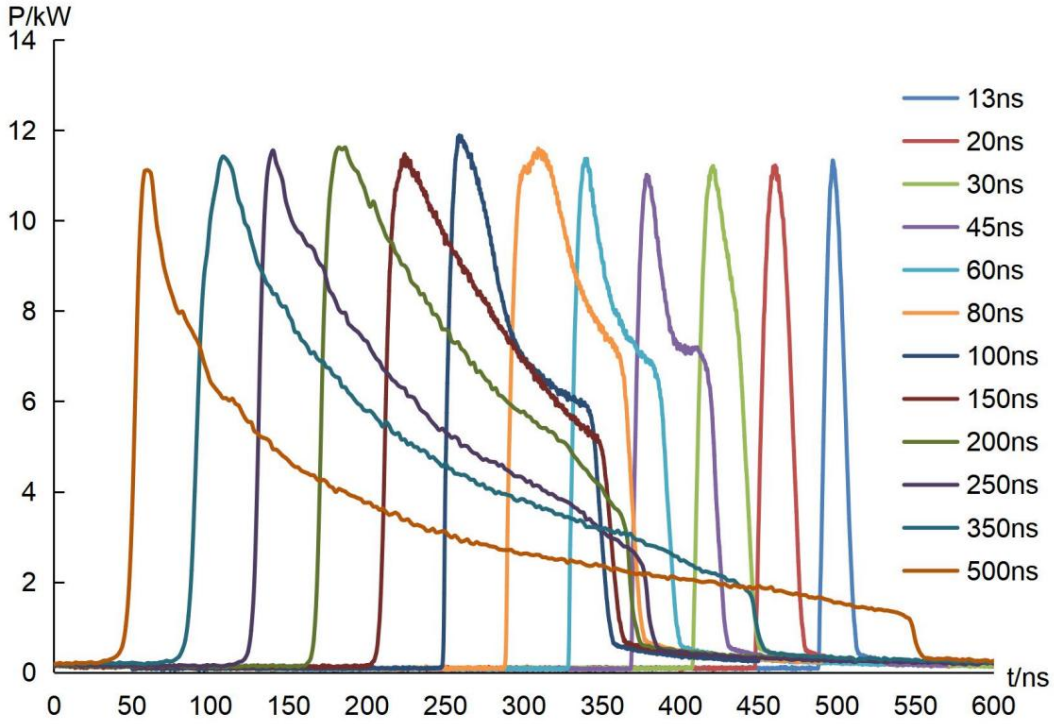


Figure **3** The power reduction frequency corresponds to the output power change



4-1 YDFLP-CL2-200-1-A output waveform curve diagram

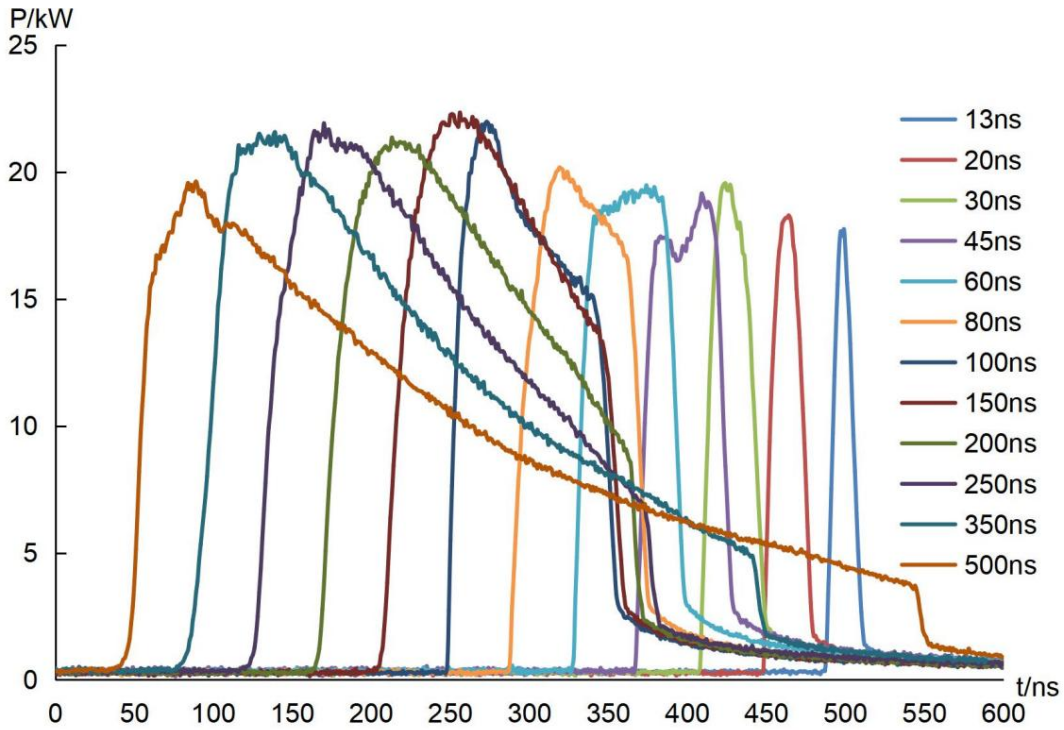


Figure **4-2 YDFLP-CL2-200-5-A** output waveform curve

*For detailed laser information, please refer to the description of JPT 200W Clean Pulse Fiber Laser YDFLP-CL2-200-1/5-A

Book

1.4 General characteristic parameters of cleaning machine

Table 4 Parameters and indicators of **CL-200** cleaning machine

model / index		CL-200
How the output works		pulse/continuous
Output armored cable length	m	5
average output power	IN	>200
cooling method		air cooling
Supply voltage	IN	100-240V
Maximum power consumption	IN	<1000
Is it anti-reflective?		yes
range of working temperature	ÿ	0ÿ40
Storage temperature range	ÿ	-10ÿ60
Washing machine size	mm	520*431*237
weight	Kg	Net: 20.2
Laser head weight	Kg	0.75

1.5 Overall dimensions of cleaning machine

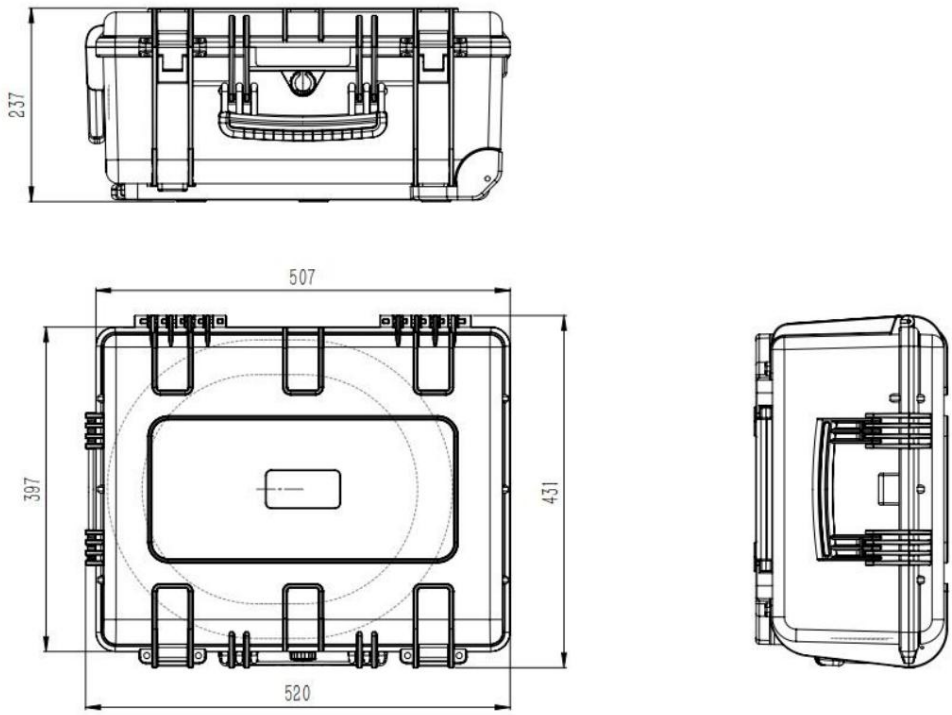


Figure **5** Dimensions of the outer box of the cleaning machine

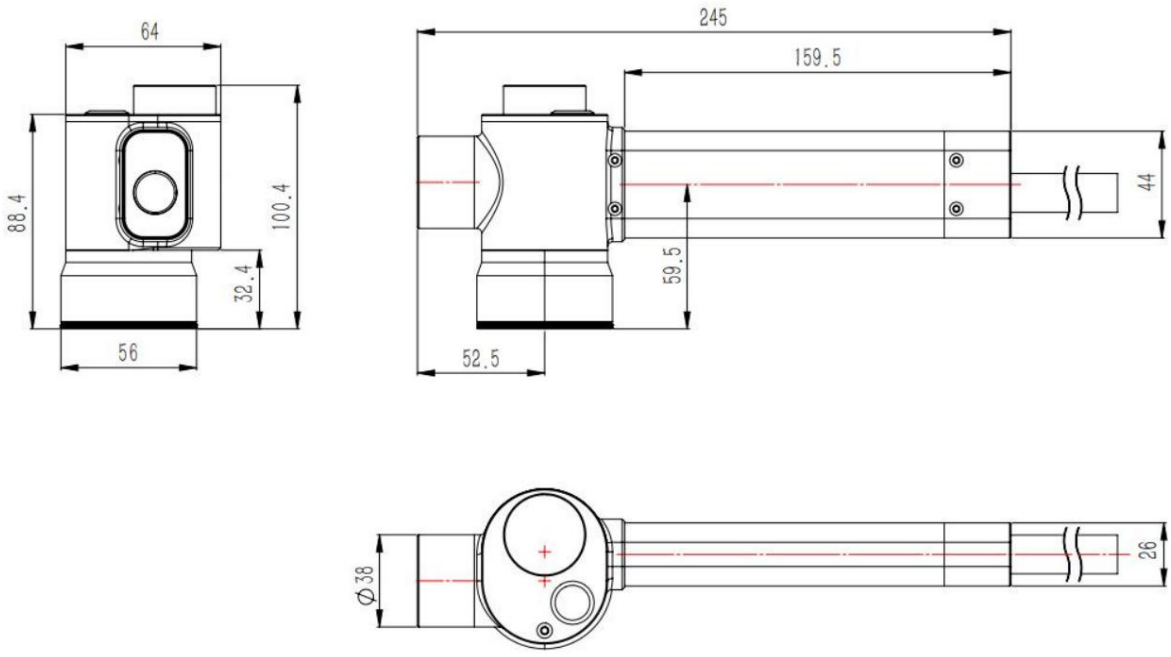


Figure **6** Dimensional diagram of cleaning gun head

1.6 Actual configuration list

Please refer to the included checklist according to Table 5

Table **5** Handheld cleaning machine configuration list

project	quantity
fiber-optic laser	1 set
Laser protective glasses	1
163 focal length field lens	1
254 focal length field lens	1
power cable	1 item
USB Type-C data cable	1 item

1.7 Interface and status display

Function description of box indicator light and interface button (Figure 7):

1. 100-240V AC power interface

2. Power key switch knob, which is the power on and off knob of the cleaning machine.

3. Emergency stop knob (when the power cannot be shut down in an emergency, press this knob to cut off the power, turn the knob clockwise to restore power)
electrical status)

4. Enable switch (you need to press this switch when the machine is working. Press it once and the red light will light up. At this time, the laser can operate normally.
light, press it again to turn it off. At this time, the laser can only emit red light, and even if the laser is given a light signal, the laser will not emit)

5. Power-on indication (after connecting the power cord, the green light lights up after the key switch is turned on, indicating that the power connection of the cleaning machine is normal)

6. Handle button, when the indicator light is green, it means the laser can be emitted (press it once and keep it to focus on red light and current scanning)
range, press twice and hold to fire out the laser)

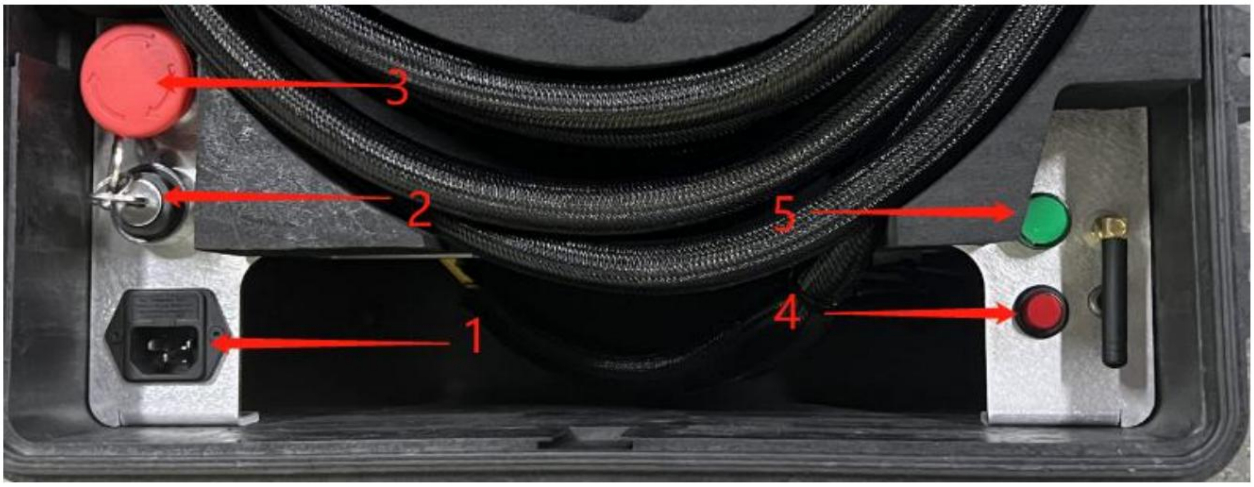


Figure **7** Box interface and button diagram

1.8 Cleaning sample display

Table **6** Cleaning Sample

	Copper alloy surface patina cleaning
	Cleaning of oxides and pollutants on the surface of steel pipes
	Rail rust removal

2. Instructions

2.1 Equipment operation steps

(1) Open the case, take out the power cord, plug one end into the power interface located next to the cooling duct on the top of the case, and plug the other end into Connect to 100-240V AC power supply.

(2) Take out the laser head, hold the handle with your hand, and align the light outlet with the material to be processed.

(3) Turn on the key switch. At this time, the whole machine is powered on and the laser fan is turned on.

(4) Press the red enable button. At this time, the red light of the button lights up and the device enters the waiting state.

(5) Control laser parameters, scanning parameters and other instructions through the wireless handheld card, and double-click the handle button to perform processing Operation.

(6) The handle button is a one-stage type. Press it once and hold it to focus on the red light and the current scanning range. Press it twice in succession and hold it. If the time interval between two consecutive presses is <0.35S, the laser will be emitted. If the time interval between two consecutive presses is >0.35S, the laser will not emit .

Can produce laser)

2.2 Micro operation instructions

2.2.1 Brief description of micro-management

Micro-operation has many functions such as marking parameter settings, drawing graphics settings, alarm monitoring, status monitoring, etc. 6 in total Interface: current parameters, graphic settings, cleaning parameters, status prompts, alarm monitoring, and function selection.

2.2.2 Interface and function introduction

(1) Pulley setting function:

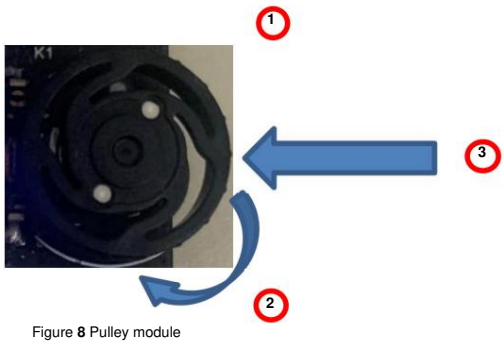


Figure **8** Pulley module

As shown in Figure 8, the pulley module has a total of three operating modes: ÿ Slide up to indicate + ÿ Slide down to indicate - ÿ Press enter to confirm. Among them, ÿ can make the pointer move upward, or represent a + value when setting a parameter value, ÿ can make the pointer move downward, or represent a - value when setting a parameter. The faster you slide up and down, the greater the change in the value of the set parameter. When using ÿ and ÿ to select parameters, ÿ can enter the parameter setting interface. At this time, use ÿ and ÿ to set the desired parameter value.

Then use ÿ to confirm the settings.

(2) Current parameters: As shown in Figure 9, you will enter the current interface when you turn on the computer. There are 4 selection templates. Each template represents a set of data. After selecting "Current Parameters" and confirming, you will enter the password input interface in Figure 10. Enter the correct password to Enter Graphics and cleaning parameter settings, micro-operation startup will automatically read the template data saved on the control card.

Figure **9** Current parameter interface

Figure **10** Enter password

(3) Cleaning parameters: As shown in Figure 11, the interface includes laser power, laser frequency, pulse width, light on delay, off

Parameters such as light delay, end delay, corner delay and jump delay, when sliding the pulley to select the corresponding parameter, press the pulley

Press the confirm button to jump to the parameter setting interface. At this time, slide the pulley up and down to select the value, and then press to confirm.

set up.

Figure **11** Cleaning parameter interface

ÿ: Indicates the real-time connection status. When the micro-operator and galvanometer control card are not connected, Disconnect is displayed. When the micro-operator and galvanometer control card are not connected, Disconnect is displayed.

When the control card is connected, but the galvanometer control card and the laser are not connected, Connect is displayed. When the micro-operator, galvanometer control card,

When the lasers are all connected, the SN number of the laser is displayed.

ÿ: Indicates the current page number. Page2/2 means there are two interfaces in total, and you are currently in the second interface (cleaning parameter interface).

(page), when the pointer slides to "->" as shown above, press OK to switch down to the graphical setting interface (Page1/2).

When the pointer slides to "<-", press the confirmation key to switch to the previous page.

ÿ: Indicates the progress bar of the current page.

Table **7** Cleaning parameter page introduction

	Function: Laser	Ranges
Parameters	power setting, laser frequency	0~100%
Laser Power	setting, laser pulse width	0~4000khz
Laser Frequency Pulse Width	setting, positive value: first turn on the	1~500ns
Lighting delay	galvanometer and then delay the set time to turn on the light. Negative value: Turn on the light first and then delay the set time to move the galvanometer. If the light is turned on, the If the cursor mark is too heavy or the galvanometer moves for a while after the light is turned on, the mark is very light. You can adjust it. Adjust the current value	-1000~+1000us
After the light-off delay	galvanometer movement is completed, the laser is turned off by the set time delay and the light-off position is adjusted. Set mark is too heavy or too light	0~1000us
End delay, galvanometer	stop time after turning off the laser, corner delay, dwell time at the	0~1000us
corner of each row in	rectangular mode, rectangular one-way mode If the jump has an arc trajectory, you can change this value to adjust	0~1000us
The jump delay is required to	jump in the rectangular bidirectional mode. The jump delay is after the jump is completed. After the dwell time, it can prevent pattern abnormality	0~1000us

(4) Graphic settings: This interface can set whether the marking graphic is a straight line, a rectangle, a circle, a sine or a double chord, according to

Depending on the selected graphics, different parameters will appear to provide settings. In this interface, select "Graphics Settings" labeled ÿ to confirm the recovery.

Return to the current parameter interface in Figure 12.

1The straight line parameters are as follows:

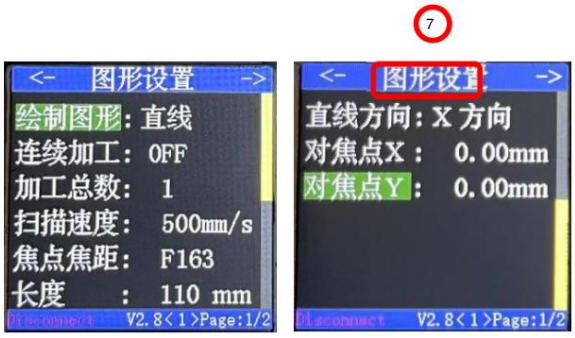


Figure **12** straight line

Parameter function is used to draw graphics to select cleaning patterns.		Ranges
Continuous processing will cycle continuously after the marking is completed. The total		Straight line/rectangle/circle/sine/double chord
number of marking processes will be invalid after continuous processing is turned on. When continuous		ON/OFF
processing is turned off,	When closed, the number of cycle markings	1~10
Scan speed, galvanometer movement speed, focus focal length, currently		0~10000mm/s
available options are F163, F254, F330, depending on the	Set the corresponding value with the field lens and use it when zooming	F163/F254/F330
length	Rectangle: The length of one side of a rectangle Straight line: straight line length	F163:0~110ÿF254:0~175ÿ F330:0~200
straight direction	Straight line: There are two directions: X and Y Rectangle: There is no such parameter	X/Y
The focus point x takes	the center point as the origin of the coordinates, and the center point x of the focus rectangular frame sits mark, you do not need to press to confirm when setting the value, it will be changed according to the The value is adjusted in real time	F163:±52mm F254:±84.5mm F330: ±97mm
The focus point y takes	the center point as the origin of the coordinates, and the center point y of the focus rectangular frame sits mark, you do not need to press to confirm when setting the value, it will be changed according to the The value is adjusted in real time	F163:±52mm F254:±84.5mm F330: ±97mm

2 The rectangular parameters are as follows:

Figure **13** Rectangle

Figure **14** Filling parameters

Parameter length	The length of the functional rectangle	Ranges F163:0~110ÿF254:0~175ÿ F330:0~200
width	width of rectangle	F163:0~110ÿF254:0~175ÿ F330:0~200
Contour enable	Select whether to outline the graphic.	-
fill enable	Select whether to fill the entire graphic. ÿ	-
When the total filling is enabled, select whether to enable the first pass of filling. ÿ When		-
the total filling is enabled, select whether to enable the second pass of filling. Select the		-
filling method. When , the way the filled line segment moves (filling ÿ and Filling ÿ is independent of each other and does not interfere with each other)		One-way, two-way, arc
Fill spacing When filling, the distance between each filled line segment (fill ÿ and Filling ÿ is independent of each other and does not interfere with each other)		0~9.99mm
Fill Angle When filling a graphic, the angle between the filled line segments and the graphic (fill Charging ÿ and filling ÿ are independent of each other and do not interfere with each other)		0ÿ45ÿ90ÿ135

3. The circular parameters are as follows:

Figure **15** Circle

Parameter	diameter of	Ranges
diameter	functional circle	F163:0~110ÿF254:0~175ÿ F330:0~200

4Sine and bisine parameters are as follows:

Figure **16** Sine and double sine

	Function:	Ranges
Parameter length	Total length of sine and double chord	F163:0~110ÿF254:0~175ÿ F330:0~200
Amplitude	The distance from the highest point of sine and double sine to the X-axis	F163:0~110, F254:0~175, F330:0~200
The number of cycles is the number of cycles contained within a total length.		1~100

5 text:

Figure **17** Text

	The length	Ranges
Parameter length	of the function text	F163:0~110ÿF254:0~175ÿ F330:0~200
width	Text font height	F163:0~110ÿF254:0~175ÿ F330:0~200
Font interval	The spacing between fonts in text	0~100mm (number of fonts changes)
content	Click to enter the text editing interface and display the current text content. The	
currently selected character of the current text. Add the currently		0~9ÿa~zÿA~Z
	selected character to the total text. Add. Delete one	
cbatacter	to the left in the total text content. Delete. OK. Save the currently edited	
Cancel the current edit. The content returned		

6 Archimedean spiral:

The Archimedes spiral (also known as the constant velocity spiral) is named after the Greek mathematician Archimedes in the third century BC. Akimi

A German spiral is generated when a point leaves a fixed point at a constant speed and rotates around the fixed point at a fixed angular speed.

trajectory. The graph is shown in Figure 23.1.

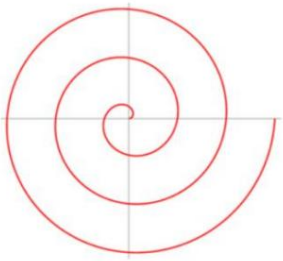


Figure **18.1** Archimedean spiral

Figure **18.2** Parameters of Archimedes spiral

Parameter	The length from	Ranges
polar diameter	the starting point to the center point of the functional action spiral	F163:0~11ÿF254:0~17.5ÿ F330:0~20
pitch	Controls the spacing between each turn of the spiral	F163:0~11ÿF254:0~17.5ÿ F330:0~20
size	Overall size of the spiral	0~110mm

ÿLissajous figure

Lissajous curve (also known as Lissajous figure, Lissajous figure or Bowditch curve) is two

The resultant trajectories of sinusoidal vibrations along mutually perpendicular directions.

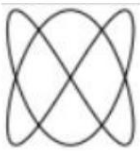


Figure **19.1** Lissajous figure

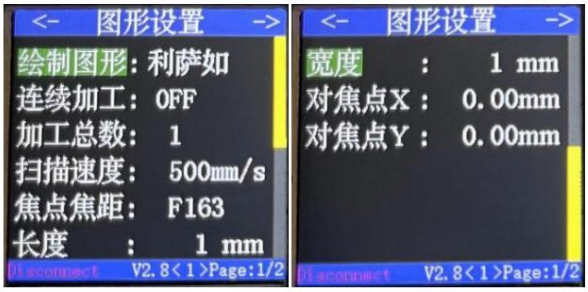
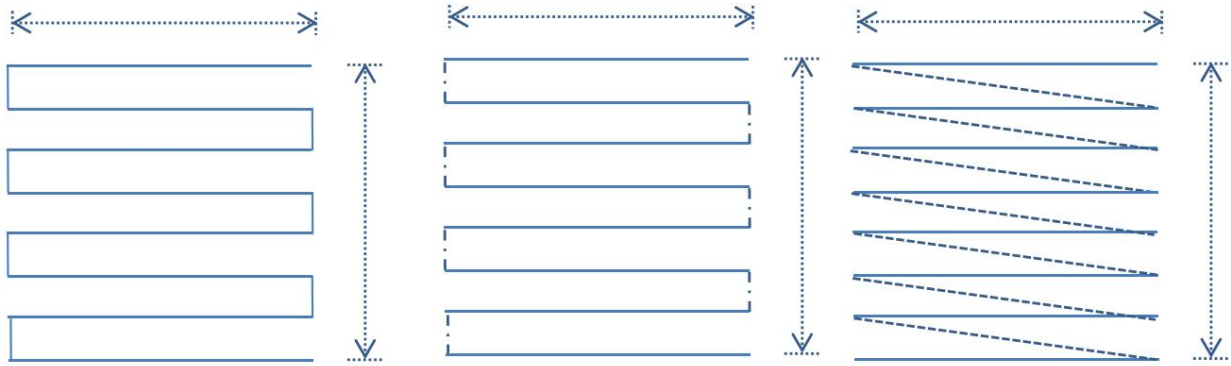


Figure **19.2** Lissajous graph parameters

parameter	function	Ranges

length	The length of the Lissajous figure	F163:0~11ÿF254:0~17.5ÿ F330:0~20
width	Lissajous figure width	F163:0~11ÿF254:0~17.5ÿ F330:0~20

The movement methods of different filling methods are as follows:



unidirectional Two-way Optimize two-way

(5) Status prompt: This interface can monitor the laser frequency, power, pulse width, PA, MO, RED, optical

Road temperature, TEC temperature status, slide up or down on the alarm monitoring interface to enter the interface, as shown in Figure 20.

Figure **20** status prompt

(6) Alarm monitoring: This interface is used to monitor optical path temperature, circuit temperature, voltage error, TEC abnormality, level one

The number of alarms and current alarm status of low current and no source pulses, press and hold in the graphic settings or cleaning parameter interface

Press the enter key to enter the current alarm monitoring interface, as shown in Figure 21.

Figure **21** Alarm status

When switching to the current interface, if the gold font in the red box changes to red, it means that the item is currently being reported.

Alarm, the numerical value indicates the number of alarms in the past.

(7) Matching of micro operation and control card: The cleaning control card and micro operation settings are controlled one-to-one. If the micro operation and main control card are controlled by

One party needs to replace a new object, and the two wireless modules cannot match. You need to power on the microcontroller again and press and hold enter at the same time.

Until the interface shown in Figure 22 appears, then select the connection host configuration. At this time, the micro operation is waiting for the main control card to send the address signal as shown in Figure 23.

Then power on the main control card again, and the interface in Figure 24 will appear (if there are multiple cleaning devices around, please ensure that each device has a unique address). Set a unique address

arbitrarily, press enter, and when successful The lower left corner displays "match

"Configuration Successful", otherwise "Configuration Failed" is displayed. Note: The control card and micro-operation only need to be initially configured once, and each subsequent

The computer will automatically connect to each other. If you accidentally click on the interface in Figure **23** when turning on the computer , subsequent connections will not be able to connect. You need to follow the above operations.

Just do it once.

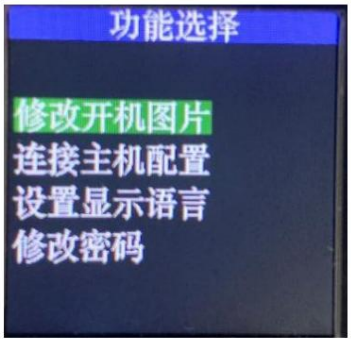


Figure **22** Function selection

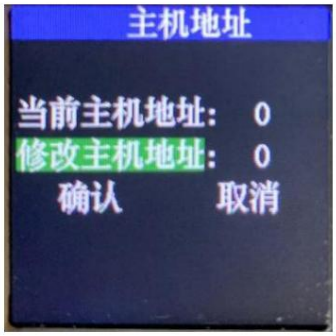


Figure **23** Host configuration

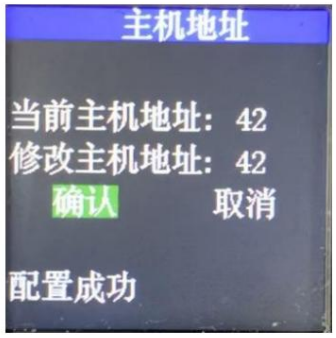


Figure **24** Configuration successful

(8) Modify the startup image: The startup image of the micro operation can be modified independently. Press and hold the enter key while giving the micro operation

After powering on, the interface shown in Figure 22 will appear. Select "Modify boot image" to enter. The interface jumps to Figure 25, which displays

Wait for the host computer data, then open the host computer to send picture information.

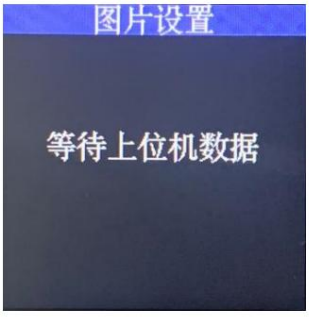


Figure **25** Picture settings

(9) Modify the display language: Follow the above operation to enter the function interface in Figure 22, select the setting language, and select Medium after entering

Either in Chinese or English.

(10) Change password: Figure 22 Enter the interface to change password, enter the old password once, and enter the new password after success.

Can. The default password for power on is 6 zeros.

2.2.3 Introduction to other micro-management functions

(1) Data storage

There are 12 groups of templates that can be saved on the micro operation. When entering each group of templates, all parameter values will be read out and automatically adjusted.

The laser is set according to the corresponding parameters, and the parameter values set in each group of templates will be automatically saved.

(2) Turn on the computer to restore the state when the power was last lost.

If the microcontroller is powered off, the current template number and all parameter values in the current template will be read from the control card each time it is powered on, such as

If the control card loses power, it will return to the state before power-off when powering on.

(3) The handheld card supports galvanometer correction function

As shown in the figure, the X and Y axis corrections correspond to the proportion correction of the X and Y axes respectively. When the actual marking graphics and the set graphics X,

Deviations in size in the Y direction can be corrected through this item. Galvanometer correction of X and Y can correct the distortion of X and Y graphics.

2.3 Usage environment requirements and precautions

If the cleaning machine is not used in accordance with the instructions in this manual, the reliability and service life of the product may be affected.

of reduction. Therefore, please read the following requirements and precautions carefully, and refer to relevant specifications when using it.

(1) The power supply of this cleaning machine adopts 100-240V AC power supply. Incorrect connection of the power supply may cause laser failure.

Unable to work!

(2) When using the cleaning machine, ensure that the bending diameter of the armored cable is greater than 15cm. Failure to coil the armored cable as required may cause

Causes the laser to emit abnormal light or be damaged and unable to work properly!

(3) The laser will adaptively change the fan speed according to the ambient temperature. When using the cleaning machine, be careful not to block the machine.

There are air inlets on the top of the chassis and air outlets on the sides. The chassis cover must be opened when working, and be careful not to block the air inlet.

Leave at least 20cm ventilation distance from the air outlet. Insufficient ventilation distance may cause the laser to malfunction and fail to work!

(4) The operating environment temperature range of the cleaning machine is 0~40ÿ. If it exceeds this range, it may cause an internal alarm in the system.

The recommended operating environment temperature range for the cleaning machine is 10~30℃. Good heat dissipation helps to extend the working life of the cleaning machine;

(5) Since the laser cleaning head often works in a dusty environment, it is recommended to blow it with clean air after each use.

Dust the field lens and cleaning head, or wipe it with a lens cloth to prevent dust or other contamination. Please use the cleaning head when it is not working.

Cover the field lens with a protective cover;

(6) Before replacing the field lens and other components, check to ensure that the cleaning machine is in a power-off state. In order to ensure that the cleaning head

Internal cleanliness, the first set of lenses of the field lens has been installed on the cleaning head, self-equipped field lenses cannot be used, the cleaning machine leaves the factory

Equipped with F160 and F254, if you need other specifications of field lenses, please contact our company for customized lenses;

(7) When cleaning the surface of highly reflective materials, it is recommended to tilt the cleaning head or offset the center of the field lens for processing.

1. Tilt the cleaning head. At this time, the angle between the light emission angle and the highly reflective material must be less than or equal to 75° as shown in Figure 26 to prevent high reflection.

Break the lens and laser.

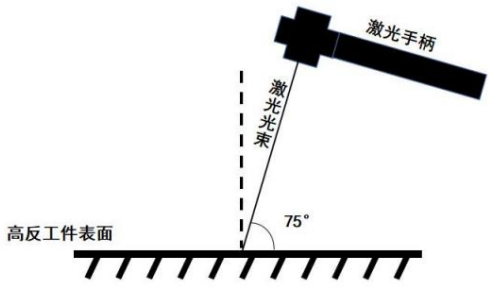


Figure **26** Schematic diagram of hand-held head angle

2. Use JPT cleaning card with offset marking function. As shown in Figure 27, adjust the marking position. The default marking position is in the vibrating position.

The edge of the mirror processing position can effectively prevent high reflection from damaging the laser and lens. The retraction distance can modify the offset position.

Adjust the offset distance. If this function is not needed, adjust the marking position to "middle" as the initial state.

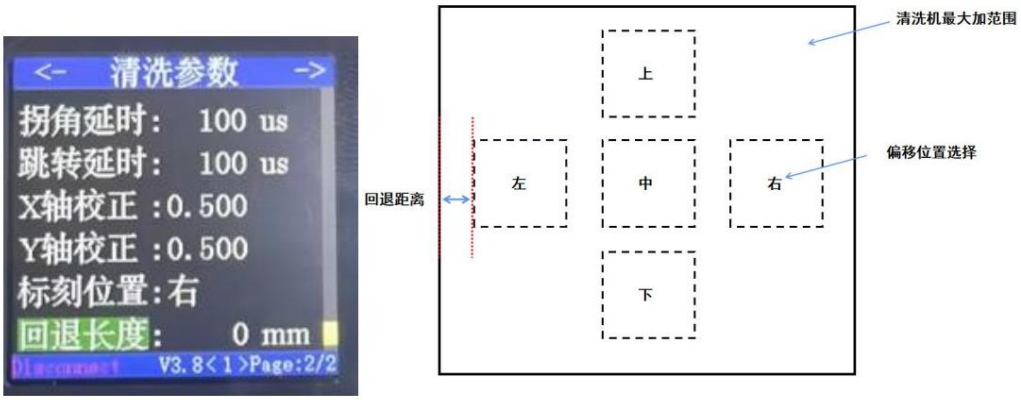


Figure **27** Introduction to offset marking function

(8) Do not look directly at the laser output head, and be sure to wear laser protective glasses during the entire operation!

3. Faults and handling measures

Table **9** Common faults and solutions

serial number	Common faults and problems	Possible causes and solutions
1	The external communication and host connection failure bit successfully matches the address of the host, and the host address needs to be modified.	
2.	The focus red light point does not light up & no red light button fails or the red light is broken and needs to be returned to the factory for repair.	
3.	The effect before and after is inconsistent under the same conditions.	The power attenuation or the armored cable is severely bent. The power attenuation is within the normal range. Under normal circumstances, the bending diameter of the armored cable should not be too small
4.	The power supply is normal and there is no alarm, but there is no light. The button is invalid or the laser is faulty and needs to be returned to the factory for repair.	
5	temperature alarm	The ambient temperature is too high and it needs to be operated at a suitable operating temperature.
6	other alarms	The laser is faulty and needs to be returned to the factory for repair.

*Except for the above, if you have any questions or malfunctions while using the cleaning machine, you can contact JPT

need help

4. Repair and service

4.1 General warranty

After all products manufactured according to the order or specifications are shipped, JPT will not be responsible for any defects in materials and technology during the contract warranty period.

Defective products are warranted and guaranteed to conform to specifications under normal use. Jept has the right to selectively defend

During the repair period, any product with material or technical problems will be repaired or replaced, and the failure is caused by materials or production processes.

Products, repair or replacement services are provided, and JPT reserves the right to charge payment for products that have problems under normal use.

4.2 Warranty Limitations

(1) It has been artificially tampered with, disassembled or modified by persons other than Jept;

(2) Damage caused by improper use, negligence or accident;

(3) Used outside the scope of product specifications and technical requirements;

(4) Laser damage is indirectly caused by malfunctions caused by user software or interfaces;

(5) Due to improper installation, maintenance or use under other abnormal operating conditions not included in this manual;

(6) Accessories are not covered by the warranty.

The above JPT company's product usage instructions are for user reference only, and the official service and warranty contents are as follows:

The agreement in the contract and after-sales service commitment shall prevail. Thank you for your support.