

TIGERTEC

The User's MANUAL FOR ATC CNC Router

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TIGERTEC

- Tel: 0086-531-88803429
- Email: info@tigertecnc.com.cn
- Location: #6 Caofan Industrial Park, Zhangqiu, Shandong Province, China 250221
- Website: <http://tigertecus.com>

TigerTec Inc.

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Relevant Safety Signs

To avoid machine damage and personnel injury, please read the following instructions before use.



Dangerous: Improper operation will lead to dangers and may cause minor or moderate injury or spoilage. Besides, even instructions included here may bring about serious consequence.



Forbidden: things must not do.



Compulsory: things must do.



Electric shock: operate cautiously.

Matters needing attention

To ensure safe and proper use of this product, please read and remember the principles of products, safety information and cautions before operation.

Users of this product must have this manual. Please keep it after reading for inquiry.

Warning signs used in this manual indicate that personal injury and mechanical damage may occur if measures are not taken according to relevant requirements.

Requirements for operators

Operators of the machine should be familiar with the installation, commissioning, procedures and requirements for the functioning of machine. Besides, corresponding measures ought to be taken in emergent situations. Other requirements are as follows:

After training and being tested qualified for the operation, operators should be able to conduct operations such as electrifying the circuit, powering off, cleaning, earthing and connecting according to the safe operation procedures laid down in this manual. Maintenance and protection of the machine are also required.

What operators should also do:

- 1 Check if the security device is in the normal condition every day.
- 2 Stay alert before starting the machine.
- 3 Do not allow debris to build up on the working table.
- 4 The working table should be clear of personnel interference.
- 5 Helmet and goggles are necessary, but do not wear gloves during operation.
- 6 No debris is allowed to build up around the machine. Keep the components clean.
- 7 Use the machine only in dry areas free from flammable liquids and excessive moisture.
- 8 Keep electric box and wires away from heat, oil and sharp edges. Do not attempt to exceed limits of machine.
- 9 Keep the machine away from any personnel when in operation.

- 10 Power the machine off when not in use, replacing spare parts or maintaining
- 11 Do not power on until maintenance, preparation and proper commissioning are done.
- 12 Press the emergency stop button when in danger.
- 13 If there is excessive moisture in the compressed air , please prepare an Air Dry Filter.

Warning the matters

- 1 High voltage is covered in this machine. To avoid electric shock, do not open the electrical cabinet door and the electric box and controller box during functioning and operation.
- 2 The machine should be properly earthed. Input power is only allowed to connect permanent fastener power line.
- 3 All regulatory parts of this machine have been adjusted to working condition. Only qualified personnel are allow to make alterations.
- 4 Children and non-operators must keep clear of the machine.
- 5 Read the safety instructions , warnings , and all the warning signs pasted on the machine before installation and commissioning. Make sure that the signs are put in a conspicuous place and replace the damaged and fallen ones.
- 6 Be familiar with the safety instructions concerning installation, commissioning, operation and maintenance. Only with proper moving, loading & unloading and maintenance can this machine be put into safe and successful use.



MACHINE INSTALLATION

1 Machine Specifications

Main components

Electric spindle: mainly used for engraving workpieces. It is featured by compact structure, lightness, small inertia force, tiny vibration, low noise, quick response, high speed, high power, and so forth, which makes it widely used in the engraver industry.

Linear tool magazine mainly used for storing spare tools. Linear tool magazine features compact structure and multiple tool slots. It can change tools rapidly and is efficient.

Guide rail: high positioning precision, high rigidity. Square guide rail features large load. Self lubrication guarantees long-term high precision of the machine tool.

Machine bed: integrated structure of welded steel pipe and high intensity. Go through aging treatment and finish processing, which guarantees the best condition of the other parts.

Helical rack and pinion: transmission part of the machine. It features high meshing capability, smooth transmission, low noise and large contact ratio, which reduces the load of every couple of gears and improves their bearing capacity.

Electric box: controlling unit, where the operating system and electrical components are put. User-friendly design makes it easy for operators to control the whole machine. Reasonable arrangement of the fans guarantees the ventilation inside the electric box and can effectively control the temperature of the box.

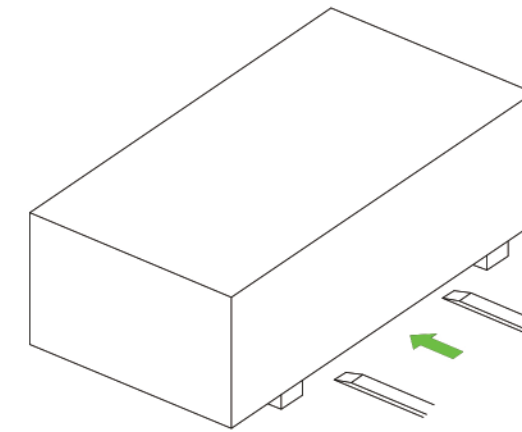
Beam: bearing the spindle, which guarantees its smooth horizontal movement. The thickness of square tube is 10mm, and the intensity is high.

T-slot vacuum table: can both suck and clamp workpieces, which features easy and flexible operation.

2 Machine Installation

1 Moving and transporting

- Forklift tonnage should be no less than 3 tons.
- Forklift operator should be qualified personnel.
- The machine should be loaded at the gravitational center of the forklift. The direction is show in the figure.
- Slowly move the machine and hold it steady.



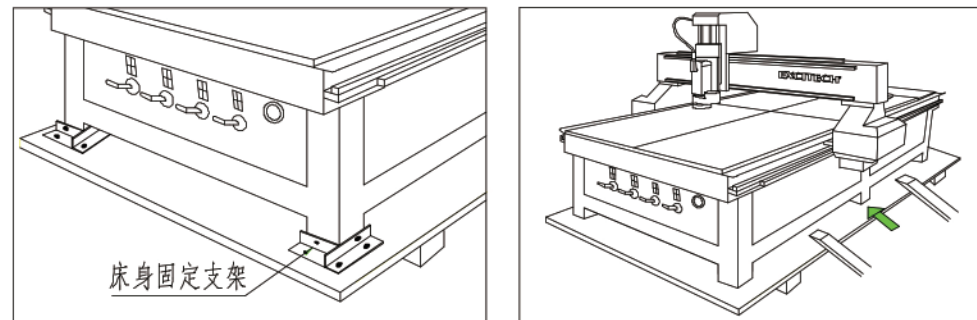
2 Installation environment

- Places free from water, steam and oily dust.
- Solid and clean places with smooth floor and no vibration.
- Places free from electromagnetic interference.
- Operating temperature should be $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$. If the temperature is beyond 40°C , please put the machine at places with good ventilation.
- Stabilized power supply such as :3~380V50HZ/60HZ or 3~220V50HZ/60HZ.is required.

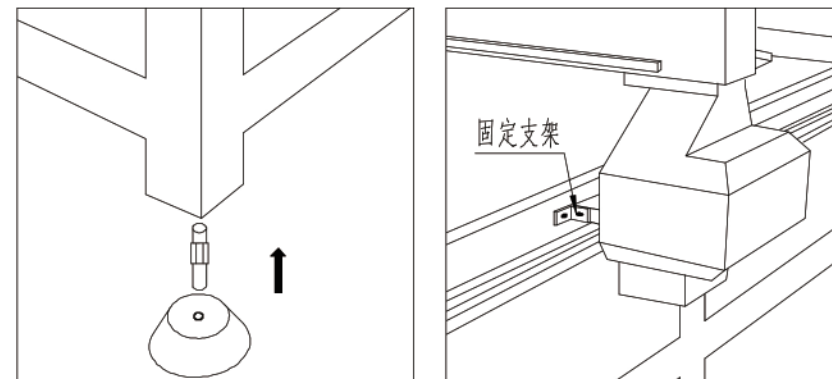
3 Installation steps

- Check the parts according to the packing list(inside the tool kit). If there is any problem, please contact us immediately. We will deal with it right as away, and we are sorry for the inconvenience might have occurred.

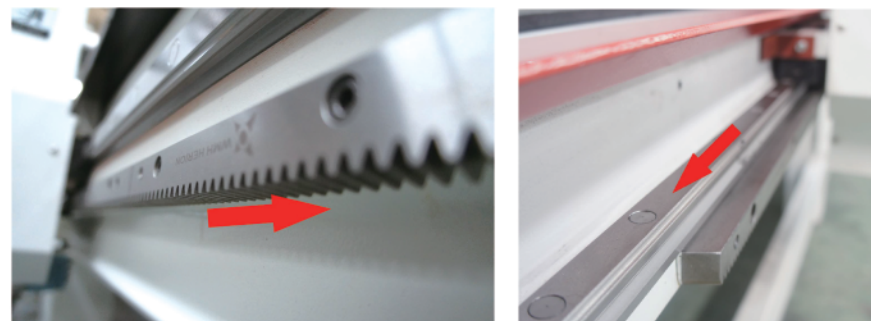
- After opening the box, please remove the exterior packaging and fixed supports.
- Place the machine on the level ground steadily with the forklift and avoid tilting. Please take the size of machine, the position of maintenance and operation into consideration when placing the machine. The direction is shown in the figure.



- Install the adjustable screw and size block. Adjust the machine as is shown in the figure.
- Remove the fixed support installed on the gantry as is shown in the figure.

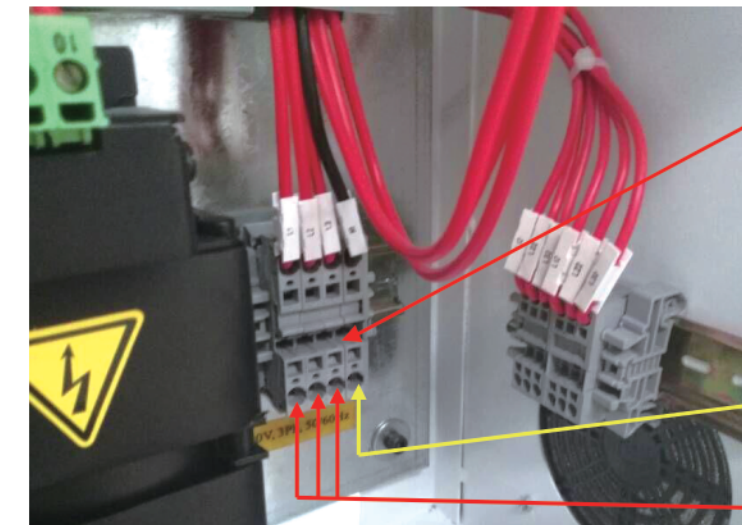


- Place the electric box at the left of the machine. Check the circuit and electrical components in the electric box.
- Place the vacuum pump behind the machine and check the appearance.
- Wipe the dustproof oil on the surface of the machine tool with clean cotton yarns. Lubricate the THK linear guide, ball screw and rack.



4 Electric Installation

Electrify the following lines(as shown in the figure). Please test to guarantee 380V stabilized voltage before electrification.



Insert the screw driver' s flat head to the square terminals one by one, then you can connect the power cord to these terminals.

The null wire should be connected to this round terminals

The three live wires should be connected to the three round terminals

① The power cord' s connection
(380V $\pm$ 10%/3PH/50HZ/60HZ)



The three terminals in the outside are power supply for vacuumpump

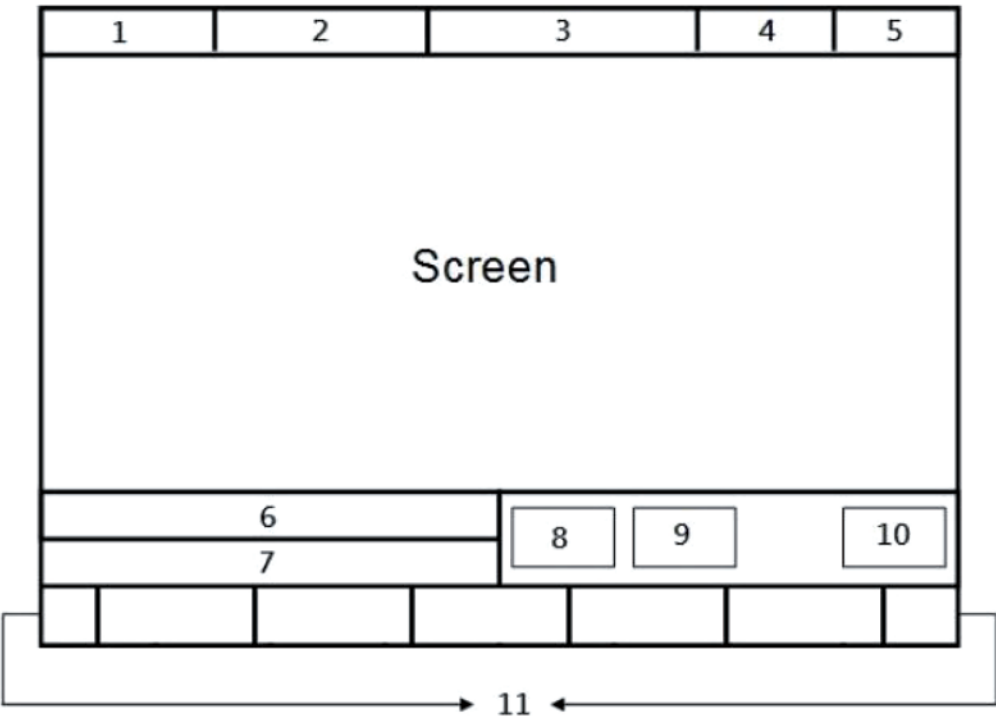
The three terminals in the inside are power supply for dust collector

The three live wires should be connected to the three

MACHINE OPERATION

1 System interface syntec

Main Screen Sections



- 1 reset coordinate system
- 2 Working file name and machining command line
- 3 Title of interface (Current interface)
- 4 Date
- 5 Time
- 6 Data input
- 7 Display(Hint)
- 8 Status
- 9 Mode
- 10 Alarm
- 11 Function Key

2 Keys

Emergency stop button



Press this button when personnel is in danger or a problem occurs during the table operation, then all the electric controlling and the machining process of the table will stop to ensure personnel and machine safety.

Origin searching function under the origin mode

Note : when the CNC router is on power, the origin searching function under the origin mode should be used.

Operation method:

- 1 Select "Home mode"
- 2 Press the table moving direction control keys [X-, Y-, Z+, .] .
- 3 The three axis of the machine will move back to the mechanical origin.

Jog mode (Rapid Jog)

Note: Users can make the table move by pressing "JOG" under this mode.

Operation method:

- 1 Enter the "manual synchronizing mode" with the mode-choosing knob.
- 2 Press the table moving direction control keys [X+, X-, Y+, Y-, Z+, Z-] , and the table will move.

- 3 Operators can adjust jog cutting amount by using JOG%or GO1%.
- 4 When operators press the table moving key and the quick positioning key "~~" together, the CNC table will move in the rapid speed.
- 5 Operators can adjust the jog cutting amount with G00%.
G00%:adjustG00%(F0 . 25% .50% .100%)G00% adjust (F0 . 25% .50% .100%)
G01%:adjustG01 / G02 / G03cutting feedrate% G01%: adjust G01 / G02 / G03 cutting feedrate G01%.

Manual jogging mode

Note:Users can make the table move by prssing "JOG" under this mode.

Operation method:

- 1 Enter the "manuajogging mode" with the mode-choosing knob.
- 2 Press the table moving direction control keys [X+, X-, Y+, Y-, Z+, Z-] ,and the table will move at fixed speed.
- 3 Users can adjust the fixed moving distance with the G00 "knob switch" . The moving distance range is *1:1um,*10:10um, *100:100um.

MPG mode

Note:User can use this mode to rotate "MPG (mobile handwheel)" to move the machine

Operation method:

- 1 Select "MPG mode" in the panel
Choose the axis that needs to move in MPG.
- 2 Choose the incremental distance.
- 3 Select the different step distance mode in the MPG(*1:1um,*10:10um, *100:100um.)

Auto mode

Note: the NC program can be automatically executed by using this function.

Operation method:

- 1 Enter the "auto processing mode" with the mode-choosing knob.

- 2 After the machine has been back to the origin, the auto processing mode starts to work.
- 3 Set the working coordinates(G54,...59). If the coordinates are not set, the CNC set value of the NC program is G54.
- 4 Set the tool radius compensation and tool length compensation in “tool setting” .
- 5 Press “start” to execute the NC program.
- 6 Press the emergency stop button to pause NC program when necessary.

MDI mode

Note: the block can be executed via with this function instead of executing NC program.

Operation method:

- 1 Turn the mode-choosing knob to “MDI mode” .
- 2 After the machine has returned to the origin, MDI mode starts to work.
- 3 Choose F4” executing processing image” under the main interface.
- 4 Press F3” MDI input” , and a dialogue box will be displayed on the screen.
- 5 After typing in data in the dialogue box, press “Enter” to input the data.
- 6 Press “start” to execute MDI single-section program.

MPG simulation function



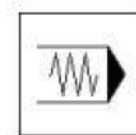
Note: this function can be used to check NC program.

Operation method:

- 1 Turn the knob to “auto mode” .
- 2 Press the “MPG stimulation function” key and the light will be turned on.

- 3 Press “start” to execute NC program.
- 4 The mechanical status will changed from “ready” to “in processing” by the CNC.
- 5 The machine remains still.
- 6 Turn the revolving hand wheel to execute NC program.
- 7 MPG (revolving hand wheel) revolves faster and faster. The machine moves faster and faster.
- 8 When MPG(revolving hand wheel)stops, the CNC machine also stops.
- 9 Through this function, users can know whether the program “can” or cannot” be executed.

Program idling



Note: This function is used to check NC program.

Operation method:

- 1 Turn the knob to “auto mode” .
- 2 Press “program idling” , and the key light will be turned on.
- 3 Press “start” to execute NC program.
- 4 The CNC mechanical status will change from ” ready” to “in processing” .
- 5 Through this function, users can know whether the program “can” or cannot” be executed.

Single-section execution

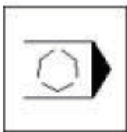


Note: through this function, users can check NC program.

Operation method:

- 1 Turn the knob to “auto mode” .
- 2 Press “single–section execution” , and the key light will be turned on.
- 3 Press “start’ to execute NC program.
- 4 CNC will execute NC program, but it will stop after executing a single section.
- 5 The CNC mechanical status will change from “in processing” to “stop” .
- 6 Press “start” again, and CNC will continue to execute the next single section.

Stop



Note: Trough this function, users can stop M01 in NC program.

Operation method:

- 1 Turn the knob to “auto mode” .
- 2 Press “stop” , and the key light will be turned on.
- 3 Press “start” to execute NC program.
- 4 When the CNC executing program contains “M01” , it will stop.
- 5 The CNC mechanical status will change from “in processing” to “stop” .
- 6 Through this function, users can change tools and check workpieces.

Skip



Note: through this function, users can set whether it should be executed or skipped when the machine executes to “/” code in NC program.

Operation method:

- 1 Turn the knob to “auto mode” .
- 2 Press “skip” , and the key light will be turned on.
- 3 Press “start” to execute NC program.
- 4 When the CNC executing program contains single section with “/” , it will automatically skip this single section.
- 5 If the key is not pressed, then CNC will execute this single section.

Spindle control



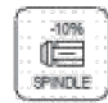
Spindle CW rotation



Spindle stop



Spindle CCW rotation



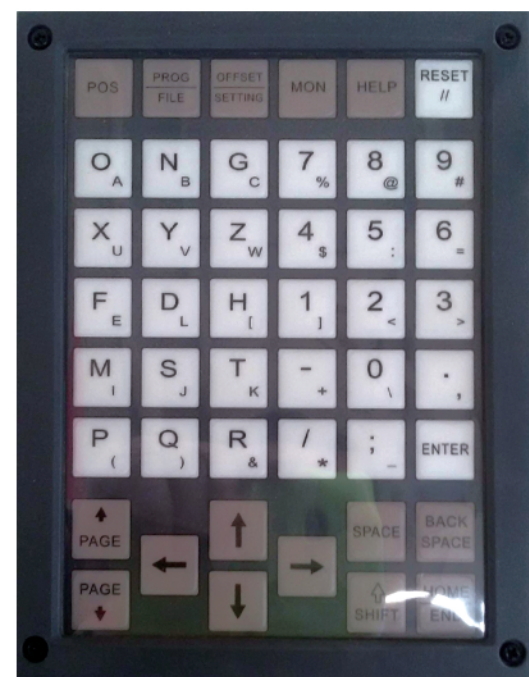
Spindle rate deceleration:Spindle speed will decelerate 10%



Spindle rate 100%:Spindle will rotate with 100%



Spindle rate acceleration:Spindle speed will accelerate 10%



A ~ Z

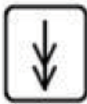
There are 26 keys in total, which are used to order positions.

0 ~ 9

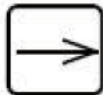
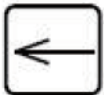
Number keys, used to type in data.

DEL

Used to delete words when editing programs.



Page- turning keys



Cursor movement keys

F1 Brush lifting key
G00 rate adjusting keys area

INS

Used to insert words when editing programs.

SHIFT

Switch keyboard to use subscript key on keyboard.

SPACE

Space key, indicating that the position is space.

BACK SPACE

Back space key, users can modify the input data.

RESET

Used to reset programs.

ENTER

Used for the type in of address key or number keys.

HELP

Help this key, and users can get real-time online help.

/: used to edit the sections need skipping when editing programs.
;; press this key to show that the input program section has been over when editing programs.
· : used to separate values.

() , [] , | , ! , & , \$, # , < , > , = , % , @ , * , : , , , + , -

The above symbols are all used in program editing.



start

Stop

Spindle control

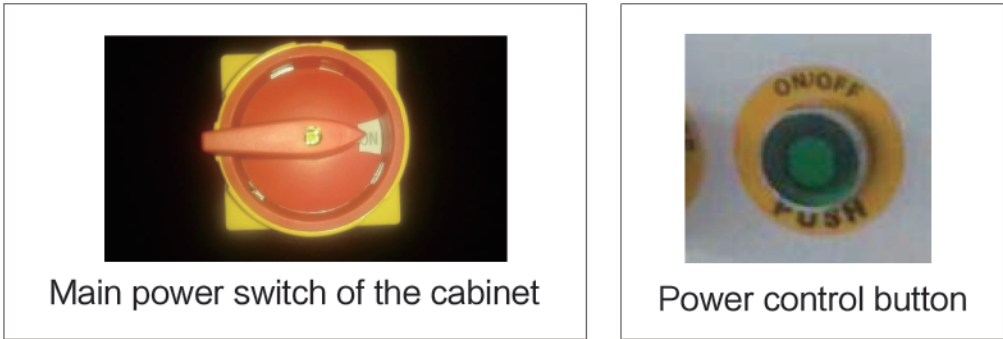
Emergency stop button

G01 G02 G03 rate adjusting keys area

3 Machine operation

3.1 Turn on the power of the machine

Make sure the main switch is on “ON” state, then press “Power control button” , then the machine will on power.



3.2 Back to origin operation

When the system completely starts up, press “Home”  on the keypad, and press X,Y,Z in order to return to the origin. The indication light will be turned on, and the alarm saying the system has not been back to the origin will be cleared. (Only after returning to the origin will the machine soft limit start to work.)

3.3 Load tools

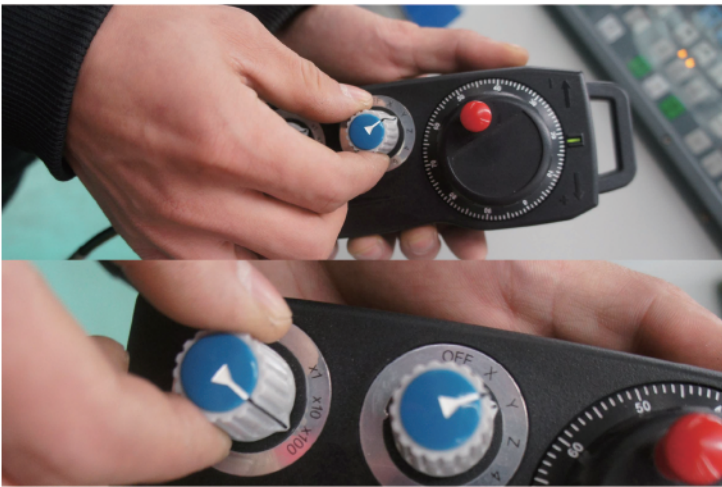
Press F2 or the green button on the spindle(as shown in thefigure) to load and unload tools.



Spindle functional button “loosen and clamp tools” .

3.4 Hand wheel operation

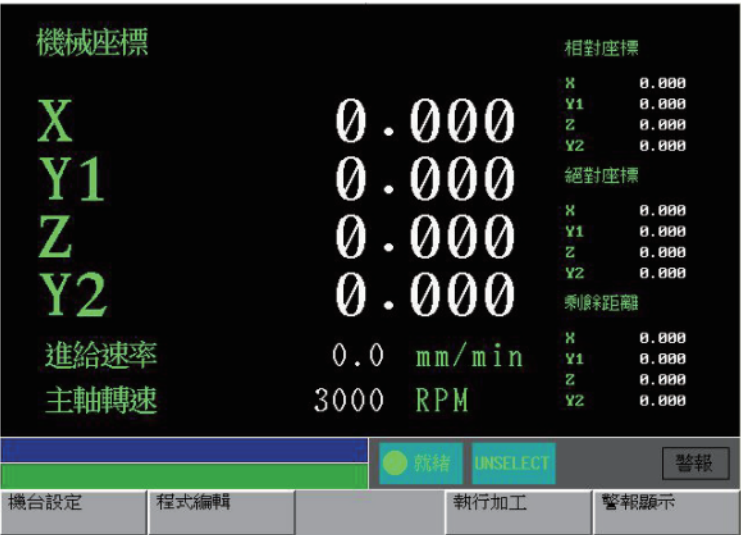
As shown in the figure, when switch XYZ axis and functioning rate, the larger the number, the higher the rate.



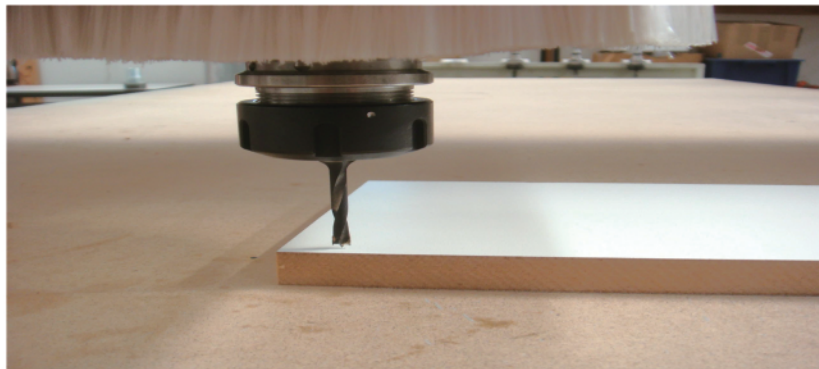
3.5 Set workpiece coordinates

As shown in the figure, when switch XYZ axis and functioning rate, the larger the number, the higher the rate.

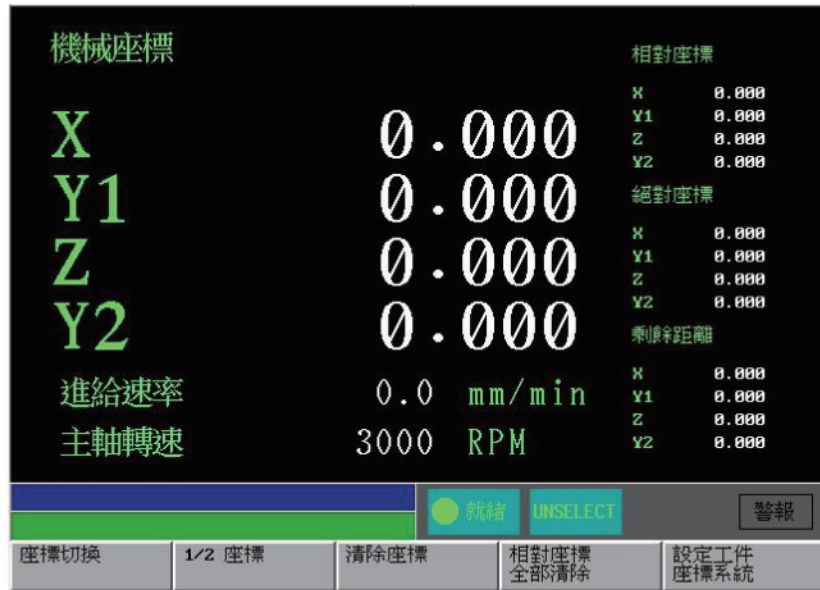
- 1 Press the hand wheel mode on the keypad to control and move the X/Y/Z axis to material processing surface(for irregular materials, users need to set a center, and the workpiece origin should be benchmarked on the zero surface on which the tool is aligned with the workpiece).



2 X/Y/Z reach the material processing surface, as shown in the figure.



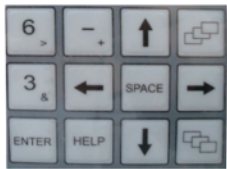
Press F1(position) to enter the interface.



Choose F5 (set workpiece).



Press the directions keys on the keypad.



Move the yellow cursor to G54 setting bar, as shown in the figure.



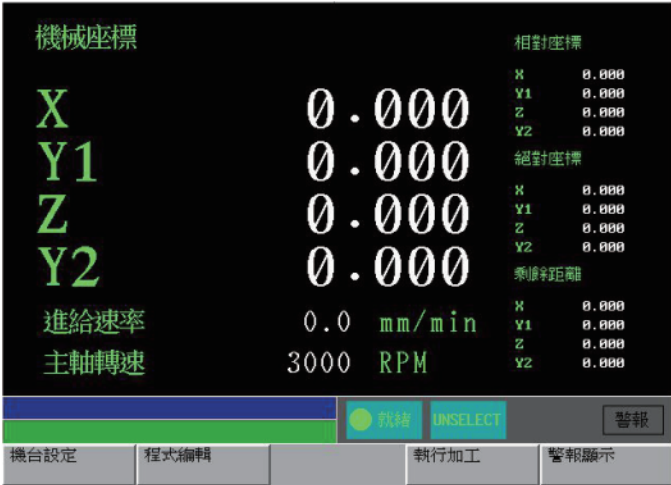
When the yellow cursor has been moved to X, press FI on the panel (Latch Machine cord), and the following note will be shown :choose “yes” , and press “Enter” on the panel.



Y1 should be set in the same way, and Z, Y2 are zero.

3.6 Set the Z axis tool compensation value(namely the Z axis coordinates).

Use the up/down/left/right arrows on the panel to enter the tool length compensation bar, as shown in the picture.



Press F4 to execute processing and the following picture will be shown.



Press F5(tool set), and the following picture will be shown.



Type the Z axis value (-150.00) below the coordinate in the blue bar. Press “Enter” on the panel, as shown in the picture.



In this way, the Z axis coordinates of T1(tool 1) in need of processing has been set. T2,T3,T4,T5,T6,T7,T8 can also be set in the same way according to different processing requirements.

3.7 Tool setting



3.8 Processing parameters

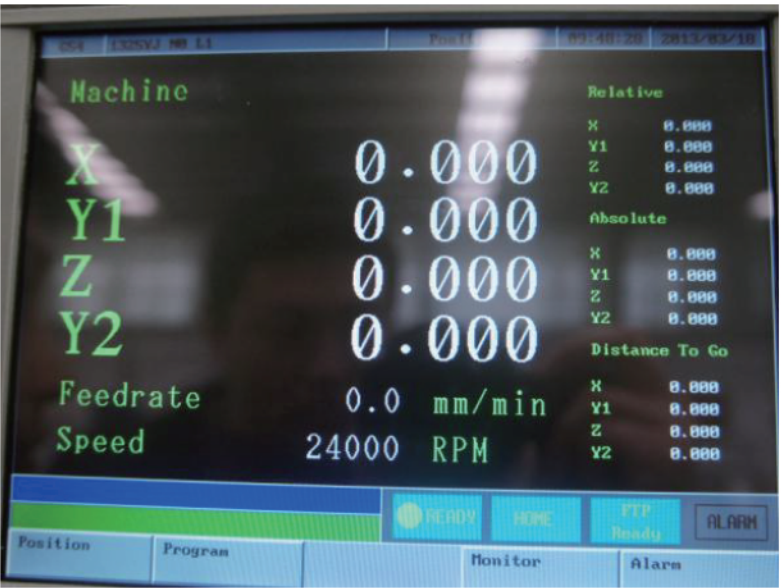


3.9 Execute processing programs

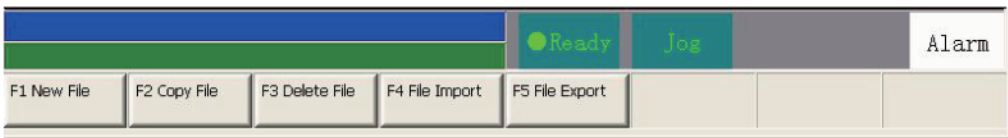
Press the "left" arrow.



Back to the startup picture.



Press F2(program) — F5 (File Manager)



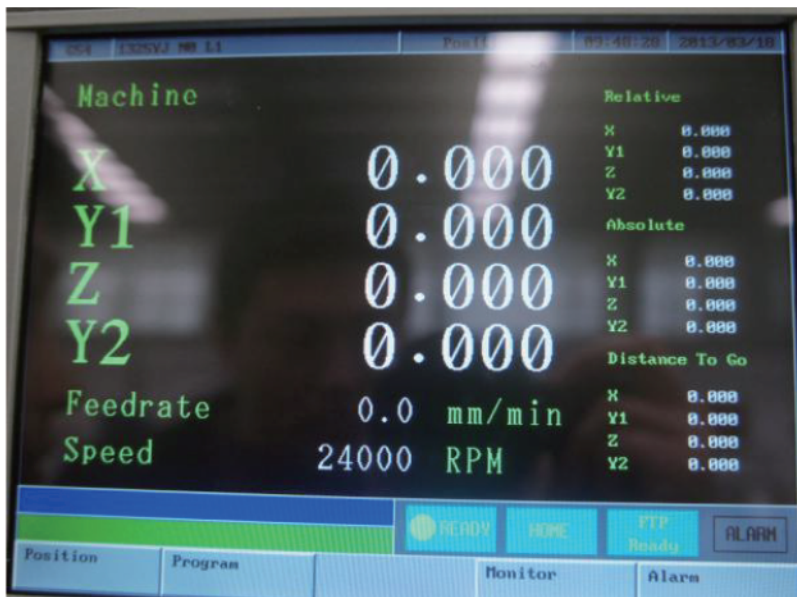
Insert USB disk to the controller(as shown in the picture).



F4(file import) and a dialogue box will pop up. Choose the file needs copying and press yes. Use the up/down/left/right arrows to choose the copied fie. Press “Enter” on the panel, and press the left arrow to open the file.

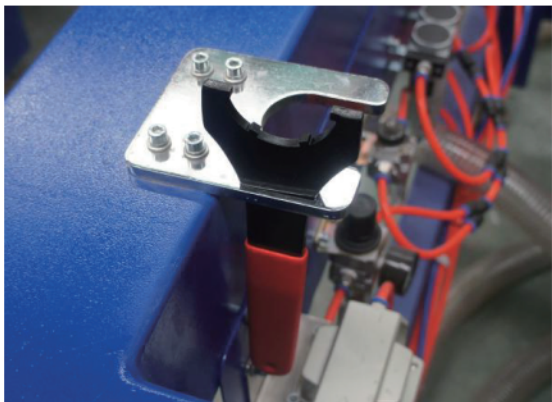


Press F4(Monitor) to enter the processing interface.

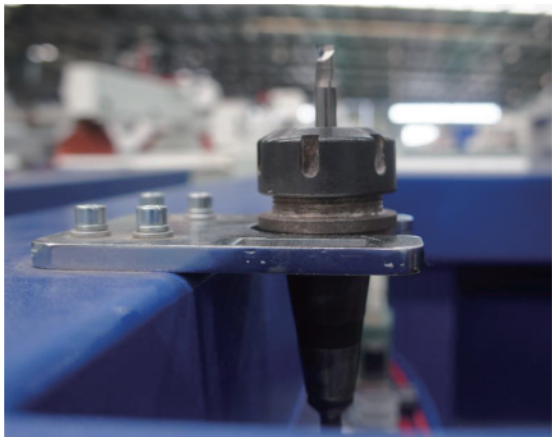


Press “auto execution +hand wheel simulation+ function” and control the machine with the hand wheel. After confirming that the machine is in normal processing condition (especially the Z axis cutting size), press hand wheel simulation keys in order(if the machine is not control by the hand wheel, it will automatically function).

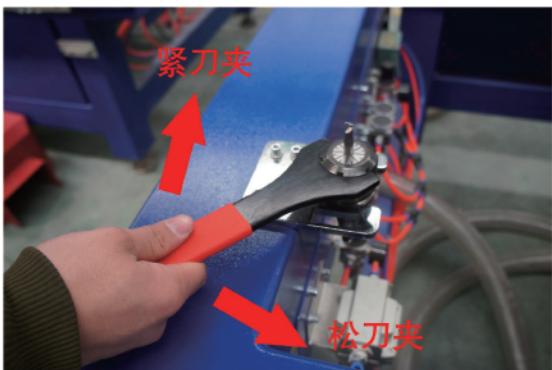
3.10 Tool locking plate operation



Put the tool on the tool locking plate, as shown in the picture.



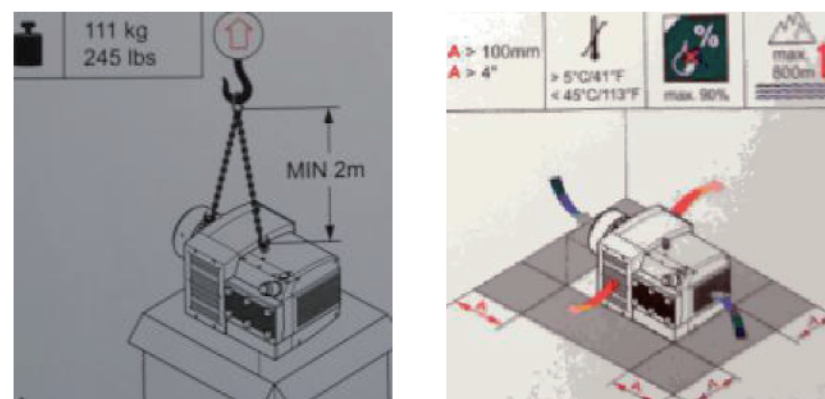
Clamp the gripper on the tool. Along the clockwise direction it will be tightened, and along the counter-clockwise direction it will be loosened.



3.11 Vacuum pump operation

1 The moving and placing of vacuum pump

Take out the vacuum pump upon arrival. Install the filter on the vacuum pump.(Make clear of the front and back side. Do not break the double nipple.) (As shown in Fig 1.)



2 Connection of vacuum pump

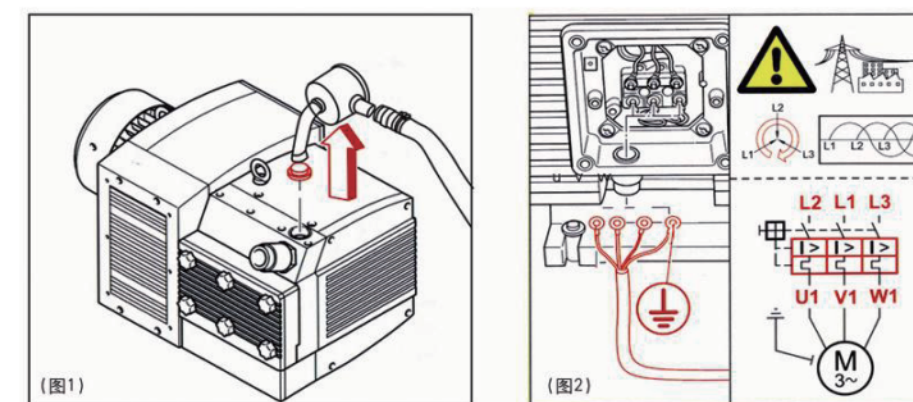
Connect the vacuum pipe of the machining center to the vacuum pump and clamp it.



3 Vacuum pump electrification

Connect the vacuum pipe of the machining center to the vacuum pump and clamp it.

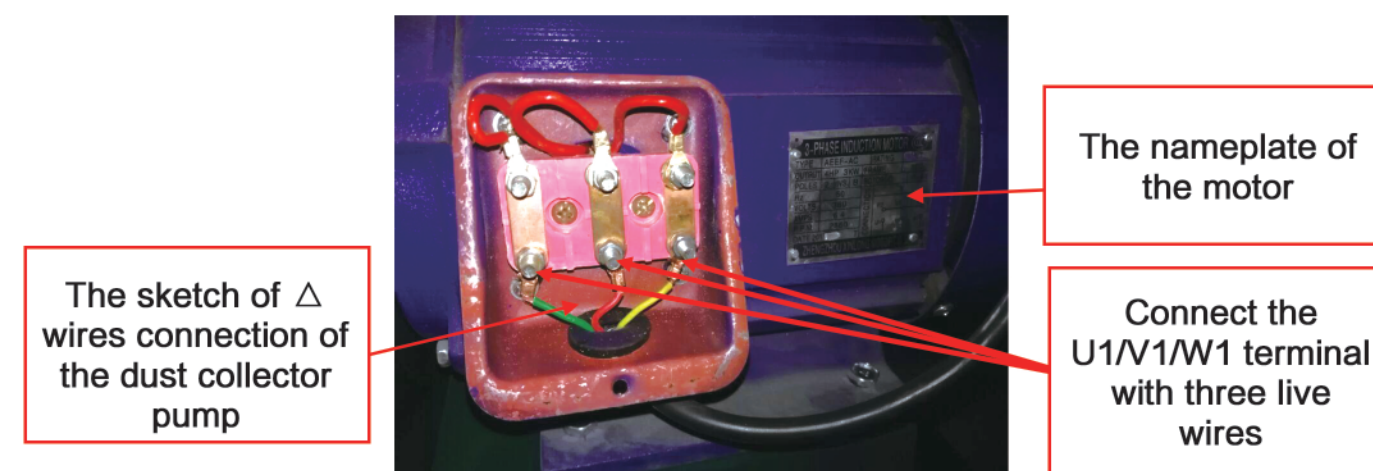
- Connect the vacuum pump to the power supply according to the power supply and voltage signs on the nameplate, as is shown in the figure.
- Start the machine. Check if it moves in the positive direction and sucks air. (If not, power it off right away and swap the ends of the power line.)
- Clean the filter every day.



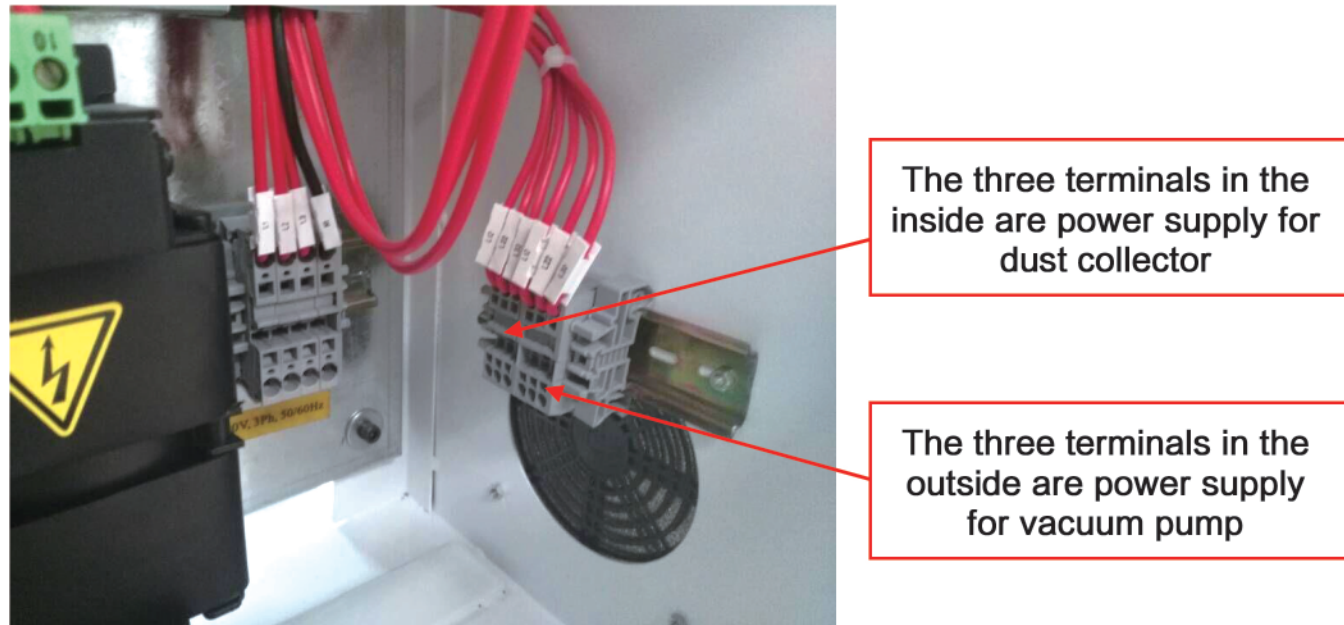
3.12 dust collect connection

First, check the power supply specification of motor by it' s nameplate (check the voltage and the wires connection is Δ connection or Y connection), using a $4 \times 4\text{mm}^2$ cable connect to the power terminal.

Note: It' s more better if you fix the cable tightly after connecting the wires.
The dust collector also need to connect to the ground



Second, you can supply the power to the motor from the dust collector's terminal in the cabinet.



Last, push on the dust collector button in the cabinet ,check whether the rotation direction of the motor is in clockwise, otherwise you should turn off the power and exchange any two wires connecting to the dust collector terminals in the cabinet.

MACHINE MAINTENANCE

Matters needing Attention for maintenance

Notes:

- 1 Please do not make any alterations without the knowledge about the machine and the electric components or authorization to do so. Otherwise, faults or damages might occur.
- 2 Switch off the main power before the maintenance. Electric tests must be done by professional electrical personnels.
- 3 Any parts or components in need of changes must meet the specification requirements from technical documentations.

1 Spindle Maintenance

1 Safety Notes

- The rivets and screws on the original tool holder should be fixed tight, or else it might cause changes of broach(拉抓抓刀) positions and damage the broach arbor.
- The shank should be kept straight when changing tools, or else it might cause incorrect positions of tools.
- Check the water filter every day and drain the water timely (every 8 hours), or else the cylinder might rust and cause incomplete movement.
- The air pressure should be between 6KG to 7KG before changing tools, or else it might cause incomplete holding of the broaches.
- The taper hole of the spindle gets dusty easily, and should be cleared when changing tools, or else the tools might not be centered. Do not blow air into the spindle with the air pipe. When not in use for a long time, the hole should be covered with the red cap to keep clear of the dust.
- Tools should be kept sharp and intact, or else it might cause uneven radial force when the spindle is revolving. The workpiece should be fixed tight on the table, or else the spindle might vibrate during processing.

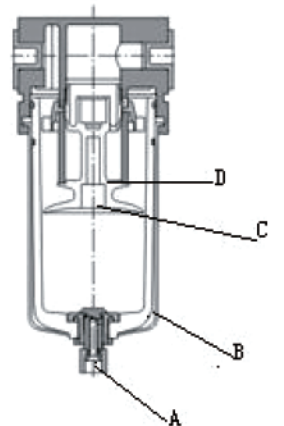
- The filter cartridge of the water-oil separator should be replaced timely (once a month). Check and drain the water timely (every 8 hours). There must be oil-free in the middle hole when blown the air into it, or else the bearings might be damaged.
- The air blown into the spindle must be processed through the dryer to remove the moist, oil mist and dust particles from the air.

2 Spindle Maintenance

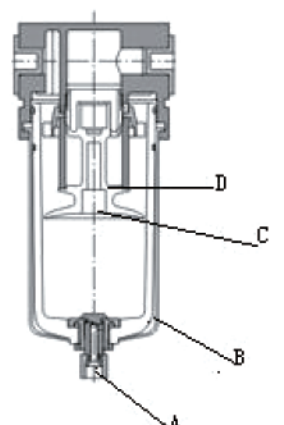
To protect the spindle, please use the air filter correctly.

The QL-series air filter has water-oil separator and filter cartridge that can remove the dust, rust, coagulum and moist from the air.

- 1 **Manual drainage:** When in use, the waterline in the QL-series air filter should not be higher than Level C (as indicated below). Drain the water in the filter timely by switching the knob A (as indicated below). When in use continuously, the QL-series air filter should be checked every day and drained every 8 hours. The air source must be dry and the air compressor should be checked every week (drain the water).



- 2 **Replace the filter cartridge:** the QL-series air filter should be under non-voltage circumstances (power off) when changing the filter cartridge. First, push Cup B (as indicated below) and the protection cover up a bit, revolve 45° and remove Cup B and the cover. Then use Allen wrench to remove C. Replace the filter cartridge D and put the cup and the cover back on. When in use continuously, the filter cartridge in the QL-series air filter should be replaced twice or 3 times a month. The filter cartridge shall be washed clean timely to prevent the dust from blocking it.



2 Maintenance of transmission parts

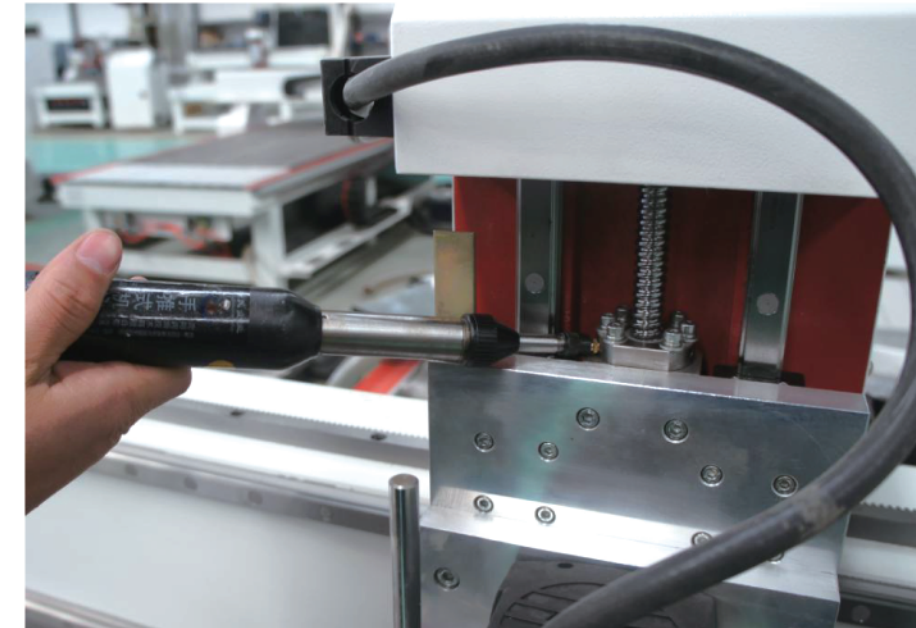
Please keep the guide rail clean. Wipe off the dust and chips after use to keep smooth running on the rail.



Use lubricant on the rack and the ball screw once a week to prolong the machine life.



When lubricating the spindle screw, please use the manual oil gun attached to the machine.



3 Maintenance of electric box

Note: Switch off the main power before the maintenance. Electric tests must be done by professional electrical personnel.

- 1 Use the pneumatic gun to clean the electric box once a week to make sure the electrical components are free from the dust.
- 2 The filter of the coolant in the electric box should be checked once a month to keep the dust away from the box and to keep the electrical components stable.
- 3 Check the “Emergency Stop” button regularly. Make sure it works.



4 Maintenance of air compressing system

1 Air compressor

When working for a long time, the welded parts of the air compressor such as supporting plate and intake pipe might have cracks caused by vibration, which should be reduced to the minimum when installing and using.

Using with excess pressure or temperature is prohibited. The compressed air going into the air tank shall not exceed the designed temperature of the tank. To ensure a normal working state of the air compressor, the environment temperature shouldn't be lower than 0°C. The tank surface shall avoid touching corrosive substances.

If the maximum volume flow of the air compressor (i.e. the actual air inflow of the air tank) exceeds the maximum of the safety valve of the air tank can take, pressure relief mechanism should be installed.

Each time the air compressor starts, please check to make sure the conveyor belt runs the same direction as indicated.



- Please use air compressor and filter pressure regulator dedicated engine oil 10# and refill the tank if needed.
- Please drain the water from the water tank every day after use.
- Please check the conveyor belt of the air compressor at any time. If it's badly worn, replace it immediately.



air compressor

Air compressor:

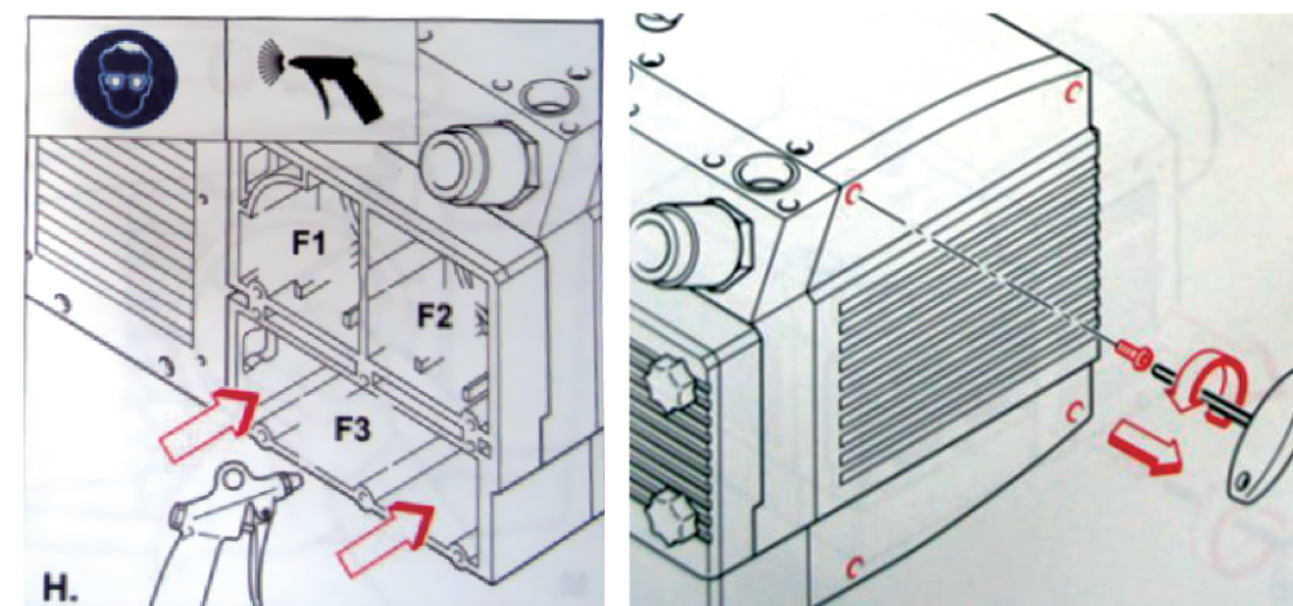
Volume flow: $\geq 0.3\text{m}^3/\text{min}$

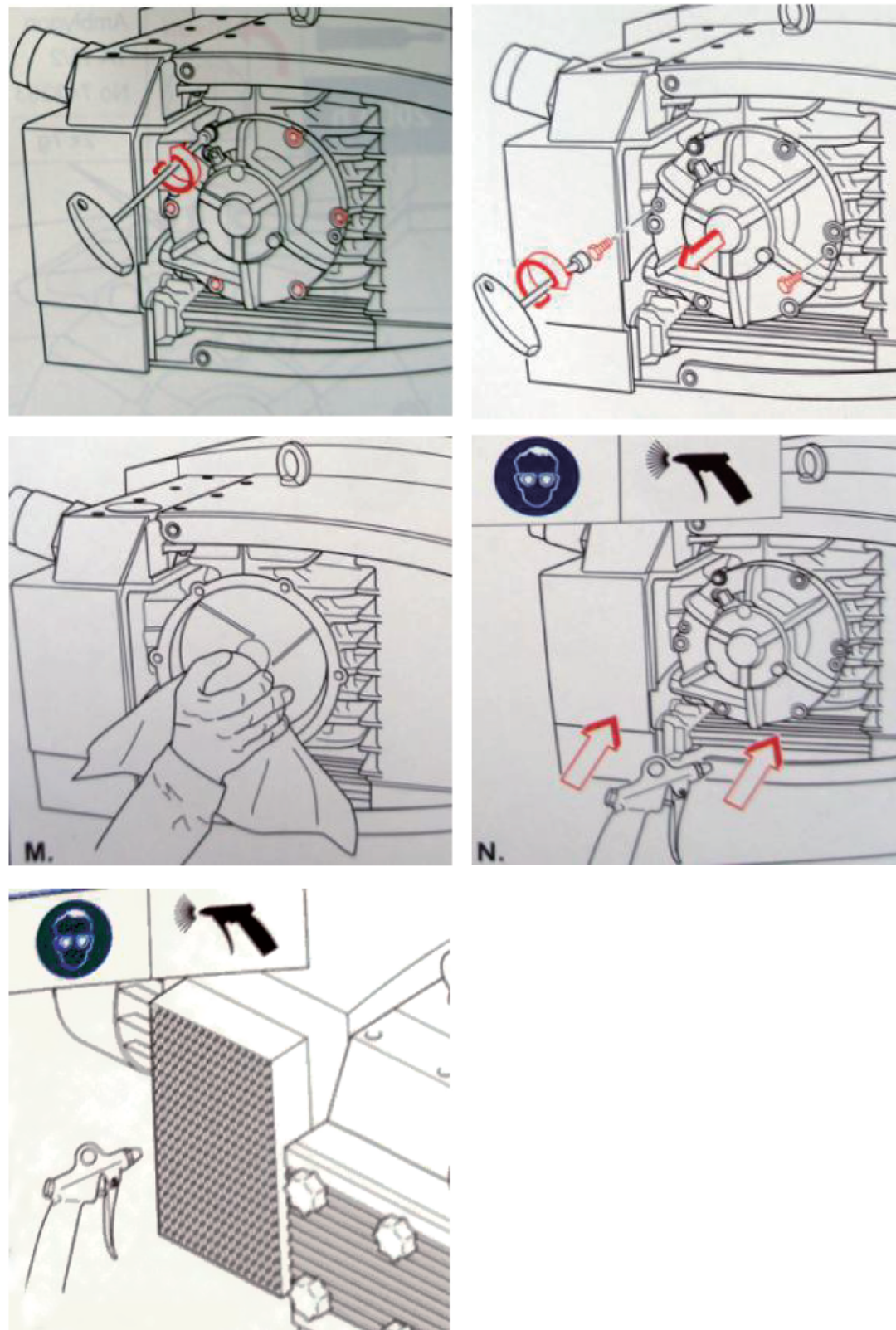
Rated discharge pressure: 0.8MPa.

Power: $\geq 3\text{KW}$

2 Vacuum pump

- Clean the air entry's filter of the vacuum pump every day to keep the chips away.
- Clean the outlet's filter of the vacuum pump once a week.
- Check the lubricant of the vacuum pump once every 2 months. If it gets dark and sticky, please change it.
- Add some lubricant every 3 months. Please use the designated lubricant.



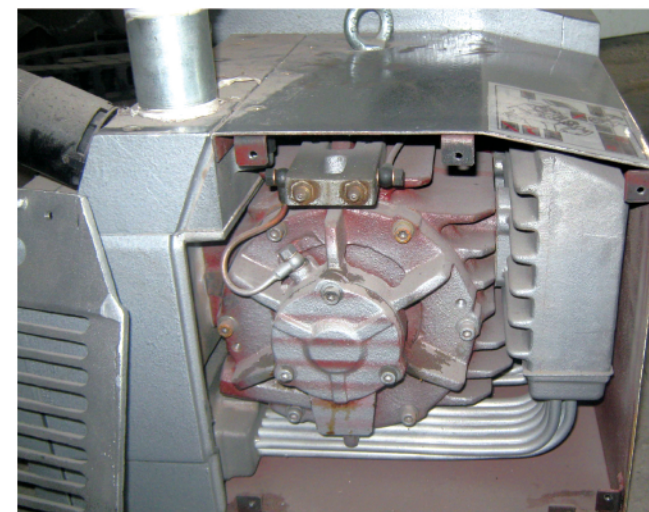


After working for a long time, the vacuum pump may have insufficient suction power. Please change the graphite sheet.

1 Remove the cover.



2 Inside of the cover you'll see as the following picture shows:



3 Remove the screws.

