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Laser Engraving Machine

User's Operation Manual

☆ Thank you very much for buying radium laser engraving machine.

☆ In order to make sure that your computer laser engraving machine can work steadily for a long period of time, please read this manual carefully, be familiar with and master the operation method and technological requirements of the machine in advance.

☆ If abnormal situation takes place, please turn off the power immediately and consult this manual. If the problem can not be solved, please contact with our company or the local customer service agent to work out a solution.

☆ You can log on the website of our company at anywhere to look up ways of contacting us to consult with the local customer service agencies for information and help.

☆ In order to guarantee the personal safety and machine security, please bear in mind the *Equipment Maintenance and Safety Cautions.*

Statement

1. **The manufacturer has the right to modify the products without notification to customers in advance.**
2. **The manufacturer only undertakes legal responsibilities for his products sold to customers. The manufacturer is not responsible for other losses caused by**

troubles of the machine.

Contents

Hardware

Hardware

Function of laser engraving machine

The application scope of laser engraving machine is completely extensive. Different designs have been adapted to our laser machine to meet the needs of all fields. And we believe that the type of machine you've chosen will surely be of great help to your work. The following introductions might provide you some inspirations on choosing and enlarging the scope of usage.

1. Printing and packaging fields: laser engraving on rubber plate, laser cutting on paper, etc.
2. Artwork and gift fields: laser engraving on bamboo, wooden book, redwood, double-colored plate, box-shaped artwork, chessboard, etc.
3. Advertising field: laser engraving (cutting) on organic glass, various tablets and double-colored plate, etc.
4. Leather and garments fields: cutting on genuine and synthetic leather and different kinds of shoes. And do engraving and cutting on the surface pattern. Cutting on various designs of garment and textiles, etc.
5. Model fields: laser engraving (cutting) on architectural model, aviation and navigation models, cartoon figures and sample of industrial model, etc.

Structure of WH series laser Engraving machines

Complete working system is composed of principal machine of laser engraving , laser power source, laser engraving software, exhaust fan, air pump, submersible pump, water tank, air pipe, computer, communication cable, etc. Printer, scanner, and various kinds of designing software can be equiped according to different objects.

1. Sketch of the structure

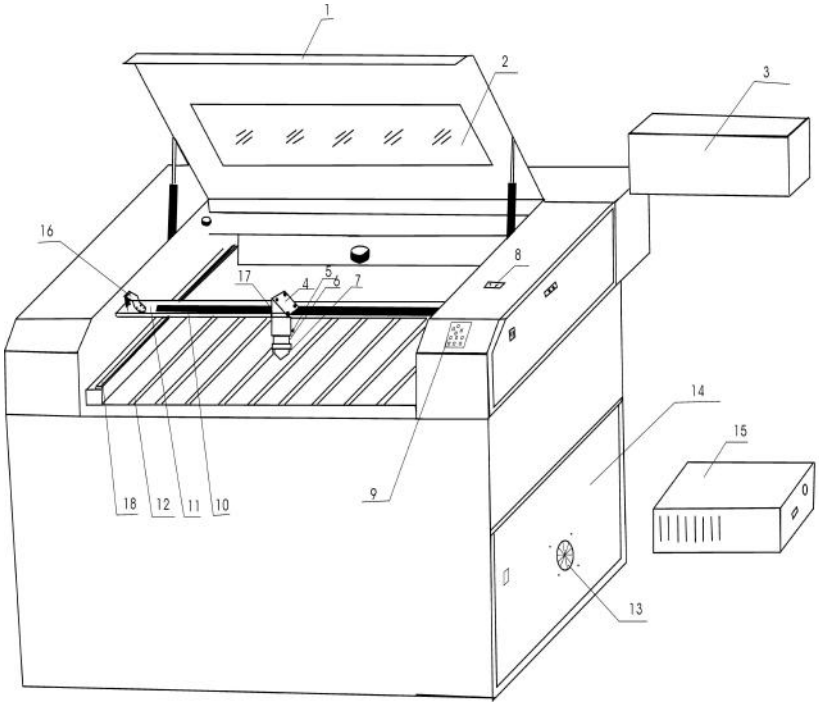


Figure 1: Front side of the laser engraving machine

1. Upper cover 2. Observation window 3. Length-extended cage of the laser tube
4. The third reflecting lens 5. Focus head adjusting screw 6. Focus lens 7. Air nozzle
8. Ammeter 9. Operation panel 10. X straight line guide rail 11. X crossbeam
12. Cutting platform 13. Heat scattered blower 14. Control cabinet door
15. Laser power supply 16. The second reflecting mirror
17. Ray inlet hole of the third reflecting lens 18. Y axle guide rail

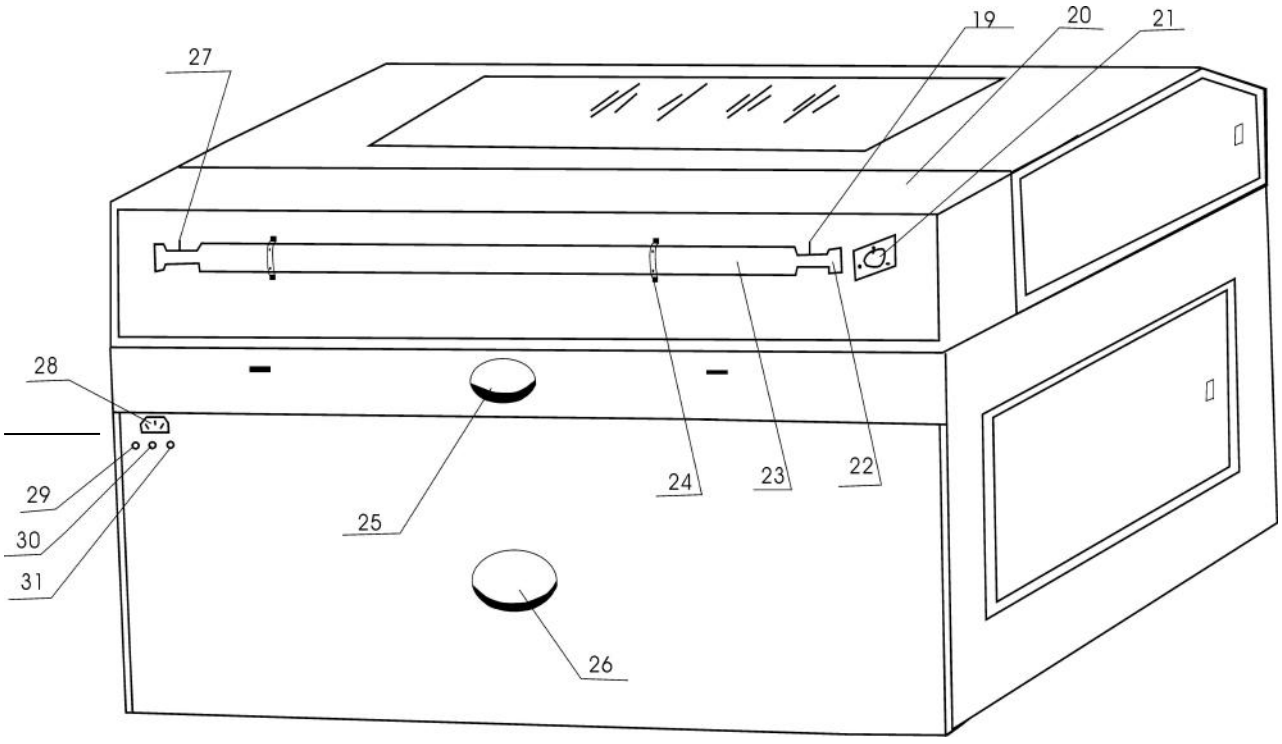


Figure 2: Sketch of the laser engraving machine's back side

19. Cathode of the laser tube 20. Laser tube cover 21.The first reflector
22. light exit holes of Laser tube 23.Laser tube 24. Clip of the laser tube
25 Upper wind suction 26. Under wind suction 27. Anode of laser tube
28. Power interface 29. Air in 30. Water in 31 Water out

2. System components

The laser engraving machine of WH series is mainly made up of five parts: Mechanical platform, optical system, transmission system, control system, and assistant system.

- ※ **Mechanical platform:** It is composed of machine cover, guide rail, base frame, reflector mount and other fittings.
- ※ **Optical system**: It is composed of laser tube, laser power source, three reflecting lens and one focusing head.
- ※ **Drive system:** It is composed of three imported balanced straight line guide rails in high accuracy, belt, two step motors and several gears.
- ※ **Control system:** It is composed of high speed DSP control card, two switches power supply and two step motor drivers.
- ※ **Assistant system:** It is composed of circulating water cooling pump, air blowing compressor and smoke suction machine.

Installation of WH series laser engraving machine

1. Disassemble the packing

After opening the packing, please check out whether there is any damage on laser tube. Then check up the complete machine to see whether there is any scratch on the surface and the completeness of fittings.

2. Positioning

The machine should be put in cool and dry places. It should be placed close to earth wire. When the machine has been debugged, please don't move it again, otherwise the ray path has to be readjusted.

3. Installation

1) Plug the data wire into the COM port of the computer, tighten the screw and install the COM driving procedure. Insert the softdog and install the operation software as well as softdog driver program.

2) Put the tube into the snap ring of laser tube. Connect the laser power source with cathode and anode of tube, and then insert the data wire.

Notice: the ray outlet hole of laser tube should be placed towards the first reflecting lens. Rubber pad have to be put in the laser tube close to snap ring. Silicon-latex should be painted on the point where anode and high pressure

connected thus to avoid fire sparks caused by high pressure. Before put cathode and anode of laser tube into use, please slightly polish away the oxide layer on each end of the line by slender sand paper.

3) Fill the water tank with purified water, connect it with water pump and air pump, and link the water outlet pipe and air inlet pipe. After several minutes of water circulation, please check out whether there is any bubble in the laser tube. If there is, please turn over the tube to push the bubble out.

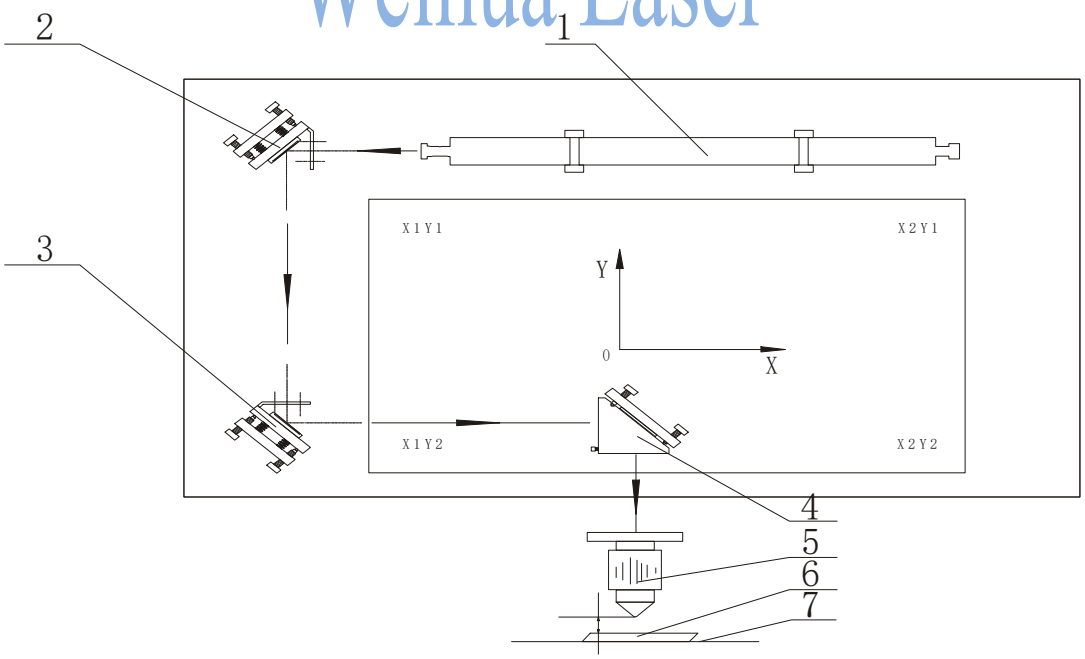
4) Embed a copper conductor with the minimum diameter of 2MM into the earth (the minimum depth is 1M). Then connect the other end of the conductor with laser power supply.

Notice: it must be grounded strictly!!!

5) Connect the principal machine and blower fan with power supply, and then start the machine.

Structure and adjusting method of ray path

1. Structure of the ray path



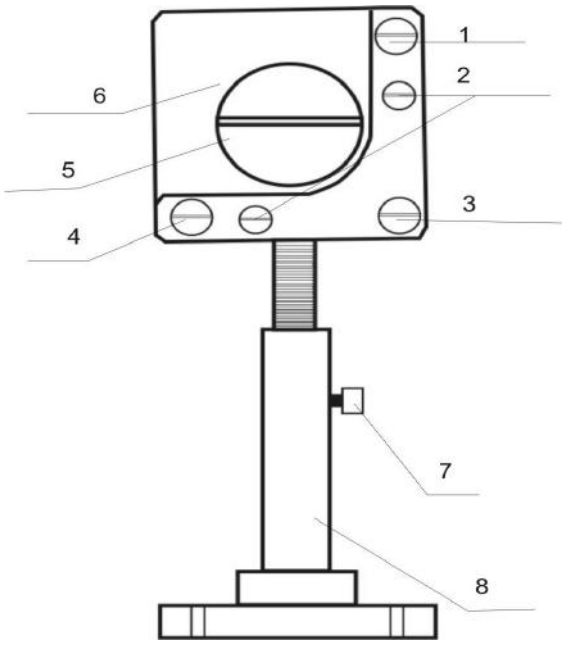
1. Laser tube 2. The first reflecting lens 3. The second reflecting lens
4. The third reflecting lens 5. Focusing head 6. Object being processed
7. Working platform

2. Structure of the optical components

Ray path is ray guide system. Laser engraving machine of WH series has adopted flying-optical system. The complete system is made up of laser tube, three reflecting mirrors, focusing lens and relevant adjusting devices. These are the main parts of the machine.

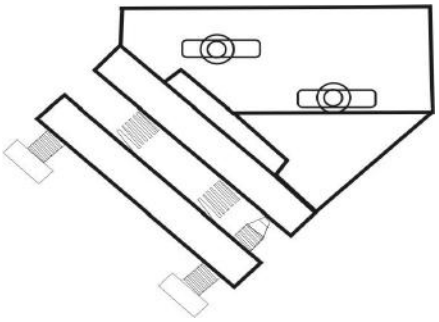
Ray path has close relationship with the effect of engraving and cutting. Therefore please be patient and careful when adjusting the ray path.

Sketch of reflector mount

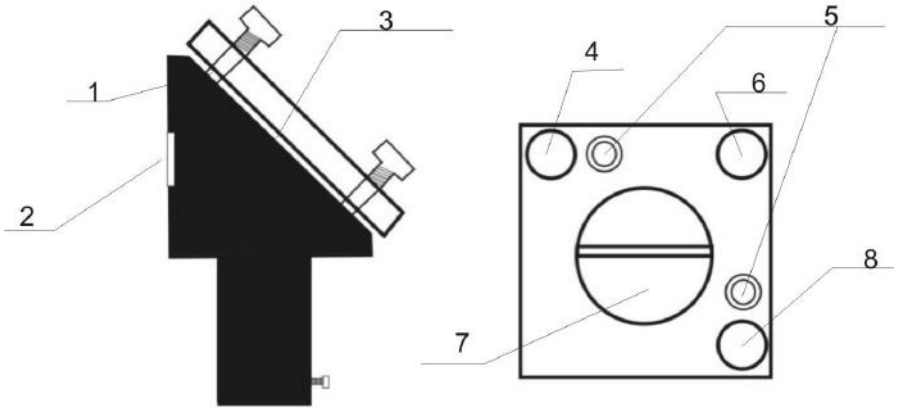


The first reflector sketch

1.Top adjusting screw of the reflecting lens 2. Pressure spring
3.Right adjusting screw of the reflecting lens 4. Left adjusting screw of the reflecting lens
5. Cover of pressure lens 6. Reflecting lens
7. Up and down adjusting screw 8. Fixed mount.



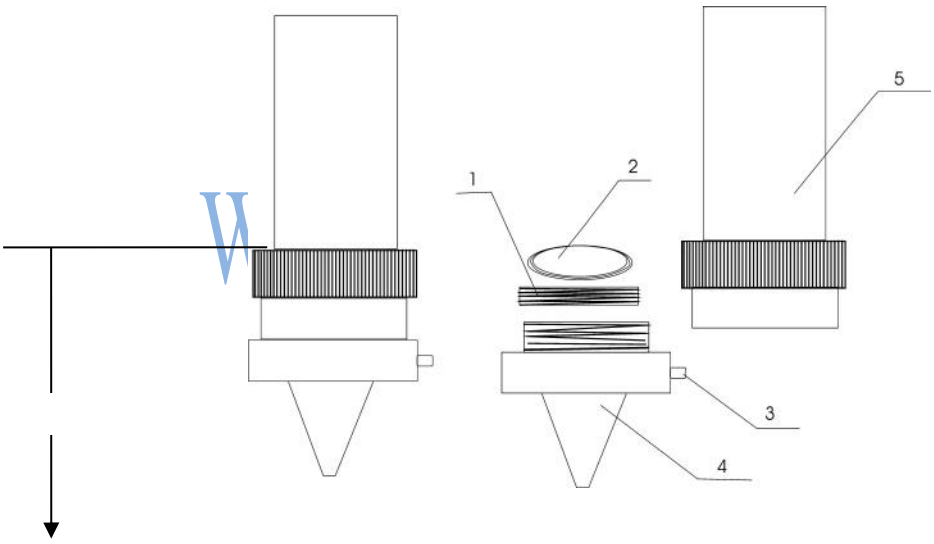
The second reflector sketch



The third reflector sketch

1：laser head　　2：light entrance hole　　3：The third reflecting lens
4：adjusting screw　　5：Spring　　6：Adjusting screw
7：Cover of pressure lens　　8：Adjusting screw

Sketch of focusing head



Focal length: 55±1MM to the surface of object

1. Focusing lens cap　　2. Focusing lens (convex side down)　　3. Air-in nozzle
4. Air-out nozzle　　5. Lens cone

3. Ray path adjustment.

（1）Reflecting lens adjusting

Put the adjusting ray center on the head of ray entrance hole, and stick a piece of paper in it; then move the laser head to upper left corner of the machine. Press “Laser” button and make a dot. Then move the laser head to the lower left corner of the machine to make another dot. Using adjusting screw of the first reflecting lens to make these two dots totally matched together, thus fix the ray path Y. Then turn to ray path X. Move the laser head to the left of crossbeam. Press “test” button to make a dot. Then move it to the right to make another dot. Using adjusting screw of the second reflecting lens to make these two dots totally matched together.

(2) Laser tube adjusting

Though in the above step, flying-optical path has been fixed, the laser ray may not be in the center of ray entrance hole. The next step is to adjust the position of laser tube and the second reflecting lens to make the laser ray in the center of the entrance hole. Check the ray position in the hole. If the ray locates in upper part, the laser tube should be moved downward. If the ray locates in under part, the laser tube should be moved upward. When the ray locates in the front; the second reflecting lens should be moved backward. The ray locates in the back; the second reflecting lens should be moved forward. During this process, every adjustment must be moved slowly and carefully. Don't operate it in haste.

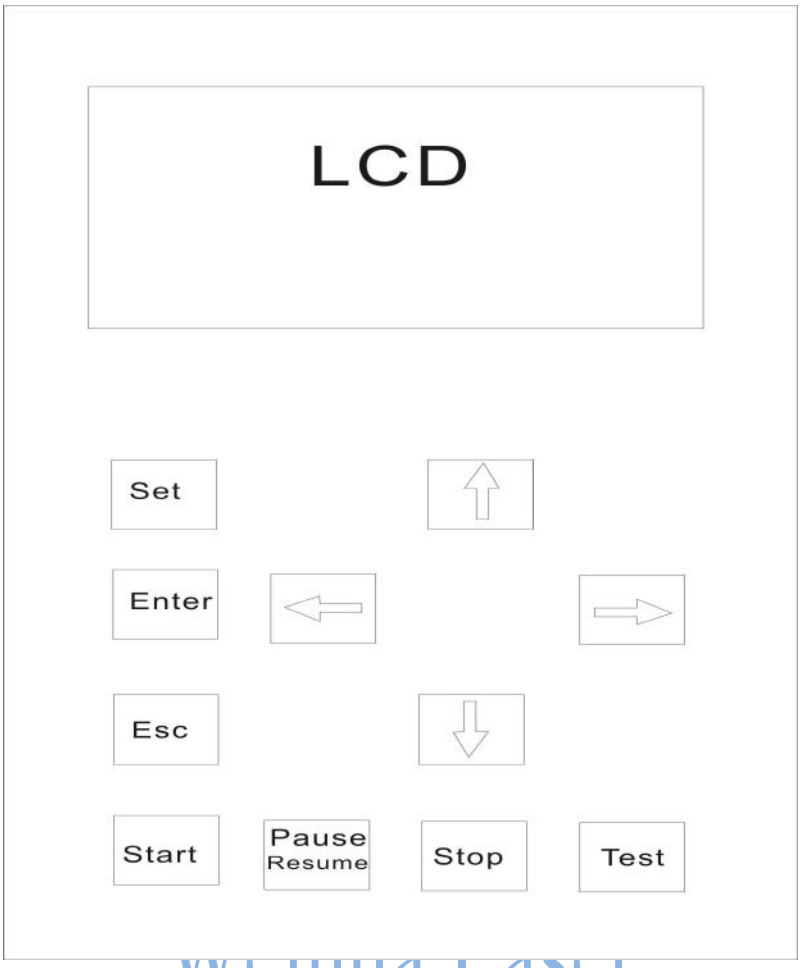
(3) Ray verticality adjustment.

Put a piece of acrylic on the working platform. Press "laser" button to see whether the pierced acrylic is vertical or not. If it is not vertical, adjust the cover on the third reflecting lens to make the ray vertical. Ray verticality adjustment is to adjust the ray position on focus lens. Only when the ray is in the center of focus lens, can the light be straight and strong.

(4) Focus adjustment

Take a thicker acrylic, and click the "Laser" button. Observe the thickness of the dot. Adjust the lens cone until it can make the thinnest ray. Commonly it is 55±1MM.

Operation panel and instruction



Sketch map of button plate

Function of keys and buttons

Move left Move right Move forward Move backward

Set: Set the specifications.

Test: Press this button, the laser tube begin to give out light

Stop: Press pause button while the machine is engraving， then press stop button the machine will stop working and return back to the original point.

Pause: Make a pause of the working machine.

The function of the operation panel is the same as computer.

Basic operation procedure

1) Start the water pump and air pump; let the water in laser tube circulate for 3 minutes.
2) Turn on the power of principal machine
3) Turn on the power of blower fan
4) Press “Test” button to see if there is ray.
5) Start the controlling software, check if the ray can move up or down, left or right.
6) Put material in position, and fix up the focal length (see focus length of figure 4).

7) Operate the computer to transmit the file, and start to engrave.

Cautions and maintenance

1. Safety cautions

1) It is forbidden to start the machine without grounding. The ground wire of laser power must be connected with the earth. It can not be connected on facilities such as doors, windows, water pipes and so on. The wire should be pulled to the outdoor ground.

2) Check the submersible pump to see if it can let the water out each time after starting the machine. It is forbidden to start the machine up when water can not come out from the pump.

3) Operators can not leave the machine when it is working in order to avoid unnecessary loss.

4) Water container should be a bit larger to make sure that there is 20 kilogram water in circulation. The water temperature should be about 25°C. If the temperature is too high, the water should be changed. It is better to use purified water so that there isn't any contamination. Circulating water should be changed regularly (every three days).

5) Because there is laser and high-pressure in the machine, non-professional workers should not disassemble the machine without authorization.

6) Reflecting mirror and focusing lens should be wiped with special camera lens paper or medical-use cotton wet by mixture of alcohol and ether. (Proportion of ether and alcohol should be 1:1) Cleaning of mirrors and lens should be done once a week. It is required that the grounding of all parts of the machine and user's computer should be safe to avoid damage of machine and injuries caused by static electricity.

7) Blower fan must be turned on while engraving, so as to avoid pollutions on mirrors and lens. It is forbidden to put any flammable and explosive articles close to the equipment so as to avoid fire.

8) Any irrelevant total reflection or diffuse reflection objects can not be placed in the equipment to prevent the laser from reflecting on human body or flammable articles directly.

9) The water in the laser tube should be drawn off in winter, in order to avoid frost cracking of the tube.

10) When the machine is working , operators should examine the working conditions (such as whether the laser ray has been blocked from shining on the paper used for crispening by the air coming from the air pump, unusual noise, temperature of circulating water, etc.) at any moment.

11) The crossbeam and Larry can not be pulled by hand. The machine should be put in places where there is no interfere and harmful effect of pollution, strong electricity, strong magnetism, and so on.

12) When the voltage is not stable, please don't start the machine. It is suggested to use voltage regulator.

13) People who have not been trained should not use the machine.

14) Don't strike the keys and buttons strongly. Please press it lightly to avoid damages of those keys and buttons.

15) In case there is damage or fire, please turn off the power at once.

16) Don't start the machine when there is thunder or lightning.

Users should follow all the above mentioned regulations carefully. Otherwise the manufacturer will not take responsibility for any troubles of the machine or physical injuries.

2. Maintenance

1) It is forbidden to use circulating water of poor quality, because it may affect the laser power seriously and shorten the service life of laser tube. The manufacturer is not responsible for repairs and maintenance of damages of the tube caused by the using of poor-qualified water. It is suggested to use purified water.

The minimum amount of cooling water should be 30L. Make sure that the water can submerge the submersible pump.

2) Water temperature should be examined at all times during the working process. Once the water turns to be warm, please change it right away (the right way of changing the water is to get out of some hot water and fill in cold water).

3) If there is any particular requirements, the ray intensity shouldn't be more than 20MA, thus to avoid the tube becoming aged quickly.

4) Water tank, water pump and water inlet rubber tube should be cleaned once every four days.

5) Lens and mirrors should be cleaned once every day before starting the machine (Notice: not at the time of being off duty).

6) Please clean the reflecting mirror carefully when it is on the machine, otherwise, the ray path must be readjusted!

7) When cleaning the third reflecting mirror and focusing lens, they must be removed form the machine. After that, the mirror and lens should be fixed firmly but not too tightly for fear of breaking up.

8) Please pay attention to the focal length before starting the machine every time. If the length is not accurate, it will greatly affect the engraving effects.

9) Please clean the working platform every time after working. Don't make the dust fly upwards.

10) Please clean the machine after working every day. When doing this, the crossbeam and larry can be pulled lightly and carefully in the condition that the power is turned off. Don't pull them strongly.

11) Guide rails should be cleaned, and lubricant should be added onto the rail every two weeks.

12) The outer equipments (blower fan, air pump, etc.) should be cleaned once every two weeks.

Problems and Solutions

Problem	Cause	Solution
No rays	Laser power supply is broken	Replace it with a new power supply
	Data wire of the laser power supply is broken	Replace it with a new wire
	No TTL control signal	chip is broken.
The object can not be fully cut	Laser tube is old	Replace it with a new one
	Focusing lens is polluted	Clean the lens
	Reflecting mirror is polluted	Clean the mirror
	Ray path is not right	Adjust the path
There are two incisions	The ray is not in the center of condensing lens. It is reflected when shining on metals	Adjust the ray path and third reflecting lens
Square becomes parallelogram when cutting	Guide rail X and rail Y are not vertical.	Adjust rail X and rail Y
Worked slowly ahead or back, left or right. Or the laser head worked toward one direction	Data wire is not connected properly, chip is damaged	Reinsert the data wire, replace chips

Regulations of repair guarantee

We are responsible for the repair of complete machine for one year. Guarantee period for repair of laser tube (we are not responsible for blowing out of laser tube caused by high water temperature and frost cracking caused by low water temperature) and optical glass is 9 months, and that of outer equipment (blower fan, air pump, water pump/chiller) is half a year.

Regulations of repair guarantee

1. Within the guarantee period, our company will provide service for problems that appear in normal using conditions for free.
2. Certain amount of maintenance fees will be charged by the company when the guarantee period is over.
3. Our company will not provide maintenance and repair for free in circumstances that the sealing paper is damaged caused by disassembly of the machine without authorization, the machine is not used in correct way, problems caused by calamities of nature and calamities imposed by other people, or the customer can not show us the repair guarantee certificate of the product.
4. It is very important to keep the serial number of the product given by the manufacturer when the product leaves factory. Only when information contained in it has been confirmed, can customers enjoy after-sale service provided by our company.
5. The manufacturer has the right to modify specifications of the product without notification to customers in advance.
6. The manufacturer only undertakes legal responsibilities for his products sold to customers, but is not responsible for other losses caused by problems of the machine or indirect compensation responsibility. The manufacturer will not take any compensation responsibility for loss of commercial profits, service interruption or any other monetary loss caused by the use or abnormal use of the product.
7. This certificate will be valid only after being stamped by distributor. It will be invalid if it is altered.

Thanks for your support to our product!

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