Operating Instructions Of Kernel Laser Machine

Explain

☆ Thank you very much for buying Anqiang Laser Engraving&Cutting Machine.

☆ In order to make sure that your 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.**

Installation Environment

It is better to install it in a room similar to " computer room", in a dust-free environment, and avoid being in the same room as equipment that may generate dust and debris such as mechanical engraving machines. Dust can cause rapid damage to the optical components of the laser system. The ventilation is good to facilitate the volatilization of heat generated by the machine and toxic gases accidentally leaked during carving.

Working Temperature

The laser tube is very sensitive to temperature, and inappropriate temperature will lead to the scrapping of the laser tube. If moving from an extremely cold or extremely hot operating environment to a suitable working environment, the laser machine or laser tube must be put on hold for more than 2 hours in the new suitable working environment to adapt to the ambient temperature. When working at minus degrees celsius, antifreeze should be added to the water chiller or water bump.

Placement Position

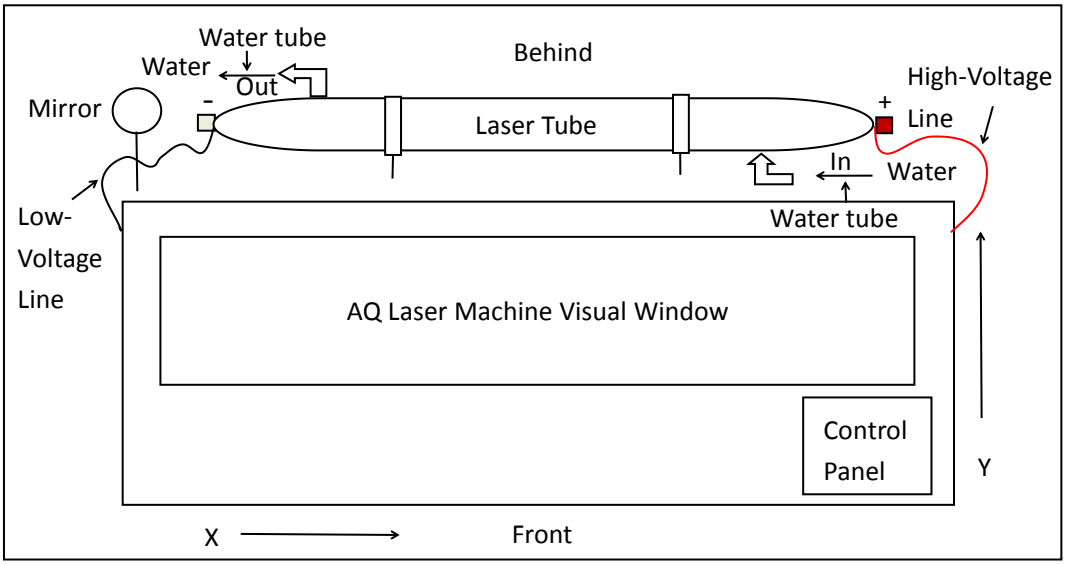
The distance between the left side and back of the laser machine and the surrounding wall must be more than 30cm, and the right side of the laser machine (with power switch and that side of the air outlet of the heat dissipation fan) must be more than 80cm away from the wall to ensure good heat dissipation effect, otherwise the laser machine will be seriously damaged.

Placement Requirements

We suggest that the laser machine should be placed on the concrete floor. The floor under the machine should be horizontal and flat to ensure that each caster is on the same level. Uneven ground will cause bending of the main components, which will lead to blocking of the motion system and cause engraving problems. If the floor does not meet the requirements, you can adjust the casters of the laser machine to level the machine, but the height error of each caster should be less than 5 mm.

Installation Of Laser Tube

Before connecting and using the laser machine, the laser tube must be installed on the laser machine. Note: Be sure to disconnect the power plug before installing the laser tube!After installation, restore it.



After connecting the water pipe of laser tube, remember to rotate the laser pipe to adjust the water inlet to the lower part, the water outlet to the upper part, and then fix the bracket.

Electricity Demand

The power supply shall meet the following requirements to ensure

the normal operation of the laser machine:

110VAC、3-15A、50Hz(60HZ)

220VAC、3-15A、50Hz(60HZ)

380VAC、3-15A、50Hz(60HZ)

For other customized voltages, please consult the manufacturer. For contact information, see the end.

Damage caused by insufficient or inappropriate power supply is not covered by the warranty.

Voltage Demand

The voltage of the laser machine is 220V (110V/380V) ± % 5, which allows voltage fluctuation range is from 10 v to 20 v. Unstable voltage or voltage spikes may affect or even destroy the electronic components of the laser. Do not short connect the ground plug to the live wire or plug the machine into an ungrounded socket. This is very dangerous. Athough it is not a fatal electric shock, it will also lead to serious consequences. Be sure to keep the power plug of the machine

connected to a reliably grounded socket.

If the voltage in your work area is unstable, the voltage is low or power is often cut off, you must have a purified and stabilized power supply. It is necessary to select the purified and stabilized power supply with reliable quality and stable performance produced by professional manufacturers. Otherwise, if you choose a voltage-stabilized power supply with unreliable quality, sometimes it will cause more serious electrical damage to the laser machine, and the situation is just the opposite.

At present, there are many types of regulated power supply on the market, and the type we require is AC (alternating current) regulated power supply. Note: Do not use UPS (Uninterruptible Power Supply) as a regulated power supply, because the normal UPS power supply does not have a good regulated function.

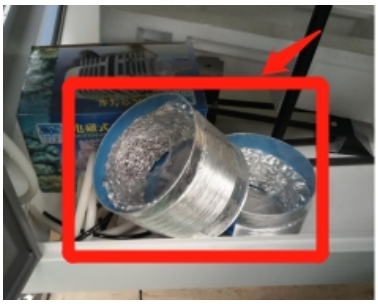
In addition, special emphasis should be placed on the user. Never unplug the laser machine and any plug on the computer while the machine is still connected to the power supply. If you want to unplug the plug, you must turn off the power supply of the computer and the laser machine (now the ATX motherboard of the computer still has the

power supply function after the machine is connected, so you must unplug the plug after the power is really cut off, not just the computer).

Exhaust Requirements

A suitable exhaust system must be installed for the laser engraving machine in order to completely exhaust the gas and smoke generated in the engraving process out of the laser machine.For exhaust fans, please refer to the accompanying accessories.





Warning: Do not use the laser machine without reasonable installation of exhaust system or abnormal operation of exhaust system.

Some materials will produce a large amount of dangerous gases during cutting and processing.

Matters Needing Attention

1. When cutting / carving, laser machine must be guarded by someone. Exposed laser beams can ignite flammable materials to cause a fire. A fire extinguisher shall be equipped beside the machine. When people leave, be sure to suspend the work of the laser machine to avoid no one to deal with the fire. If a flame is found, open the upper cover of the laser machine in time, and the laser will turn off automatically.

2. Laser is invisible. Exposed laser beam can seriously damage eyes and cause burning of body Injury. The system should be used and managed correctly, and no part of the human body should be exposed to the laser beam. Do not modify or remove the safety devices in the system.

3. When computer or the laser machine is on, do not plug or unplug the signal transmission line and Power cord. When connecting or cutting off the signal transmission cable, ensure that the power switch of the computer and laser machine is in the closed state, and cut off the total power supply of the equipment. Otherwise, it will cause

serious damage to the electronic components of the laser machine.

4.Do not use laser when there is no smoke exhaust system installed or when the smoke exhaust system does not work or the power is insufficient Machine. Smoke can cause serious damage to optical devices and electronic circuits. Do not cut / carve PVC materials. Carving / cutting PVC materials will produce highly corrosive gases, causing serious corrosion to optical devices, electronic circuits and mechanical components.

5.A computer can only control a laser machine, and must not plug or unplug data transmission lines or print the A/B converter uses one computer to control multiple laser machines. Otherwise, it may not only cause data transmission errors, the laser does not work or does not work as expected, but also cause damage to the electronic components of the laser or computer. The data transmission line provided by the manufacturer must be used.

6. Warning must clean the lens, lens, roller, belt and guide rail in time. If the lens is clean, do not clean it. Excessive cleaning will also damage the lens of the lens.

Hardware Instructions

I.Function Of Laser Engraving Machine

The application scope of laser engraving machine is very wide. Different designs have been used in machines of our company to meet the needs of all use. 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 information for enlarging the scope of usage and to use laser machine well.

1. Printing and packaging trade: rubber plate laser engraving, laser cutting of paper product, etc..

2. Trade of artwork and gift: bamboo slip laser engraving, wooden book laser carving, redwood laser engraving, double-colored plate laser engraving, box-shaped artwork laser engraving, chessboard laser carving, etc..

3. Advertising: organic glass laser engraving (cutting), laser carving of all kinds of boards, double-colored plate laser carving, etc..

4. Trade of leather clothing: genuine and synthetic leather cutting and surface pattern engraving of different kinds of shoes and leather clothing, pattern engraving of all kinds of clothing and textile, etc..

5. Trade of model producing: building model laser engraving (cutting), laser engraving (cutting) of aviation and navigation models, laser engraving (cutting) of cartoon figures, industrial model laser engraving (cutting), etc..

II.Structure Of Series laser Engraving Machines

Complete working system is composed of principal machine of laser engraving,laser power supply,laser engraving software,control system ,exhaust fan,air pump,water chiller/submersible pump,air pipe,Com--munication cable etc.They are equipped according to different machin--es being set up.

1. Sketch Map Of The Structure

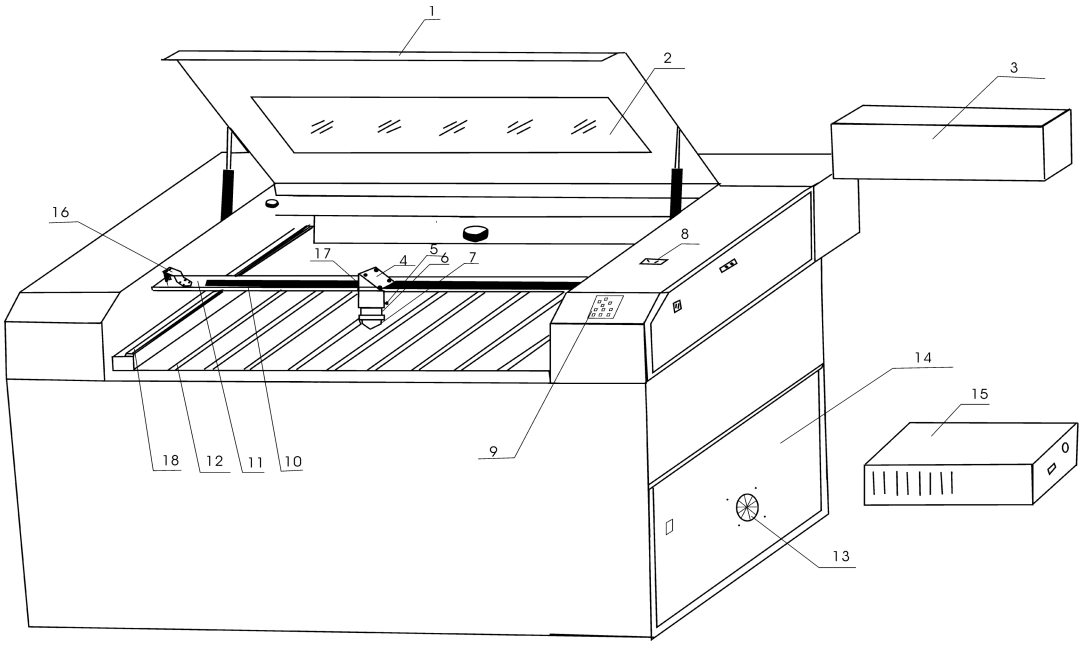


Figure 1: Sketch map of the laser engraving machine's front side

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

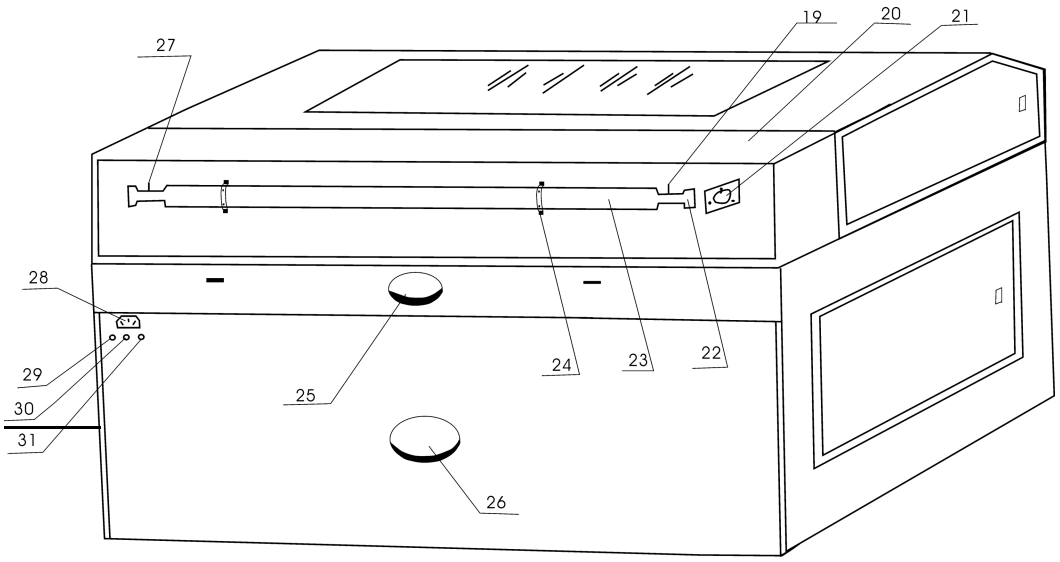


Figure 2: Sketch map of the laser engraving machine's back side

19. Cathode of the laser tube 20. Laser tube cage 21. The first reflecting mirror
22. Ray outlet hole of the laser tube 23. Laser tube 24. Snap ring of the laser tube
25 Upper suction opening 26. Lower suction opening 27. Anode of the laser tube
28. 220V power socket 29. Water inlet hole 30. air inlet hole 31. Water outlet hole

2. System Components

The laser engraving machine of series is made up of five parts: machinery platform, optical system, transmission system, control system, and accessory system.

※ **Machinery platform: composed of fittings such as machine cover, guide rail, base frame, reflector mount, etc..**

※ **Optical system: composed of laser tube, laser power supply, three reflecting mirrors and one focus head.**

※ **Drive system: composed of three imported balanced straight line guide rails of high accuracy, belt, two step motors and several gears.**

※ **Control system: composed of high speed DSP control card, two sets of switching power supply and two step motor drivers.**

※ **Accessory system: composed of circulating cooling water pump, air blowing compressor and smoke suction machine.**

III.Installation Of Series Laser Engraving Machine

1. Dismount of the packing box

After opening the packing box, please check out whether there is any damage on laser tube or not. 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) Connect the USB cable on the machine to the notebook. and download the appropriate software.

2) Connect the laser tube and water circulation pipe with cathode and anode conducting wire, and then put in the laser tube snap ring. Connect the laser power supply with cathode and anode of the laser tube. Insert the data wire.

Notice: the ray outlet hole of laser tube should be placed towards the first reflecting mirror. Rubber pad have to be put in the laser tube close to snap ring. Silicon rubber should be painted on the anode and high pressure connection thus to avoid fire sparks caused by high pressure. Before welding conducting lines on cathode and anode, please polish off the oxide layer on each end of the line slightly by using sand paper.3

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.

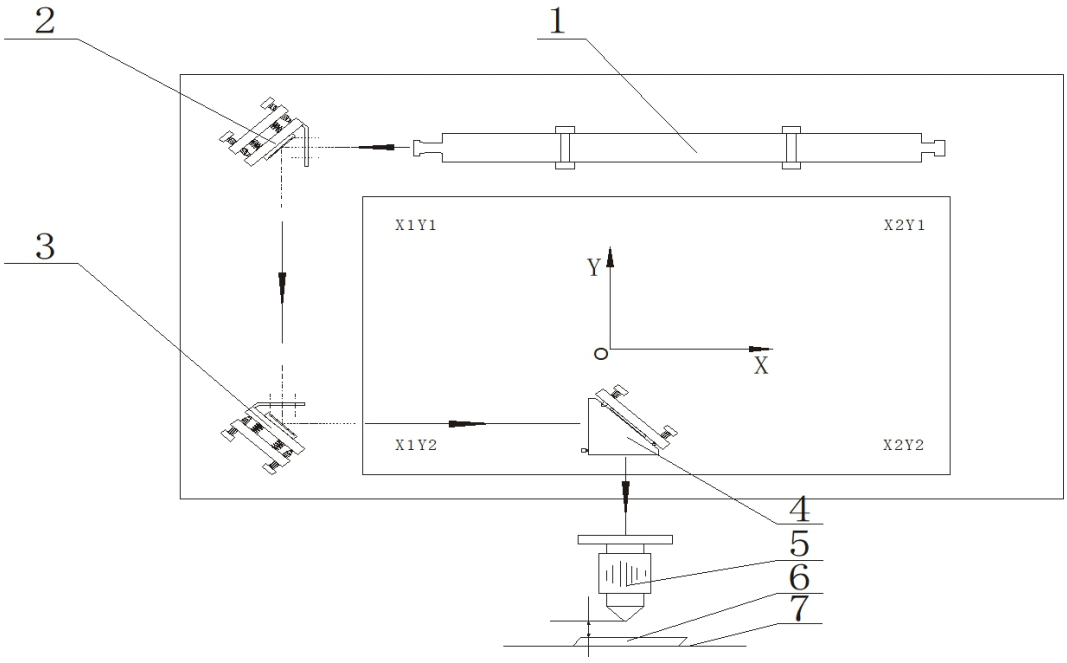
4) Embed a copper conductor with the minimum diameter of 2mm into the earth (the minimum depth is 1M). Then connect the

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.

IV.Structure And Adjusting Method Of Ray Path

1. Structure of the ray path



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

2. Structure of the optical components

Ray path is ray guide system. Laser engraving machine of series has adopted flying-optical system. The complete system is made up of laser tube, three reflecting mirrors, condensing 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.

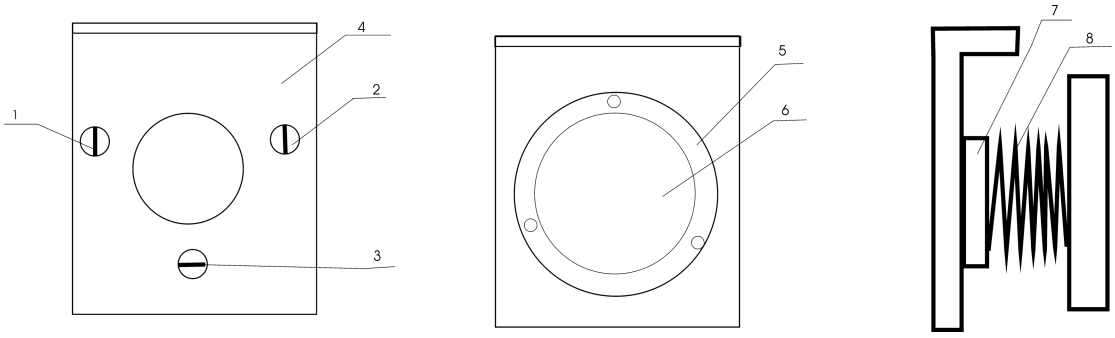
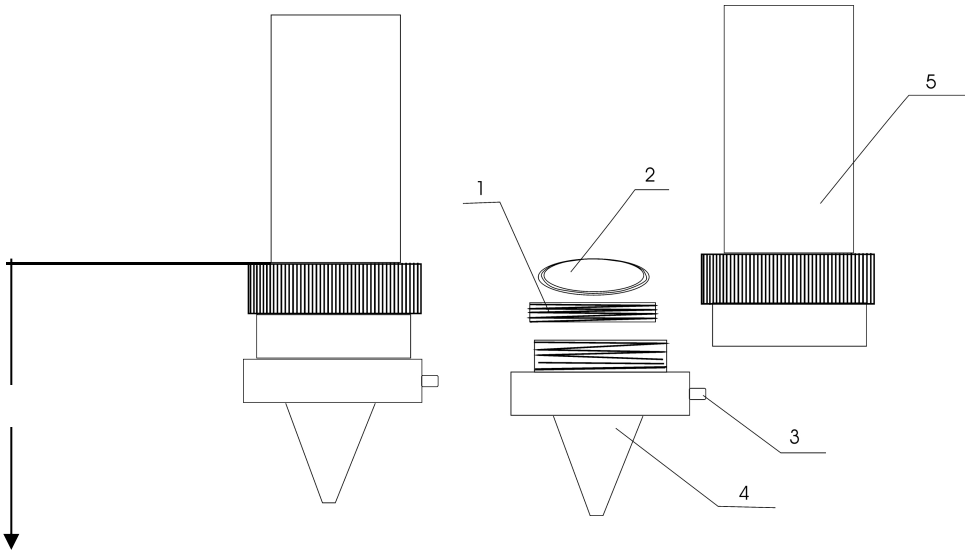


Figure 3: Sketch map of reflector mount

1. Left adjusting screw of the reflecting mirror
2. Right adjusting screw of the reflecting mirror
3. Lower adjusting screw of the reflecting mirror 4. Fixed mount of the reflecting mirror
5. Fixed ring of the reflecting mirror 6. Reflecting mirror 7. Spring seat
8. pressure spring



Focal length: Depending on the lens model

Figure 4: Sketch map of focus head

1. Condensing lens cap 2. Condensing lens (convex side down) 3. Suction nozzle
4. Air nozzle 5. Lens cone

3. Ray Path Adjusting

（1）Reflecting mirror adjusting

Stick a piece of paper on ray inlet hole of laser head; then move the laser head to upper left coroner of the machine. Press “ray testing” button and make a dot. Then move the head to the lower left corner of the machine to make another dot. Using adjusting screw of the first reflecting mirror 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 “ray testing” button to make a dot. Then move

it to the right to make another dot. Using adjusting screw of the second reflecting mirror 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 inlet hole. The next step is to adjust the position of laser tube to make the laser ray in the center of the hole. Then check up 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 lower part, the laser tube should be moved upward. The ray locates in the front; the tube should be moved backward. The ray locates in the back; the tube should be moved forward. During this process, the tube must be moved slowly and carefully. Don't operate it in haste.

(3) Ray verticality adjusting

Put a piece of acryl on the working platform. Press "ray testing" button to see whether the pierced acryl is vertical or not. If it is not vertical, adjust the mirror cover of the third reflecting mirror to make the ray vertical. Ray verticality adjusting is to adjust the ray position on

condensing lens. Only the ray is in the center of condensing lens, can the it be straight and strong.

V.Operation Panel And Instruction

Please refer to the control system manual for specific use.

VI Basic Operation Procedure

1. Starting up

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) Turn on the laser power, and press “ray testing” button to see if there is ray

5) Start the controlling software, make sure that left and right optical head can move.

6) Put work pieces in position, and fix up the focal length (the length see Figure 4).

7) Operate the transmission file in the computer to start carving.

2. Shut down

Turn off the laser power, principal machine, Exhaust fan, water pump and air pump in turn.

VII 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 form the pump.

3) Operators can not leave the machine when it is working so as 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 20oC. If the temperature is too high, the water should be changed. It is better to use purified water so that here isn’ t any contaminant. 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 condensing lens should be wiped with special camera lens paper or medical-use cotton wetted by mixture of alcohol and ether. (Proportion of ether and alcohol should be 1:1) Cleansing 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) Exhaust fan must be turned on while carving, 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 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 (Water

chiller 6-10L). 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)Water tank, water pump and water inlet rubber tube should be cleaned once every four days.

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

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 condensing 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 carving 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.

VIII.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	Check control signal
The object can not be fully cut	Laser tube is old	Replace it with a new one
	Condensing lens is polluted	Clean the lens
	Reflecting mirror is polluted	Clean the mirror
	Ray path is not right	Adjust the path
There are two slitting	The ray is not in the center of condensing lens. It is reflected when shining on metals	Adjust the third reflecting mirror
Square becomes parallelogram when cutting	Guide rail X and rail Y are not straight	Adjust rail X and rail Y

IX.Technical Parameters

Technical Parameter

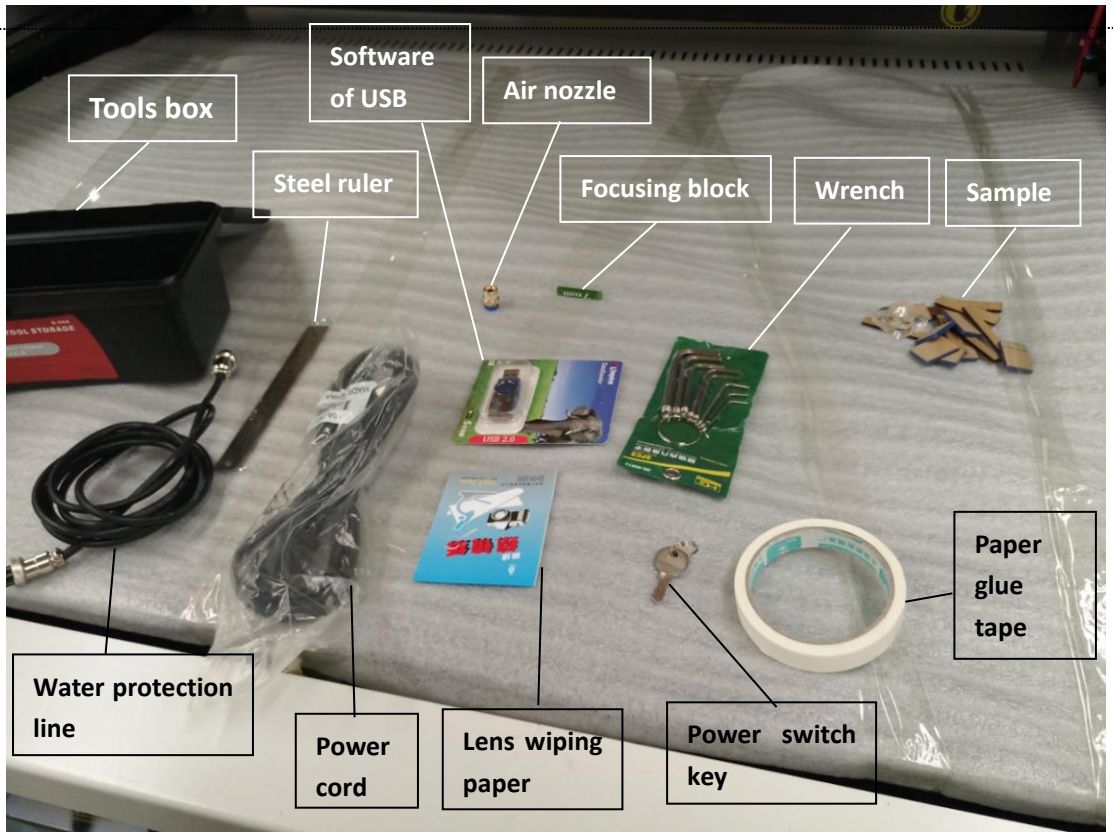
Item	Kernel Laser Machine
Speed	0—60m/min
Speed control	0-100% no segment control
Laser tube cooling	Water cooling
Machinery resolution	0.025mm
Minimum size of shaped character	Chinese character 2mm, English 1mm
Repetitional precision	±0.01mm
Power supply	AC220V±15% 50Hz
Format of images	BMP, PLT, DXF, DST
Driving	Step motor, subdivision driving
Laser power	100W
Temperature of operating environment	0℃～45℃
Humidity of operating environment	5%～95%

X.Accessories

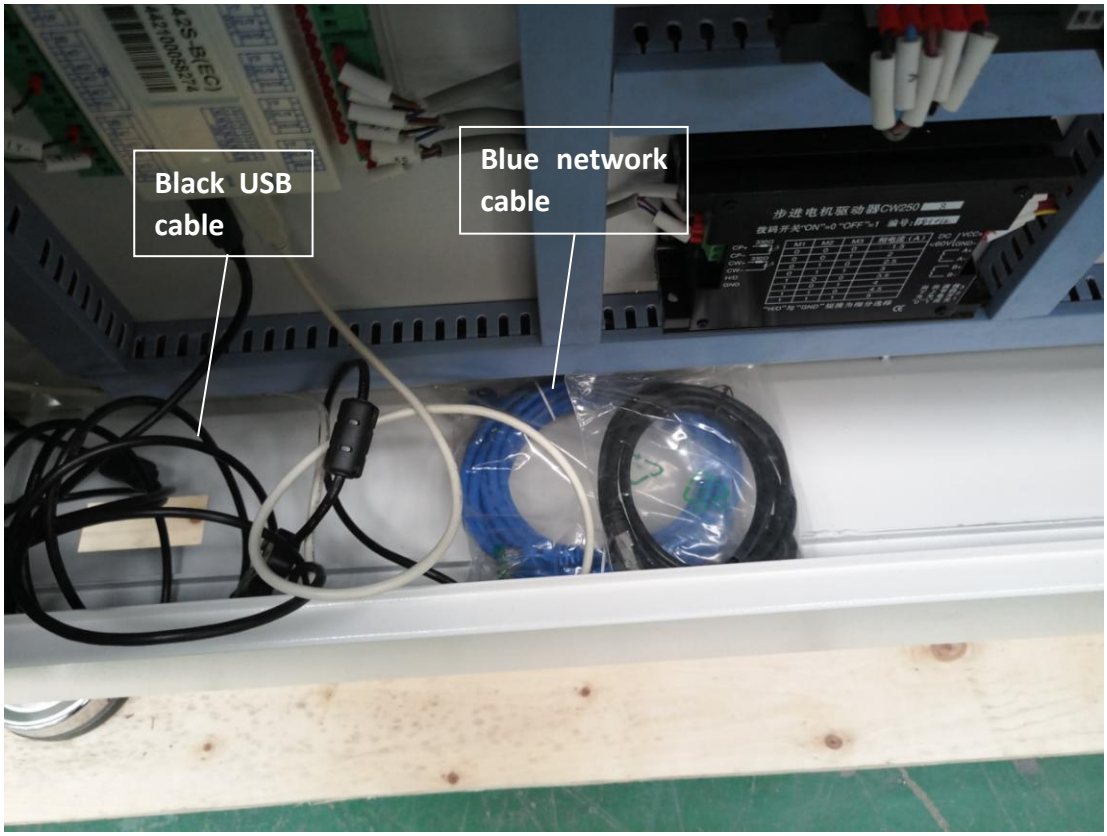
Complete machine	1
Air pump	1 set
Black air pipe	1

Exhaust fan	1 set
Silver Exhaust pipe	2
Water chiller	1 set
White Rubber water tube	2
Black USB cable	1
Blue network cable	1
Laser tube	1 sets
Tools box	1
Software of USB	1
Wrench	1 set
Steel ruler	1
Paper glue tape	1
Focusing block	1
Lens wiping paper	1
Water protection line	1
Air nozzle	1
Power cord	1

Power switch key	2







XI.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 three months, and that of outer equipment (blower fan, air pump, water pump) 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 altered.