1500W/2000W Handheld Fiber Laser Cleaning Machine Manual

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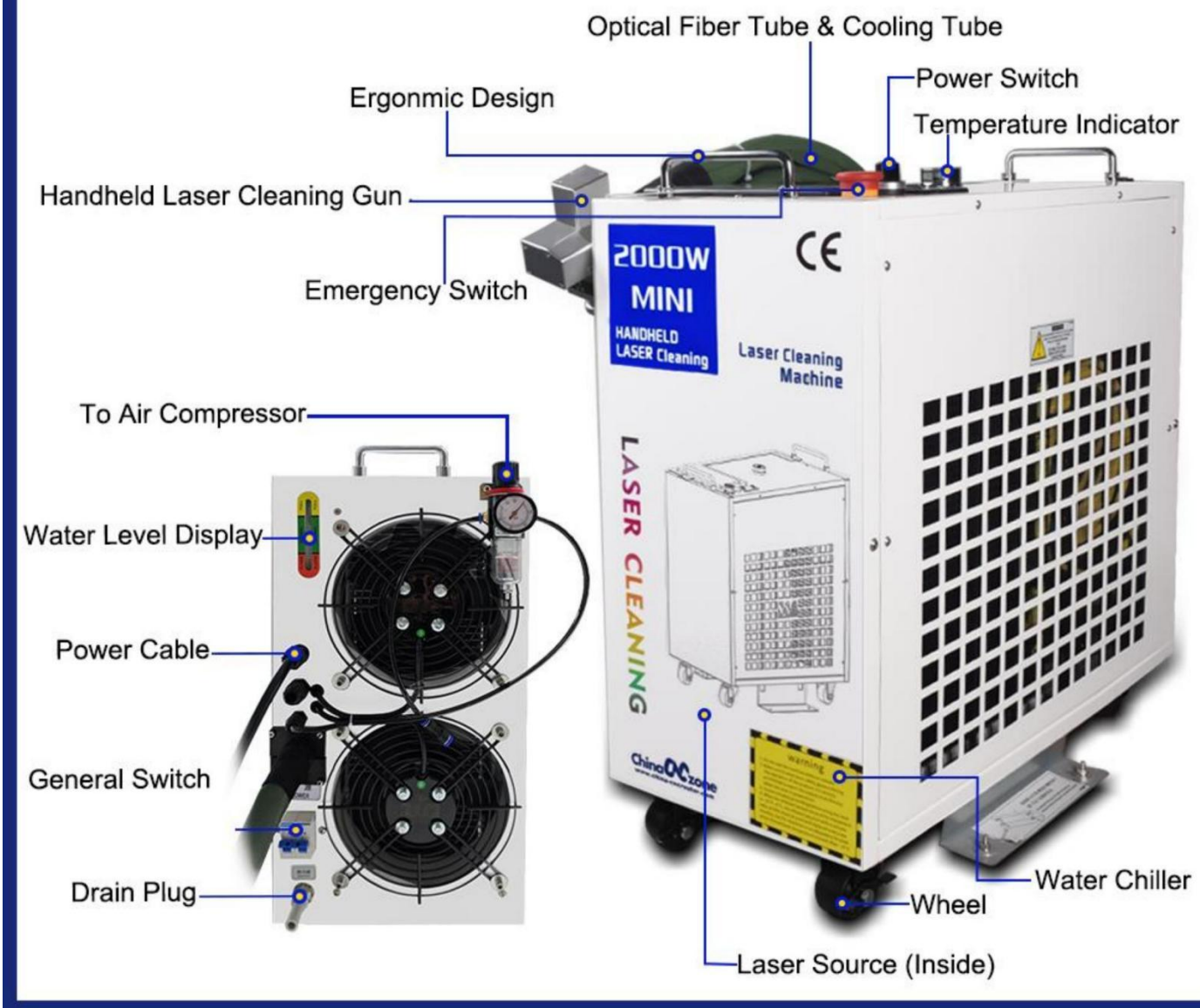
1.Product Description

1.1 Overall display

Overview of Laser Cleaning Machine:

Laser cleaning machine is a device that uses laser technology to remove surface pollutants. By irradiating the surface of the workpiece with a high-energy laser beam, dirt, rust, or coating can be instantly vaporized or peeled off, achieving a cleaning effect. Compared with traditional cleaning methods, laser cleaning machines have the characteristics of easy operation, easy automation, no need for chemical reagents, adaptability to surface cleaning, high cleanliness, high precision, and are efficient, environmentally friendly, safe and reliable, with minimal damage to the substrate surface.

Product Details



1.2 Parts included in package

2. Safety Instructions

2.1 precautions

When using a laser cleaning machine, in order to ensure the safety of operators and equipment, the following safety precautions must be strictly followed:

1. Equip with protective equipment: Operators must wear complete protective equipment, including dust masks, laser protective goggles, laser protective face shields, laser protective clothing, and safety shoes, to ensure that their skin is not directly exposed.

2. Avoid direct viewing of the laser: During operation, it is strictly prohibited to directly view the laser beam to prevent permanent damage to the eyes.

3. Set up laser protection measures: The laser cleaning operation area should be isolated using laser protective curtains or partitions, and laser radiation warning signs should be posted. Personnel who are not wearing protective equipment are prohibited from entering the area.

4. Keep the work environment clean: Flammable and combustible materials are strictly prohibited from being placed in the cleaning area to prevent laser fires. At the same time, keep the site clean and avoid debris affecting the cleaning operation.

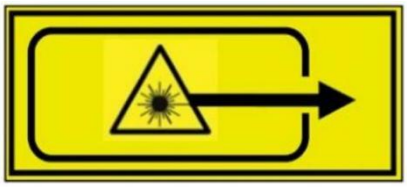
5. Follow the on/off sequence: When starting up, start the water pump (water cooler) first, then turn on the power switch, and finally turn on the laser switch. When shutting down, first turn off the laser switch, then turn off the power switch, and finally turn off the water pump (water cooler).

6. Maintain appropriate cleaning distance: The optimal cleaning distance should be maintained between the cleaning gun and the workpiece to ensure that the laser beam accurately illuminates the area to be cleaned, while preventing accidental injury to the operator.

7. Emergency stop button: The laser cleaning machine is equipped with an emergency stop button to quickly cut off the power in case of an emergency and prevent the accident from escalating.

8. Regular maintenance: The laser cleaning machine needs to be regularly maintained and serviced, including cleaning dirt, replacing consumables, etc., to ensure the normal operation of the equipment and extend its service life.

2.2 Product safety warning label

		
Warning label – Hazard symbol	Explanatory label (Take 1000W as example)	Alternative label for laser aperture
		
Alternative label for Class 4	Must be grounded	Electrical Hazard

2.3 Product safety information

E-CrossStu GmbH

Felix-Dahn-Str 4

Stuttgart 70597

E-CrossStu@web.de +49 71191222069

EC REP

CE

THIS WAY UP

Product name :Laser cleaning machine

Model : LCM-YHY

Rated voltage :220V

Rated current : 15A

Manufacturer : Shenzhen Yuhaiyuan Technology Co., Ltd

Address: Longgang District Yayuan Road Chuangyiyuan Y1-2-14 Shenzhen China

Made in China

3. Technical parameters

3.1 Machine parameter details

Laser cleaning machine			
laser power（W）	1500	2000	3000
scanning speed（ mm/s）	20000	20000	20000
Laser Frequency（Hz）	5000	5000	5000
Duty cycle%	100	100	100
scan length（MM）	150	200	300
scan width（MM）	150	200	300
focal length between handheld gun and material （MM）	800	800	800
Fiber Length	10M		
way of working	Continuous/modulated pulse		
Wavelength	1080nm		
Water cooler	Dual temperature and dual control constant temperature water tank		
Cooling medium	Distilled water or deionized water [antifreeze needs to be added below zero]		
Working environment	Support ambient temperature of -20 to 40 degrees Celsius, machine operating temperature of 10-40 ℃ [adjusted to this temperature through dual temperature and dual control] humidity of 10% -90% without frost		
working voltage	220V 50Hz		380V 50Hz
Water tank capacity	8L		16L
total power	4KW	5KW	8KW

3.2 Cleaning efficiency

The following is laboratory data on rust removal and cleaning efficiency, for reference only. Please refer to the actual situation for details

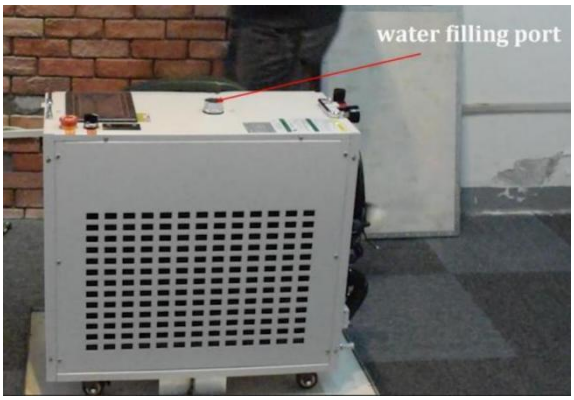
Continuous Laser	Single time Cleaning thickness	Cleaning efficiency
1500W	1-2MM	15-20 ㎡/hour
2000W	2-2.5MM	20-25 ㎡/hour
3000W	3-4MM	35-40 ㎡/hour

4. Operation procedure

4.1 Procedure before energization

(1) After removing the wooden box, check the appearance of the machine for deformation.

(2) Fill the water tank with pure water until the water level gauge on the back of the machine reaches the green mark. (see ①, ②)



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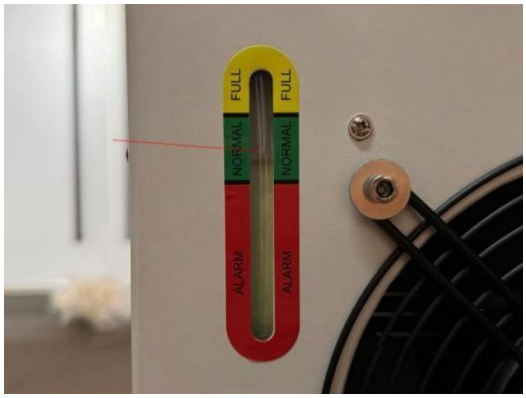

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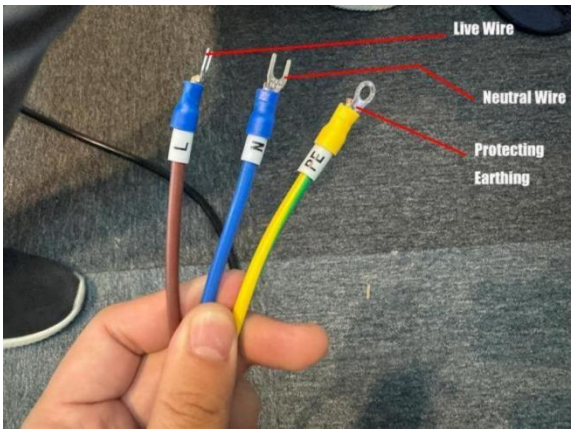
(3) Connect the power cord to the electrical box (see ③, ④)



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④

(4) Connecting the air compressor, The flow rate of the air compressor needs to reach 15L/min (see ⑤, ⑥)

⑤

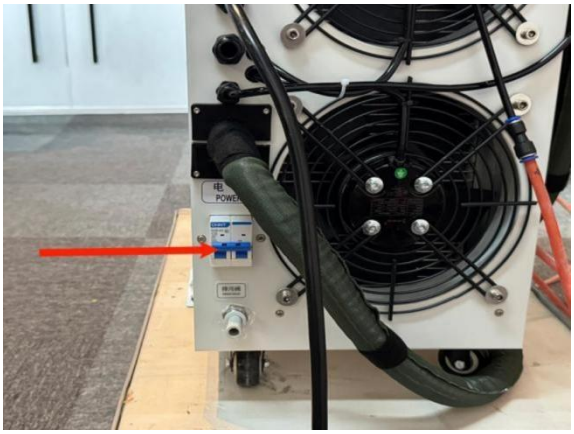
⑥

(5) Turn the knob on the air pressure gauge on the back of the machine so that the pressure index of the pressure reducing valve reaches 0.2-0.3Mpa.(see ⑦, ⑧)

⑦

⑧

(6) Toggle the air switch on the back of the machine up, then flip the switch on the machine's control panel, the screen lights up, and the machine starts to run.(see ⑨, ⑩)



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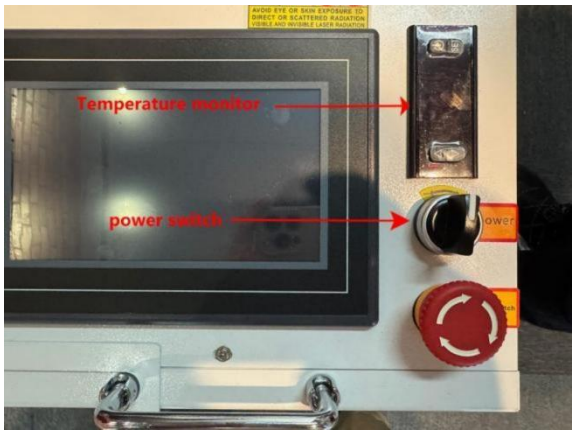

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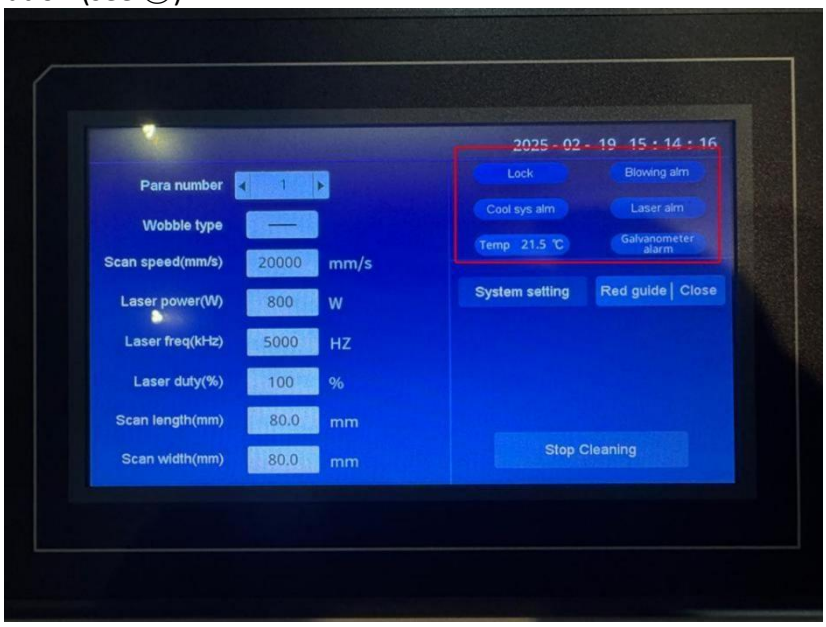
4.2 Procedure after energization

(1) Water chiller temperature can not be lower than 20 ℃, if lower than 20 ℃, wait for the machine to warm up to reach more than 20 ℃ before operation.（Temperature is already set, no need to adjust the water temperature again）

(2) Check if there is an alarm flashing in the upper right corner of the panel, if there is no flashing, continue the operation.(see ⑪)



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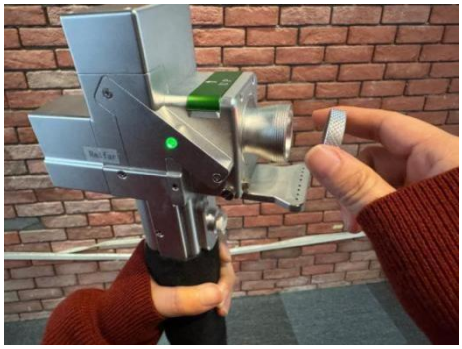
(3) Adjust the parameters (power and scan width), then select the appropriate power, wobble type and scan size.

(4) Click on the bottom right corner of the screen to switch on the laser (REDAY TO CLEAN) (see ⑫)

⑫

(5) Uncover the muzzle protector of the gun head, aim the gun head at the cleaning material, double-click the button on the gun head and then hold it down, laser shoots out. (see ⑬, ⑩, ⑮)



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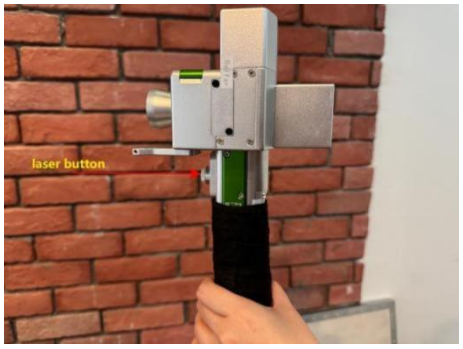

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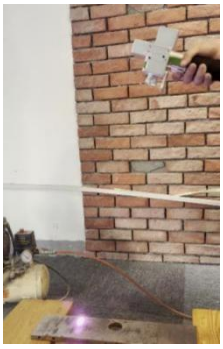

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5. Maintenance and upkeep

5.1 Regular cleaning

- **Keep the surface of the equipment clean to prevent dust accumulation**

5.2 Cooling system inspection

- **Regularly check the coolant level and the operation of the cooling system**

Cooling system water temperature setting:

Water cooler 25 ± 1 ℃ (no need to change in summer)

Coolant requirements:

- Purified water is used as cooling water, and it is recommended to use purified drinking water and replaced every month.
- To prevent mold growth in the water in the chiller from causing pipe blockage, it is recommended to add ethanol with a volume ratio of 10% when adding purified water.
- When the ambient temperature of the equipment is between - 10 ℃ and 0 ℃, the ethanol solution with a volume ratio of 30% must be used and replaced every two months.
- When the ambient temperature of the equipment is lower than - 10 ℃, the dual-system (with heating function at the same time) water chiller must be used, and the uninterrupted operation of the cooling system must be guaranteed.

Other requirements for the cooling system:

- When starting the cooling system for the first time, check the entire water system and connections for water leaks. The external water pipes must be installed and connected according to the water inlet (IN) and water outlet (OUT) marked by the laser.Otherwise, the laser may not work properly.
- If the laser is not used for a long time, the cooling water inside the cooling system and the laser should be drained, otherwise the laser will be irrecoverable damaged.

Warning

- Set the water temperature of the cooling system correctly according to the ambient temperature.
- If the water temperature is set too high, the laser will not work properly.
- If the water temperature is set too low,condensed water will be generated inside the laser or in the laser output optical cable, which will cause irreparable damage to the laser.
- Before turning on the laser, it is necessary to ensure that the cooling system operates normally and that the water temperature reaches a suitable temperature.

5.3 Maintenance of optical components

Tool: 2mm inner-hexagon wrench, dust-free cotton swab, alcohol.

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

※ Disassembly and assembly steps:

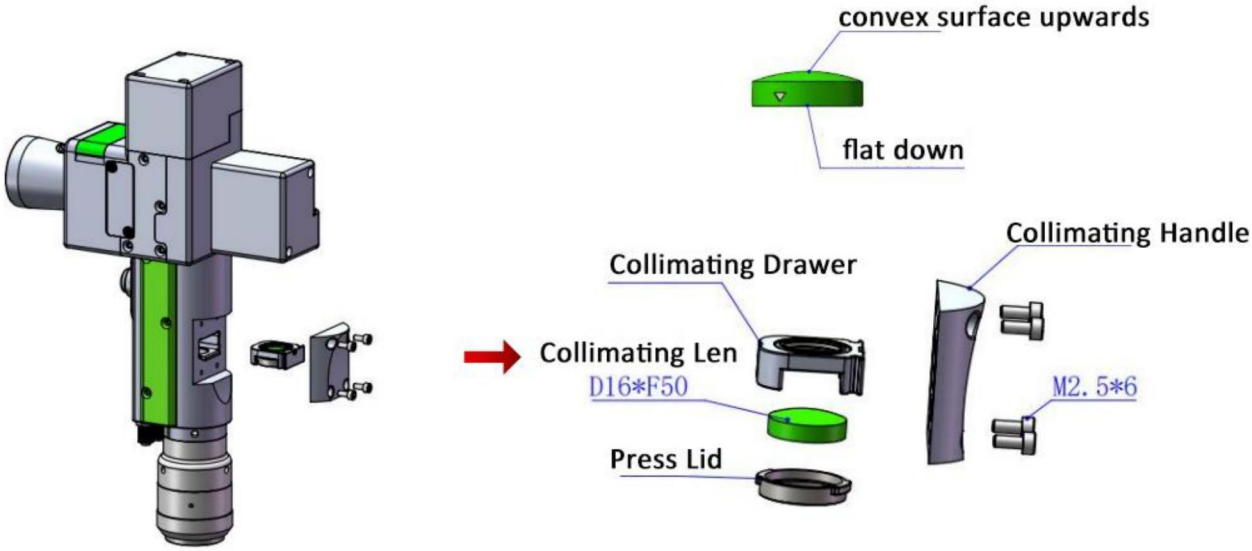
Step 1: Clean up all the dust on the surface of the laser head firstly.

Step 2: Loosen the M2.5*6 screw in the figure with 2mm inner-hexagon wrench.

Step 3: Take out the collimating drawer module and seal the port with textured paper to prevent the dust from entering the cavity.

Step 4: When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens. (Note that the orientation of lens installation can be divided into plane and convex surface. After disassembly, record it; otherwise, the optical path will be affected.)

Note: Install the drawer with the notch facing upwards.



5.3.1 Disassembly and assembly of focus lens

Tool: 2mm inner-hexagon wrench, dust-free cotton swab, alcohol

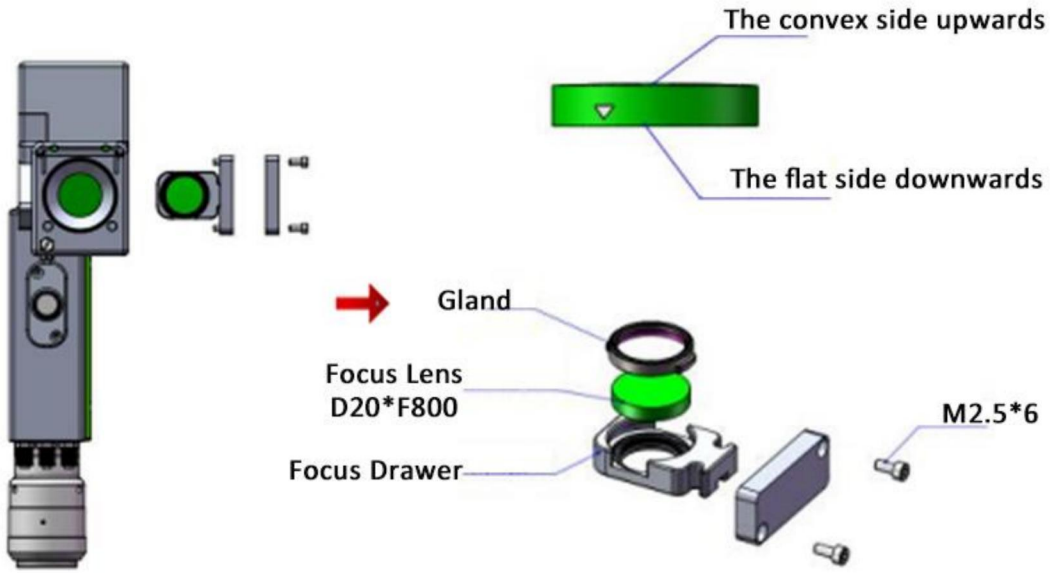
※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.
※ Disassembly and assembly steps:

Step 1: (figure 1) Loosen the lateral M2.5 screws.

Step 2：Remove the focus drawer assembly horizontally and seal the exposed sealing surface of the cavity with textured paper to prevent dust from entering.

Step 3: (figure 2) When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens. (Note that the orientation of lens installation can be divided into plane and convex surface. After disassembly, record it; otherwise, the optical path will be affected.)

Note: Install the drawer with the notch facing upwards.



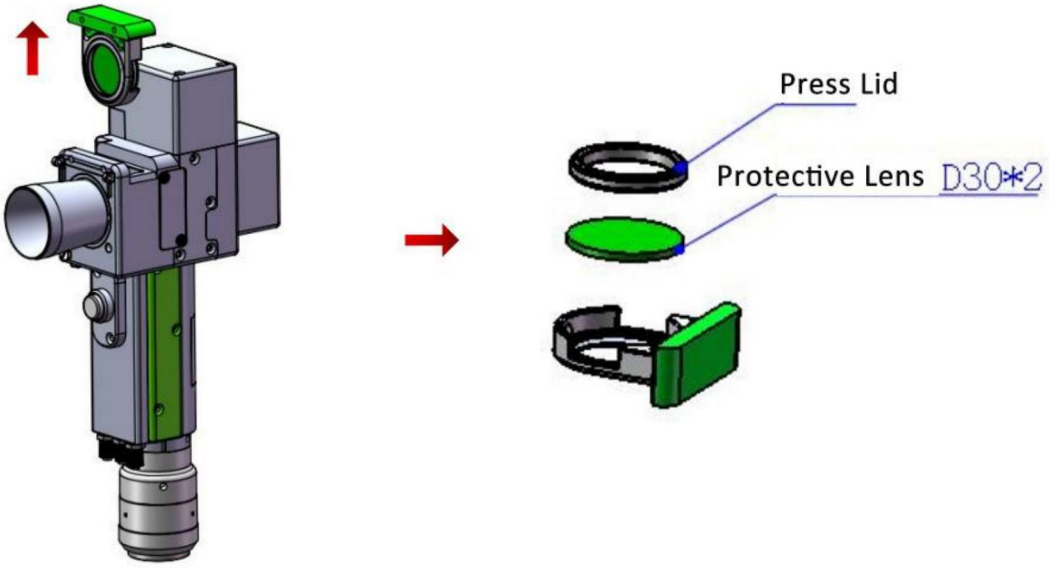
5.3.2 Disassembly and assembly of protective lens

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

Change the protective lens

The first step is to take both sides of the drawer in hand and pull out the protective drawer seat upward. After taking it out, seal the window exposed on the cavity with textured paper to prevent dust from entering.

Step 2,
When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens.



5.4 Lubrication and Maintenance

- **Regularly lubricate moving parts to ensure smooth operation of the equipment**

6. Fault resolution

Alarm Name	Alarm description	Possible solutions
System Timer Alarm	The internal clock of the laser is abnormal.	When this alarm occurs, please contact after-sale service directly.
Laser On Button Alarm (Light output button alarm)	The light button alarm occurs when the light button on the front panel of the laser has been pressed before the laser is powered on.	When this alarm occurs, please power off the laser and use the light enable button to be in the pop-up state, and then power on the laser again to clear the alarm. If the alarm continues to occur, please contact after-sale service.
Security Clip Alarm	The safety clip is not reliably connected to the cleaning gun head.	Clamp the safety clip onto a metal object for use.
Blowing Alarm	The blowing Alarm button blinking, laser does not output light.	Check whether the air supply pressure of the air pressure gauge reaches 0.1Mpa or above.
Cool system Alarm	Cool system Alarm button blinking, laser does not output light.	When this alarm occurs, please check the water level gauge of the chiller. Check if the water flow circulation is normal. If the water tank is short of water, replenish the water into the tank.When the water cooling system operates normally,Try restarting the laser. If the alarm continues to occur, please contact after-sale service.
Temperature Alarm	The system displays a high/low temperature	Check if the refrigeration of the water cooler is normal and if the water temperature gauge shows that the water temperature exceeds 28 ℃ or below 10℃. After troubleshooting, power on the machine again and observe if the temperature drops below 28℃ or below 10℃. If the alarm continues to occur, please contact after-sale service.

6.1 Alarm message

Alarm information includes: **Safety clamp alarm** and **machine alarm**.

Safety clamp alarm lies in that the safety clamp and cleaning head is not reliable conduction.

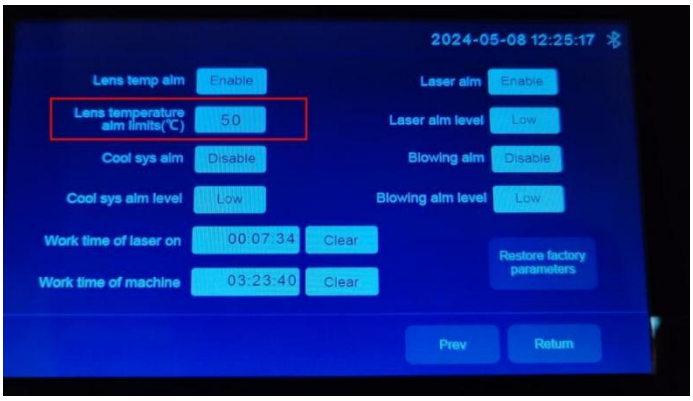
Machine alarm includes 3 alarms, **laser alarm**, **water-cooling machine alarm**, **under voltage alarm**.

In the alarm information interface, it can display multiple alarm information, up to 3 pages, and it can switch through the previous page and the next page. When the alarm is triggered, the output of the laser will be stopped and the galvanometer will stop moving at the same time, and the corresponding alarm information will be prompted. The user can check the related hardware problems according to the alarm prompt and remove the alarm. When the alarm is lifted, the alarm record of the machine alarm will still exist in the alarm information. At this time, you can manually clear the alarm by entering the alarm information interface. If the alarm is not lifted, the alarm will continue to prompt when it is manually cleared.

6.2 Lens temperature alarm limits

[Home Page]→[System Parameter]→[Device paras]→[Input Password: 666888] →next page→ lens temperature alarm limit value.

It's suggested to set the set value of lens temperature to 50. After the lens temperature exceeds the set value, the alarm caution will arise on the home page and the display light on the side of the handheld plumb joint will turn to red



7. Machine maintenance and upkeep

7.1 When need add antifreeze

Cooling system water temperature setting:

Water cooler 25 ± 1 ℃ (no need to change in summer)

Coolant requirements:

- Purified water is used as cooling water, and it is recommended to use purified drinking water and replaced every month.
- To prevent mold growth in the water in the chiller from causing pipe blockage, it is recommended to add ethanol with a volume ratio of 10% when adding purified water.
- When the ambient temperature of the equipment is between - 10 ℃ and 0 ℃, the ethanol solution with a volume ratio of 30% must be used and replaced every two months.
- When the ambient temperature of the equipment is lower than - 10 ℃, the dual-system (with heating function at the same time) water chiller must be used, and the uninterrupted operation of the cooling system must be guaranteed.

Other requirements for the cooling system:

- When starting the cooling system for the first time, check the entire water system and connections for water leaks. The external water pipes must be installed and connected according to the water inlet (IN) and water outlet (OUT) marked by the laser.Otherwise, the laser may not work properly.
- If the laser is not used for a long time, the cooling water inside the cooling system and the laser should be drained, otherwise the laser will be irrecoverable damaged.

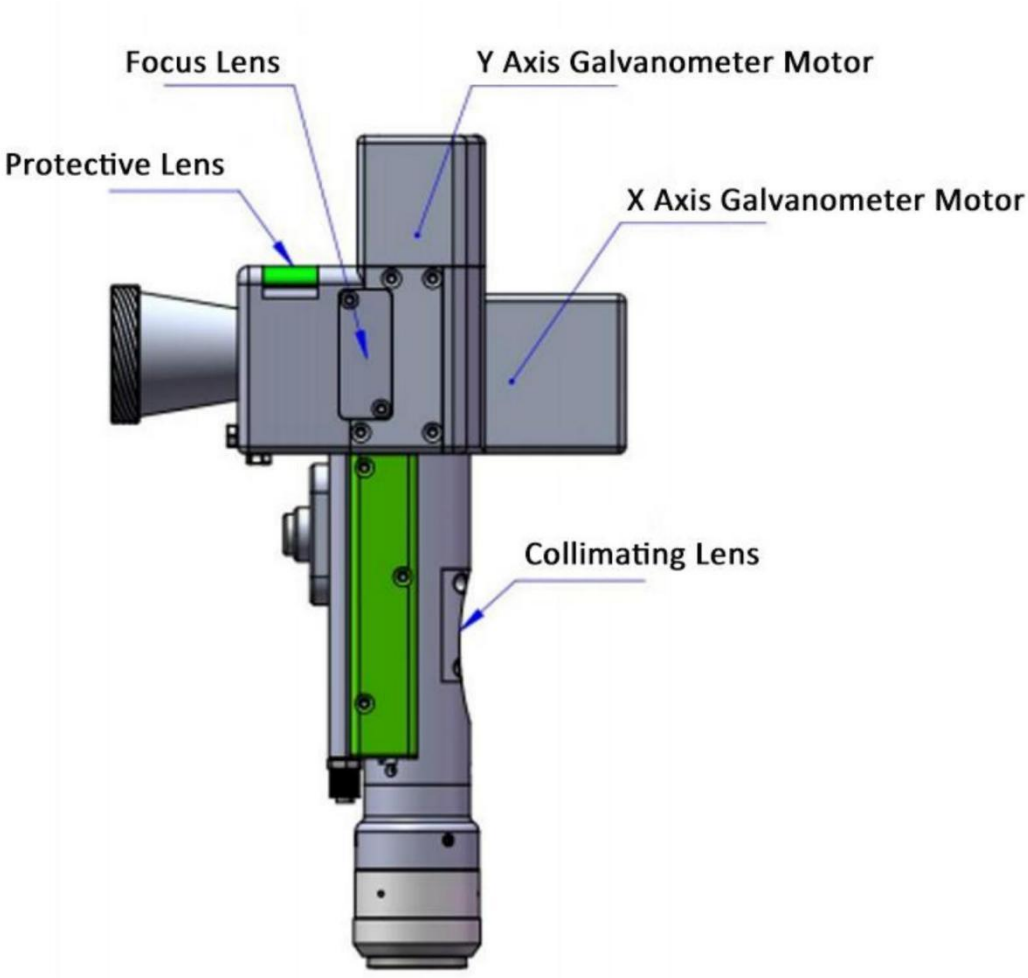
Warning

- Set the water temperature of the cooling system correctly according to the ambient temperature.
- If the water temperature is set too high, the laser will not work properly.
- If the water temperature is set too low,condensed water will be generated inside the laser or in the laser output optical cable, which will cause irreparable damage to the laser.

- Before turning on the laser, it is necessary to ensure that the cooling system operates normally and that the water temperature reaches a suitable temperature.

7.2 Optical lens structure

※ The assembly is completed in the dust-free plant at the time of replacement of parts. In principle, except for the front-end first protective glass can be disassembled and assembled, other modules are forbidden to be dismounted. If it is necessary to check the collimation lens, focus lens and galvanometer lens, the product shall be put into a clean environment for disassembly.



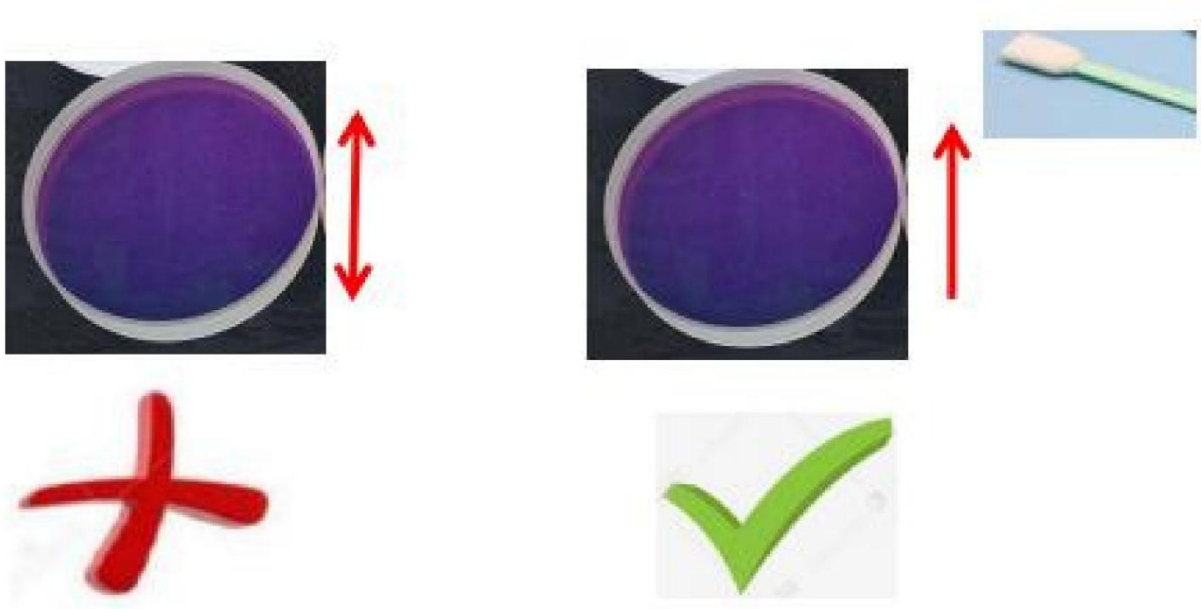
7.3 Cleaning of optical lenses

※ Clean optical lenses, operating methods and precautions:

※ Tools: Dust free gloves or finger covers, dust-free wiping cotton swabs, isopropanol, Fill with dry and pure compressed air.

Spray isopropanol onto a dust-free cotton swab, with the lens facing both eyes and the left hand Gently pinch the side edges of the lens with your thumb and index finger, and hold a dust-free cotton pad with your right hand for wiping. Sign and gently wipe the front and back of the lens from bottom to top or left to right in a single direction Face, (avoid wiping back and forth to avoid secondary contamination of the lens).

Use filling dry and pure compressed air is blown onto the surface of the lens to confirm that there is no residue on the surface of the lens after cleaning any foreign object.



7.4 Disassembly and assembly of optical lenses

7.4.1 Disassembly and assembly of collimating lenses

Tool: 2mm inner-hexagon wrench, dust-free cotton swab, alcohol.

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

※ Disassembly and assembly steps:

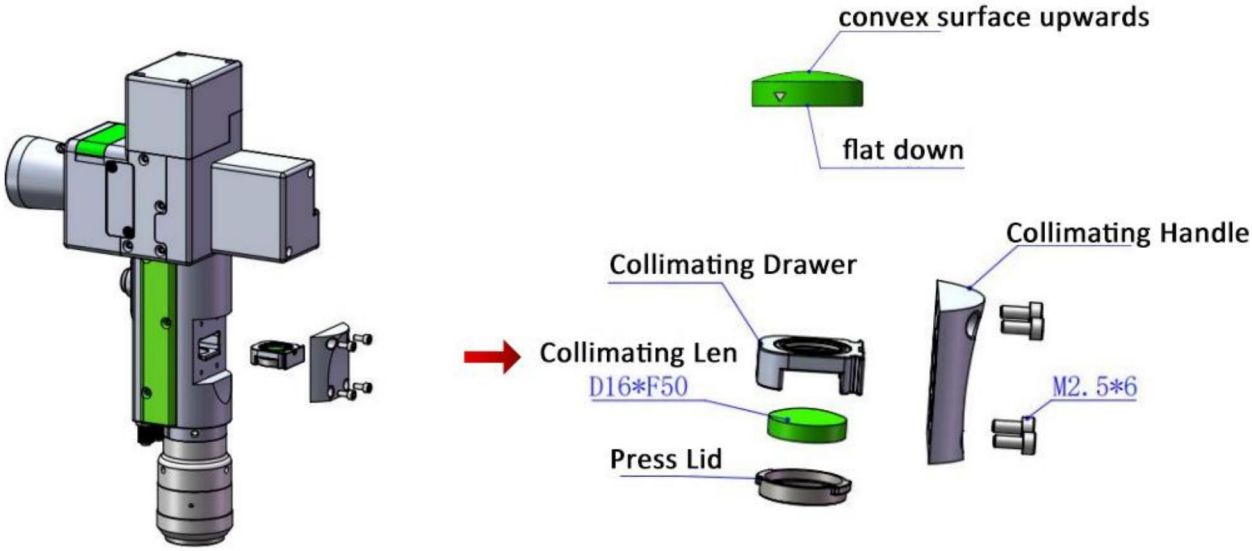
Step 1: Clean up all the dust on the surface of the laser head firstly.

Step 2: Loosen the M2.5*6 screw in the figure with 2mm inner-hexagon wrench.

Step 3: Take out the collimating drawer module and seal the port with textured paper to prevent the dust from entering the cavity.

Step 4: When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens. (Note that the orientation of lens installation can be divided into plane and convex surface. After disassembly, record it; otherwise, the optical path will be affected.)

Note: Install the drawer with the notch facing upwards.



7.4.2 Disassembly and assembly of focus lens

Tool: 2mm inner-hexagon wrench, dust-free cotton swab, alcohol

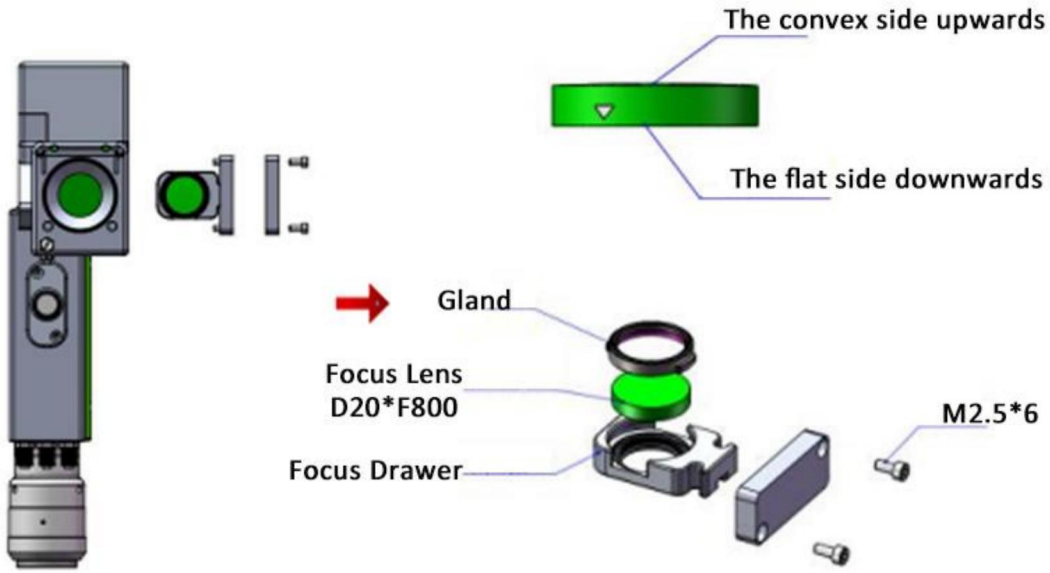
※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.
※ Disassembly and assembly steps:

Step 1: (figure 1) Loosen the lateral M2.5 screws.

Step 2：Remove the focus drawer assembly horizontally and seal the exposed sealing surface of the cavity with textured paper to prevent dust from entering.

Step 3: (figure 2) When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens. (Note that the orientation of lens installation can be divided into plane and convex surface. After disassembly, record it; otherwise, the optical path will be affected.)

Note: Install the drawer with the notch facing upwards.



7.4.3 Disassembly and assembly of protective lens

※ The disassembly and assembly shall be completed in a clean place. When the lens are dismounted, the dust-free gloves or dust-free fingerstall.

Change the protective lens

The first step is to take both sides of the drawer in hand and pull out the protective drawer seat upward. After taking it out, seal the window exposed on the cavity with textured paper to prevent dust from entering.

Step 2,
When the two bosses are aligned with the opening slot after the gland is rotated anticlockwise, remove them upward and replace the lens.