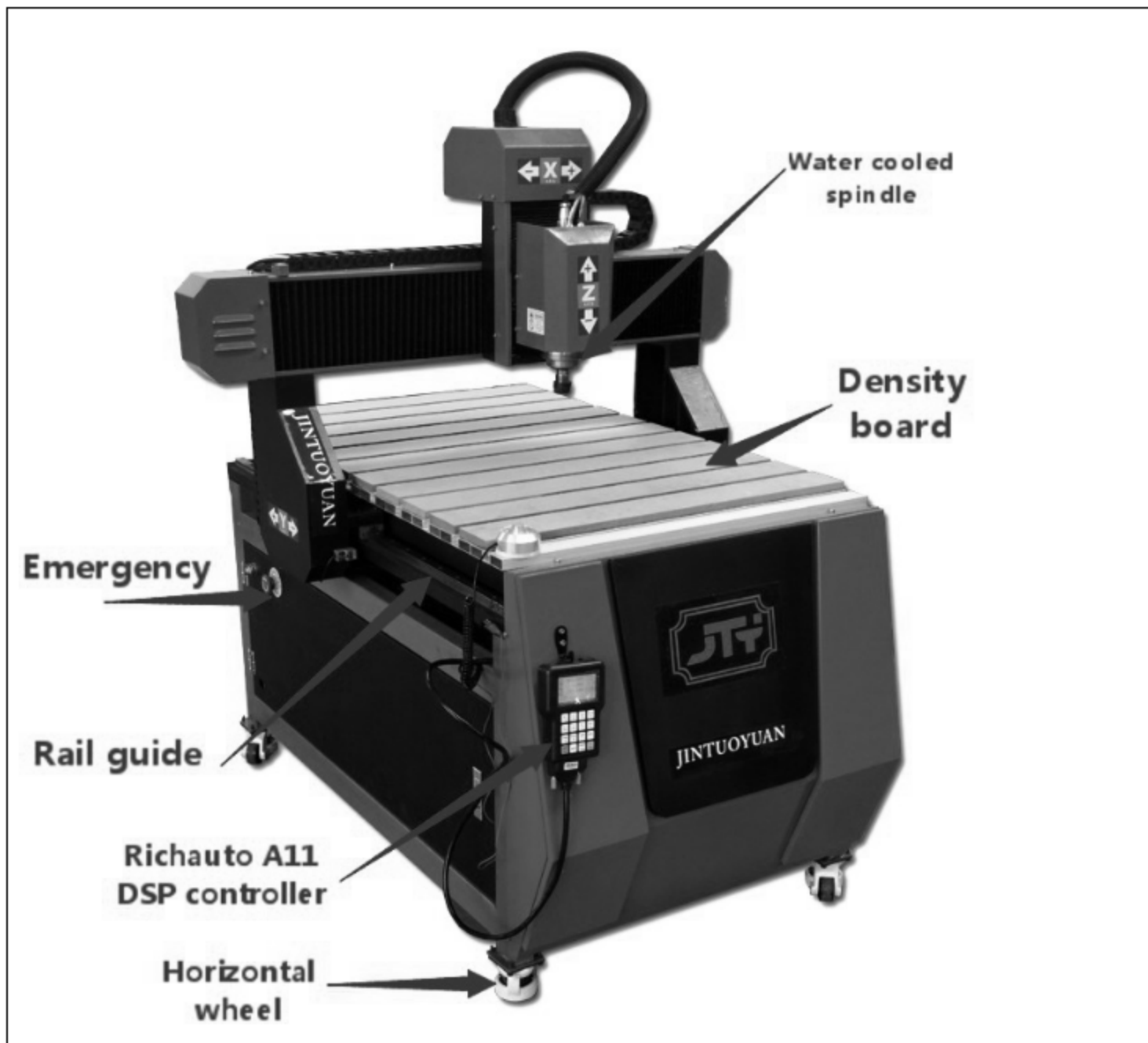
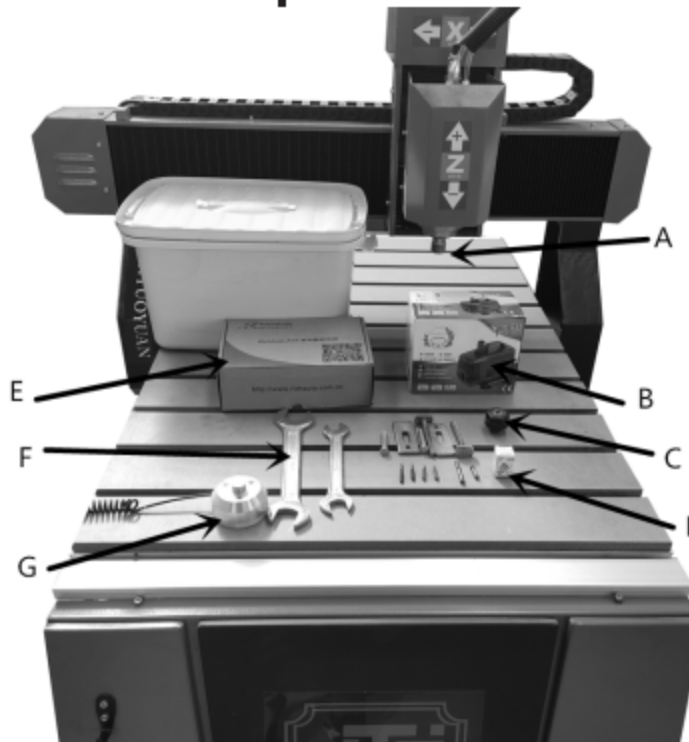


Become familiar with the names and locations of the controls and features shown below to better understand the instructions in this manual.



Controls & Components



A Spindle Motor: 3 HP motor capable of rotating cutting tool at 24,000 RPM.

B Coolant pump

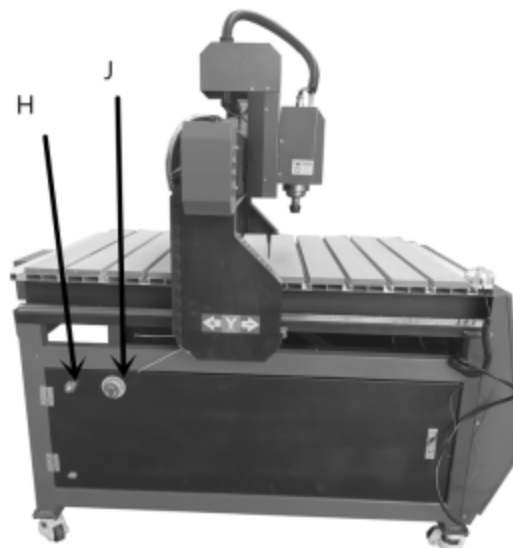
C Spindle Nut: Secures collet and cutting tool on spindle.

D ER20 Collet: Holds cutting tool with up to 1/4" diameter shank.

E Hand-held controller

F spanner

G tool-measure device.

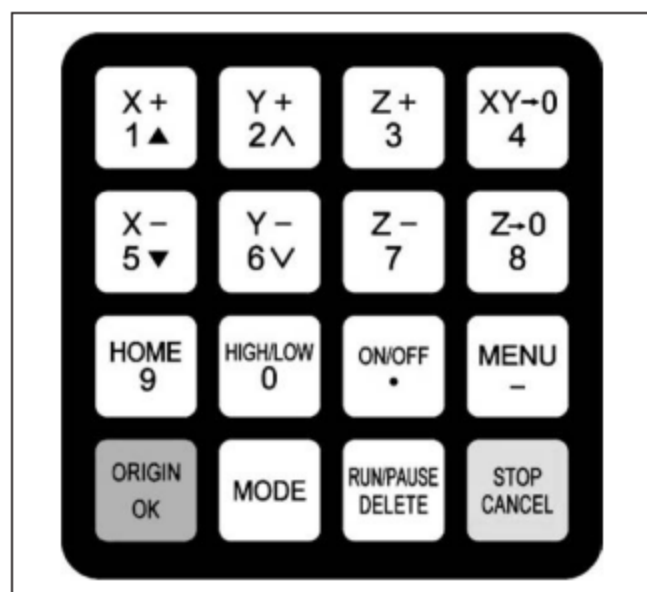


H ON Button: Enables power to machine.

J E-STOP Button: Disables power to machine. To reset, twist button clockwise until it pops out.

Controller Functions

The following commands are used for the basic navigation of the machine and controller.



X+ or 1: Moves spindle motor along X-axis in positive direction. Scrolls menu up. Input for "1".

Y+ or 2: Moves spindle motor along Y-axis in positive direction. Increases feed rate. Scrolls sub-menu up. Input for "2".

Z+ or 3: Moves spindle motor along Z-axis in positive direction. Increases spindle speed during process. Input for "3".

XY→0 or 4: Sets work origin of X- and Y-axes (see Page 28). Input for "4".

X- or 5: Moves spindle motor along X-axis in negative direction. Scrolls menu down. Input for "5".

Y- or 6: Moves spindle motor along Y-axis in negative direction. Decreases feed rate. Scrolls sub-menu down. Input for "6".

Z- or 7: Moves spindle motor along Z-axis in negative direction. Decreases spindle speed during process. Input for "7".

Z→0 or 8: Sets work origin of Z-axis (see Page 28). Input for "8".

HOME or 9: Returns all axes to home position (see Page 28). Input for "9".

HIGH/LOW or 0: In manual mode, selects high or low speed for axis movement. Input for "0".

ON/OFF or (•): Turns spindle ON or OFF. Input for decimal point.

MENU or (-): Enters setup menus. Input for the negative symbol.

ORIGIN or OK: Returns all axes to work origin (see Page 28). Confirms motions, inputs, or operations.

MODE: Toggles between the three jogging modes: Continuous, Step or Distance.

RUN/PAUSE or DELETE: Runs or pauses processing. Used to load a program from either the USB drive or internal memory.

STOP or CANCEL: Stops a running program. Cancels commands.

Preface

Thank you for choosing Top CNC!

This instruction manual is your technical document explaining the proper use and safe operation of the TC-6090 engraving machine. Please read it carefully and keep it for your records.

In order to receive optimum performance of the TC-6090 and ensure the safety for the user, please carefully read this manual before installation to learn more about the safety precautions of the equipment, proper installation, operation parameters, troubleshooting diagnosis, and routine maintenance.

About safety identification

To prevent damage to the product and to prevent injury to yourself or others, please read the following precautions carefully before using the device.

If operated improperly the user puts themselves and those around them at risk of moderate to severe injuries.

Precautions

In order to use the machine safely and correctly, be sure to read this matter carefully before use. The warning signs in this manual and equipment mean that if you do not comply with the relevant requirements and do not take appropriate measures, it may result in personal injury and equipment damage.

Requirements for equipment operator

The personnel who operate the equipment should be familiar with the steps and requirements for installation, debugging and commissioning of the equipment, as well as the corresponding measures for various emergencies that can occur. After familiarizing themselves with all safety features and operations contained within this manual the user can then safely operate the machine.

The operator should check the following on a daily basis:

1. Verify all safety switches are operational.
2. Clear work table of debris and scrap material.
3. Always be aware of your surroundings and ensure no other person is in the working area vicinity.
4. Do not wear gloves when operating the machine.
5. Keep a clean working area surrounding the machine.

Warning

1. The TC-6090 utilizes 220V 1ph voltage. When the equipment is connected to the power supply, the electric cabinet door and the electrical control box must not be opened during operation to avoid electrical shock.
2. Ensure the machine is properly grounded and all electrical connections are secure.
3. The equipment has been calibrated prior to shipment and it is prohibited for non-qualified personnel to make adjustments.
4. Keep children and non-professionals away from the machine at all times.
5. Take note of all warnings labels on the machine and familiarize yourself and those around the machine of their meanings.
6. Only when you are familiar with all the safety instructions and regulations on the installation, commissioning, operation, maintenance, contained within this manual can a reliable guarantee for the safety and successful operation of this equipment be ensured.

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The contents of this manual are subject to change without notice

I. Product Inspection

The machine is strictly inspected and packaged before leaving the factory. Please check before use. Please contact your local dealer if there are any problems.

Please verify the following

1. No machine damage.
2. All machine accessories are included.
3. Machine model.

II. Machine Installation

Installation environment

1. Utilize a dry environment.
2. Finished level surface.
3. No electromagnetic interference.
4. Ambient temperature of 10 °C ~ 40 °C. If the ambient temperature is more than 40 °C above, please place in a well-ventilated place.
5. Verify Input voltage is 220V 1ph along with proper grounding.
6. If voltage is not stable a voltage regulator may be required.

Machine installation steps

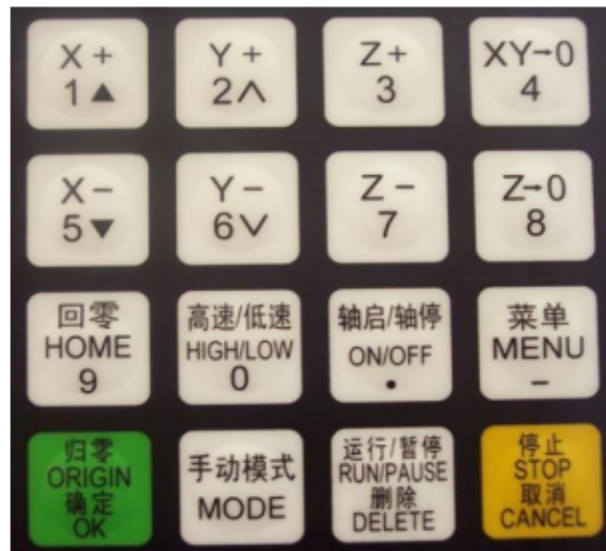
1. Remove the machine from its pallet and place in the desired working position. Install the base plates on the machine feet and level the machine using the adjustable feet. Then place the electrical control box on the left side of the machine.






2. The plug connects to the socket.


















- (1) Remove the DSP handle and connection;
- (2) First connect the cable to the terminal board, then connect the handle;

The key function of the A11 DSP control system



key	Function
	Positive movement of X axis, Menu upward , figure 1 inputting
	Positive movement of Y axis, accelerate process speed, figure 2 inputting
	Positive movement of Z axis, figure 3 inputting, rise spindle speed in process

<div>XY→0</div> <div>4</div>	Working origin of X axis and Y axis setting, figure 4 inputting
<div>X-</div> <div>5▼</div>	Negative movement of X axis; Menu downward, figure 5 inputting
<div>Y-</div> <div>6▼</div>	Negative movement of Y axis; slowdown process speed; figure 6 inputting different property selecting in Menu
<div>Z -</div> <div>7</div>	Negative movement of Z axis, figure 7 inputting, spindle speed adjusting in process
<div>Z→0</div> <div>8</div>	Z axis origin setting ; figure 8 inputting
<div>HOME</div> <div>9</div>	Axes home to machine tool origin, figure 9 inputting

	Combined-key	Function
1	 + "0-9" Number keys	to switch the coordinate system (0 for the mechanical coordinate system , 1 - 9 for the work coordinate system)
2	 + 	Start Z-axis automatic tool setting
3	 + "1-8" Number keys	to start the break processing (support number 1 - 8)
4	 + 	to start the advanced processing modes
5	 +  / 	To switch gear shaft
6	 + 	Repeat last time processing
7	 + 	Operate machine by entering coordinates parameters
8	 +  键	System update
9	 +  键	Quit buttons check

II. Machine Operation

Warning:

Before you operate the machine, pls do below:

1. Check daily whether the safety device is normal;
2. Do not place any debris on the workbench except the processed material;
3. Make sure there are no personnel or sundries on the machine table, and no operation of the device before the interference can be operated;
4. Do not use gloves to operate; in the event of danger, first press the emergency stop button;
5. The machine, near the distribution box, do not accumulate debris, and keep the parts clean;

After check, put a MDF board on the table .


Tips : to make sure the table surface not be broken when you work on the material especially when cutting off , you can put one MDF board at 6~8mm thickness on the table face ,then put the your work piece on it .

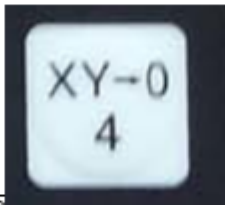
1. Turn on the "power on" button



2. Then the DSP will start system



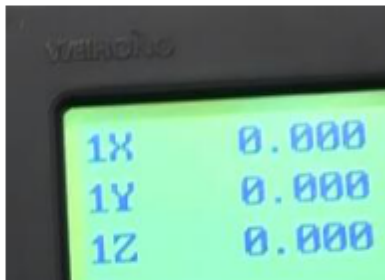
3. Press  . Then the X,Y,Z axis all go home.
4. Set the workpiece origin(front-left point).



Press



Press




You can see

Connect the U-disk to the USB connection of the DSP





Choose the file that you will use. Press , then press

The detailed manual of NK105 DSP controller is attached, pls check.

All other parameters are set in our workshop. No need to adjust.

IV. Equipment maintenance

Do not change the machine or appliance without understanding or authorization, otherwise it may cause malfunction or injury! Turn off the main power supply when servicing. Always consult with your electrician when working with the machines supply voltage! Maintenance replacement parts must meet the specifications of the technical documentation. Please consult the manufacturer or dealer prior to replacing parts.

- (1) The operator should develop proper habits of maintaining the equipment.
- (2) Routine maintenance includes cleaning surrounding work area, spindle motor, work table, control cabinet, chuck, and nut of the spindle motor daily.
- (3) Clean the spindle, X, Y, and Z-axis slide bearings, guide rails and lubricate. Add lubricating oil if the lubricating oil can be evenly distributed on the transmission parts which will extend the lifespan of the machine. Check all wiring connection cables, and proximity switches to ensure secure connections are made. Make sure all fixing screws of servo motor and motor shaft in the three directions of X, Y, Z are tight.
- (4) Check regularly if the emergency stop button is normal.
- (5) Regularly clean the cooling ventilation system of the numerical control device. Always check if the cooling fans on the CNC device work properly. The inspection should be conducted once every six months or one quarter depending on the conditions of the workshop environment.
- (6) Regularly monitor the grid voltage of the CNC system.
- (7) Prevent dust from entering the CNC device, and ensure to remove any debris build up within the electrical cabinet using light air.
- (8) It should be noted that CNC machine tools are not suitable for long term storage. The purchased machine should be put into production as soon as possible. If the CNC machine goes without use for a long time, the electronic components may collect moisture and the performance of the CNC machine will be reduced or damaged. Therefore, when the machine is idle for long periods of time, the CNC system should be regularly maintained and kept dry.
- (9) Check guide rails and remove debris before operating and ensure proper lubrication.
- (10) Make sure the servo motor tooth rack rail is kept clean and free from wood and dust.

Mechanical maintenance

New machines will have a break in period which is the tightness of mounting hardware of rails, motors, cover plates, etc. will become loosened. Please be sure to check the tightness of these fasteners regularly during the machines break-in period. Typical break in periods estimates to one

week of operation.

1.Cleaning

- (1) Clean up the dust, dirt, and dirt on the guide, rack, screw and so on in time so as not to affect the use of the machine
- (2) After the removal of the dirt, the lubricating oil should be added. (Note: liquid lubricants less than 1500SC)
- (3) The surface of the rack also needs to be cleaned regularly and coated with antitrust or lubricating oil to prevent rust, generally half a month for a cycle.
- (4) Check the tightness of the synchronous belt and adjust it in time. (Note: standard within 2mm of winding degree)
- (5) A machine with a refueling device, oil marking: N32 mechanical oil.

Maintenance list			
Sequence number	Component	Content	Cycle / Time
1	Air-cooling spindle	Ensure spindle appearance is neat running smoothly/quietly.	everyday
2	Air-cooling spindle	If abnormal spindle sound or high spindle temperature please turn off your air and check to ensure all air lines are free of debris.	everyday
3	Vacuum/Air/Debris Lines	Ensure all air lines, vacuum lines, and debris lines are free from blockage.	everyday
4	The indicator light / warning light / control button	The indicator light / warning light / control button is checked to be normal;	everyday
5	lubricating system	Check the lubricating oil levels and ensure there is sufficient fluid.	everyday
6	electric cabinet	Check to ensure all cooling fans for the electrical cabinet are free of debris and working properly.	everyday
7	Line guide rail lubricating	Line guide rail lubricating sliding surface clean, no rust, no damage, stable operation, on-time lubrication.	everyday
8	urgent stop switch	Ensure both E-stop buttons are functioning properly.	everyday
9	The synchronizing belt	regularly checks the tightness of the synchronous belt and adjusts in time. (Note: standard within 2mm of winding degree)	240hours
10	Chiller	If the fan runs normally, the flow is smooth and the water level of the cooling water is normal.	everyday

3. Electrical Maintenance

- (1) Clean debris from motors, drivers, inverter, in a timely manner.
- (2) Regularly check the firmness of the line contact and the use of the wiring.

V. Simple Fault Analysis and Troubleshooting

Common Faults	Fault Causes	Method of exclusion
After starting the machine, when the zero-return command is executed, the motor moves in the opposite direction	The control system sends out an error signal	Power off and restart the machine to run again
	Motor electrode wiring error	Adjust the X, Y axis motor lines Change the direction of operation
Poor vacuum suction of workpiece	Inlet ventilation is blocked	Check inlet lines and remove debris
	Leakage of sealant causing air leakage	Check and replace the strip
	Uneven work	Replace flat work
Using a large knife to sculpt when starting the spindle is noisy and resonant	Rotor shaft and jacket friction	Stop the spindle to adjust the gap between the rotor and the sheath
	Improper tool balance, handle is not correct	Re-adjust the tool
Limit switch not working	Broken switch or broken switch line	Change the switch and check the line

Common Fault	Causes	Judgment method	Solution
Spindle stall	1. The line is short-circuited or blocked 2. The inverter shows abnormal output 3. Spindle failure	1. Use a multimeter to measure the continuity of the circuit 2. Look at the inverter display is abnormal Measure the output terminal voltage 3. Whether the inverter is no-load normal, abnormal load	1. Replace the spindle three-wire 2. Adjust the inverter parameters Replace the inverter 3. Replace or repair the spindle
Machine axis or multi axis does not move	1. Input and output lines are abnormal 2. Drive failure 3. Poor connection between motor and reducer	1. Use a multimeter to measure the continuity of the circuit 2. See if the indicator light flashes; two drivers swap test 3. Can see the motor rotation but the machine does not move	1. Change the connection signal line 2. Replace the drive 3. Fastening screws
Stepper motor malfunction	1. Driver overheat 2. Poor connection between motor and reducer 3. No ground wire or poor conductivity	1. The driver has problems after working for a long time 2. Can see the motor turns but the machine does not move 3. Check connection between ground cable and the machine	1. Replace the drive 2. Fasten screws 3. Secure the ground

VI. Simple carving techniques

1. Wood carving

Solid wood is the main raw material for modern homes, so there are many patterns in wood carving, different materials have certain differences in the method of engraving, here are some simple engraving techniques for reference only:

- (1) Wood with relatively loose texture, coarse wood wool, and strong toughness should adopt horizontal broken wire engraving. When carving, the feed speed should be slow and gradually accelerate.
- (2) For harder wood, when use small knife engraving should use slow speed to make the travel space and then gradually speed up carving.

VII. Equipment warranty details (Please pay attention)

1. the key parts warranty cycle

Calculated from the time the machine leaves the factory. Under the condition that the machine is working normally for 8 hours/day, our company undertakes the warranty for key parts of the machine. The specific warranty time is as follows:

- (1) Purchase this engraving machine, bed, drive, frequency converter, spindle (one-year warranty for spindle produced by this company, half year warranty for outsourced spindle), screw, guide rail, drive motor, reducer, control system main part (limited Genuine), equipment cable, the above accessories can be a one-year warranty;
- (2) Control system data line (limited to original), cabinet board (limited to original), light switch, above accessories can get 3 months warranty;
- (3) Other vulnerable parts are not warranted.

2. Please keep A card after purchase, and return B card within ten days, otherwise the company will only provide paid warranty.

3. Please mark (or specify) the product number.

4. Because of the natural forces and artificial damage, due to improper repair, resulting in the normal use of the machine, because the abuse beyond the scope of use, the loss of buyer personnel, improper operation, resulting in the use of the machine cannot be used, the company will only provide paid services.

VII. Warning

- I. Without the company's permission for private demolition, all the consequences of the private change of the machine caused by the customer at the same time, at the same time the company terminated all services after sale.
- II. The company will only provide paid service if the return receipt is returned to the company and it proves that you have carefully read this manual, the fault caused by improper repair and repair, and the wrong use beyond the scope of use.
- III. The customer is responsible for the damage caused by the lack of phase in the other power equipment.
- IV. If the machine smokes, emits odors, noise, etc., please cut off the power immediately and do not use it.
As shown in Figure 6, ensure that the machine is reliably grounded.
- V. Do not use corrosive liquids to clean machine parts and keyboards.
- VI. According to different points carved material and engraving depth to select the appropriate tool and set the appropriate feed rate (the tool should be manually rotated after the spindle to observe the tool is vertical and concentric if not vertical concentric should re-install or replace the tool).
- VII. Rotate the tool before performing Z-axis positioning and engraving output.
- VIII. Before each engraving operation, please be sure to check whether the spindle cooling water circulation is smooth, so as not to burn out the spindle (cooling water should be replaced in time when the spindle temperature is high).
- IX. Don't destroy or replace the original power cord arbitrarily. Do not make the power cord excessively bent, pulled, bundled, or pressed under heavy objects.
- X. Do not touch the tool and the spindle part by hand during the working process of the machine.
- XI. The machine cannot penetrate the liquid, fell into the metal parts. After each engraving, the machine should be cleaned in time to remove chips and dust. Lubricate the screws, bars, guide rails, and racks regularly. keyboard.