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## **Manual of CNC Router**

### **ST6090D**





## PREFACE:

Thank you for purchasing this CNC router.

All the safety instructions contained in this manual must be read carefully and must be fully understood before you attempt to use your CNC router, in order to avoid potential hazards that could cause bodily injury, property damage, or damage the CNC router.

CNC routers belong to the high precision CNC machine. Improper installation or usage may damage the accuracy, stability or the lifetime of the machine. Please read this manual before installing the machine and keep this for long-term use or maintenance.

## Safety Marks

1. DANGER (Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.)
2. FORBIDDEN (Indicates forbidden to do.)
3. (Must to do.)
4. CAUTION: (Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or moderate injury.)

## Caution

In order to safely and properly use this CNC router, please read this manual before use it. Please remember the principle and safety information of this machine and keep this manual for long term use.

## Request about the operator

The operator must know the request and procedures about the installation, adjustment and running. And he must know how to overcome the emergency situations and have the following terms: 1.) Have taken the training before. 2.) The operator can run the machine commonly or run the machine safely according this manual. 3.) The operator can do turning on, turning off, clearing, grounding, connecting or other operations. 4.) The operator can use, repair and protect the machine.

The operator must do the following things.



1. Checking the safely appliance run properly or not.
2. Keep all operators alert before turn on the machine.
3. Keep clean worktable.
4. CNC routers may move unexpectedly, stay clear of machine at all times.
5. Wear safety glasses and hearing protection at all times when operating machine.
6. Use a grounded dust collection system to reduce hazard of explosion of airborne particles. Clean machine surfaces and lead screws periodically to remove any foreign material.
7. Don't turn on the machine before preparation.
8. Press E-stop when meet hazard situation.

#### Warnings

1. This machine with hazard voltage, don't open the door of the control box or electronics to avoid potential hazard.
2. This machine has well grounding appliance, the input power just permitted to connect with the permanent power cables.
3. The machine adjusted to be the working situation, don't arbitrarily do any changes. Please do the changes by the professional engineers.
4. Avoid the children and non-operator far away from the machine.
5. Please read safety cautions, warnings and safety marks on the machine before installation and adjustment. Ensure to put the warning marks at the eyesight position and change the damaged or fall off marks.
6. Please read the manual and instruction carefully to install adjustment and maintain the machine. Proper movement, assemble and maintenance can ensure the reliability of the machine.



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## I. Introduction of CNC router

### 1. Model: ST6090D



① **Bed**

“T” slots worktable are used to clamp the job or fixtures to the bed.

② **Gantry**

The gantry straddles the bed and carries the router spindle motion system. It is moved along the length of the bed by a precision ball screw system that is controlled by the machine controller.

③ **Router Spindle**

The router spindle is moved along the gantry by a precision ball screw system that is controlled by the machine controller.

④ **Frame**

The frame is a heavy aluminum welded construction that supports all the other parts of the machine.

⑤ **Electrical control box**

The electrical control box is a dust free enclosure design.

⑥ **Water pump**

The water pump provides coolant for the router spindle motor. Running the router spindle

## 2. Parameters of CNC router

| NO. | Description                                | Parameter               |
|-----|--|-------------------------|
| 1   | X, Y, Z Working Area                       | 600*900*100mm           |
| 2   | X, Y, Z Traveling Positioning Accuracy     | 0.05/300mm              |
| 3   | X, Y, Z Repositioning Positioning Accuracy | 0.05mm                  |
| 4   | Table Surface                              | Aluminum T-slot         |
| 5   | X, Y ,Z Structure                          | Ball-screw transmission |
| 6   | Max. Power Consumption                     | 2.5Kw                   |
| 7   | Max. Rapid Travel Rate                     | 32000mm/min             |
| 8   | Max. Working Speed                         | 20000mm/min             |
| 9   | Spindle Power Motor                        | 1.5 Kw                  |
| 10  | Spindle Speed                              | 0-24000RPM              |
| 11  | Drive Motors                               | Stepper Motor           |
| 12  | Working Voltage                            | AC220V/60Hz 1PH         |
| 13  | Command Language                           | G Code                  |
| 14  | Operating System                           | DSP System              |
| 15  | Interface                                  | USB                     |

|    |              |       |
|----|--------------|-------|
| 16 | Net Weight   | 180KG |
| 17 | Gross Weight | 210KG |

## II. Setting up the CNC router

### 1.Work environment

- 1.) No dropping, no steam and no dust place.
- 2.) Ground is leveled, cleaned and no vibration.
- 3.) No interfere of electromagnetism
- 4.) Working environment temperature: -10°C—40°C. If the temperature reach to 40°C, please keep good aeration.
- 5.) Input voltage is 220V/60Hz.

### 2.Setting up the machine

- 1.) Setting up CNC router
  - ① After receiving the CNC router, please check for the following:
    - a.) Check to make sure that the package includes the thing listed.
    - b.) Inspect the unit to assure it was not damaged during shipment.
    - c) Connect the wires to the control box



### 3..Setup DSP panel.

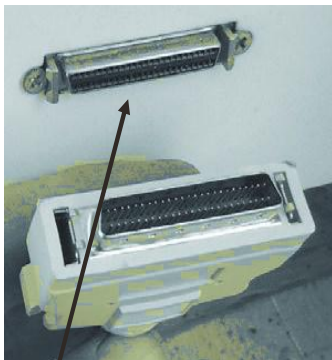
Install DSP system. (Pic.1 & Pic.2)

First step: Connect the digital cable with the inverter hub on the control box

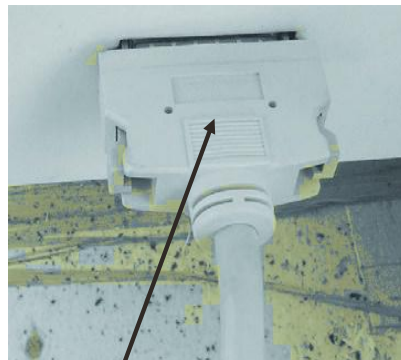
Second step: Connect the other end of the digital cable with the DSP panel.



**Controller**



**Cabinet socket**



**Controller cable fitted to cabinet socket**

#### Characteristics about DSP system

- ① Totally independent from PC platform;
- ② Directly read files from U Disk;
- ③ Easily process G code or PLT file with super size;
- ④ Strong system and process file examining function;
- ⑤ Easy to update system program;
- ⑥ It supports high micro step which makes precise and fast process possible;
- ⑦ Support to process part of the file;
- ⑧ Reliable data protection and recover function;
- ⑨ Friendly operating interface





### Bottom functions on the DSP panel



Positive movement of Z axis, Menu upward, figure 1 inputting



Positive movement of Y axis, accelerate process speed, figure 2 inputting, different property selecting in Menu



Positive movement of Z axis, figure 3 inputting, rise spindle speed in process



Working origin of X axis and Y axis setting, figure 4 inputting



Negative movement of X axis; Menu downward, figure 5 inputting



Negative movement of Y axis; slowdown process speed; figure 6 inputting different property selecting in Menu



Negative movement of Z axis, figure 7 inputting, spindle speed adjusting in process



Z axis origin setting; figure 8 inputting



Axes home to machine tool origin, figure 9 inputting



Manual moving mode, high speed or low speed selection, figure 0 inputting



Spindle startup/stop, decimal point inputting



Menu setting entering, negative symbol inputting, multi process state checking,



All axes go working origin: confirm of motions /inputting/operating



Manual move, continue, step and distance modes selection











Cut process running/pause/inputted words delete



High/low speed parameter adjust, Cut process stop/selections, inputting and operating cancel

## Compound buttons

1. “”+ digit button, switch working coordinate;
2. “”+“” button, C.A.D function;
3. “”+digit button, stop point process;
4. “”+“” button, advanced process;
5. “”+“”, help information;

There are some compound buttons for special applications. The operating mode is: press the first button and hold then press the second button, release the two buttons at same time.

## Home Operating







Home is the machinery origin, Goto home operating refers to make all axes go back machinery origin. Home position depends on home sensor. Normally there are 3 sensors in an engraving machine. Goto home operating sets up the relationship between the machine and the working coordinates. And many system function applications rely on this operating, such as: stop point save, power off reboot and so on.

## Warnings

1. Don't use this product in strong magnetic filed or interfere environments;

2. Don't Pull out U Disk while it is running a file;
3. Protect it from water, moist, dust and fire:
4. Protect it from metal materials getting into the cover;
5. Forbad to open the cover, there is no any user maintainable parts inside;
6. Plug U Disk and other lines gentle

1. Goto home parameter includes Home Speed and Home Direction; and those parameter should be adjusted in Menu. Home Speed refers to that 3 axes home speed, normally Z axis home speed should be lower than that of X and Y axes. Home Direction refers to which direction the axes go when it is under home process. It depends on the motor direction and Home sensor's location and sensor's property.

2. Entering Menu, cursor is on "Machine Setup" item, press  button, press  move the cursor to "Home Setup" item, repress  button to enter it, the cursor is on "Home Speed" item automatic ally, press  to enter and set 3 axes speed.
3. Speed limit Press  to confirm and save the new speed for X axis. The Cursor moves to the Y axis speed item automatically, if it is unnecessary to change the value, press  to move to the Z axis speed item. If it is necessary to change the speed, please do the same operating with X axis. When you finish all settings, it will go to former menu.

#### 4.Introduction about inverter

- ① When using a GFCI (Ground Fault Circuit Interrupter), select a current sensor with sensitivity of 200mA, and not less than 0.1-second detection time to avoid nuisance tripping.
- ②Connect these terminals (R/L1, S/L2, T/L3) via a non-fuse breaker or earth leakage breaker to 3-phase AC power (some models to 1-phase AC power) for circuit protection. It is unnecessary to consider phase-sequence.
- ③Do not connect 1-phase models to a 3-phase power source.
- ④Make sure that the wiring is correct. In particular, check that the output terminals U, V, W. are not connected to power and that the drive is well grounded.

## 5. Installation of auxiliary equipment.

(1) Installation of water pump.

①Put the pump directly in the water container and connect it to the water pipe.

②There are two water pipes coming out of the machine, one for water inlet and the other one for water outlet. One water pipe is connected to the water pump, and the other is placed on the container.

③Do not put the water outlet pipe in the water, otherwise the water is not easy to circulate.

④Connect one of the pipes to the water pump by pushing it into the 90° Connector. Lightly pull on the pipe to ensure that it is connected correctly.

⑤Fill a container about  $\frac{3}{4}$  full with clean water.

⑥Place the lid onto the container to keep dust and dirt out of the container. Check the container periodically as the water will evaporate.



**Note:** Never run the spindle without the cooling being connected or the spindle could be damaged. NEVER handle pump in water with power on, always disconnect power before handling.

**Note:** If the spindle is run without cooling, it could be damaged and fail.

**Note:** If your shop is subject to freezing temperatures antifreeze must be added to the cooling water.

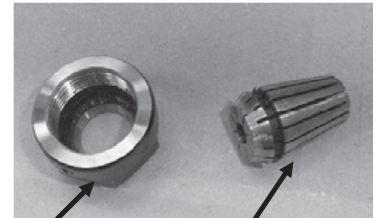
**Note:** No water container is supplied. You will need a container with a minimum of 5 gallons capacity. If your shop is subject to high ambient temperatures a larger water container may be required.

**Note:** If water is not flowing or is slow, reverse the hoses on the pump and flow should regain,

sometimes the system will create an air bubble during shipping causing vapor lock.

## 6. Fitting the router bit into the router head.

**Note:** Before changing or fitting the router bit always disconnect the power to the machine.



**Spindle nut**      **Collet**

1). Select a pointed router bit and its relevant collet.

2). Fit the collet into the spindle nut. Press the collet into the spindle nut until it snaps into place.

**Note:** The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted into the collet, the collet can not compress and snap into the spindle nut.

The face of the collet and the face of the spindle nut will be close to flush.

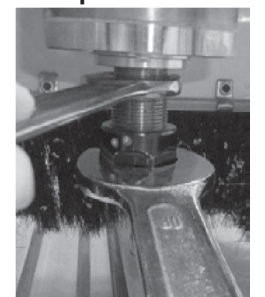
**Note:** To remove the collet, hold the spindle nut and press the collet on the side. The collet will compress and pop out. Do not try and remove the collet while a cutter is fitted as the collet will not compress and pop out.



**Collet fitted to spindle nut**

3). Fit the spindle nut and collet assembly onto the spindle thread by hand.

4). Press the bit into the collet but note, the flute of the router bit must not be inside the collet and should be a minimum of 1/16" outside the collet. Hold the router spindle with the supplied wrench and tighten the collet with a second wrench. Do not over tighten.



**Tightening the spindle nut**

**Note:** Use this process for all other router bits that you need to fit, but you will have to change the collet if the shank of the router bit is a different size.



## 7. Introduction of software


We use Ucam, JDPAINT software (Chinese software), Type3 software (France software) and Artcam software (England software) for our CNC router.

II. Test the machine

(1) Turn on the power of the inverter and check whether it has abnormality. If it has some problems,

please power off the machine and check the problems.

- (2) When it has been supplied power, it appears on the screen: “Goto Home?”, actually it is a question which needs your answer, press  means “Yes”, then Z axis moves first, When Z axis arrives its home, then X and Y move. Press  means “No”, 3 axes do not move to their homes. Press any other buttons, only Z axis goes to home, X and Y don't go home;

- (3) When it is in Manual state, press  and 3 axes will go home; If the machine doesn't stop when back to home, please check the wire connection of the limit sensor and the damage of the limit sensor.
- (4) Turn on the switch of inverter to check whether it has any alarm. If it has alarm, please turn off the power and solve the problem. And then move to next step.
- (5) Press “start” on inverter, the spindle start to rotating. Please check the running sound, direction right or not and whether the inverter has alarm. If it has abnormality, please turn off the power of inverter and check it. Then move to next step.
- (6) Check the air compressor, dust collector and vacuum pump working well.
- (7) You can use the DSP system to power on/off the spindle.
- (8) Turn on the computer and install the driver and software.
- (9) Down load a samples G code file to test the accuracy of the machine and then you can use it.

## 8.Loading a program into the machine

The controller has a USB slot located to the top.

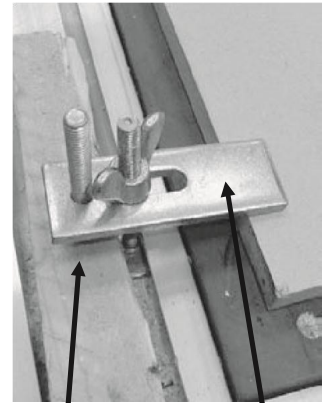
- (1) Load your program into your USB drive.
- (2) Fit the USB into the USB slot in the controller.
- (3) Press the button RUN PAUSE/ DELETE. The display will show U disc.
- (4) Press the OK button. This will load onto the screen what is in the USB drive.
- (5) Use the arrow keys to select the file that you need to load into the controller.
- (6) Select, then press OK button.
- (7) Once the code / program has been downloaded the machine will start to operate.
- (8) Note: Ensure that you are clear of the machine as the spindle will start to turn and could cause injury.

- (9) The router will just cut the surface of the spoil board the distance that you set in the design software, [we suggest 1.6mm [1/16”]] and cut the outline of the job. This will give you the location of the part on the spoil board.

### 9. Fitting the Job to the Table Using the T Slots

You may find it convenient to clamp the job with the table clamps. This attachment method can only be used if the outside edges are not being machined.

When using the clamps, place a piece of packing under the jacking bolt to protect the bed of the machine.



Packing

Clamp

## III. Maintenance

### 1.Maintenance

- (1) Don't operate, disassemble and repair the machine without authorization or training.
- (2) Turn off the power of the machine before the maintenance. Please ask the professional electrician do the inspection when the machine power on.
- (3) Please check the E-stop works well or not.
- (4) Please use the same model parts for the replacement.
- (5) Please do a regular inspection on the thermo emission system.
- (6) Please check the power voltage of the control system.
- (7) Protect the dust fall into the control device.
- (8) The maintenance of the control system if no use for long time. First, it is not good to the CNC machine for long time stock. Please use the machine after getting it. If long time no use, the technical function will be declined. Please do regular inspection on the control system.

### 2. Other routine maintenance

- 1.) Please clean the inlet filter of water pump per day to avoid the dust goes into vacuum pump.
- 2.) Please clean the outlet filter of the water pump per week.
- 3.) Please ensure the linear and ball without any block from the dust.

### 3.Common problems and solutions



1. DSP controller dies

Change a new DSP controller power supply (+5v) in the control box.

Use the manostat (UPS)

2. The machine doesn't go home.

Restart the DSP controller

Use a new DSP controller

Recover the data in DSP controller: MENU=>SYSTEM MAINTENACE=>DATA SETUP=>RECOVER DATA

3. Machine moves to the opposite direction

The cable maybe loose and you can check the cable.

Change the wire port A+ and A- on motor driver: you can find A+ and A-on the driver in the control box.

Change a new red limit sensor.

Change the cable connected with the limit switch.

4. Computer dies when downloading file

Data is inordinate and format the data in DSP controller: MENU=>SYSTEM MAINTENANCE=>DATA  
SETUP=>FORMAT DATA

Enlarge the EMS memory and CPU.

Change a better computer

5. Main spindle doesn't rotate?

Voltage is too low and use the manostat (UPS)

Check the cable connected with the main spindle

Change a new transducer

Change a new main spindle

Date out of order after being copied and recover the data: MENU=>SYSTEM MAINTENACE=>DATA  
SETUP=>RECOVER DATA





6. Machine doesn't work accurately

Change the motor of every axis or change the motor driver.

Use ground wire

Fasten the linker of the screw ball

7. Engraving size is not right

Change the pulse equivalent according to the type of the machine (screw machine: 320 160 320; gear machine: 127.3 127.3 400: 320,320,320 for XHYZ6090): MENU=>SYSTEM MAINTENACE=>SYSTEM PARAMATERS=>PULSE EQUIVALENT

8.Machine doesn't work after opened (including the machine don't go home)

The switch is broken, change a new switch

There is something wrong with the power, check or change the power

Check the cable connected with the switch and pin in one side of the cable

9. Machine strikes sideward peg when it is working

The sensor switch is broken or the sheet copper of the sensor switch is distort, change a new sensor switch or fix the sheet copper

The dimension of the machine in controller is not right, reset the dimension according to the working size (the soft limited in the DSP): MANU=>MANUAL SETUP=>MOTION LIMIT.

10. Blade is broken when engraving

Lower the engraving speed: MANU=>MANUAL SETUP=>MOTION PARAMATERS LOW SPEED/HGIH SPEED.

If the material is too thick, engraves by steps

Change a better quality blade

Collet is in a wrong position and corrects it.

11. There are some leftover of the material when the machine is working.

Rectify the inter space of the screw of every axis in DSP: MENU=>SYSTEM MAINTENACE=>SCREW



## INTERSPACE

Change the bearing on the screw ball

Fasten the linker of Y axis (for ball screw machine)

12. Red sensor switch is ok but can't stop the machine

Sensor switch is dirty and clean it

Sheet copper is too far away from the red sensor switch, the best distance is 1-2mm

When we operate machine manually, the sensor switch doesn't work

13. Add machine in soft ware TYPE3

Open the TYPE3, and find the machining=> set up machines =>choose the FAUNC OMD in CNC machines=>ok

14. X-axis or y-axis doesn't move.

Usually it is the problem of the stepper motor, driver and cable connected with the x-axis or y-axis, check them and correct

15. How to protect the worktable

Don't hollow out the material when engraving

16. How to change Chinese version to English (DSP)

Open English version ZHBUSB, Download Controller Menu and Download Label.

17. How to solve the problem of message over Z + limited in Type3

When we use software TYPE3, we need to set up machine. When we set up machines, the initial position and end position of Z-axis are the same and higher than the Z between contours.

18. How to change the language of TYPE3 from Chinese to English

Open the soft ware type3 and press the button F10. It will appear option windows. You can choose English