WE THANK YOU VERY MUCH FOR YOUR INTEREST SHOWN IN OUR PRODUCT.

Before using this machine, please read the instruction carefully.

1. Open the package, please check the center unit, make sure it is not be broken, and make sure the packing list conform to the article.
2. Please make the voltage is (AC220V±10%, and use the isolation transformer or other isolation voltage regulator device to make sure the system work stably. The machine must be grounded reliably when it is working.
3. Clean up dust on a regular basis to ensure the rail and rack clean.
4. The display screen of CNC system is easily broken, pay attention to protect it.
5. This machine should be operated by professional, with some operation and safety train information.
6. If there is something unclear, please contact with the local dealer or call the manufactures.

Content

1 Machinery part---------------------------------------------------------------3

2 CNC control system part-----------------------------------------------------8
Machinery Part

1. Put the crossed beam on the center unit, connect the line with the motor.

2. Put the motor into the center unit.
3. Fix the four screws.

4. Put the security cover on the beam.
5. Fixed the screw of the security cover.

6. Install the anti-fire plate.
How to use the special crossed beam trunkings?

① Loosen the screw, remove the anti-fire plate.

② Take the security cover from the center unit.

③ Loosen the screw of the trunking, take it out, put the plasma cable into the trunking, and cover it. Then install security cover and the anti-fire plate as following picture.
## Ports details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>220V</td>
</tr>
<tr>
<td>Power frequently</td>
<td>50HZ</td>
</tr>
<tr>
<td>Rated power</td>
<td>180W</td>
</tr>
<tr>
<td>Display</td>
<td>5.7 inch</td>
</tr>
<tr>
<td>Effective cutting range</td>
<td>X-axis: 2000mm Y-axis: 1200mm</td>
</tr>
<tr>
<td>Speed</td>
<td>Flame cutting: 0-1000mm/min unload&gt;8m Plasma cutting: 0-4000mm/min unload&gt;8m</td>
</tr>
<tr>
<td>Cutting thickness</td>
<td>Flame cutting: 0-150mm Plasma cutting: 6-150mm</td>
</tr>
<tr>
<td>Transversal beam length (Y-axis)</td>
<td>1500mm</td>
</tr>
<tr>
<td>Longitudinal rails frame (X-axis)</td>
<td>2500mm</td>
</tr>
<tr>
<td>Total weight</td>
<td>80Kg</td>
</tr>
<tr>
<td>Gas depression</td>
<td>Max 0.1Mpa</td>
</tr>
<tr>
<td>Oxygen depression</td>
<td>Max 1.5Mpa</td>
</tr>
<tr>
<td>Befitting gas</td>
<td>Ethane, propane, methane</td>
</tr>
</tbody>
</table>
CNC system part

Chapter One  Summarize

1.1 System features
1) 5.7 high-definition lattice LCD, Small volume, Structure compact.
2) Processing graphics dynamic/static display.
3) High speed 16-bit and 8-bit single-chip microcomputer and hardware interpolator control. High speed running by $0.5\mu$ equivalent 6 meters/minute.
4) Step motor high subdivision control the driver, move smoothly, low noise, the quality improved clearly.
5) You can set begin speed and the time of rising/falling arbitrarily.
6) Supplying multiple constant loops to program simply.
7) Directly diagnose all input information of system, Convenience for you to check.
8) Multi-settings of parameter, can suit different requires.

1.2 Technology norm
1) Pulse equivalent: X-axis $0.5\mu$ (diameter) Z-axis $1\mu$ (or X axis $0.25\mu$ diameter)
   Z-axis $0.5\mu$

2) G00 Max-speed: $\geq 6$ meter/minute(X-axis $0.25\mu$ (diameter) Z-axis $0.5\mu$)

3) Number of connected shaft: 2 axis

4) Input coordinate scope: $\pm 9999.999 \text{mm}$

5) Maximum lines of user program: 540 line

6) User program space: 60K

7) Number of user program: 64

8) Dimension: $300*200*85$
Chapter Two   System Operation and Function

2.1 Operate panel keyboard illustration

【F1】 - 【F6】  Function keys:  Under different operate mode, they have different definition.

【   】，【   】  Triangle sign   Give up and quit : Definition of the left and right key is same.
【INS】: Insert key under program state. Under others, it is used for increasing LCD brightness.

【DEL】: Delete key under program state. Under others, it is used for decreasing LCD brightness.

【Pgup/ S↑】: Page-up key under program state. Under automatic and manual function, it is used for adjust cutting-gun, when press/loosen the key, cutting-gun rising/stopping.

【Pgdn/ S↓】: Page-down key under program state. Under automatic and manual function, it is used for adjust cutting-gun, when press/loosen the key, cutting-gun falling/stopping.

【Shift】: Space key. It is used for distinguish between upper case and lower case under program editing state.

【→】: Enter/Effective key

【F↑】: It is used for increase speed under automatic and manual control state, increase 1%/press once

【F↓】: It is used for decrease speed under automatic and manual control state, decrease 1%/press once

Strong current control

Ignition automatically key under manual control state.

Strong current control

Preheat oxygen key under manual control state

Strong current control

Acetylene open key under manual control state

Strong current control

Cutting oxygen key under manual control state

Strong current control

Perforation key under manual control state

Strong current control

Close all states under automatic and manual control state
2.2 Main interface of system working

After power on, enter into main interface, please press 【F1】—【F6】 key and select function as follow:

【F1】Auto : Machining program automatically.


【F3】Editor : Edit/modify machining program

【F4】Parameter : Parameter setting

【F5】Diagnosis : Checking input/output information of lathe.

【F6】Return : Lathe return to origin (the position set by proximity switch)

Press 【G】【G】【3】key, System will clear all contents of user program.
2.3 Auto function

Under main interface, press 【F1】 key, System will enter into auto function and display as follow:

```
<table>
<thead>
<tr>
<th>Speed : F* 100%≈00000</th>
<th>Program : 0001</th>
<th>Number : 0000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Machining</td>
<td></td>
</tr>
<tr>
<td></td>
<td>automatically</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acetylene closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preheat closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cutting closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cutting tip stop</td>
<td></td>
</tr>
</tbody>
</table>

X +0000.000
```

Preheat : 0850

- G92 X100 YZ0
- G00 Y100

U +0000.000

V +0000.000

<table>
<thead>
<tr>
<th>Single segment</th>
<th>Manual</th>
<th>Free play</th>
<th>Graphics</th>
<th>Select segment</th>
<th>Return reference point</th>
</tr>
</thead>
</table>

*The first line display : F× (magnification) %= (current speed), current program name and the number of machining.
*The medium display the current coordinate of X and Y by big character.
*Under the coordinate the two lines are current continuous program, use ‘►’ indication.
*Above line of the right indicate the state is automatic machining.
*Under line of the right indicate current system state respectively, including : Acetylene ( switch ), Preheat oxygen ( switch ), Cutting oxygen ( switch ), Cutting tip ( rising/falling/stopping ).

*Others indication :

M—Latest instruction M.

U, V—Increment coordinate.
Operate under automatic function

1. Press 【F1】 , System select single segment machining , Press 【F1】 again, give up. Under this state, Press 【Startup】 key once , System will run one instruction. Press 【Quit】 key , give up this function.

2. Press 【F2】 , System enter into manual state, concrete function refer manual function section.

3. Press 【F3】 , System enter into free play state , Press 【Startup】 system working, display the moving trace of cutting tip. But the operation of driver and I/O all closed to check whether program is correct.

4. Press 【F4】 , System enter into graphics machining tracking state. (referring the picture below)

5. Press 【F5】 , System select arbitrary segment to machining , '►' represent the first line program that current running. Press 【↑】 and 【↓】 key , you can select orderly the current program. Press 【Startup】 , System will run from the selected program. Press 【Quit】 will give up select segment machining. Attention: Under select segment machining state, firstly, you should aim the cutting-gun to initiation position of program (easy aim). Press 【Startup】 begin to select segment machining. When appear ‘Pause’ sign, you can manual control the strong current switch to finish the prepare working, then press 【Startup】 , System will begin to run from the selected segment.

6. Press 【F6】 , System will return automatically to reference point.

7. When lathes are not running, you can select strong current key to control Ignition, Acetylene opened/closed , Preheat oxygen opened/closed, Cutting oxygen opened/closed and Cutting tip rising/falling/stopping. Under normal machining state, the strong current keys are locked. Attention: Press ignition key , if acetylene key is not open, please open acetylene valve firstly , then open ignition switch, after one ignition delay ( refer Parameter - Control - Ignition delay ) , close ignition switch. Press 【K1】 key will run a preheat perforation
procedure. (refer M50 preheat perforation fixed cycle). Press 【K2】key is general switch.

8. Press 【F↑】and 【F↓】，you can increase or decrease speed magnification. Note: Manual and automatic magnification are saved respectively. The value immune to influence of power on/off.

9. Press 【Pgup/S↑】and 【Pgdn/S↓】. This two keys are compound. Under edition state, they are turn to page up and down. Under this state they are used to control move up and down of cutting tip. Press 【Pgup/S↑】(or 【Pgdn/S↓】) cutting tip moving up (or down), loose it will stop.

Automatic graphics track

<table>
<thead>
<tr>
<th>Speed: F×100%=0000</th>
<th>Program:0001</th>
<th>Number:0000</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="" alt="Diagram" /></td>
<td><img src="" alt="Diagram" /></td>
<td><img src="" alt="Diagram" /></td>
</tr>
<tr>
<td>x500 y200</td>
<td>x0050.000 y00200.000</td>
<td>M05 Preheat:0850</td>
</tr>
</tbody>
</table>

Under graphics mode, press 【F】，the picture will double its size, Press 【F】 again, come back. Press 【↑】，【↓】，【←】，【→】key will move the display window, you can observe every segment in detail.

10. Press 【DEL】key to clear counter.
Reference point under automatic machining

Reference point is initial point of machining program (set by G92). One program run once (include free play), Reference point will be saved automatically (Also set by parameter).

Once reference point is set, orientation of reference point is very easy, as follows:

1. Please aim the knifepoint to special position of steel plate that waiting for cut (know coordinate), set the current coordinate.

2. Under automatic or manual mode, if select return reference point function, system will automatically return to reference point.

Startup under automatic machining

After all prepare work is ok, there are two means to startup the automatic machining program.

1. Press 【Startup】.

2. Press outside “startup” button. (refer chapter 6.1 “outside input interface”)

Control and error compensate under automatic machining

After automatic machining beginning, only these keys are effect:

1. 【Pause】: Press this, system will decrease speed till stop. Execute instruction M according to the set of G61 to keep the current display contents. If press 【Startup】system will keep on running. Under pause state, if find deviation of dimension, you can press 【F2】key to enter into manual state (in inch state automatically, increment is 0.01mm), Operator press direction key to adjust the position of knifepoint, its move be considered compensation. Adjustment finished, press 【Startup】system will neglect compensation movement and keep on running according to before adjustment. If press 【Quit】system will return to main picture.

Error compensation under pause state is reference point’s compensation in fact.

2. 【F↑】, 【F↓】Moving axis adjust speed key: Increase or decrease speed magnification, change 1% once.
3. 【Pgup/S↑】，【Pgdn/S↓】 Control cutting gun rising or falling, Press key, cutting gun rising or falling, loose it will stop.

4. 【Stop】: Outside button (refer chapter 6.1 “outside input interface”)，Signal can derive from input port. All stop when this key is effect.

**Return and renew machining according to original track**

During machining, because of cutting incompletely, need return and renew machining. You can deal with as follow:

1. Press 【Pause】，system will decrease speed till stop and display "pause" sign. Prompt (Graphics mode)" F 2 manual  F 6 return "，Press【F2】can enter into manual compensation function (refer below)，press 【F6】can enter into return and renew machining function.

   If select 【F6】，System will hint:

   Return ← - - > forward

   Indication: Press 【←】，System will return along original trace. Press 【→】，System will forward along original trace base of return. During return, if reach position that want to return, You can press 【Pause】 again, repeat the above-mentioned procedure, select again keep on returning or forward.

   2. You may press 【Pause】 again when system get to the return position，After system stop steady, you can press the strong current key correspondingly (like Preheat perforation, open cutting oxygen etc.)，Press 【→】 again, and select machining forward.

   3. Above-mentioned operate can run repeatedly till get the satisfactory effect.

**Break recover and power cut disposal**

When system pause by man-made, it will save automatically the current working trace (cutting tip’s position) as a break. This break will be saved forever, regardless power off. Power on again or enter into automatic mode, if only the current program is not changed you can press 【G】key to resume break. When find the break, system will hint "pause" state, You can press the strong current function key correspondingly (such as preheat perforation, open cutting oxygen etc.), Press 【Start up】again, system will keep on running from break’s position.
After machining pause, if you want to quit automatic state and enter into manual state to move cutting tip (whatever how much), when press \([G]\) key to begin resuming break, system will move the cutting tip to the position of break firstly, then resume break. Of course, if you changed the current coordinates by hand, the break will not be resumed normally.

If during machining, you encounter failure of electricity, you can enter into automatic mode firstly after get back electric power. Press \([F3]\) key will set the current coordinate as break and recover like above-mentioned. Attention: This moment you must not move the cutting tip or set the current coordinate.

Only pause operation can generate break.

### 2.4 Manual function

Under main picture, press \([F2]\) enter into manual mode, display:

<table>
<thead>
<tr>
<th>Speed: (F \times 100% = 0000)</th>
<th>Program: 0001</th>
<th>Number: 0000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual operating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetylene closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preheat closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting tip stop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U 0000.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V 0000.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preheat: 0850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XY coordinate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G inch increment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inch moving</td>
<td>Manual Pulse</td>
<td>MDI</td>
</tr>
<tr>
<td>Manual operating</td>
<td>Return parameter</td>
<td>Test position</td>
</tr>
</tbody>
</table>

**Display under manual function**

Like automatic mode, but have any distinction:

1. Under left of the menu display the current increment value.

2. Under right hint: Press \([G]\), you can modify the inch increment.

3. Press \([X]\), you can modify the X value. Press \([Y]\), you can modify the Y value.
Operate under manual function

1. Press 【↑】 and 【↓】 to adjust the position of X axis, Press direction-key correspondingly. The X axis will run by speed the maximum speed limit. Press 【→】 and 【←】 to adjust the position of Y axis. Press direction-key correspondingly, The Y axis will run by speed the maximum speed limit. Manual magnification.

2. Press 【F1】 , system will enter into inch moving state, Press the direction-key once, Motor will move one inch increment correspondingly. Press 【F1】 again, return to continue state. Press 【G】 key can change the inch increment.

3. Press 【F2】 , system will enter into manual pulse mode, display as follow:

<table>
<thead>
<tr>
<th>Speed : F×100%=0000</th>
<th>Program : 0001</th>
<th>Number : 0000</th>
</tr>
</thead>
<tbody>
<tr>
<td>X +00000.000</td>
<td>Program</td>
<td>Manual operating</td>
</tr>
<tr>
<td>Y +00000.000</td>
<td></td>
<td>Acetylene closed</td>
</tr>
</tbody>
</table>

Select valid weight:
- 【F3】 - 1.00mm / pulse
- 【F4】 - 0.10mm / pulse
- 【F5】 - 0.01mm / pulse

4. Press 【F4】 , system will select MDI function, Under this mode, You can directly input single segment program, such as:

G01 X100 Y200

After input one line, press 【Enter】 key to run at once. Press 【Quit】 key to cancel. MDI mode supports various G, M, S instructions. Note: The MDI instruction inputted will be saved till modified or power off.
5. Press 【F5】 , system will control cutting tip return to reference point.

6. Press 【G】 will change the value of inch increment, hint: input increment value, then press enter key, this value will be saved till changed or power off.

7. Press 【X】 key to change value of X. Hint: input coordinate of X (Y) axis, then press enter key, the coordinate of X and Y are changed at once; Press 【Y】 key to change value of Y. Hint: input coordinate of Y axis, then press enter key, the coordinate of Y are changed at once.

8. Press 【F6】 key, system enters into test-position function. Test-position is testing the precision distance from the current position of cutting tip to the origin of machine tool. Concrete usage: Firstly, You should aim the cutting tip to a special point (such as reference point), test the current coordinate and modified (press “X/Y”), Press 【F6】 key, cutting tip begin to return to origin of machine tool and save it as machine’s origin of parameter. Return-position is same to test-position from shape, but their results are not same: Return-position is that send the origin value of machine tool to current coordinates, but test-position is that send the current coordinate to origin of machine tool.

9. Press 【F↑】 and 【F↓】 , you can adjust the manual magnification. Note: Manual and automatic magnification are saved respectively till changed and the value immune to influence of power off.

10. Press 【Pgup/S↑】 , 【Pgdn/S↓】 and strong-current key , their usage is same to auto mode.

2.5 Parameter set

Under main working picture, Press 【F4】 can enter into parameter set function.

Displaying:

Parameter set

| Speed | Adjustment | Control | System | Save |
Every function item save parameter as follow:

**Speed**---- Start speed, Adjust time, Max speed.

**Adjustment**---- Software limit position, Origin, reverse clearance, reference point

**Control**---- Machining speed limit, Ignition delay, Preheat delay, Cutting gun rising delay, Cutting gun falling delay, Perforation cutting gun rising delay, Perforation cutting gun falling delay.

**System**---- Each axis’s electric gear, Driver’s subdivision.

**Save**---- Save the changed parameters to parameter area.

### 2.5.1 Speed parameter

Press 【F2】 and select (refer picture below)

<table>
<thead>
<tr>
<th>Speed parameter setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start speed : X  00250 Y  00250</td>
</tr>
<tr>
<td>Adjust time : X  00040 Y  00040</td>
</tr>
<tr>
<td>Max speed limit : X  05000 Y  05000</td>
</tr>
</tbody>
</table>

Means of each parameter refer left picture:

- Start speed and max speed ‘s unit is mm/minute
- time’s unit is one percent second
- 00040 express 0.4 second.

The **max speed limit** regulate the max speed of by-hand and G00.

### 2.5.2 Adjust parameter

Press 【F3】 and select adjust parameters (refer picture below), Among these:
1. Soft positive/negative-limit is system alarm when the current coordinate over the value set. If it is not used, you should set the parameter over the actual value.

2. Origin value of machine tool is coordinate value relative to reference point in mechanical origin (use switch setting). If the machine tool do not set mechanical origin, you can set the origin value of machine tool as zero.

3. The reference point is defined as start point of program machining, G92 will be produced automatically when system running.

4. Reversal clearance should fill diameter when fill the value of X axis.

<table>
<thead>
<tr>
<th>Adjust parameter settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft positive limit :   X 1500.000 Z 1500.000</td>
</tr>
<tr>
<td>Soft negative limit :   X -1000.000 Z -1500.000</td>
</tr>
<tr>
<td>Machine tool origin :   X 0000.000 Z 0000.000</td>
</tr>
</tbody>
</table>

Press 【F4】 and select, refer picture below:

<table>
<thead>
<tr>
<th>Control parameter settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining speed limit : 01000</td>
</tr>
<tr>
<td>Ignition delay : 00050</td>
</tr>
<tr>
<td>Preheat delay : 01000</td>
</tr>
<tr>
<td>Cutting gun rising delay : 00200</td>
</tr>
</tbody>
</table>

1. **Machining speed limit** is set the max speed of G01,G02,G03. When program running, it will execute in this mode by default. When the set speed(F) low the machining speed limit, actual speed is according to F speed.
2. **Ignition delay**----Keep up the electrified time of high-voltage ignition.

3. Preheat delay----It is the preheat time when steel plate perforation, preheat time is adjustable.

When preheat perforation, press【Pause】key, can delay automatically 150 seconds. Press【Startup】will stop preheating and save the actual preheat time to parameter.

4. **Cutting gun rising delay**----It is used usually before G00 transfer .The cutting gun rise to suitable height in order to avoid knocking between cutting gun and steel plate.

5. **Cutting gun falling delay**----Contrary to the above item, the cutting gun fall to suitable height.

After transfer the G00, you should down the cutting gun before machining. Because of gravity, the time of falling is shorter than rising.

6. **Perforation cutting gun rising**——Under fixed cycle of preheat perforation, cutting gun rising rapidly and perforation cutting gun rising delay. This moment open cutting oxygen and cutting gun begin falling and perforation cutting gun falling delay. Cutting gun rising before open cutting oxygen in order to avoid jamming the cutting gun’s gate when open cutting oxygen.

7. **Perforation cutting gun falling**——Its usage refer the above item. Under fixed cycle of preheat perforation, it will finished after cutting gun falling and perforation cutting gun falling delay. Because of gravity, the time of falling is shorter than rising.

### 2.5.4 System parameter

Press 【F5】and select, refer picture below:

<table>
<thead>
<tr>
<th>Cutter</th>
<th>Speed</th>
<th>Adjus</th>
<th>Contr</th>
<th>Syste</th>
<th>Save</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric gear: X N 00000 M 00000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric gear: Z N 00000 M 00000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subdivision: X 0040 Z 00040</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Electric gear formula :**

\[
\frac{N}{M} = \frac{\text{Micrometer thread pitch} \times 1000}{360 \times \text{subdivision} \times \text{Stepping angle} \times \text{Transmission ratio}}
\]

**Explaining :** N—Numerator after simplified.
M—Denominator after simplified.

Micrometer thread pitch’s unit : mm ;

Stepping angle unit : angel ;

Transmission = \( \frac{Z_1}{Z_2} \) = Motor’s rotate speed / spindle rotate speed.

Formula can also be written:

\[
\frac{N}{M} = \text{Pulse equivalent weight} = \frac{\text{Micrometer thread pitch} \times 1000}{\text{Pulse number of step motor}} \text{ that spindle rotate one circle}
\]

2.6 Program editing

This system program edit have two districts: Machining program and user program, refer picture below. There are battery to protect data from missing.

Machining program edit area : Current working program area , only one current program. Once machining program be added from user program area to machining area(or new program), Regardless of new or modification executed in edit area and need not save program by saving means. Only when need change new program, the current program is saved to user program area by 【F3】. New or add new machining program 【F2】 from user program area.

Program space: 64K bites.

Number of user program: Save 64 user programs at best, but affected by the space of user program. When the user’s program is long, the number of user program are saved will reduce relatively. When the user’s program is short, the number of user program are not over 64, even though there have space.

Length of machining program: The max line is 540 that system supported.

Under main menu , press 【F3】 , you can enter into edit function, refer the picture below:

<table>
<thead>
<tr>
<th>Line</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>G92 X0 Y100</td>
</tr>
<tr>
<td>002</td>
<td>G00 X-20</td>
</tr>
<tr>
<td>003</td>
<td>G01 X100 Y30</td>
</tr>
<tr>
<td>004</td>
<td>M03</td>
</tr>
<tr>
<td>005</td>
<td>G04 L100</td>
</tr>
<tr>
<td>006</td>
<td>M02</td>
</tr>
</tbody>
</table>
There are 6 items after enter into program edit state, function as follow:

1)  【F1】 – New program, Clear the area of program edit and start editing new machining program.

2)  【F2】 – Call program, Call the existent program to the area of machining program edit and you can modify it.

3)  【F3】 – Save the program of machining edit area to user’s program area.

4)  【F4】 – Delete existent program from user’s program area.

5)  【F5】 – Delete the line of current edit program.

6)  【F6】 – You can receive or send user program to computer or CNC system.

2.6.1 Edit

Enter into edit function, the current machining program will be displayed. You should pay attention to the several items as follow:

1)  The faceplate keys have double kinds. One is compound key, the other is single function key. Usually press the compound key is the value of lower case, if you firstly press 【Shift】 ,then press compound key is the value of upper case, this function is effect only under program editing state.

2)  Cursor move up and down: When cursor move up and down, the cursor will lie in the first line automatically. The cursor will move one line each press. When the cursor move out the first line of screen, if the front have program again, the screen will roll one line; When cursor move out the last line, if the last have program, the screen will roll one line backward.

3)  Cursor move left and right: The cursor will move one character each press. When move to the first line, still press left is not effect. When move to the last, still press right is not effect.

4)  Press 【F↓】 ,Cursor will move right to last line.

5)  Turn page up and down: Press 【Pagup / S↑】 or 【Pagdn / S↓】 , the screen will turn page forward or backward.
6) During machining program, the number is generated automatically.
7) Note of machining program: The note have important effect on add sub-program and transfer sentence when source program editing. When the line’s first character is”—“or”。” show this line is note.

8) This system’s minimum resolution is 0.001mm。

2.6.2 New

Press 【F1】.select New.2

System hint: Are you continue?

If press 【Enter】.Clear the current editing area; if press 【Quit】.give up producing new program.

2.6.3 Call program

Press 【F2】 and select the program that be called user’s program area. The system will listed the existent program’s name, and the cursor will stay the current name of program. Move the cursor, you can select various program. After press【Enter】.The selected program will be called into editing area; If press 【Quit】.it will give up the function of calling.

2.6.4 Save program

Press 【F3】 select save function, the system will hint:

Program name : 0001

The system display the current program name, you can modify it. If press 【Enter】 , it will save the program of machining edit area to the user’s program area by the selected name. If press 【Quit】.it will give up the function of saving. Note: The document name is only four bits number.
2.6.5 Delete program

Press 【F4】 and select deleting the program of user program area. The system will listed the existent program’s name, and the cursor will stay the current name of program. Move the cursor, you can select various program. After press 【Enter】 , The selected program will be deleted from user editing area; If press 【Quit】 , it will give up the function of deleting.

2.6.6 Transport program

Press 【F6】 and select transport function. The system supports RS-232 communication. The program that transported is managed in machining edit area. Step as follow:

1 . Connect well two machines that will transport program by cable.

2 . Ensure the receive machine have no documents (if have, please first save it) that you want to reserve in machining edit area. Select again the function of transport—receive. The receiver should is receiving state.

3 . On the program transporter, Call the program that will be sent out to machining editing area, then select Edit—Transport—Send out.

4 . When transporting finished , Save the received programs.

Chapter three Instruction system

3.1 Programming symbol explanation

Every action of CNC machining should run according to regulated program. Every machining program is composed of some instruction-segment, Every instruction-segment is composed of some function-word. Every function-word must start by character, followed by parameter.
The definition of function-word:

N  The number of instruction-segment
G  Prepare function
M  Auxiliary function
S  Principal axis
L  Cycle frequency
X  X axis (diameter) definitely coordinates
Y  Y axis definitely coordinates
U  The increment of X axis relatively current position
V  The increment of Y axis relatively current position
I  When machining arc, Value of coordinates that the center of a circle subtract the value of start point that X axis.
J  When machining arc, Value of coordinates that the center of a circle subtract the value of start point that X axis.
R  Specify arc radius
F  Specify machining speed, use for G01, G02, G03

Note 1: Underneath explanation, Appointment as follows:

X[U]n  -- It represent X or U, n represent value, but only appear once.
Y[V]n  -- It represent Y or V, n represent value, but only appear once too.
PPn   -- Random axis combination, include one axis at least, it also can include two-axis.

Note 2: Executing order, the up line will be executed first than next (except Jump and Call sub-program instruction). In the same program, M, S and T is executed first than G

3.2 Coordinates system
This system adopt standard coordinates system, that is right hand Descartes coordinates system, as follows:
3.3  **G (Basic prepare instruction)**

1) **G92 reference point setting**
When you set the program running, you must put the coordinate value of machining start (reference point) to the start of program, and set use definitely coordinates.

**Format:** G92 Xn Yn

If the content of X and Y don’t follow G92, Current coordinates of X and Y be regarded as reference point. When use the origin of machining tool to locate, the content of X and Z don’t follow G92.

2) **G00 dot moving**
This instruction can carry out getting to specify position quickly. When two axis all have displacement, System will move straight from the start to destination by the most limited speed multiply magnification. When G00 exerting , it will be affected by speed magnification.

**Format:** G00 X[U]n Z[W]n

or   G00 PPn

**Example:**
- G92 X0 Y0
- G00 X120 Y280
  (or G00 U120 V280)
- M02

- Position of current cutting-gun
- Position of anticipate cutting-gun
3) **G01 Cutting along straight line**

This instruction can carry out cutter get to straight specify position, as cutting instruction, Single axis or double axes can move along straight interpolation. The speed of process is specified by F instruction.

**Format:**

\[ \text{G01 X[U]n Z[W]n [Fn]} \]

**or**

\[ \text{G01 PPn [Fn]} \]

**Example:**

\( \text{G92 X0 Y0} \)
\( \text{G00 X200 Y95} \)
\( \text{G01 X80 Y235} \)

(or \( \text{G01 U-120 V145} \))
\( \text{M02} \)

![Diagram showing current and anticipative position of cutting-gun]

- The current position of cutting-gun
- The anticipative position of cutting-gun

4) **G02/G03 Arc cut**

This instruction uses for arc interpolation, it is divided into sequence arc \( \text{G02} \text{ (anticlockwise)} \), inverse arc \( \text{G03} \text{ (clockwise)} \). For the setting of direction refer the picture below:

**Format:**

\[ \text{G02[03] X[U]n Y[V]n In Jn [Fn] or : G02[03] X[U]n Y[V]n Rn [Fn]} \]

\[ \text{G02[03] PPn In Kn [Fn] or : G02[03] PPn Rn [Fn]} \]
Illustration:
- The value of I and J is increment that relative to start point of X and Y direction center. (Center subtract start point).
- R is radius. (R is positive value, When arc≤180°, you can use R to represent radius.
- If you specified I, J, no R. If you specified R, no I and J.

5) G04 Pause / delay instruction
This instruction can be used for set time delay, When program run this instruction, The program will delay according to the L defined. Unit is second.

Format: G04 Ln

Example: G04 L2.4  ( delay 2.4 second )

When during run G04, Press 【Start】 key, it will stop delay, continue to run program that behind G04. Press 【Quit】 key, it will stop the run of current program.

6) G26,G27,G28 return to reference point
Implement this instruction, Cutter can return to reference point automatically.

Format: G26  X  axis return to reference point
G27  Z  axis return to reference point
G28  X  and Z axis return to reference point simultaneously
Example: G28 (X and Z axis return to reference point simultaneously, equal to G00)

7) **G97 Jump sentence**
This instruction can make program jump automatically to specified section running.

**Format:**   G97  Nn

<table>
<thead>
<tr>
<th>Format</th>
<th>G97</th>
<th>Nn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td>N000</td>
<td>G92</td>
</tr>
<tr>
<td></td>
<td>N001</td>
<td>G00</td>
</tr>
<tr>
<td></td>
<td>N002</td>
<td>G01</td>
</tr>
</tbody>
</table>

...  

<table>
<thead>
<tr>
<th>Format</th>
<th>Nn</th>
<th>Nn</th>
</tr>
</thead>
<tbody>
<tr>
<td>N151</td>
<td>G28</td>
<td></td>
</tr>
<tr>
<td>N152</td>
<td>G97 N1 (jump to instruction that No N001 running)</td>
<td></td>
</tr>
</tbody>
</table>

M02

The above program is a endless loop, usually it is used for check the stability of system and mechanism.

8) **G98/G99 Call sub-program**
The use of G98 and G99 need cooperating, G98 is call instruction and G99 is return instruction.

**Symbol:**   G98 Nn  (N is the first segment number of subprogram that will be called)

**G99**

<table>
<thead>
<tr>
<th>Format</th>
<th>Nn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example :</td>
<td>N001</td>
</tr>
<tr>
<td></td>
<td>N002</td>
</tr>
<tr>
<td></td>
<td>N003</td>
</tr>
<tr>
<td></td>
<td>N004</td>
</tr>
<tr>
<td></td>
<td>N005</td>
</tr>
</tbody>
</table>

...  

<table>
<thead>
<tr>
<th>Format</th>
<th>Nn</th>
</tr>
</thead>
<tbody>
<tr>
<td>N019</td>
<td>M02 - Program finished</td>
</tr>
<tr>
<td>N020</td>
<td>G02 U0 V-20 R10 - The first subprogram</td>
</tr>
<tr>
<td>N021</td>
<td>G03 U0 V-20 R10</td>
</tr>
<tr>
<td>N022</td>
<td>G99 - The first subprogram return</td>
</tr>
<tr>
<td>N023</td>
<td>* - Two note lines, adjust the position of subprogram</td>
</tr>
<tr>
<td>N024</td>
<td>*</td>
</tr>
<tr>
<td>N025</td>
<td>G01 U2 V-1 - The second subprogram</td>
</tr>
<tr>
<td>N026</td>
<td>G01 V-5</td>
</tr>
<tr>
<td>N027</td>
<td>G98 N20 - Subprogram nesting, call subprogram one.</td>
</tr>
</tbody>
</table>
Note: Subprogram can call subprogram(named nesting), System permit subprogram that have five nesting.

8) **G22/G80 Cycle sentence**

This instruction can be used to run program cycle, G22 is the start that cycle body, and specified the cycle times L. G80 is the finished sign of cycle body. This instruction can nesting cycle, but don’t allow over five. G22 and G80 make up a cycle body.

**Format:**

```
G22  Ln_  ( L is the specified times )
```

**Cycle body**

```
G80   ( Sign of cycle body finish )
```

**Example:**

```
N000  G92  X100 Y100
N001  G00  X60 Y80
N002  G22  L5                -  First layer cycle starting
N003  G00  V50 U-25
N004  G22  L5                -  Twice layer cycle starting
N005  G01  U5  V-10
N006  G80                    -  Twice layer cycle finish
N007  G80                    -  First layer cycle finish
N008  G28
N009  M02
```

9) **G81 Machining piece add one**

This instruction can make the machining piece add one.

**Format:**  

**G81**

---

### 3.4 M function and configuration files

1) **M function**

- **M00**  Program pause instruction, Press 【Start】 , program will continue running.
- **M02**  Program finish instruction, program is waiting state after run this.
- **M30**  Same to M02
- **M10/M11**  Acetylene valve on-off, M10(On), M11(Off)
- **M12/M13**  Cutting oxygen valve on-off, M12(On), M13(Off)
- **M14/M15**  Cutting-gun rising on-off, M14(On), M15(Off)
M16/M17  Cutting-gun descending on-off,M16(On), M17(Off)

M24/M25  Preheat oxygen valve on-off, M24(On), M25(Off)

M20/M21  Ignition on-off M20(on), M21(off)

M50  **Preheat perforation fixed circle**, operate order as follow:

1. If acetylene valve isn’t opened, turn on acetylene ignition;
2. Cutting-gun descending (Cutting-gun descending delay, refer M71);
3. Open preheat oxygen valve, start preheat delay. If the time of preheat is not enough, you can press【Pause】; the preheat time will delay automatically 150 seconds.

If preheat is ok, you can press【Start】to finish preheat delay, and the pre-heat time will be saved automatically to preheat delay parameter.
4. Cutting-gun rising (perforation cutting gun rising delay)
5. Open cutting oxygen valve, at the same time cutting-gun descending (perforation cutting-gun delay) and start to run the latter program.

M51  Close cutting fixed cycle, opposite to M50. Operate order as follow:

1. Close cutting oxygen valve (M13);
2. Cutting-gun rising (Cutting-gun rising delay, refer M70).

M51 is often used before G00, put up cutting-gun to shift position and avoid colliding with steel plates.

M52  **Ignition fixed cycle**, operate order: open acetylene valve (M10) and high-voltage ignition (M20), delay “ignition delay”, close high-voltage ignition (M21).

M70  **Cutting-gun rising fixed cycle**, operate order: open cutting-gun rising on-off (M14), delay “cutting-gun rising delay”, close cutting-gun rising on-off (M15).

M71  **Cutting-gun descending fixed cycle**, operate order: open cutting-gun descending on-off (M16), delay “cutting-gun descending delay”, close cutting-gun descending on-off (M17).

M80  General switch, after execute M80, all outputs will be closed.

M16/M17  Control output 4# on-off, M16(on), M17(Off)
M18/M19  Control output 6# on-off, M18(on), M19(Off)
M22/M23  Control output 7# on-off, M22(on), M23(Off)
M40/M41  Control output 9# on-off, M40(on), M41(Off)
M26/M27  Control output 10# on-off, M26(on), M27(Off)
M28/M29  Control output 11# on-off, M28(on), M29(Off)
M32/M33  Control output 12# on-off, M32(on), M33(Off)
M34/M35  Control output 13# on-off, M34(on), M35(Off)
M36/M37  Control output 14# on-off, M36(on), M37(Off)
M38/M39  Control output 15# on-off, M38(on), M39(Off)
M42/M43  Control output 16# on-off, M42(on), M43(Off)
2) Output configuration files

In order to adapt for different user’s request of output form, This system adapt configuration files to confirm:

1. Specified M function after G60, it will output pulse signal. At the same time D parameter will specify pulse width. If G60 is not specified M function, it will output electric level form.

2. M function that behind G61 instruction is need executed after carry out the Pause instruction.

3) Output configuration files sentence contents:

1.G60  : Specified M instruction that followed is pulse output.

Format: G60 Mn Dn

Mn – M function( You can specify eight M function at most or none.)

Dn – Delay time ( uniform delay time of above specified M function ) , unit: second, default value: 0.13 second.

Example: G60 M03 M04 M05 M10 M11 M12 M08 M09 D0.23
Explain: Specified M03 M04 M05 M08 M09 M10 M11 M12.  Output is pulse signal that 0.23 second.

2.G61  : Specified the followed M instruction be used after Pause.

Format: G61 Mn

Mn – M function ( You can specify eight M function at most or none ).

Example: G61 M05 M12 M22 M04 M09 M78
Explain: After system execute pause operation, requiring execute M05 M12 M22 M04 M09 output. M78 express resuming automatically pause’s output state when start again after pause.

4)The usage of output configuration files:

( Only execute once, if not amend the output form, it is not need to execute again. )

1. Enter program editing function.
2. Compile configuration files that include G60 and G61, named file again and save.
3. Entering automatic function, execute configuration files.
Chapter Four  System diagnosis

Under main function menu, Press 【F5】 and enter System diagnosis function, refer picture below:

<table>
<thead>
<tr>
<th>Output: M10</th>
<th>M12</th>
<th>M14</th>
<th>M16</th>
<th>M20</th>
<th>M18</th>
<th>M22</th>
</tr>
</thead>
<tbody>
<tr>
<td>M24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>M40</td>
<td>M26</td>
<td>M28</td>
<td>M32</td>
<td>M34</td>
<td>M36</td>
</tr>
<tr>
<td>M42</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input: &gt;X+</th>
<th>X-&lt;</th>
<th>&gt;Y+</th>
<th>Y-&lt;</th>
<th>HAD</th>
<th>STP</th>
<th>PAU</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

System diagnosis display the opened hardware resource of current system. Under the picture of system diagnosis, you can check the interface that followed:

1. **Output checking:** Cursor move to random position of 16 dots photo-electricity isolation output. Use “0” and “1” to change output state of electric level. 1 express set-bit, 0 express cancel. The definition of other output ports, please refer to 6.2 chapter. (output ports definition).

2. **Input checking:** Display the input state of current 16 dots photo-electricity isolation. ‘1’ express set-bit. ‘0’ express this port have no set-bit. The definition of other input ports, please refer to 6.1 chapter.(input ports definition).

3. **Keyboard checking:** Press random key of 44 keyboard and display the value.

4. **Coder checking:** Turn coder, the screen display coding angle signal cumulate value, rotate signal and checking thread No.

5. **Hand-pulse generator checking:** Turn hand-pulse, display direction electric level and the number of input pulse.
Chapter five  System inside connect

5.1 System inside structure picture

- LCD
- Double SCM circuit
- LCD control circuit
- Keyboard receiving
- Hardware interpolation machine
- Battery circuit
- Photo-electricity isolation input/output
- CNC main-board

5.2 System power supply

- AC220V
- 7A / 5V
- Connect LCD be in poor light
- LCD adjust
- LCD brightness
- Digital potentiometer
- LCD power source
- DC / DC
- Transformer On-off power source
- On-off power source
- AC220V
- +24V
- +5V
- Connect shifting board
- RS232
- Hand-pulse
- Motor
- Input
- Output
- Coder

AC380V
5.3 CNC main-board

J1 DC power source input DC5V

J2 photo-electricity isolation
16 way input
16 way output
D/A output

J3 photo-electricity isolation
step motor signal
Coder signal
Hand-pulse signal

J4 F1-F6
Little keyboard

J5 Character/numb

J6 LCD interface
5.4 Signal shifting board

J7 LCD inverter interface
Chapter six  System outside connect

6.1 Outside input interface

1) Urgent stop / Start /Pause signal input

Urgent stop/Stop/Pause commonly use mechanical on-off, in order to avoid interfere, we usually use normally off contact of mechanical on-off, according to the followed picture to connect.

![Diagram of urgent stop signal input](image)

**Attention**: System require urgent stop, start, pause and the logic of margin is uniform, this is all connect to normally on or normally off (in common use). After system start, it will check the state of start bit automatically and as control base. So, if don’t connect external start on-off, the corresponding start-bit should be connected to 24V ground (simple to connect to normally off contact) or connect none(simple to connect to normally on contact).

2) Margin / origin signal input

Margin/origin usually use mechanical on-of or double thread magnet on-off and NPN, PNP Hall on-off. Toward use mechanical on-off or double thread magnet on-off, you can connect according to as the above item 1). If use NPN or PNP model Hall on-off, you can connect according to the picture below.
### 3) Definition of input ports

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>25 pin socket</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;X+</td>
<td>1</td>
<td>X+ margin, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>X-</td>
<td>14</td>
<td>X- margin, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>&gt; Y+</td>
<td>2</td>
<td>Y+ margin, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>Y-</td>
<td>15</td>
<td>Y- margin, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>H A D</td>
<td>3</td>
<td>Manual/ Auto change selecting</td>
</tr>
<tr>
<td>S T P</td>
<td>16</td>
<td>External urgent stop key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>P A U</td>
<td>4</td>
<td>External pause key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>S T A</td>
<td>17</td>
<td>External start key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>X+</td>
<td>5</td>
<td>External manual control box, X+ positive control, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>X-</td>
<td>18</td>
<td>External manual control box, X- positive control, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>Y+</td>
<td>6</td>
<td>External manual control box, Y+ positive control, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>Y -</td>
<td>19</td>
<td>External manual control box, Y - positive control, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>SP+</td>
<td>7</td>
<td>External manual control box’s speedup control key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>SP-</td>
<td>20</td>
<td>External manual control box’s speed-down control key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>UP</td>
<td>8</td>
<td>External manual control box’s cutting-gun rising control key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>DOW</td>
<td>21</td>
<td>External manual control box’s cutting-gun descending key, high-level is effect, if don’t use, the signal connect to 24V ground.</td>
</tr>
<tr>
<td>24V</td>
<td>12,24</td>
<td>+24V/1A power source</td>
</tr>
<tr>
<td>24V ground</td>
<td>13,25</td>
<td>24V power source ground</td>
</tr>
</tbody>
</table>

### 6.2 Outside output interface

Explain: Control signal = 0 on-off/relay switch-on (+24V’s circuit come into being loop, low-level is effect, signal send out)

Control signal = 1 on-off/relay switch-off (+24V’s circuit don’t get, signal cancel)

**Output port definition**  (25 pins socket) (hole)

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>Socket No</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10/M11</td>
<td>1</td>
<td>Acetylene valve control, M10(on), M11(off)</td>
</tr>
<tr>
<td>M12/M13</td>
<td>14</td>
<td>Cutting oxygen control, M12(on), M13(off)</td>
</tr>
<tr>
<td>M14/M15</td>
<td>2</td>
<td>Cutting-gun rising control, M14(on), M15(off)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>M16/M17</td>
<td>15</td>
<td>Cutting-gun descending control, M16(on), M17(off)</td>
</tr>
<tr>
<td>M20/M21</td>
<td>3</td>
<td>Ignition control, M20(on), M21(off)</td>
</tr>
<tr>
<td>M18/M19</td>
<td>16</td>
<td>Output port 6# control, M18(on), M19(off)</td>
</tr>
<tr>
<td>M22/M23</td>
<td>4</td>
<td>Output port 7# control, M22(on), M23(off)</td>
</tr>
<tr>
<td>M24/M25</td>
<td>17</td>
<td>Preheat oxygen valve control, M24(on), M25(off)</td>
</tr>
<tr>
<td>M40/M41</td>
<td>5</td>
<td>Output port 9# control, M40(on), M41(off)</td>
</tr>
<tr>
<td>M26/M27</td>
<td>18</td>
<td>Output port 10# control, M26(on), M27(off)</td>
</tr>
<tr>
<td>M28/M29</td>
<td>6</td>
<td>Output port 11# control, M28(on), M29(off)</td>
</tr>
<tr>
<td>M32/M33</td>
<td>19</td>
<td>Output port 12# control, M32(on), M33(off)</td>
</tr>
<tr>
<td>M34/M35</td>
<td>7</td>
<td>Output port 13# control, M34(on), M35(off)</td>
</tr>
<tr>
<td>M36/M37</td>
<td>20</td>
<td>Output port 14# control, M36(on), M37(off)</td>
</tr>
<tr>
<td>M38/M39</td>
<td>8</td>
<td>Output port 15# control, M38(on), M39(off)</td>
</tr>
<tr>
<td>M42/M43</td>
<td>21</td>
<td>Output port 16# control, M42(on), M43(off)</td>
</tr>
<tr>
<td>0-10V</td>
<td>9, 22</td>
<td>0-10V Voltage output</td>
</tr>
<tr>
<td>24V</td>
<td>12, 24</td>
<td>+24V / 1A Power source</td>
</tr>
<tr>
<td>24V ground</td>
<td>13, 25</td>
<td>24V ground</td>
</tr>
</tbody>
</table>

### 6.3 Outside step-motor driver interface

**Start Microstep CNC SH-2000TH**

- J5-9 XDIR-  
- J5-1 XDIR+  
- J5-10 XCP-  
- J5-2 XCP+  
- J5-11  
- J5-3 YDIR+  
- J5-12 YCP-  
- J5-4 YCP+  
- J5-7  

**Start Microstep CNC MS serial driver**

- DIR+/CCW+  
- DIR-/CCW-  
- CP+/CW+  
- CP-/CW-  
- DIR+/CCW+  
- DIR-/CCW-  
- CP+/CW+  
- CP-/CW-
Connect Start Microstep MS serial driver demonstration

Start Microstep CNC SH-2000TH

- J5-7
- J5-1 XDIR+
- J5-9 XDIR-
- J5-2 XCP+
- J5-10 XCP-
- J5-7
- J5-3 YDIR+
- J5-11
- J5-4 YCP+
- J5-12 YCP-

Start Microstep CNC SH serial driver

- OPTO
- DIR
- CP

Start Microstep CNCSH-2000TH

- J5-1 XDIR+
- J5-9 XDIR-
- J5-2 XCP+
- J5-10 XCP-
- J5-7
- J5-3 YDIR+
- J5-11
- J5-4 YCP+
- J5-12 YCP-

Panasonic servo

- CN1/F5
- CN1/F6
- CN1/F3
- CN1/F4

Connect Start Microstep SH serial driver demonstration
Connect Panasonic servo-driver demonstration

6.4 RS232 serial interface

RS232 interface definition:

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>9 pin socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD</td>
<td>2</td>
</tr>
<tr>
<td>RXD</td>
<td>3</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
</tr>
</tbody>
</table>

Driver signal interface definition:

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>15 pin socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>XDIR+</td>
<td>1</td>
</tr>
<tr>
<td>XDIR-</td>
<td>9</td>
</tr>
<tr>
<td>XCP+</td>
<td>2</td>
</tr>
<tr>
<td>XCP-</td>
<td>10</td>
</tr>
<tr>
<td>ZDIR+</td>
<td>3</td>
</tr>
<tr>
<td>ZDIR-</td>
<td>11</td>
</tr>
<tr>
<td>ZCP+</td>
<td>4</td>
</tr>
<tr>
<td>ZCP-</td>
<td>12</td>
</tr>
</tbody>
</table>

Motor output signal definition

Connect Panasonic servo-driver demonstration

RS232 interface definition:

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>9 pin socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD</td>
<td>2</td>
</tr>
<tr>
<td>RXD</td>
<td>3</td>
</tr>
<tr>
<td>GND</td>
<td>5</td>
</tr>
</tbody>
</table>

Driver signal interface definition:

<table>
<thead>
<tr>
<th>Signal definition</th>
<th>15 pin socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>XDIR+</td>
<td>1</td>
</tr>
<tr>
<td>XDIR-</td>
<td>9</td>
</tr>
<tr>
<td>XCP+</td>
<td>2</td>
</tr>
<tr>
<td>XCP-</td>
<td>10</td>
</tr>
<tr>
<td>ZDIR+</td>
<td>3</td>
</tr>
<tr>
<td>ZDIR-</td>
<td>11</td>
</tr>
<tr>
<td>ZCP+</td>
<td>4</td>
</tr>
<tr>
<td>ZCP-</td>
<td>12</td>
</tr>
</tbody>
</table>
Chapter seven  System surface and setting dimension

Panel dimension: 270 X 170

Appendix 1  Electronic gear fast check table

Stepping angle 1.5 · Transmission ratio 1:1 (360 * subdivision * transmission / stepping angle) /micrometer thread pitch

<table>
<thead>
<tr>
<th>Subdivision (Screw-pitch mm)</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5/2</td>
<td>5/4</td>
<td>5/8</td>
<td>5/16</td>
</tr>
<tr>
<td>4</td>
<td>10/3</td>
<td>5/3</td>
<td>5/6</td>
<td>5/12</td>
</tr>
<tr>
<td>5</td>
<td>25/6</td>
<td>25/12</td>
<td>25/24</td>
<td>25/48</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>15/6</td>
<td>5/4</td>
<td>5/8</td>
</tr>
<tr>
<td>8</td>
<td>20/3</td>
<td>10/3</td>
<td>5/3</td>
<td>5/6</td>
</tr>
<tr>
<td>10</td>
<td>25/3</td>
<td>25/6</td>
<td>25/12</td>
<td>25/24</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>5</td>
<td>15/6</td>
<td>5/4</td>
</tr>
</tbody>
</table>
Stepping angle 0.75 - Transmission ratio 1:1 (360*subdivision*transmission/stepping angle) /micrometer thread pitch

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-pitch (mm)</td>
<td>5/4</td>
<td>5/8</td>
<td>5/16</td>
<td>5/32</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5/3</td>
<td>5/6</td>
<td>5/12</td>
<td>5/24</td>
</tr>
<tr>
<td>5</td>
<td>25/12</td>
<td>25/24</td>
<td>25/48</td>
<td>25/96</td>
</tr>
<tr>
<td>6</td>
<td>5/2</td>
<td>5/4</td>
<td>5/8</td>
<td>5/16</td>
</tr>
<tr>
<td>8</td>
<td>10/3</td>
<td>5/3</td>
<td>5/6</td>
<td>5/12</td>
</tr>
<tr>
<td>10</td>
<td>25/6</td>
<td>25/12</td>
<td>25/24</td>
<td>25/48</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>5/2</td>
<td>5/4</td>
<td>5/8</td>
</tr>
</tbody>
</table>

Stepping angle 0.6 - Transmission ratio 1:1 (360*subdivision*transmission/stepping angle) /micrometer thread pitch

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-pitch (mm)</td>
<td>1</td>
<td>1/2</td>
<td>1/4</td>
<td>1/8</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4/3</td>
<td>2/3</td>
<td>1/3</td>
<td>1/6</td>
</tr>
<tr>
<td>5</td>
<td>5/3</td>
<td>5/6</td>
<td>5/12</td>
<td>5/24</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1/2</td>
<td>1/4</td>
</tr>
<tr>
<td>8</td>
<td>8/3</td>
<td>4/3</td>
<td>2/3</td>
<td>1/3</td>
</tr>
<tr>
<td>10</td>
<td>10/3</td>
<td>5/3</td>
<td>5/6</td>
<td>5/12</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1/2</td>
</tr>
</tbody>
</table>

Stepping angle 1.8 - Transmission ratio 1:1 (360*subdivision*transmission/stepping angle) /micrometer thread pitch

<table>
<thead>
<tr>
<th>Subdivision</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-pitch (mm)</td>
<td>3</td>
<td>3/2</td>
<td>3/4</td>
<td>3/8</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1/2</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5/2</td>
<td>5/4</td>
<td>5/8</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>3</td>
<td>3/2</td>
<td>3/4</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5/2</td>
<td>5/4</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>3/2</td>
</tr>
</tbody>
</table>
## Appendix 2 Error information table

<table>
<thead>
<tr>
<th>Error code</th>
<th>Error contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>40H</td>
<td>‘urgent stop’ key press</td>
</tr>
<tr>
<td>41H</td>
<td>X axis positive margin</td>
</tr>
<tr>
<td>42H</td>
<td>X axis negative margin</td>
</tr>
<tr>
<td>43H</td>
<td>Y axis positive margin</td>
</tr>
<tr>
<td>44H</td>
<td>Y axis negative margin</td>
</tr>
<tr>
<td>45H</td>
<td>Software coordinates negative margin</td>
</tr>
<tr>
<td>46H</td>
<td>Software coordinates positive margin</td>
</tr>
<tr>
<td>01H</td>
<td>When programming, there are unwanted or illegal character</td>
</tr>
<tr>
<td>20H</td>
<td>Division overflow</td>
</tr>
<tr>
<td>21H</td>
<td>Arc ( G02, G03 ) Start point or end point have error</td>
</tr>
<tr>
<td>22H</td>
<td>Arc ( G02, G03 ) radius have error</td>
</tr>
<tr>
<td>24H</td>
<td>Arc ( G02, G03 ) term have error</td>
</tr>
<tr>
<td>34H</td>
<td>Executing illegal operation</td>
</tr>
</tbody>
</table>

Neri Machine Tools Pvt Ltd.
Plot No. 92/93, 7th Main, 3rd Phase, Peenya Industrial Area, Bangalore – 560 058 (India)
Phone: +91 80 28374885, Fax: +91 80 28397834, E-mail: sales@nerigroup.in
Website: www.nerigroup.in