

# CNC Cutting Controller CC-M3 & CC-M3c Manual

## CC-M3

## CC-M3c



Beijing Flourishing Start Control Technology Co., Ltd.

5F Building 2, No.9 Shuangyuan Road, Shijingshan District, Beijing, China 100041

Tel: 0086 10 8890 9235    Mobile (WhatsApp): 0086 159 0106 9532;    Email: cuttingcnc@hotmail.com;    Skype: henryhaozq

# Catalog

## Safety

## Chapter 1 controller general introduction

- 1-1 Installation dimension
- 1-2 display
- 1-3 keys
- 1-4 USB port
- 1-5 Switch power supply
- 1-6 Replays
- 1-7 Signal ports

## Chapter 2 parts load

- 2-1 load from Figures
- 2-2 load from disk
- 2-3 load from Edit
- 2-4 restore parts cutting

## Chapter 3 parts nest

- 3-1 rotation
- 3-2 mirror
- 3-3 scale
- 3-4 array
- 3-5 nest

## Chapter 4 parts cutting

- 4-1 auto interface, figures display, operation display, state display
- 4-2 manual interface
- 4-3 preparation before cutting, cutting mode, speed limitation, kerf
- 4-4 optional operation, torch movement, return, reset (fixed point), parts alignment, outline, simulation, start point change, section, manual output
- 4-5 operation during cutting
- 4-6 operation after pause

## Chapter 5 Settings

- 5-1 speed
- 5-2 system
- 5-3 control
- 5-4 craft
- 5-5 figure
- 5-6 machine
- 5-7 configuration
- 5-8 advanced parameter management

5-9 save

## Chapter 6 Edit

6-1 edit function

6-2 code instrument

6-3 coordinate system

6-4 G command

6-5 M assistant function

6-6 file manager

## Chapter7 Diagnose

7-1 diagnose

## Appendix

1. Quick user guide

## **Safety notice**

Please carefully read the manual before using the product. Here list some safety operation items, but they can't replace some safety operation rules from the country and the company.

## **Safety operation**

Users must follow safety operation rules made by the country and the company.

## **Mechanical dangerousness**

Operation and repair of automation equipment are a little dangerous and are careful. Please be far away from the working equipment. Please control the equipment by correctly using the panel's buttons. Don't wear so loose clothes when using and repairing the equipment.

## **High-voltage dangerousness**

Be careful of electric shock during operation. Please install the equipment according to its manual. Don't touch cables or wires after power on. Only professional maintenance personal can open the controller. When the equipment has problems, power should be off and then repair.

## **Power isolation**

Please check whether power is right (AC220V±15%).

You must need an AC stabilized-voltage power if power is beyond the above range.

In some places there is no normal power, such as zero line and ground line are together or no zero line, an isolation transformer must be used from 2-phase/3-phase AC380V to 2-phase AC220V.

A lightning rod is also a must.

## **Working environment**

The controller's working temperature is 0-40°C. If out of its working temperature, the controller probably works worse. If the temperature is below 0°C, the screen will not display normally.

Relative humidity is 0-85%.

Special protection is a must when working in high-temperature, high-humidity, and corrosive-gas environment. Don't ask dusts, metal chips and others to go into the controller.

## **Controller connection**

The controller's input/output uses DC24V power (3A or over 3A) and the power can't be used for other electrical equipment. When the power is not connected and emergent stop and limit position are both valid, the controller will in the state of emergent stop and limit position.

The connection line between the controller and the driver should be shielding wire.

Don't plug in and plug out when power on.

Controller's input/output line should connect well.

## **Good ground-connection**

All parts of the cutting machine and the controller should connect ground.

Controller's ground wire diameter should be over 4 mm<sup>2</sup>, and try to keep a shorter distance to the ground.

DC24V ground (-) must break with ground.

## **Controller protection**

Don't ask dusts, metal chips and other materials to go into the controller so that it can't normally work.

The controller's LCD screen should be protected.

## **Others**

The controller can use U disk and its format is FAT or FAT32

The controller has a manual.

If the controller damages because of abnormal operation, we are not responsible for maintenance.

Controller operation and maintenance

Only professional operators can use the controller.

### **Controller operation**

Please use fingers to press buttons.

Please don't change functions and parameters at random if you are not familiar with them.

Please feel free to let us know problems during operation.

### **Controller maintenance**

When the controller can't work normally, you need to check relative hardware or wire connection after power off.

Don't open the controller to repair without professional personnel.

Please feel free to let us know when the controller has problems.

### **Declaration**

Controller guarantee instruction

Guarantee period: within 12 month after leaving our company.

Guarantee terms: during guarantee period any problems under normal operations.

During guarantee period, we charge for out of guarantee terms.

We charge for all problems out of guarantee period.

### **Following situations are beyond guarantee:**

Any damage under abnormal operation or accident damage;

Damaged by plug in and out of the controller when power on;

Natural disasters;

Repair, disassemble, retrofit, etc. at random without our allowance.

## Chapter 1 controller general introduction

### Basic parameters

Processor: industrial ARM chip

Display: 10.4" color LCD

Input/output: 20 optoelectronic isolation input, 20 optoelectronic isolation output

Axis number: 2 axes, 4 axes are available

AD/DA: DA X 1

Communication: RS232 X 2, USB X 1

Pulse equivalence: electronic gear numerator, denominator set range: 1 ~ 65535

Store space: 4G

Installation dimension: 410 X 310 X 58 (mm)

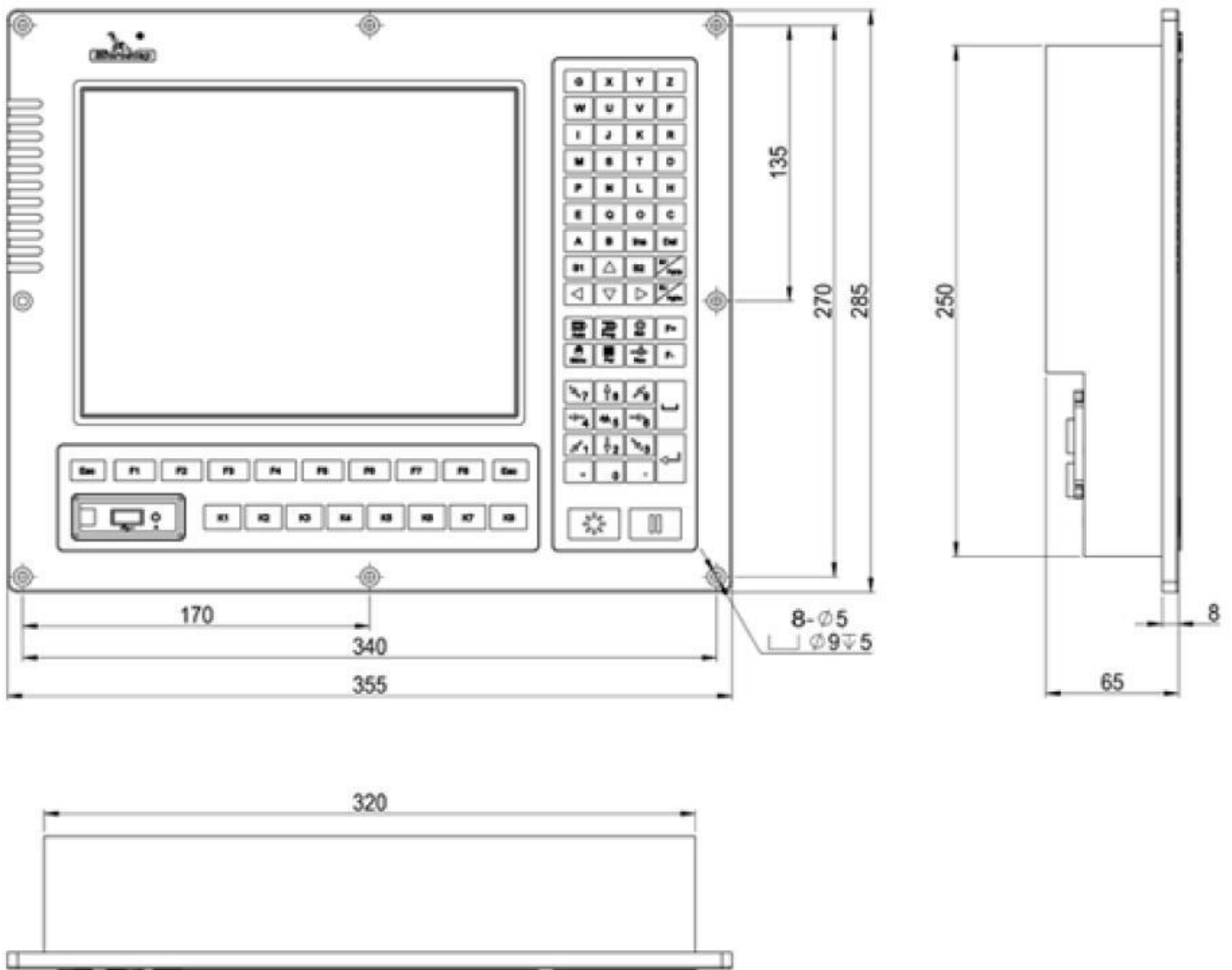
Working temperature: 0°C ~ +40°C

Store temperature: -40°C ~ +60°C

### 1-1 Installation dimension (same as model SH-2200H)



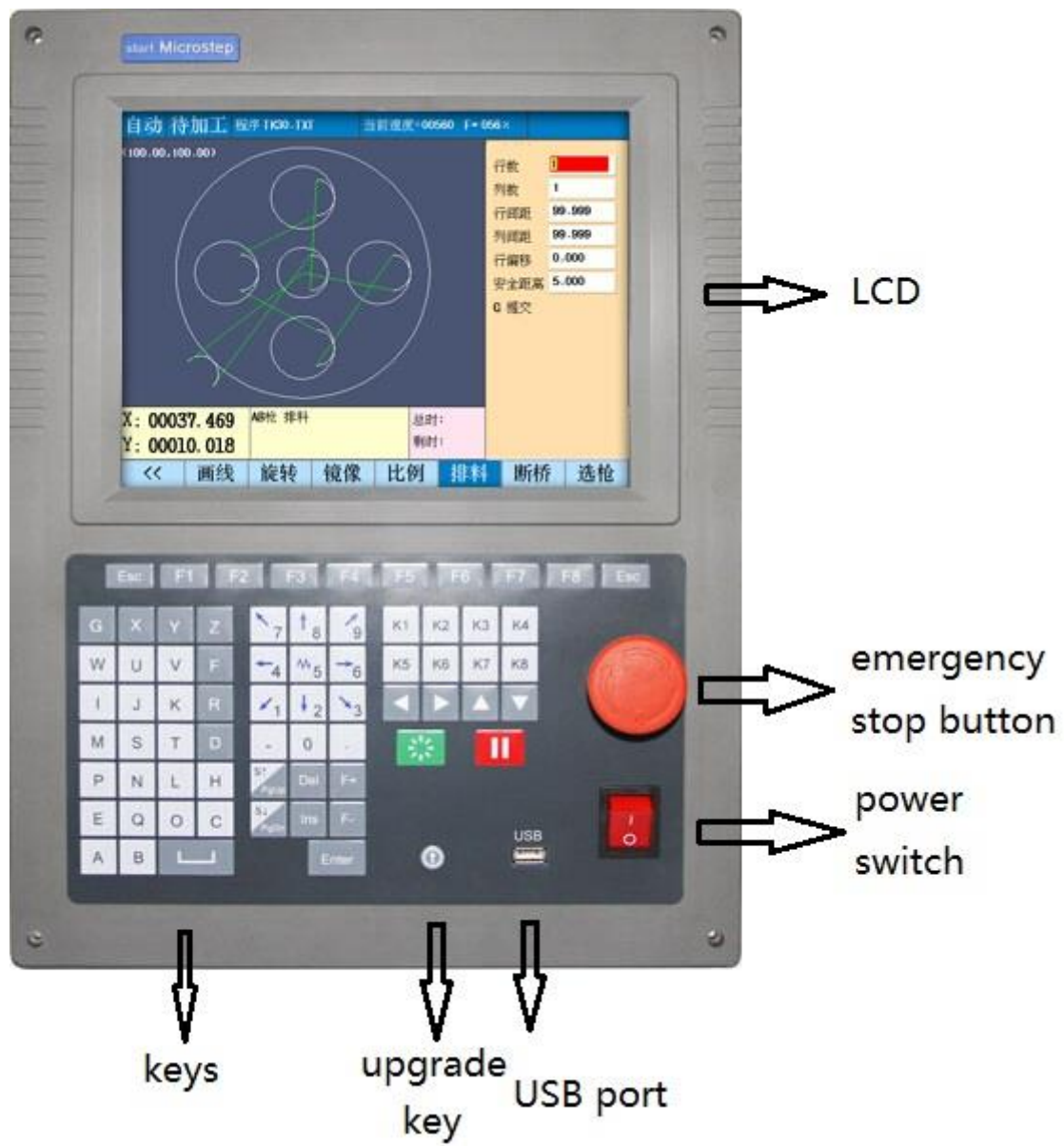
CC-M3C



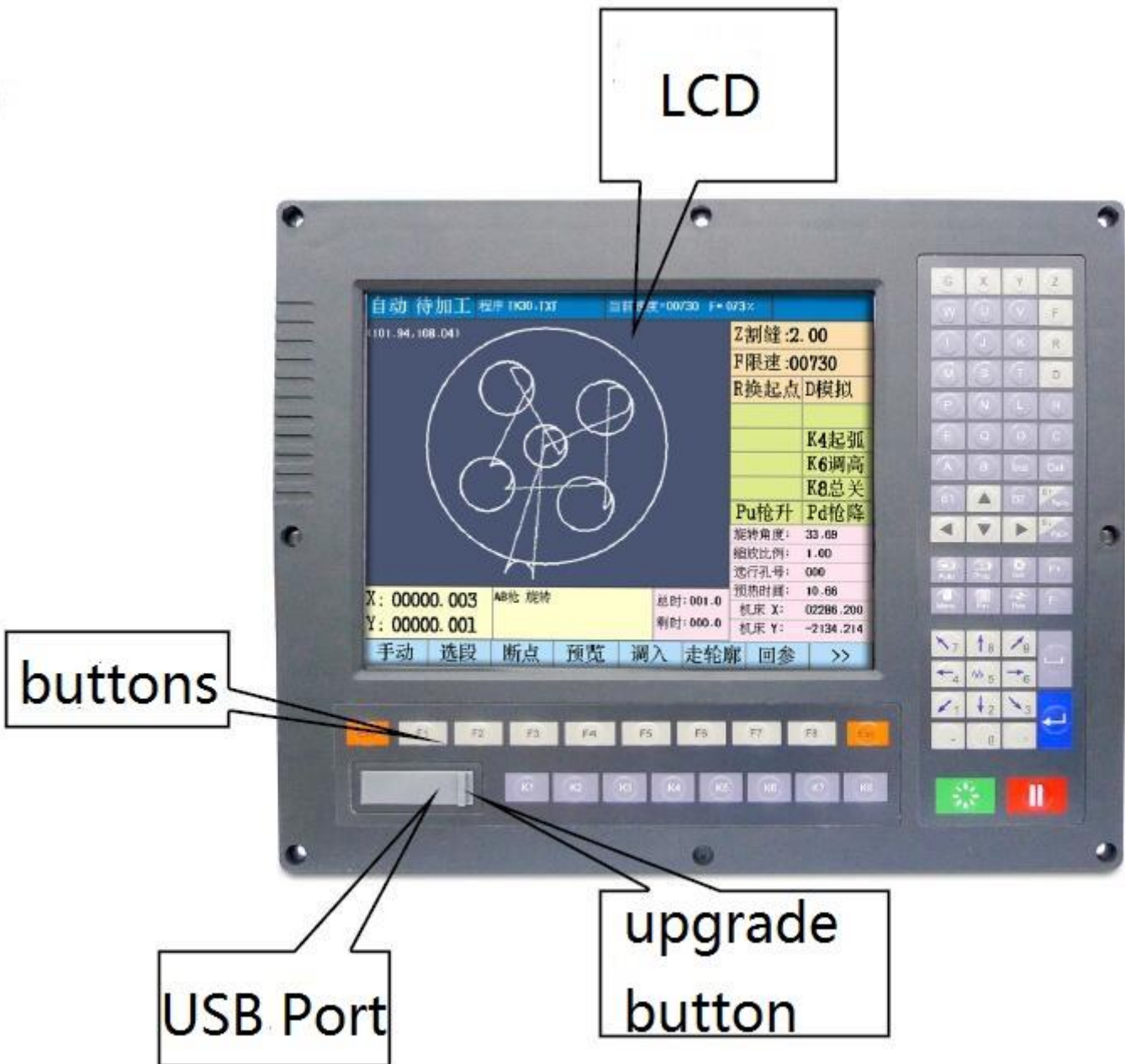
## 1-2 Display

10.4" true color LCD, resolution: 640\*480

CC-M3 Front panel



CC-M3c



### 1-3 Keys

Function keys: specific function is up to the current interface. Esc is to cancel or back to the previous menu.






Cursor movement keys: to move the cursor or to move the figure when preview.



Letters keys: mainly to edit the program, or to operate in the auto and manual interfaces.

Fast operation:

1. To revise values, press , then press  to clear numbers.
2. Usually  for confirm and linefeed.
3. When preview figures, Y to zoom in, Z to zoom out, G to restore.

G	X	Y	Z
W	U	V	F
I	J	K	R
M	S	T	D
P	N	L	H
E	Q	O	C
A	B	⏏	

Switches keys: manually turn on or turn off the external switches

K1	K2	K3	K4
K5	K6	K7	K8

Directions, speed adjustment, torch up/down keys

↖ 7	↑ 8	↗ 9
← 4	⏏ 5	→ 6
↙ 1	↓ 2	↘ 3
-	0	.

Up/down, edit, speed adjustment keys

S↑ PgUp	Del	F+
S↓ PgDn	Ins	F-
Enter		



torch up/down, or pageup/down when edit.

F+: speed up

F-: speed down

Del: delete

Ins: insert

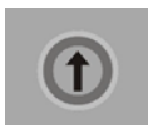
Enter: confirm

Start, pause keys



When preheat,  extend delay,  skip delay.

Upgrade key



press the key and turn on the controller, enter upgrade interface.

Multiple choices

Press the same key, different options display in cycle.

Section key: "pierce point" and "line number" display in cycle and automatically tip input range.

Break point key: 3 break points display in cycle and the first one is the latest one.

Mirror key: "X mirror", "Y mirror" and "XY mirror" display in cycle.

Torch key: "torch A", "torch B" and "torch A and B" display in cycle.

Return key: back to "part reference point" and "laser location point" if parameter setting has laser location.

## 1-4 USB port



It's better that U disk format is FAT and FAT32 format with small storage.

It's better to save the program from the U disk to the controller to cut.

CC-M3 USB transfer speed is 20 times as fast as SH-2200H.

## 1-5 Power switch



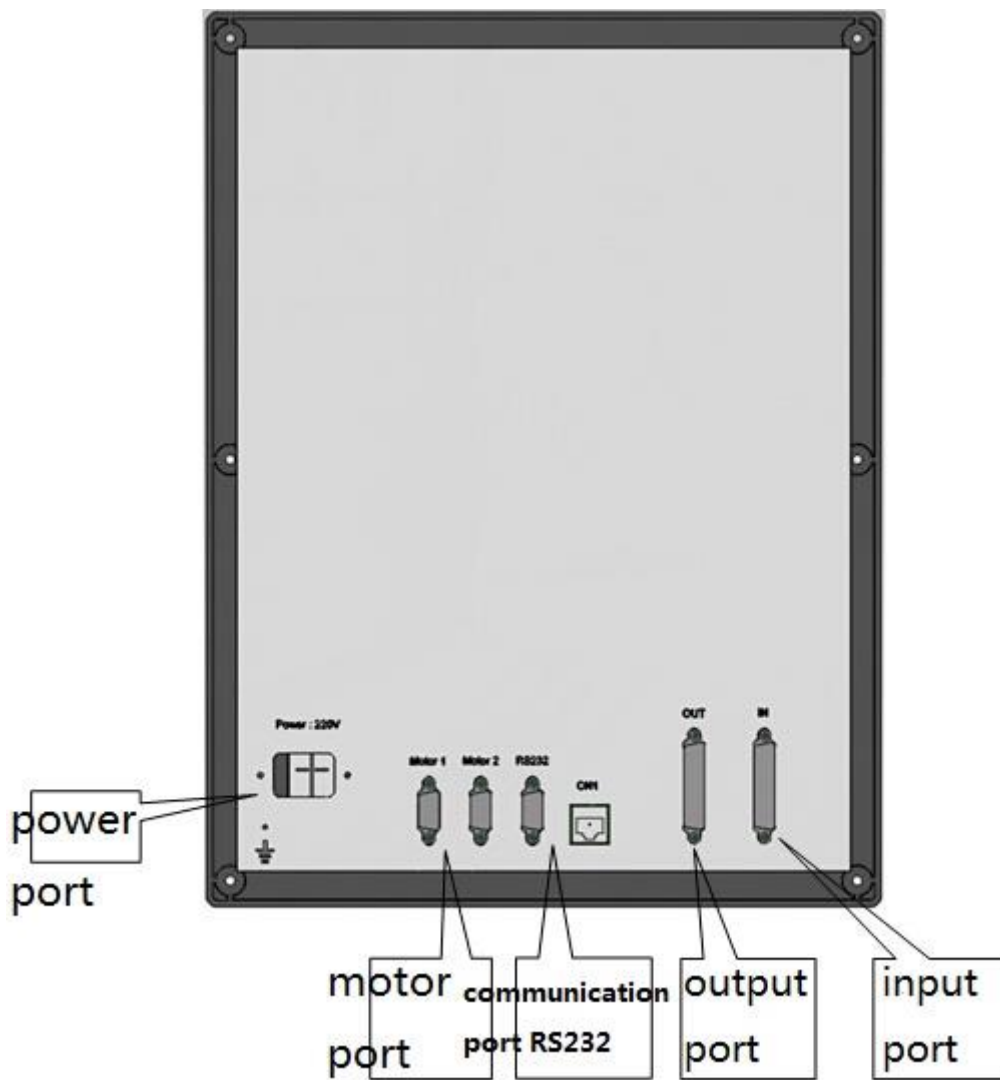
## 1-6 Emergency stop switch



After press it, the running motors immediately stop and all output are closed. If there is emergency-stop signal before work, then there is no movement and output.

**Note:** when only use the switch as emergency-stop function, need to connect input pin16 and pin23. If need external emergency-stop switch, should connect an external emergency-stop switch normally-closed contact between pin16 and pin23.

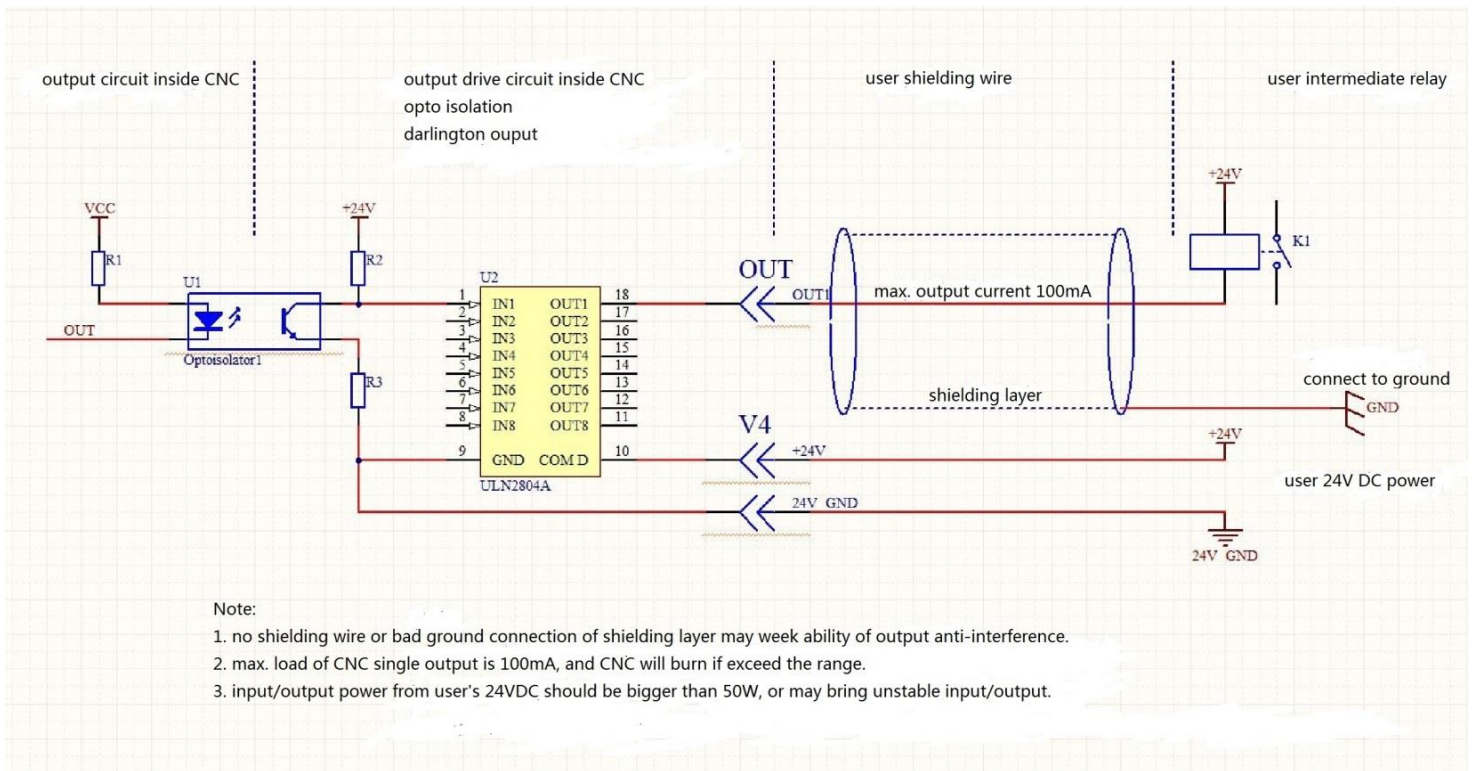
## 1-7 back panel



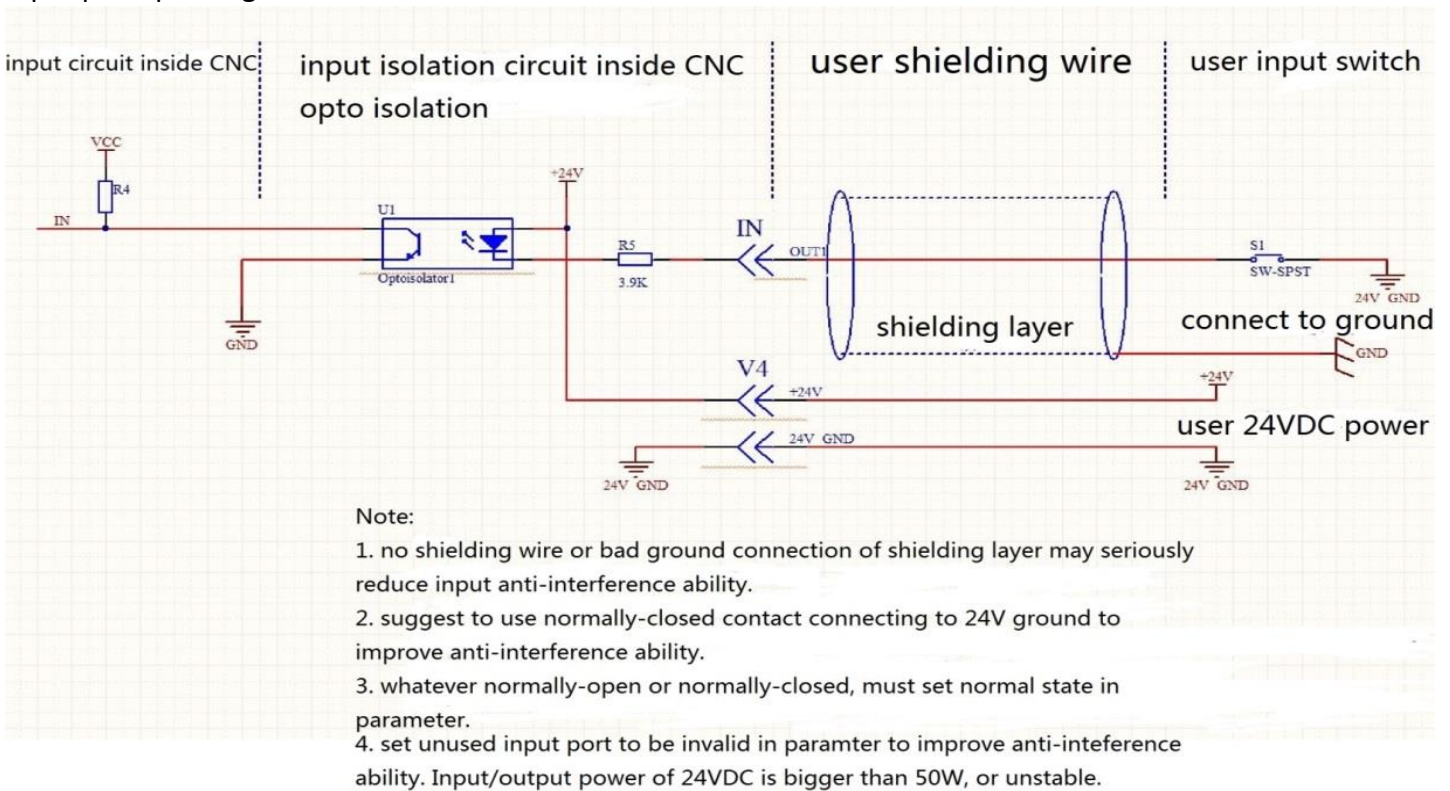
- Input signal port: 25-pin X 1
- Output signal port: 25-pin X 1
- Communication signal port: 9-pin X 1, RJ45 internet access X 1
- Motor signal port: 9-pin port X 2
- Power port: 3-pin plug

**1-8 Signal port**

Output principle diagram



### Input principle diagram



### Input signal port definition

Diagnosis interface can check input port, and change the position of the input port and set the input signal logic.

25-pin port	Signal definition	Instruction
1	X + limit	Connect X axis + limit switch
14	X - limit	Connect X axis – limit switch
2	Y + limit	Connect Y axis + limit switch
15	Y - limit	Connect Y axis – limit switch
3	Arc strike success signal	Connect plasma power arc strike success signal
16	Emergency stop	Connect external emergency-stop key

4	Pause	Connect external pause key
17	Start	Connect external start key
5	Z + limit	Connect Z axis + limit switch
18	Z - limit	Connect Z axis – limit switch
6	Close	Connect external general switch
19	Torch collision	Connect the lifter collision check switch
7	X 0 point	X 0 mechanical origin
20	Y 0 pint	Y 0 mechanical origin
8	Torch A in position	Connect torch A in-position switch
21	Torch B in position	Connect torch B in-position switch
12	24V +	External DC24V+
24	24V +	External DC24V+
13	24V -	External DC24V ground
25	24V -	External DC24V ground

When choose “Use Outside Input” in Ctrl menu, the input definitions are partly different.

25-pin port	Signal definition	Instruction
1	X + limit	Connect X axis + limit switch
14	X - limit	Connect X axis – limit switch
2	Y + limit	Connect Y axis + limit switch
15	Y - limit	Connect Y axis – limit switch
3	Arc strike success signal	Connect plasma power arc strike success signal
16	Emergency stop	Connect external emergency-stop key
4	Pause	Connect external pause key
17	Start	Connect external start key
5	Manual direction X+	Connect X+ switch
18	Manual direction X-	Connect X- switch
6	Manual direction Y+	Connect Y+ switch
19	Manual direction Y-	Connect the Y- switch
7	Speed up	Connect speed up switch
20	Speed down	Connect speed down switch
8	Torch up	Connect torch up switch
21	Torch down	Connect torch down switch
12	24V +	External DC24V+
24	24V +	External DC24V+
13	24V -	External DC24V ground
25	24V -	External DC24V ground

### Output signal port definition

Diagnosis interface can check input port, and change the position of the input port and set the input signal logic.

25-pin port	Signal definition	Instruction
1	M10	Gas/preheat
14	M12	Cutting oxygen/arc strike
2	M14	Torch A up
15	M16	Torch A down
3	M18	Low preheat
16	M20	Ignition

4	M22	High preheat
17	M24	Preheat
5	M32	Low oxygen
18	M34	Powder
6	M36	Torch B up
19	M38	Torch height control
7	M40	Torch B down
20	M42	Drill up
8	M44	Drill down
21	M46	Drill on
12	24V +	External DC24V+
24	24V +	External DC24V+
13	24V -	External DC24V ground
25	24V -	External DC24V ground

### Communication signal port

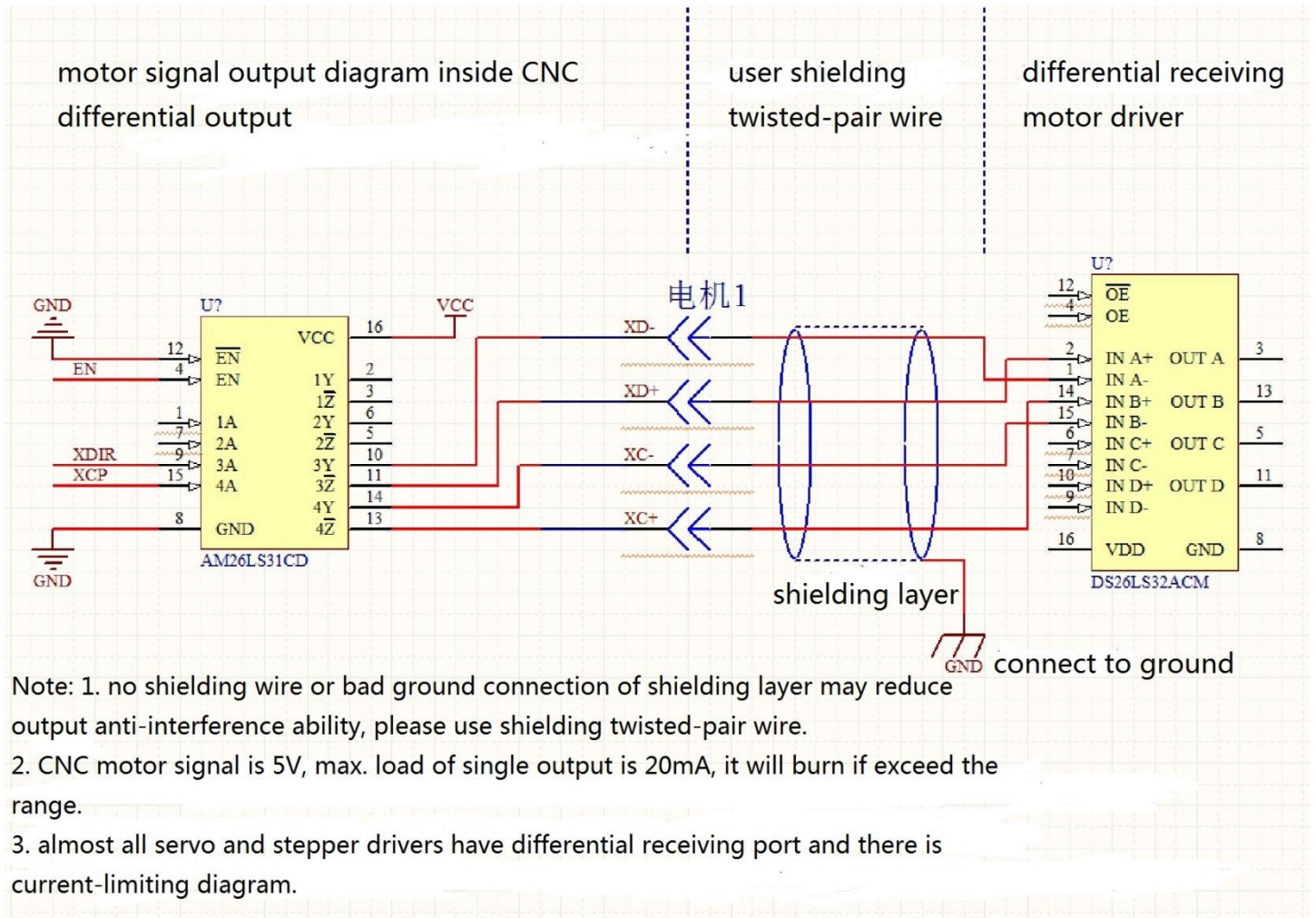
#### CN1 (RJ45) communication port definition

Internet access	Signal definition	Instruction
1	+24V	24V +
2	TXD	Serial port signal
3	RXD	Serial port signal
4	5lin	Sub-board communication
5	+5V	5V +
6	Jerk	External emergency stop
7	21VG	5V/24V ground
8	24VG	5V/24V ground

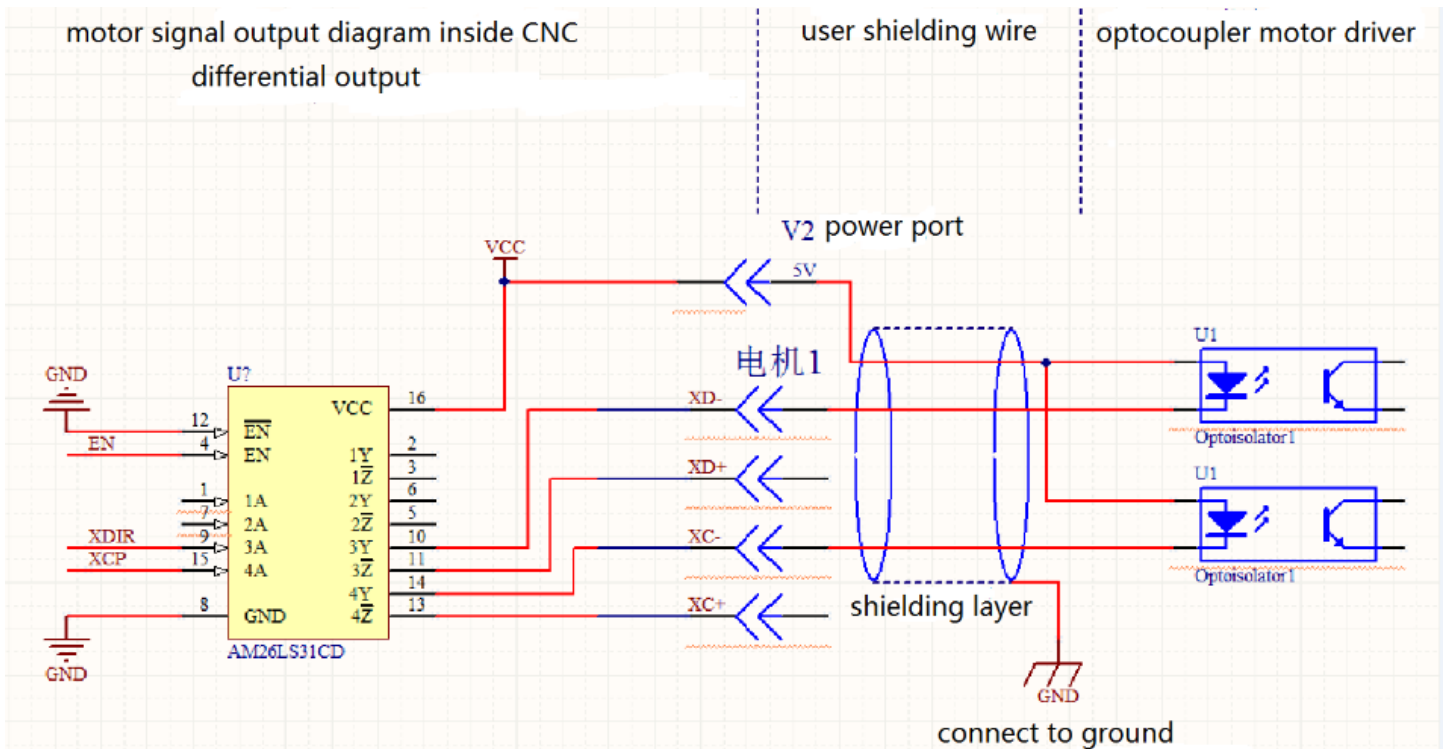
For connection of the remote control and the expansion board.

### Motor signal port

Driver connection principle diagram of differential signal



Driver connection principle diagram of optical coupler (common anode) signal



1. no shielding wire or bad ground connection of shielding layer may reduce output anti-interference ability.
2. CNC motor signal is 5V, max. load of single output is 20mA, it will burn if exceed range.
3. optocoupler driver usually has current-limiting diagram.
4. when common anode connection, the common port connects to CNC "V2" power 5V+.

### Motor signal port definition

Motor 1 Port (9-pin)	Signal definition	Instruction
1	XD+	X axis + direction
6	XD-	X axis - direction
2	XC+	X axis + pulse
7	XC-	X axis - pulse
3	YD+	Y axis + direction
8	YD-	Y axis - direction
4	YC+	Y axis + pulse
9	YC-	Y axis - pulse
5	VCC	5V+

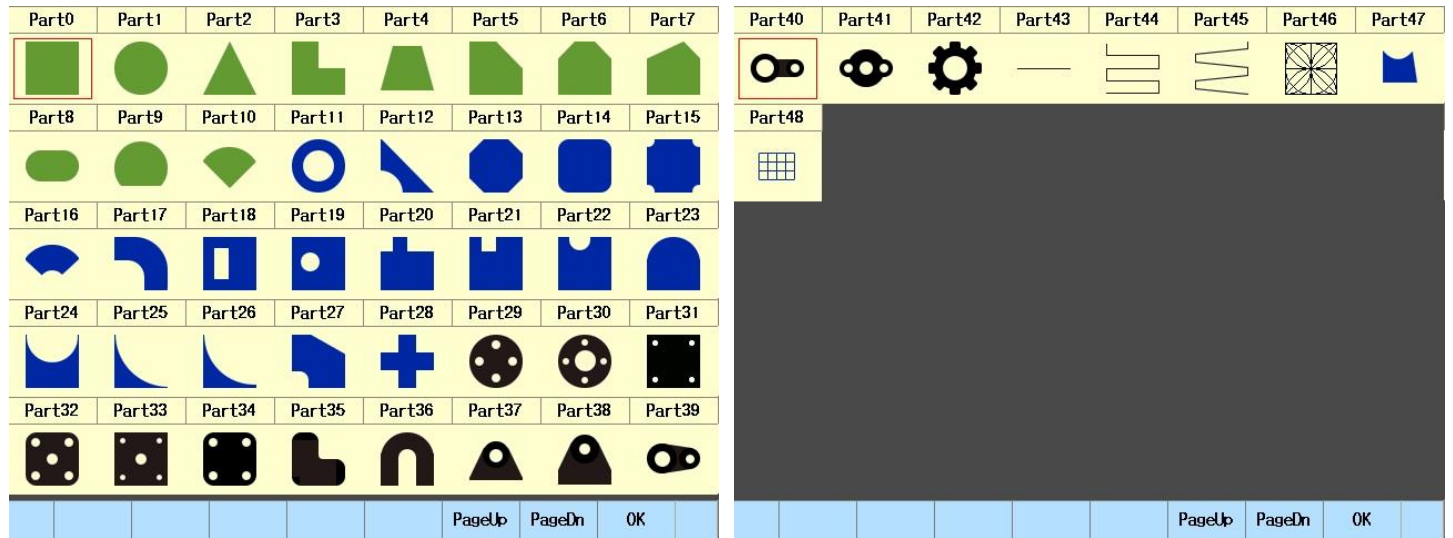
Motor 2 Port (9-pin)	Signal definition	Instruction
1	XD+	Dual-drive X axis + direction
6	XD-	Dual-drive X axis - direction
2	XC+	Dual-drive X axis + pulse
7	XC-	Dual-drive X axis - pulse
3	YD+	Dual-drive Y axis + direction
8	YD-	Dual-drive Y axis - direction
4	YC+	Dual-drive Y axis + pulse
9	YC-	Dual-drive Y axis - pulse
5	VCC	5V+

The motor signal is DC5V.

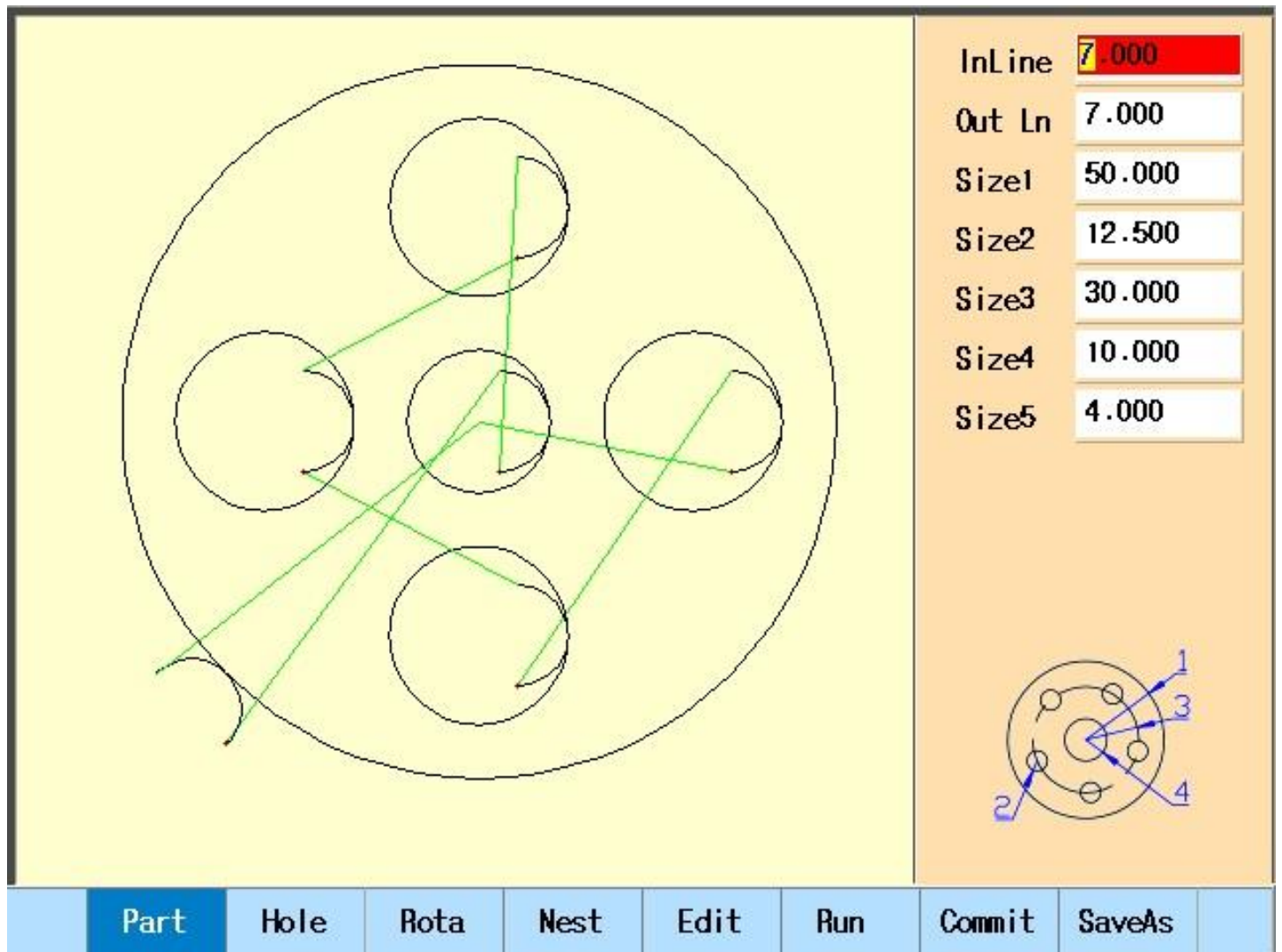
## Chapter 2 load parts

2-1 load from figure

Turn on CNC, press F6 Figure



There are 48 common parts, choose by direction keys and press F8 to confirm.



Press direction keys to choose parameters of the part, input values by number keys.

F1 Part: set the figure as part.

F2 Hole: set the part as hole type, some parts can't change inner/outer outline (can't change lead-in/out line

direction).

F3 Rotate: input angle, positive number is anticlockwise, negative number is clockwise.

F4 Nest: nest part.

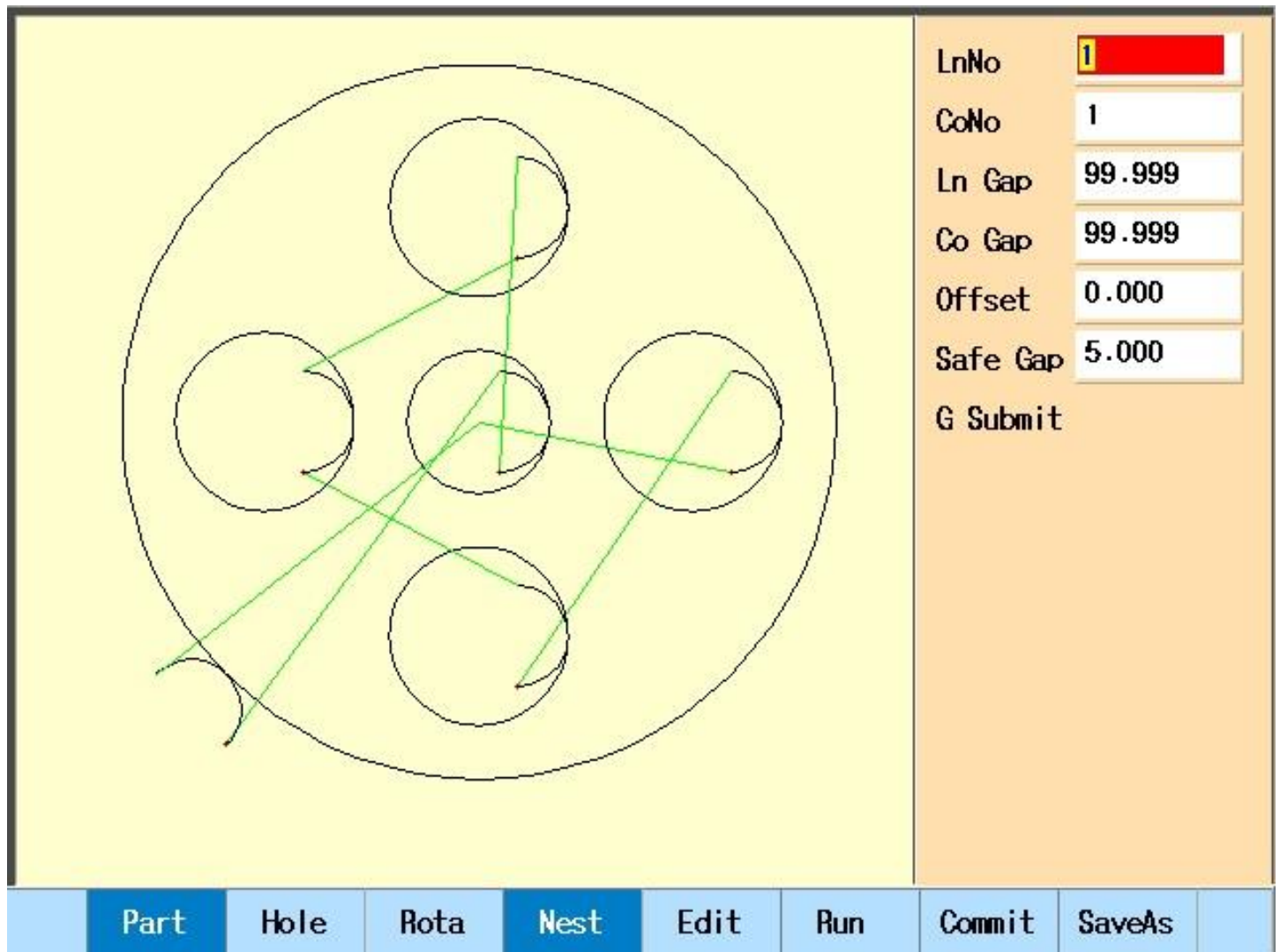
F5 Edit: load the part program in the edit area.

F6 Run: load the part and enter auto cutting interface.

F7 Commit: submit

F8 SaveAs: save current part program.

F4 Nest: after set parts size, nest the parts, including LnNo( line number), CoNo (column number), Ln Gap (line gap), Co Gap (column gap), Offset (line offset), Safe Gap (between two parts to avoid wrong cutting), then submit.



LnNo	1
CoNo	1
Ln Gap	99.999
Co Gap	99.999
Offset	0.000
Safe Gap	5.000

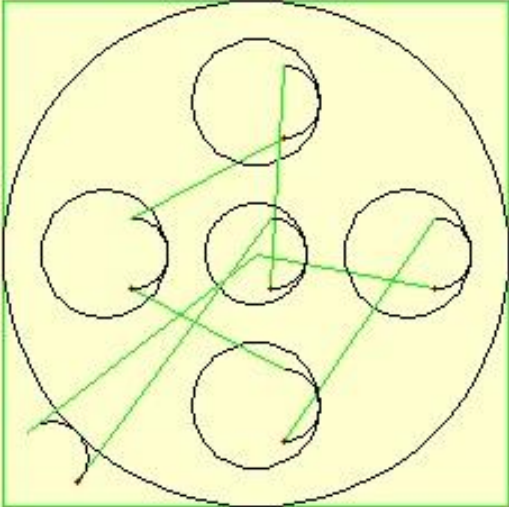
G Submit

Part Hole Rota **Nest** Edit Run Commit SaveAs

## 2-2 load from Disk

Two methods:

1. press F5 Load in Auto interface.

File Save					
Name		Info			
0.bmp		614472			
5990.doc		131072			
1.bmp		614472			
TK30.TXT		947			
2.bmp		614472			
3.bmp		614472			
Space: 0.945G				TK30.TXT	
Used: 0.002G				(100.00, 100.00)	
Subjec 6					
Disk	UDisk	View	Search	SaveAs	Repl

F1 Disk: files in CNC disk.

F2 U Disk: files in U disk.

F3 View: preview the current file.

F4 Search: input file name and search it.

F8 OK: load the file.

Note: CNC only supports 1-level folder, don't set folder in the folder.

2. Press F2 Open in Edit interface

Edit		ProgTK30.TXT		Tot Ln 000052						
00001	G92	X0.000	Y0.000							
00002	G90									
00003	G00	X35.500	Y-7.000							
00004	M07									
00005	G41									
00006	G03	X42.500	Y0.000	I0.000	J7.000					
00007	G03	X42.500	Y0.000	I-12.500	J0.000					
00008	G03	X35.500	Y7.000	I-7.000	J0.000					
00009	M08									
00010	G40									
00011	G00	X5.500	Y-37.000							
00012	M07									
00013	G41									
00014	G03	X12.500	Y-30.000	I0.000	J7.000					
00015	G03	X12.500	Y-30.000	I-12.500	J0.000					
00016	G03	X5.500	Y-23.000	I-7.000	J0.000					
00017	M08									
00018	G40									
00019	G00	X-24.500	Y-7.000							
00020	M07									

New	Open	View	Save	SaveAs	Manage	Del Ln	Line
-----	------	------	------	--------	--------	--------	------

The difference of two methods is that if cut the part program from the Edit interface, it needs to go to Auto interface.

### 2-3 load from Edit

In the Edit interface edit G code program and save and go to auto cutting interface.

F1 New: create a new program edit area.

F3 View: preview program cutting path.

F4 Save: input file name and save to the local disk.

### 2-4 restore part cutting

Cutting break, pause or power off

If there is a more urgent part to cut, then you can press Pause to stop the current cutting. Then continue the previous cutting by "break point".

If power off when cut, the controller can automatically record the current position and save break point, when power on, continue the previous cutting by "break point".

Auto Proces		Prog TK30.TXT		Speed = 01000 F* 100 %			
(100.00,100.00) TK30.TXT				Z Kerf0.00			
				F SpdL01000			
				R Start D Simul			
				K1 Ignit	K2 Gas		
				K3 Prehe	K4 HOxy		
				K5 Pierc	K6 Heigh		
				SU GunUp		SD GunDn	
				Angle: 0.00			
				Scale: 1.00			
				Hole No.: 002			
				PreheatT: 100.00			
MachinX: -0032.751							
MachinY: -0023.922							
X: -0006.308		AGun		Total			
Y: -0040.786		TK30.TXT (14)		Left:			
Man	Secti	BreakP	View	load	Outlin	Return	>>

F3 BreakP (break point): display the file name of the latest breakpoint, (serial number).

Controller can record 3 latest break points of 2 files, press F3 again to display last break point till the first break point. The controller automatically loads the file and preview figure and display the break point position.

Record rule:

- Record two latest break points in the same file, when over two points, then the first point is covered.
- cut a new file and have 2 break points, then the last point of last file is recorded.

Note:

- If the program is not saved, then can't restore cutting by "break point".
- Restore cutting by "break point" is useful when no machine coordination clearance and troch movement and other operations, or torch position may be wrong.

### Chapter 3 array parts

After load the part, it can be rotated, mirrored, zoomed or arrayed.

3-1 rotate

In Auto interface, press F3 Rotate.

Auto Proces		Prog TK30.TXT		Speed = 01000 F* 100 %			
(100.00,100.00) TK30.TXT				Z Kerf0.00			
				F SpdL01000			
				R Start		D Simul	
				K1 Ignit		K2 Gas	
				K3 Prehe		K4 HOxy	
				K5 Pierc		K6 Heigh	
				SU GunUp		SD GunDn	
				Angle:		000.00	
				Scale:		1.00	
				Hole No.:		002	
				PreheatT:		100.00	
MachinX:		-0032.751					
MachinY:		-0023.922					
X: -0006.308		AGunRotate		Total			
Y: -0040.786		Angle: 45		Left:			
<<	Line	Rotate	Mirror	Scale	Nest	Bridge	Torch

After input angle, press Enter, the part is rotated, positive value is anticlockwise, negative value is clockwise. Press F3 again to cancel.

3-2 mirror

Press F4 Mirror

Auto Proces		Prog TK30.TXT		Speed = 01000 F* 100 %			
(100.00,100.00) TK30.TXT				Z Kerf0.00			
				F SpdL01000			
				R Start		D Simul	
				K1 Ignit		K2 Gas	
				K3 Prehe		K4 HOxy	
				K5 Pierc		K6 Heigh	
				SU GunUp		SD GunDn	
				Angle:		000.00	
				Scale:		1.00	
				Hole No.:		002	
				PreheatT:		100.00	
MachinX:		-0032.751					
MachinY:		-0023.922					
X: -0006.308		AGunMirror		Total			
Y: -0040.786		XMirror		Left:			
<<	Line	Rotate	Mirror	Scale	Nest	Bridge	Torch

X mirror, Y mirror and XY mirror display in cycle, press Enter to confirm. Press F4 to cancel.

3-3 scale

Press F5 Scale

Auto Proces		Prog TK30.TXT		Speed = 01000 F* 100 %			
(100.00,100.00) TK30.TXT				Z Kerf0.00			
				F SpdL01000			
				R Start		D Simul	
				K1 Ignit		K2 Gas	
				K3 Prehe		K4 HOxy	
				K5 Pierc		K6 Heigh	
				SU GunUp		SD GunDn	
				Angle:		000.00	
				Scale:		1.00	
				Hole No.:		002	
PreheatT:		100.00					
MachinX:		-0032.751					
MachinY:		-0023.922					
X: -0006.308		AGunScale		Total			
Y: -0040.786		Scale:		Left:			
<<	Line	Rotate	Mirror	Scale	Nest	Bridge	Torch

After input scale value, press Enter to confirm, press F5 to cancel.

3-4 nest  
Press F6 Nest

Auto Proces		Prog TK30.TXT		Speed = 01000 F* 100 %															
(100.00,100.00) TK30.TXT																			
				<table border="1"> <tr> <td>LnNo</td> <td>1</td> </tr> <tr> <td>CoNo</td> <td>1</td> </tr> <tr> <td>Ln Gap</td> <td>99.999</td> </tr> <tr> <td>Co Gap</td> <td>99.999</td> </tr> <tr> <td>Offset</td> <td>0.000</td> </tr> <tr> <td>Safe Gap</td> <td>5.000</td> </tr> <tr> <td colspan="2">G Submit</td> </tr> </table>		LnNo	1	CoNo	1	Ln Gap	99.999	Co Gap	99.999	Offset	0.000	Safe Gap	5.000	G Submit	
LnNo	1																		
CoNo	1																		
Ln Gap	99.999																		
Co Gap	99.999																		
Offset	0.000																		
Safe Gap	5.000																		
G Submit																			
X: -0006.308		AGunNest		Total															
Y: -0040.786				Left:															
<<	Line	Rotate	Mirror	Scale	Nest	Bridge	Torch												

LnNo: the number of line.

CoNo: the number of column.

Ln Gap: line gap.

Co Gap: column gap.

Offset: line offset.

**Note:** 1. after set the line offset, the controller automatically limits the nesting width, the actual quantity is smaller than input quantity.

2. the initial values of "line gap" and "column gap" are automatically calculated by the controller according to the parts size, and can revise.

### 3-5 Nest

Press F7 to Nest

	Z BoardL1000										
	F BoardW1000										
	R Spacing10										
	D Step 5										
	H Roate										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%; text-align: center;">Add</td> <td style="width: 10%; text-align: center;">Del</td> <td style="width: 10%; text-align: center;">Ahead</td> <td style="width: 10%; text-align: center;">Aback</td> <td style="width: 10%; text-align: center;">Remove</td> <td style="width: 10%;"></td> <td style="width: 10%; text-align: center;">Refresh</td> <td style="width: 10%; text-align: center;">Save</td> <td style="width: 10%;"></td> </tr> </table>			Add	Del	Ahead	Aback	Remove		Refresh	Save	
	Add	Del	Ahead	Aback	Remove		Refresh	Save			

F1 Add: add parts.

F2 Delete: delete parts.

F3 Ahead: change cutting sequence, a place in advance.

F4 Aback: change cutting sequence, a place back.

F5 Remove: move the part by direction keys.

F7 Refresh: display cutting sequence.

F8 Save: save part program.

L1 BoardL: plate length

L2 BoardW: Plate width

L3 Space: gap of parts

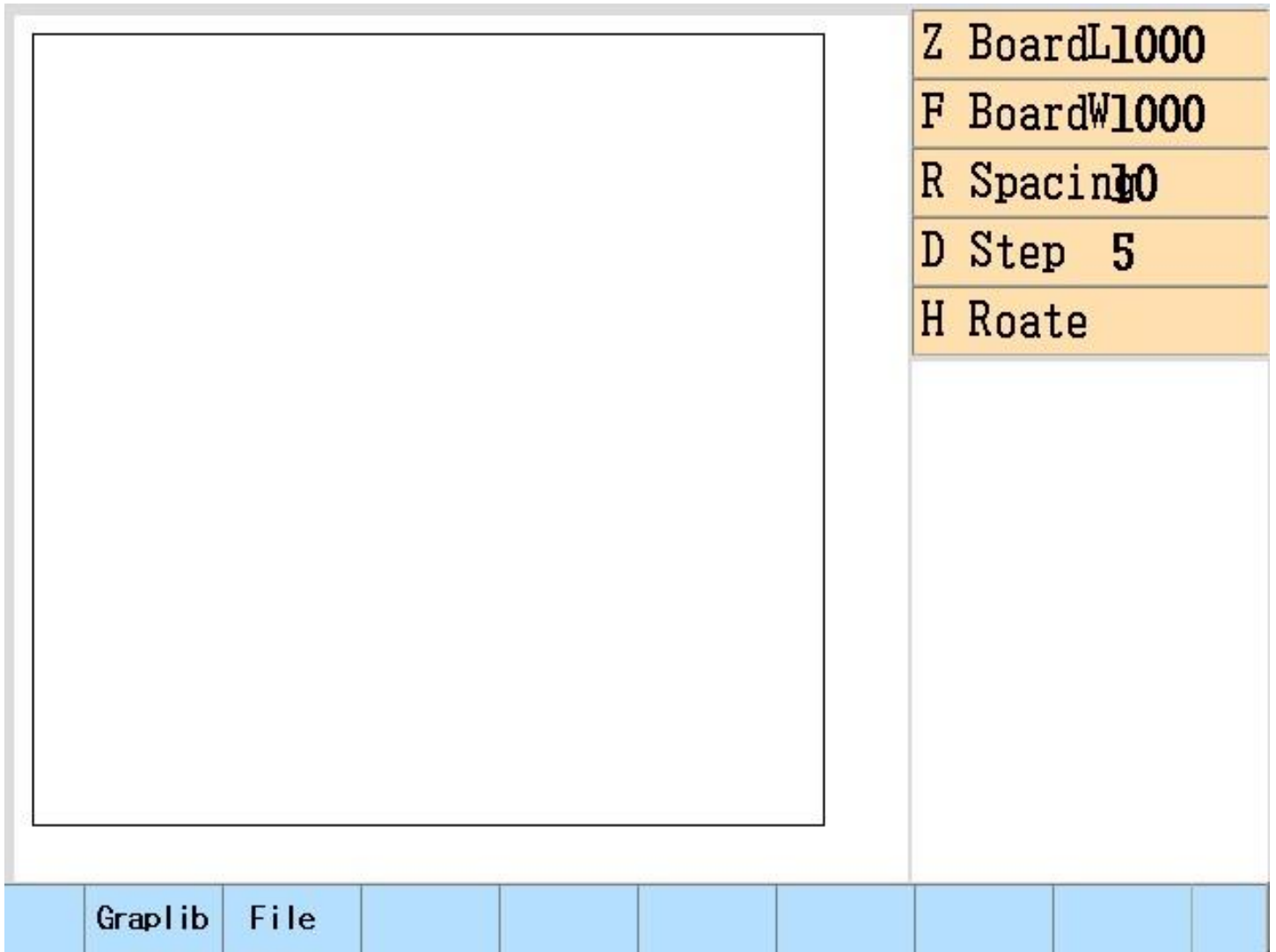
L4 Step: movement distance

L5 Rotate: rotation angle

Note: suggest to set plate size and distance of parts before add the part.

Add parts

Press F1 to Add



F1 Figure to add parts

InLine	10.000
Out Ln	10.000
Size1	100.000
Size2	100.000

count 5

1 2

Part	Hole	Rota	Commit	count
------	------	------	--------	-------

Choose the part and set parameters, press F7 to preview, press F8 to confirm,  
Note: after revise the number of part, must preview.

Press F2 File, dd parts from local disk.

File Open							
Name		Info					
TK30.TXT		947					
5990.doc		131072					
6.bmp		614472					
7.bmp		614472					
TL00.TXT		175					
TL01.TXT		175					
8.bmp		614472					
Proforma Invoice.doc		123904					
扫描0001.jpg		1931958					
Space: 0.945G				8.bmp			
Used: 0.004G				(110.00, 110.00)			
Subjec 9							
Disk	UDisk	View	Search				OK

Choose parts and press F8 to confirm and input the number of parts, press Enter.

Delete parts

After add parts, choose them by direction buttons, press F2 to delete.

<div style="border: 1px solid black; width: 90%; margin: 5px auto;"> <div style="border: 1px solid black; width: 100%; height: 100%;"></div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid red; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> <div style="border: 1px solid black; width: 30px; height: 30px;"></div> </div> </div>	Z BoardL1000									
	F BoardW1000									
	R Spacin10									
	D Step 5									
	H Roate 0.0									
	<b>TL02. TXT</b> TL02. TXT TL02. TXT TL02. TXT TL02. TXT									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 15%;">Add</td> <td style="width: 15%;">Del</td> <td style="width: 15%;">Ahead</td> <td style="width: 15%;">Aback</td> <td style="width: 15%;">Remove</td> <td style="width: 15%;"></td> <td style="width: 15%;">Refresh</td> <td style="width: 15%;">Save</td> <td style="width: 15%;"></td> </tr> </table>		Add	Del	Ahead	Aback	Remove		Refresh	Save	
	Add	Del	Ahead	Aback	Remove		Refresh	Save		

Change parts sequence

After add parts, change cutting sequence by "Front" and "Back", press F7 to refresh.

Move parts

After add parts, choose them by direction buttons, press F5 to move, press L4 to set movement distance.

Z BoardL1000  
F BoardW1000  
R Spacin10  
D Step 5  
H Roate 0.0

TL02. TXT  
TL02. TXT  
TL02. TXT  
TL02. TXT  
TL02. TXT

Add Del Ahead Aback Remove Refresh Save

Rotate parts

After choose parts, press L5 and input rotation angle.

Z BoardL1000  
F BoardW1000  
R Spacin10  
D Step 5  
H Roate 45.0

TL02. TXT  
TL02. TXT  
TL02. TXT  
TL02. TXT  
TL02. TXT

Add Del Ahead Aback Remove Refresh Save

Save nesting parts program

Press F8 to save.

File Save					
Name		Info			
TK30.TXT		947			
5990.doc		131072			
6.bmp		614472			
7.bmp		614472			
TL00.TXT		175			
TL01.TXT		175			
8.bmp		614472			
9.bmp		614472			
Proforma Invoice.doc		123904			
扫描0001.jpg		1931958			
TL02.TXT		175			
Space: 0.945G				12.bmp	
Used: 0.006G				(0.00,0.00)	
Subjec 14					
Disk	UDisk	View	Search		SaveAs Repl

Chapter 4 cut parts

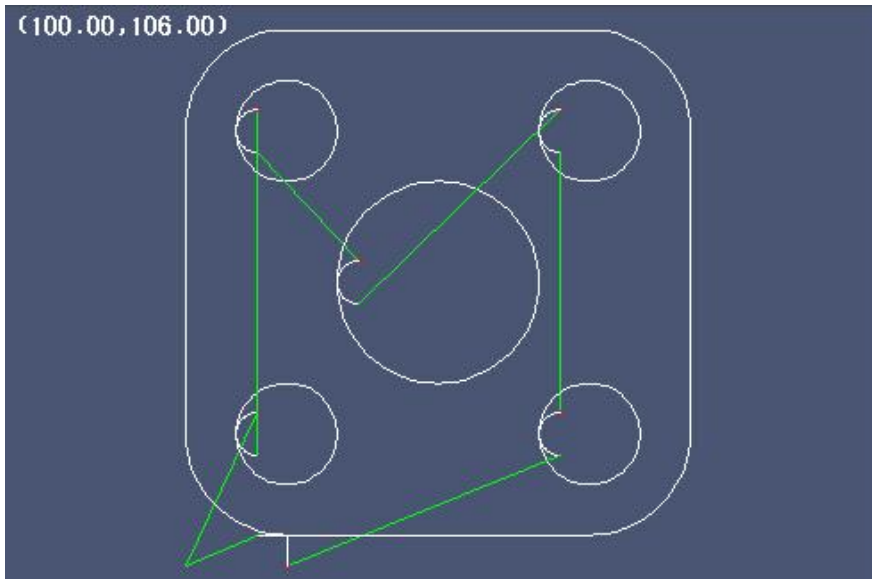
#### 4-1 Auto interface

After turn on controller, press F1 to Auto

Auto	Proces	Prog 17.bmp	Speed=	01000	F*	100	
							L1 SpdL01000
							L2 Kerf0.00
							L3 Outlin
K4 Arc							L4 Simulate
K5 Pierc							L5 StartPoi
K6 Heigh							
							Angle: 0.00
							Scale: 1.00
K8 Close							Hole No.: 000
							PreheatT: 100.00
							MachinX: 00030.048
							MachinY: -0031.038
SU GunUp	X:00030.048	AGun					Total
SD GunDn	Y:-0031.038						Left:
Man	Secti	BreakP	View	load	Torch	Return	>>

Figure display area

After load parts, press F4 to preview, there is part outline size at the left top corner.



X: zoom in the figure

Y: zoom out the figure

G: restore the figure

Move the figure by direction buttons.

Set figure

In Parameter and Figure interfaces figure can be set.

K4 Arc
K5 Pierc
K6 Heigh
K8 Close
SU GunUp
SD GunDn

K: turn on and turn off output.

SU/SD: torch up/down.

Highlight means turn on.

L1: set cutting speed limitation

L2: set kerf compensation

L3: outline mode, press Start, torch will move along the outline to check whether the plate is big enough.

L4: simulation run mode, press Start, torch will move along the cutting path till program ends without output.

L5: change start point, choose torch start point (initial position), change 5 different positions.

L1 SpdL01000
L2 Kerf0.00
L3 Outlin
L4 Simulate
L5 StartPoi

#### 4-2 manual interface

K: turn on and turn off output.

SU/SD: torch up/down.

Highlight means turn on.

L1: set manual speed, also idle-run speed in auto mode.

L2: fast change manual speed rate, 80%-10%.

L3: continuously move, in manual mode, press direction buttons, torch moves all the time and stop when press again.

L4: clear reference coordinate.

Note:

1. If don't choose "continue", then press the button to move, release the button to stop.
2. During continuously movement, press the buttons of the same or reverse directions to pause, press other direction buttons to slantly move, press direction buttons again, stop to move in one direction.

#### 4-3 preparation before cut

1. Cutting situation is safe, gas and plasma power source are ready, intermediate relay and solenoid valve DC24V power on.
  2. Cutting machine precision is set (CNC parameters), motor and drivers are ready.
- After load the part program, check cutting mode, speed and kerf, then press Start button.

### Speed limitation

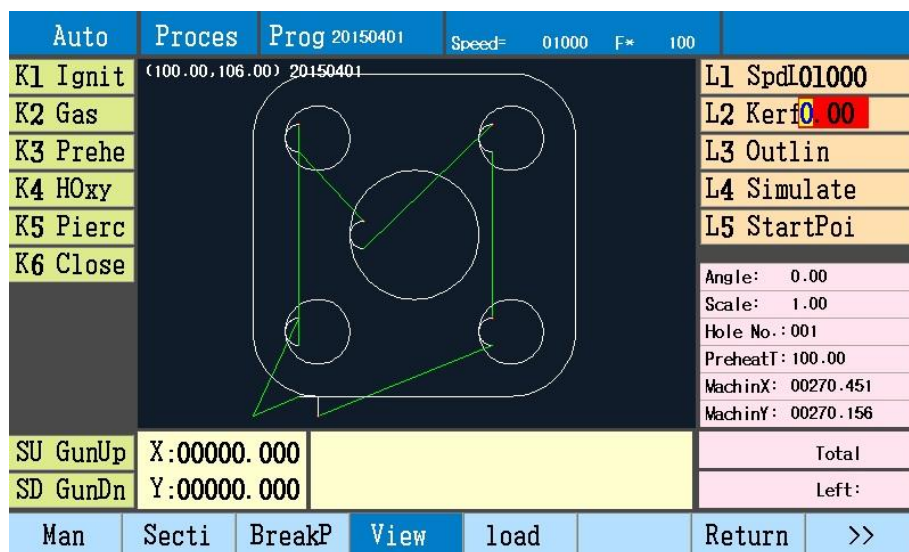
1. L1: set cutting speed.
2. Multi-functional knob, turn it to adjust speed rate.
3. F+/F- to adjust.

In auto interface, under pending state, press "0" to check and revise "idle-run speed", "cutting speed", "manual speed" and "back speed".

Note: the adjusted speed rate will be recorded till adjust next ime.

### Kerf

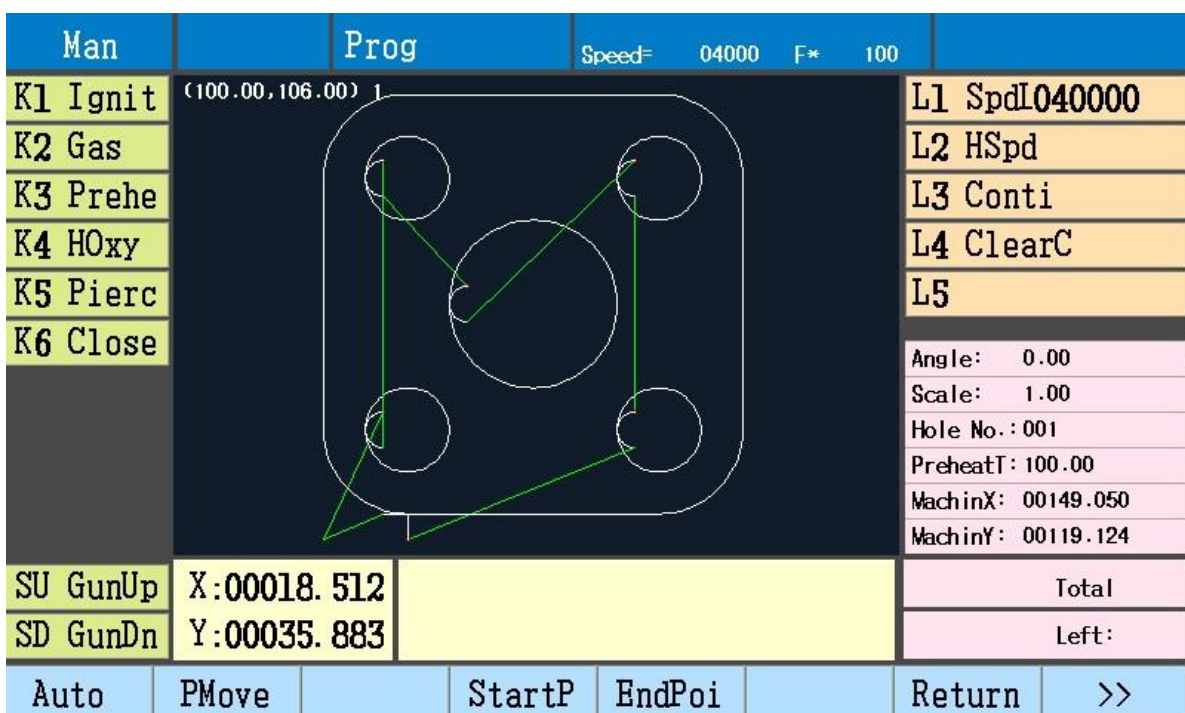
In auto interface, under pending state, press L2 to revise kerf, set value is a half of the actual kerf width, unit:mm.



### 4-4 other operations before cut

Move torch

Press F1 to manual interface



1. Manual move the torch to any position

Press direction buttons to move the torch, release buttons and the torch stops.

L3 continue: press direction buttons to move the torch, it stops till press Pause, or the same or reverse direction buttons.

In continue mode, press the direction button of another axis, and torch obliquely moves, press direction buttons again to cancel another axis movement.

2. Manually adjust torch to specified position

F2 point move, single axis, input "point move increment" value, after confirm, press direction buttons to move torch at specified distance.

Man	Prog	Speed=	04000	F*	100	
K1 Ignit	(100.00,106.00) 1					L1 SpdL040000
K2 Gas						L2 HSpd
K3 Prehe						L3 Conti
K4 HOxy						L4 ClearC
K5 Pierc						L5
K6 Close						Angle: 0.00
		Scale: 1.00				
		Hole No.: 001				
		PreheatT: 100.00				
		MachinX: 00149.050				
		MachinY: 00119.124				
SU GunUp	X:00018.512	PMove				Total
SD GunDn	Y:00035.883	PMoveIncr	100	Left:		
Auto	PMove	StartP	EndPoi	Return	>>	

F3 move to, single or dual axis, input "point move increment" value of X axis and Y axis, after confirm, press Start button, the torch moves in two axis at the same time.

**Return**

Move the torch to the part reference point, default is G92 X0 Y0.

Man	Prog	Speed=	04000	F*	100	
K1 Ignit	(100.00,106.00) 1					L1 SpdL040000
K2 Gas						L2 HSpd
K3 Prehe						L3 Conti
K4 HOxy						L4 ClearC
K5 Pierc						L5
K6 Close						Angle: 0.00
		Scale: 1.00				
		Hole No.: 001				
		PreheatT: 100.00				
		MachinX: 00149.050				
		MachinY: 00119.124				
SU GunUp	X:00018.512	Return				Total
SD GunDn	Y:00035.883	StarOrCanc	Left:			
Auto	PMove	StartP	EndPoi	Return	>>	

Press F7 to tip "back to part reference point"

The movement speed is idle-run speed.

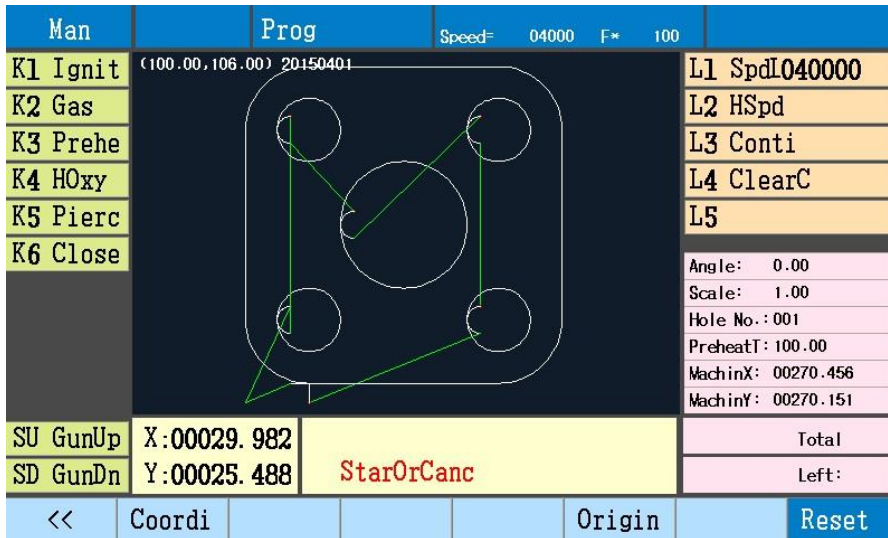
## Reset

“use 0 point switch” in “Machine” and reset direction in “System” is not 0, press Reset, the axis fast moves along reset direction, and stops when meet mechanical 0 point signal, current coordinate is parameter origin coordinate, machine coordinate clears.

“do not use 0 point switch” in “Machine” and reset direction in “System” is not 0, press Reset, the axis fast moves along reset direction to the machine 0 point, the current coordinate is parameter origin coordinate.

“do not use 0 point switch” in “Machine” and reset direction in “System” is 0, press Reset, the axis doesn’t move, machine coordinate clears, current coordinate is parameter origin coordinate.

Controller supports 2 machine fixed points, and they can be switched, when cut a part, another part can be loaded at the same time to improve efficiency.



## Note:

1. When do not use 0 point switch, and continue off-line to move torch, the machine coordinate will accumulate, clear by reset.
2. Two axis reset at the same time, one axis meets 0 point switch, two axis stop, after one axis reset, another axis continue.
3. Fixed point coordinate is machine coordinate, when machine 0 point position changes, fixed point position moves as well.
4. Speed to fixed point is manual speed.

## Align parts (plate calibration)

If plate doesn’t align with machine axis, then manually align parts.

F1 Manual

Press direction buttons to move torch, align one side of plate, press F4 set start point.

Press direction buttons to move torch, align another point of the same side of plate, press F5 set end point.

Controller tips rotation angle, after confirm, back to Auto, preview, display the figure after rotation.

Note: after set end point, can press F6, back to the start point.

## Outline

If want to check whether the plate is big enough for parts, can choose outline before cutting.

Auto	Proces	Prog 20150401	Speed= 01000 F* 100
K1 Ignit	(100.00,106.00) 20150401		L1 SpdL01000
K2 Gas			L2 Kerf0.00
K3 Prehe			L3 Outlin
K4 HOxy			L4 Simulate
K5 Pierc			L5 StartPoi
K6 Close			Angle: 0.00
			Scale: 1.00
	Hole No.: 001		
	PreheatT: 100.00		
	MachinX: 00270.456		
	MachinY: 00270.151		
SU GunUp	X:00029.982	StarOrCanc	Total
SD GunDn	Y:00025.488		Left:
Man	Secti	BreakP	View load Return >>

L3 outline, choose it, press start button, torch moves along outer outline to check whether torch is beyond plate.

Auto	Proces	Prog 20150401	Speed= 01000 F* 100
K1 Ignit	(100.00,106.00) 20150401		L1 SpdL01000
K2 Gas			L2 Kerf0.00
K3 Prehe			L3 Outlin
K4 HOxy			L4 Simulate
K5 Pierc			L5 StartPoi
K6 Close			Angle: 0.00
			Scale: 1.00
	Hole No.: 001		
	PreheatT: 100.00		
	MachinX: 00270.454		
	MachinY: 00270.149		
SU GunUp	X:-0000.002		Total
SD GunDn	Y:-0000.002		Left:
Man	Secti	BreakP	View load Return >>

### Simulation run

Before cutting, choose simulation run to check cutting path is right or not.

L4 simulation run, choose it and press start button, torch moves along program path at cutting speed.

During the operation, output is invalid. E-stop, pause, limit and other input are valid.

Auto	Proces	Prog 20150401	Speed=	01000	F*	100
K1 Ignit	(100.00, 106.00) 20150401					L1 SpdL01000
K2 Gas						L2 Kerf0.00
K3 Prehe						L3 Outlin
K4 HOxy						L4 Simulate
K5 Pierc						L5 StartPoi
K6 Close						Angle: 0.00
						Scale: 1.00
	Hole No.: 000					
	PreheatT: 100.00					
	MachinX: 00270.451					
	MachinY: 00270.156					
SU GunUp	X:-0000.003		M15	Total	001.0	
SD GunDn	Y:00000.007		GunUpOf	Left:	000.0	
Man	Secti	BreakP	View	load	Return	>>

### Change start point

For some irregular parts or plate, in order to get cutting start point, can change that point.

L5 change start point, current start point displays at left bottom corner in part figure preview area. Press L5 button several times to change that point. Press start button, torch moves to the first pierce point from selected start point and then cut.

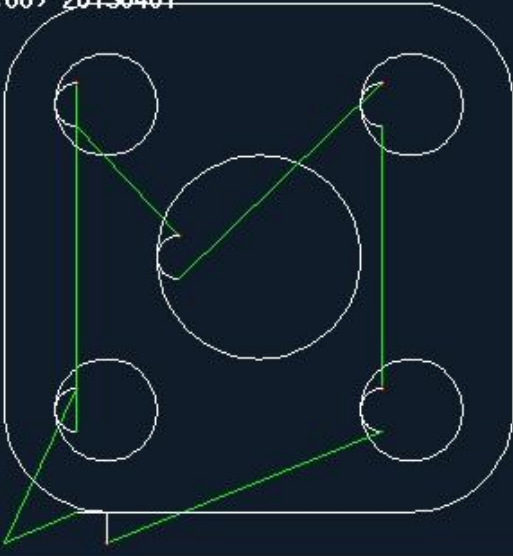
Auto	Proces	Prog 20150401	Speed=	01000	F*	100
K1 Ignit	(100.00, 106.00) 20150401					L1 SpdL01000
K2 Gas						L2 Kerf0.00
K3 Prehe						L3 Outlin
K4 HOxy						L4 Simulate
K5 Pierc						L5 StartPoi
K6 Close						Angle: 0.00
						Scale: 1.00
	Hole No.: 000					
	PreheatT: 100.00					
	MachinX: 00270.451					
	MachinY: 00270.156					
SU GunUp	X:-0000.003		M15	Total	001.0	
SD GunDn	Y:00000.007		GunUpOf	Left:	000.0	
Man	Secti	BreakP	View	load	Return	>>

### Section

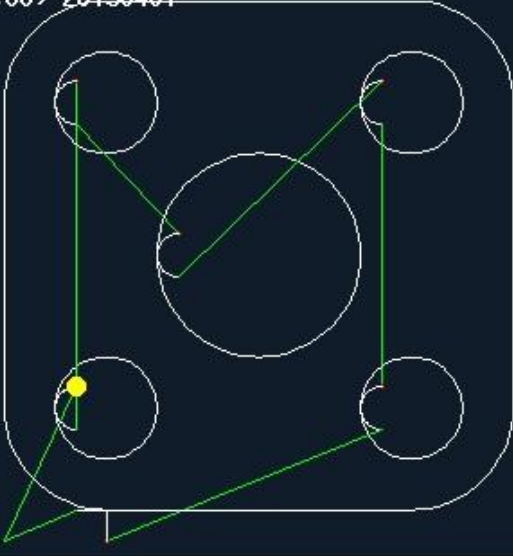
Before cutting, choose a certain position of the part to cut by section function.

F2 section, press it to input pierce point number, press again to input line number.

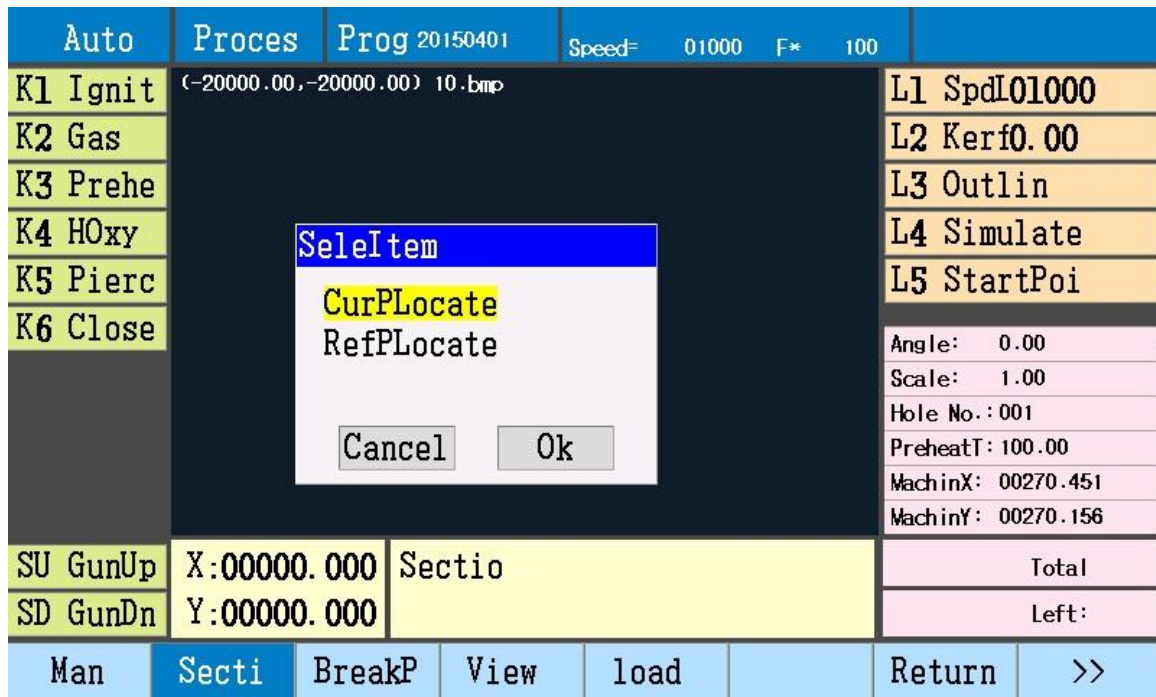
After input pierce point number, and confirm to preview selected pierce point position.

Auto	Proces	Prog 20150401	Speed=	01000	F*	100
K1 Ignit	(100.00,106.00) 20150401					L1 SpdL01000
K2 Gas						L2 Kerf0.00
K3 Prehe						L3 Outlin
K4 HOxy						L4 Simulate
K5 Pierc						L5 StartPoi
K6 Close						Angle: 0.00
						Scale: 1.00
	Hole No.: 001					
	PreheatT: 100.00					
	MachinX: 00270.451					
	MachinY: 00270.156					
SU GunUp	X:00000.000	PierceP: <b>1</b> <6				Total
SD GunDn	Y:00000.000					Left:
Man	Secti	BreakP	View	load	Return	>>

Display the target point after section.

Auto	Proces	Prog 20150401	Speed=	01000	F*	100
K1 Ignit	(100.00,106.00) 20150401					L1 SpdL01000
K2 Gas						L2 Kerf0.00
K3 Prehe						L3 Outlin
K4 HOxy						L4 Simulate
K5 Pierc						L5 StartPoi
K6 Close						Angle: 0.00
						Scale: 1.00
	Hole No.: 001					
	PreheatT: 100.00					
	MachinX: 00270.451					
	MachinY: 00270.156					
SU GunUp	X:00000.000	Sectio				Total
SD GunDn	Y:00000.000					Left:
Man	Secti	BreakP	View	load	Return	>>

Option dialog displays after start.



**CurPLocate (current point location):** after confirm, torch makes the current position as pierce point, after start, cut.

**RefPLocate (reference point location):** after confirm, torch locates as reference coordinate and moves to the pierce point in idle-run speed, press start, cut.

**Choose as program line number:** F2 section, press twice, input line number, after confirm, preview the start position of selected line.

**Manual output:** Before cutting, according to cutting mode, manually open some output.

Flame mode

- 1, press K1 for ignition cycle (M52), press K8 to close.
- 2, press K2 to open gas output (M10), press K2 again or K8 to close (M11).
- 3, press K3 to open preheat oxygen output (M24), press K3 again or K8 to close (M25).
- 4, press K4 to open cutting oxygen output (M12), press K4 again or K8 to close (M13).
- 5, press K5 for pierce cycle (M07), press K8 to close.
- 6, press K6 to open torch height control auto output (M38), press K6 again or K8 to close (M39).
- 6, press SU for torch up, release button to stop.
- 7, press SD for torch down, release button to stop.

Plasma mode

- 1, press K4 to open plasma arc strike output (M12), press K4 again or K8 to close (M13).
- 2, press K5 for pierce cycle (M07), press K8 to close.
- 3, press K6 to open torch height control auto output (M38), press K6 again or K8 to close (M39).
- 4, press SU for torch up, release button to stop.
- 5, press SD for torch down, release button to stop.

Note: when cut and torch moves, torch up/down are valid. When torch moves up/down, press reverse direction button, torch stops and other output control buttons are invalid.

#### 4-5 auto cutting

After cutting preparation, in auto mode, press start button to cut as current cutting mode and parameter settings.

After start, controller will work as below,

- 1, deal with parts cutting program, draw parts preview figure.
- 2, output and delay time and other movements.
- 3, control torch up/dwon.
- 4, port input signal.
- 5, speed adjustment.
- 6, refresh figure and state.

**Dynamic figure display:** During cutting, controller dynamically displays current torch position, can zoom preview figure.

Z zoom in

Y zoom out

G restore

Note: after zoom in preview figure, controller can automatically move the figure and follow the torch position, if moves too fast, maybe refresh figures frequently.

**Delay timer:** During cutting, delay has timer, can operate “extend”, “set” and “skip”.

	M14	Total 001.0
	AGunUpOn	Left: 000.7
Extend	Set	Skip

F6 extend time, add 100s.

F7 set current time as operation time of the same movement. Time setting in parameter also changes.

F8 skip left time, can't change time setting of same operation and parameter.

Note:

- 1, in flame mode, load new file, the initial preheat time is 100s.
- 2, when delay, press start button is like skip button, pause button is like extend button.
- 3, flame: ignition and pierce time; plasma: arc strike and pierce time. Set before cutting.

### Pause during auto cutting

After cutting, not delay, can press pause to stop cutting, close output, slow speed and stop torch movement, after pause, controller records current position as break point.

Auto	Pause	Prog TK32.TXT	Speed= 01000	F* 100	
K1 Ignit	(100.00, 106.00) TK32.TXT			L1 SpdL01000	
K2 Gas				L2 Kerf0.00	
K3 Prehe				L3 StartPoi	
K4 HOxy				L4 Simulate	
K5 Pierc				L5 Move	
K6 Close				Angle: 0.00	
				Scale: 1.00	
SU GunUp	X:00029.585		MachinX: 00057.662	M23 Total 000.8	
SD GunDn	Y:00083.181		MachinY: 00133.721	PreheaOf Left: 000.0	
>>15: G03 X10.000 Y86.000 I0.000 J-4.		PierceP	Forward	Backward	Cancel
16: G03 X10.000 Y86.000 I10.000 J0.					

When pause, can operate output control at left side, torch up/down and speed adjustment, and can operate

items at right side, also can move torch at 10% of manual speed, press F to change between 10% and 80%.

**Start:** After pause, press start button, controller pierce at current position, then continue to cut.

Flame cutting, if close preheat, controller finishes pierce; if preheat goes on, then skip preheat, then pierce, so discover preheat state, after enough preheat, then start.

**Forward and backward:** After pause, can move forward and backward along program path, press F6 and F7, initial speed is back speed in parameter settings, only move torch, don't change output state.

Move forward and backward to a position, can press start button to continue cutting.

When don't cut through the plate, can use forward and backward.

After forward start, no pause to stop movement, then automatically start preheat, pierce, cutting at the next pierce point.

After backward start, no pause to stop movement, then automatically pause at the next pierce point, can continue backward or forward.

**Pierce point:** After pause, choose pierce point and cut.

Press F5 to display pierce point number of "forward" and "backward".

Auto	Pause	Prog TK32.TXT	Speed= 01000 F* 100
K1 Ignit	(100.00,106.00) TK32.TXT		
K2 Gas			
K3 Prehe			
K4 HOxy			
K5 Pierc			
K6 Close			
SU GunUp	X:00029.585	L1 SpdL01000	
SD GunDn	Y:00083.181	L2 Kerf0.00	
		L3 StartPoi	
		L4 Simulate	
		L5 Move	
		Angle: 0.00	
		Scale: 1.00	
		Hole No.: 002	
		PreheatT: 100.00	
		MachinX: 00057.662	
		MachinY: 00133.721	
		M23	Total 000.8
		PreheaOf	Left: 000.0
>>15: G03 X10.000 Y86.000 I0.000 J-4.2 16: G03 X10.000 Y86.000 I10.000 J0.		PierceP	Forward Backward Cancel

Press Enter to confirm, controller displays selected pierce point position.

Auto	Pause	Prog 2015033101	Speed= 01000 F* 100
K1 Ignit	(100.00,106.00) 2015033101		
K2 Gas			
K3 Prehe			
K4 HOxy			
K5 Pierc			
K6 Close			
SU GunUp	X:00029.650	L1 SpdL01000	
SD GunDn	Y:00028.610	L2 Kerf0.00	
		L3 StartPoi	
		L4 Simulate	
		L5 Move	
		Angle: 0.00	
		Scale: 1.00	
		Hole No.: 002	
		PreheatT: 100.00	
		MachinX: 00099.127	
		MachinY: 00248.422	
		M23	Total 000.8
		PreheaOf	Left: 000.0
>>8: G03 X10.000 Y26.000 I0.000 J-4.2 9: G03 X10.000 Y26.000 I10.000 J0.		PierceP	Forward Backward Cancel

Press start button, torch moves to selected pierce point position from current position.

**StartPoi (back to the start point):** Back to start point after pause.

Press L3 after pause, torch moves back to start point in idle-run speed.

**Simulate (simulation run):** After pause to press L4 to simulatively run the left parts program.

**Move (continuously move):** After pause, can manually move torch, the default state is “press to move, release to stop”. Choose L5, when move torch, it will continuously move.

**Cancel:** Press F8, exit pause state, back to auto pending state, can continue to cut by “break point”.

**Start after path deviate**

After pause, use direction buttons to move torch, to make torch to deviate path, there are 3 methods to continue cutting.

Auto	Pause	Prog 1	Speed= 04000 F* 100
K1 Ignit	(100.00,106.00) 1		L1 SpdL04000
K2 Gas			L2 Kerf0.00
K3 Prehe			L3 StartPoi
K4 HOxy			L4 Simulate
K5 Pierc			L5 Move
K6 Close			Angle: 0.00 Scale: 1.00 Hole No.: 001 PreheatT: 100.00 MachinX: 00175.606 MachinY: 00102.177
SU GunUp	X:00045.068		M23 Total 000.8
SD GunDn	Y:00018.936		PreheaOf Left: 000.0
>>: G03 X10.000 Y26.000 I0.000 J-4.2 8: G03 X10.000 Y26.000 I10.000 J0.0			
		PierceP	Forward Backward Cancel

**Back to path:** F5 keep current output state, torch moves to pause position from current position by shortest path.

Auto	Pause	Prog 1	Speed= 04000 F* 100
K1 Ignit	(100.00,106.00) 1		L1 SpdL04000
K2 Gas			L2 Kerf0.00
K3 Prehe			L3 StartPoi
K4 HOxy			L4 Simulate
K5 Pierc			L5 Move
K6 Close			Angle: 0.00 Scale: 1.00 Hole No.: 001 PreheatT: 100.00 MachinX: 00160.486 MachinY: 00110.217
SU GunUp	X:00029.948		M23 Total 000.8
SD GunDn	Y:00026.976		PreheaOf Left: 000.0
>>: G03 X10.000 Y26.000 I0.000 J-4.2 8: G03 X10.000 Y26.000 I10.000 J0.0			
		PierceP	Forward Backward Cancel

**Cut Back:** F6 pierce at current position, then cut to pause position by shortest path, choose the operation, please choose path to avoid wrong cutting.

Auto	Pause	Prog 1	Speed=	01000	F*	100
K1 Ignit	(100.00, 106.00) 1				L1 SpdL01000	
K2 Gas					L2 Kerf0.00	
K3 Prehe					L3 StartPoi	
K4 HOxy					L4 Simulate	
K5 Pierc					L5 Move	
K6 Close						
SU GunUp	X:00018.512		M23	Total	000.8	
SD GunDn	Y:00035.883		PreheaOf	Left:	000.0	
			PierceP	Forward	Backward	Cancel

**Move Part:** F7 pierce at current position then cut the left parts.

When plate and parts have enough space, or near plate edge, choose “cutting back”, better smoothness of break point.

Note: pierce in flame mode, controller finishes different tasks according current output state.

- 1, gas, preheat oxygen, cutting oxygen all close, execute complete M07, then cut left parts program.
- 2, gas and preheat oxygen open, cutting oxygen close, execute “pierce torch up” (delay) --- “open cutting oxygen” (delay) --- “pierce torch down” (delay), then cut left parts program, just like manually finish preheat.
- 3, not above two situations, then firstly close output, and execute complete M07, cut left parts program.

**Input port:** Controller has 13 input signals, when cut in auto or manual mode, check input port state and deal with accordingly.

Input port

- 1, correctly connect external input switches.
- 2, correctly set port logic state in diagnose interface.
- 3, connect external 24VDC power and start.

Note: port logic state setting is available in “diagnose”.

When have e-stop or alarm signal input, controller immediately stop torch movement, close all output, save the current position as break point, display e-stop or alarm in tip place, before e-stop and alarm input state change, can't move torch and open output.

When limit signal input, controller will operate the same as e-stop or alarm signal input, but can manually move torch in reverse direction to leave limit.

Note: when e-stop, alarm and limit input, torch urgently stops movement, maybe there is overshoot, so the actual stay position may be a little different from break point position, when restart or break point restore, maybe need to manually calibrate.

## Chapter 6 Setup

Press F4 to enter settings interface

### Speed

Para Name	Value	Unit	Range
Start Speed	200	mm/min	20~4000
Lifting Rate	5		1~500
Speed Coefficient	20.0		1.8~20.0
Speed Limit	4000	mm/min	20~30000
Flame Cut Speed Limit	1000	mm/min	5~30000
Plasme Cut Speed Limit	1000	mm/min	5~30000
Backforward/Forward Speed	500	mm/min	100~15000
Reset Speed	1000	mm/min	100~6000
Speed Angle	30	°	0~90
Corner Speed Limit	500	mm/min	100~6000
曲线因子	0.01		0.01~100000.00

Para Tips: start and stop speed

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

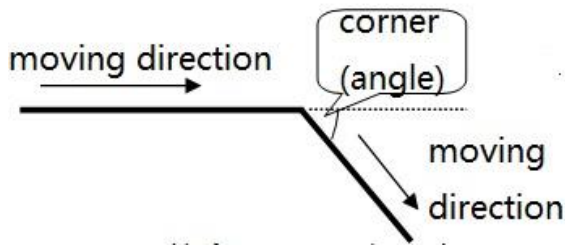
Para Name	Value	Unit	Range
Lifting Rate	5		1~500
Speed Coefficient	20.0		1.8~20.0
Speed Limit	4000	mm/min	20~30000
Flame Cut Speed Limit	1000	mm/min	5~30000
Plasme Cut Speed Limit	1000	mm/min	5~30000
Backforward/Forward Speed	500	mm/min	100~15000
Reset Speed	1000	mm/min	100~6000
Speed Angle	30	°	0~90
Corner Speed Limit	500	mm/min	100~6000
曲线因子	0.01		0.01~100000.00
选择曲线	0		0~3

Para Tips: 0:指数曲线, 1:S曲线, 2:正态分布, 3:Gas曲线

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

1	Start Speed	Start and stop speed
2	Speed Coefficient	When reduce or increase speed, change is fast or slow, the bigger, the slower
3	Speed Limit	Max. speed when manually or idle-run (G00)
4	Cut Speed Limit	Max. speed when auto cutting
5	Backward/Forward Speed	After pause, forward or backward speed
6	Reset Speed	Reset speed
7	Speed Angle	Auto mode, direction change of two sections is over the angle, slow speed in

		advance
8	Corner Speed Limit	Auto mode, max. speed of cutting the corner between two sections



Note: when change direction during torch movement, controller will lower speed in advance to avoid torch shake.

In fact, torch shake is caused by different factors, such as inertia, machine rigidity and so on, users can set the corner speed to improve steadiness.

## System

Para Name	X axis	Y axis	Range				
Gear Numerator	2	2	1~65535				
Gear Denominator	1	1	1~65535				
Machine Origin	0.0	0.0	-300.0~3000.0				
Reset Direction	0	0	-1~1				
Backlash	0.0	0.0	0.0~10.0				
Soft + Limit	9000	9000	0~31000				
Soft - Limit	-9000	-9000	-31000~0				
Sheet Size	8000	8000	-15000~15000				
Para Tips: numerator/denominator is pulse equivalent for precision, unit:mm							
Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>

1	Gear Numerator	Numberator/denominator is pulse equivalent, for machine accuracy, unit: $\mu\text{m}$
2	Gear Denominator	Numberator/denominator is pulse equivalent, for machine accuracy, unit: $\mu\text{m}$
3	Machine Origin	Machine origin coordinate, a certain position coordinate for machine 0 point
4	Reset Direction	-1 negative direction, 0 don't move, 1 positive direction
5	Backlash	Mechanical gap when compensation direction change
6	Soft + Limit	Positive direction max. value of machine coordinate
7	Soft - Limit	Negative direction max. value of machine coordinate
8	Sheet Size	

**Gear Numerator and Denominator:** Numerator/denominator is pulse equivalent; controller sends a pulse, the torch movement distance,

Example: numerator is "2", denominator is "1", and pulse equivalent is 0.002mm.

Formula:  $\text{numerator/denominator} = \text{lead screw pitch} \times 1000 / (360 \times \text{subdivision number} / \text{step angle} \times \text{drive ratio})$

Adjustment method:

- 1) set a ratio, such as 8/1, manually move a standard distance, such as 2000, measure actual moving distance, use formula,  $8 \times \text{actual distance} / 1 \times 2000$ , if the actual distance is 2651, then the simplified fraction is 2651/250.
- 2) set a ratio, such as 8/1, manually move a standard distance, such as 2000, measure actual moving distance, press F key, input the value, press Enter, there is result, press F8 to confirm.

**Note:** automatic calculation is better.

**Machine Origin:** Set a coordinate point as machine reference point, or in manual interface to move the torch to a certain position, confirm the origin position by F6 Test Origin.

**Test origin:** machine has mechanical zero point, and when reset direction is right, move the torch to the selected position, set current coordinate, then press F7 Test Origin, execute "XY axis reset at the same time", then display XY axis current coordinate, press Enter to confirm, current coordinate is machine origin coordinate.

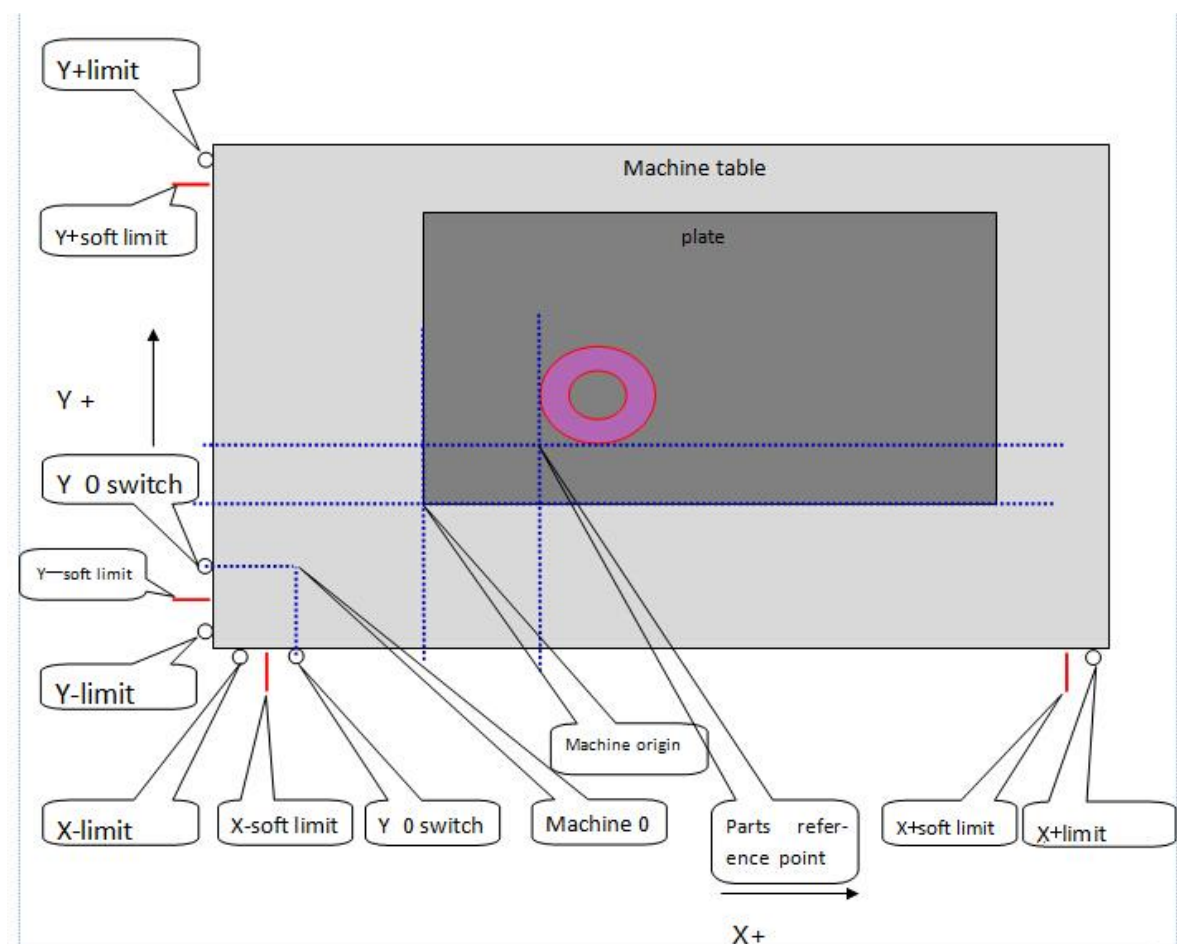
**Backlash:** eliminate mechanical backlash, usually check mechanical structure, it's better not to use backlash, or easy to damage the machine.

**Soft Limit:** set a machine coordinate range, when torch moves beyond the range, reduce speed and stop, only move torch in reverse direction to limit torch movement range to avoid torch collision, if don't use soft limit, can set soft limit invalid in Machine parameter.

Note: when automatically run, then stop after soft limit, automatically record break point.

**Reset Direction:** when set reset, torch movement direction is 1, torch positive movement direction is -1, torch negative movement direction is 0, torch doesn't move, when machine coordinate become X0, Y0, current position is equal to machine zero point position.

## Coordinate setting reference diagram



Note: machine origin can set to any point of value range.

## Control

Para Name	Value	Unit	Range
Metric/British System	0		0~1
Speed Limit for ARC	1	0~1	0~1
Coordinate	0	-1~1	-1~1
G41/G42 Check	0	0~1	0~1
Torch Up after Pause	0	0~1	0~1
Edge Pierce	0	0~1	0~1
Corner Arc	0	0~1	0~1
Clear Coord when start	0	0~1	0~1
Smooth Precision	0.1	mm	0.0~100.0
Bridge Cut Length	0.0	mm	0.0~100.0
Bright Length	0.0	mm	0.0~100.0

Para Tips: 0: metric system mm, 1 British system inch

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

1	Metric/British System	Length unit, 0: metric system (mm), 1: metric system (in)
2	Coordinate	Same as machine direction
3	G41/42 Check	Whether check interference caused by kerf compensation
4	Torch Up after Pause	Whether torch automatically move up after pause (height is up to torch up time)
5	Edge Pierce	Valid: move to pierce point, automatically pause, manually move to proper position, after start, cut to pierce point and continue, better for thick plate.
6	Corner Arc	Arc transition at corner, transition radius is kerf width
7	Smooth Precision	For programs with small sections, to improve stability
8	Bridge Cut Length	Set bridge, cutting length
9	Bridge Length	Set bridge, bridge length

**Torch Up after Pause:** Choose 1, press “torch up delay” after pause, torch moves up after the time, after start again, press “torch down delay”, torch moves down after the time, choose 0, after pause, torch keeps the current cutting height.

**Edge Pierce:** Valid: torch moves the pierce point, options column appear, choose “edge pierce”, “continue locally”, “no pierce”.

F5 Edge Pierce, this moment can manually move torch, away from original path, choose plate edge pierce, then cut back to the previous point in shortest path, continue the left cutting, equal to cutting return after pause, can reduce preheat time for thick plate and improve cutting efficiency.

F6 Local Pierce, pierce at local point and continue left cutting.

F7 No Pierce, idle run the path till next pierce point, new tip appears.

Note: when several pierce points, there is tip for every pierce point.

**Smooth Precision:** When use parts drawings not made by CAD, such as art word, with lots of small sections, use smoothness precision to improve cutting efficiency.

## Craft

Two cutting types: plasma and flame, F5 Switch key to change.

Para Name	Value	Unit	Range
Ignition Time	0.5	s	0.0~20.0
Preheat Time	100.0	s	0.0~999.0
Pierce Time	0.5	s	0.0~30.0
Move Pierce Time	0.0	s	0.0~10.0
Torch Up Time			0.0~10.0
Torch Down Time			0.0~10.0
Pierce Up Time			0.0~10.0
Pierce Down Time			0.0~10.0
Cut Close Time	0.0	s	0.0~10.0
Ignitor	0	0~1	0~1
High Preheat Oxygen	0	0~1	0~1

Message  
to Plasma Mode?  
Cancel Ok

Para Tips: ignition time

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

## Flame

Para Name	Value	Unit	Range
Ignition Time	0.5	s	0.0~20.0
Preheat Time	100.0	s	0.0~999.0
Pierce Time	0.5	s	0.0~30.0
Move Pierce Time	0.0	s	0.0~10.0
Torch Up Time	1.0	s	0.0~10.0
Torch Down Time	0.8	s	0.0~10.0
Pierce Up Time	1.0	s	0.0~10.0
Pierce Down Time	0.8	s	0.0~10.0
Cut Close Time	0.0	s	0.0~10.0
Ignitor	0	0~1	0~1
High Preheat Oxygen	0	0~1	0~1

Para Tips: ignition time

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

Para Name	Value	Unit	Range
Torch Up Time	1.0	s	0.0~10.0
Torch Down Time	0.8	s	0.0~10.0
Pierce Up Time	1.0	s	0.0~10.0
Pierce Down Time	0.8	s	0.0~10.0
Cut Close Time	0.0	s	0.0~10.0
Ignitor	0	0~1	0~1
High Preheat Oxygen	0	0~1	0~1
High Preheat	0	0~1	0~1
Stop Time	0.0	s	0.0~100.0
torch up then open cut oxygen	0	0~1	0~1
do not close output after cut	0	0~1	0~1

Para Tips: very short time between 2 cut, can choose do not close output

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

1	Ignition Time	Ignition time
2	Preheat Time	Preheat time, default is 100s for new program
3	Pierce Time	Pierce time at pierce height
4	Move Pierce Time	Keep output when pierce and XY axis start to move
6	Torch Up Time	Torch up time after cutting
7	Torch Down Time	Torch down time after ignition
8	Pierce Up Time	Torch up time to pierce height after preheat
9	Pierce Down Time	Torch down time to cutting height after pierce
10	Cut Close Time	Input positive value, after torch stops, cutting output close after a period of time for eliminate cutting lag angle, then torch move up; input negative value, close cutting output before torch stops.
11	Ignitor	Set whether use ignitor, when don't use, keep preheat between two cuttings, when use, ignite again for every pierce
12	High Preheat Oxygen	Set whether use high-pressure preheat oxygen to assist preheat
13	Low Preheat	Whether keep low preheat oxygen on after preheat and start to cut
14	High Preheat	Whether keep high preheat oxygen on after preheat and start to cut

**Ignition Time:** time of torch ignition

**Preheat Time:** before pierce turn on low preheat and high preheat oxygen

Note: when use auto ignitor

1, when ignite, firstly turn on gas output, then turn on low preheat output, then turn on ignitor output, after ignition time, turn off ignitor output, keep gas and low preheat output.

2, when pierce (output off), according to setting of "high preheat" to judge whether turn on high preheat. If choose high preheat, firstly turn on gas output, then turn on low preheat output, then turn on ignitor output, after ignition, turn off ignitor output, keep gas and low preheat output, turn on high preheat, preheat starts, after preheat delay, pierce starts; if don't use high preheat, firstly turn on gas output, then turn on low

preheat output, then turn on ignitor output, after ignition, turn off ignitor output, keep gas and low preheat output, preheat starts, after preheat, pierce starts.

Don't use auto ignitor

1, when ignite, ignition time set 0, firstly press K1 to open gas and low preheat output, manually ignite gas

2, when pierce, controller doesn't open ignitor output, ignition time skip, directly preheat starts

**Pierce Time:** after preheat, torch moves up to pierce position, open cutting oxygen (high oxygen) output, the time of pierce starts

**Move Pierce Time:** after start pierce, before torch moving down to cutting height, X and Y start moving time, the time is to avoid steel slag

**Torch Up Time:** after cut, torch move up time

**Torch Down Time:** after ignition, torch move down time

Note: 1, torch up time and torch down time decide torch idle-run and preheat height, usually up time is longer than down time

2, before start cutting every time, firstly move torch to align plate start point, and adjust torch to proper cutting height, then start, controller firstly executes torch up, then idle-run to pierce position and ignite, after ignition, move down to cutting height (torch down time), after cutting, execute torch up, idle-run to start position, don't execute torch down, so before next start, firstly need to adjust torch to proper cutting height.

Pierce up time: after preheat, torch move up time

Pierce down time: after pierce, torch down time

Note: 1, pierce up time and pierce down time decide torch cutting height, usually up time is longer than down time.

2, move up before pierce to avoid steel slag

**Cut Close Time:** after cutting, keep cutting output time, to avoid lag angle, after the time, torch starts to move up

**Ignitor:** when set 0, before move to the next pierce point, keep gas and low preheat output (with fire), set 1, close gas and low preheat output after cutting current part, ignite again at the next pierce point

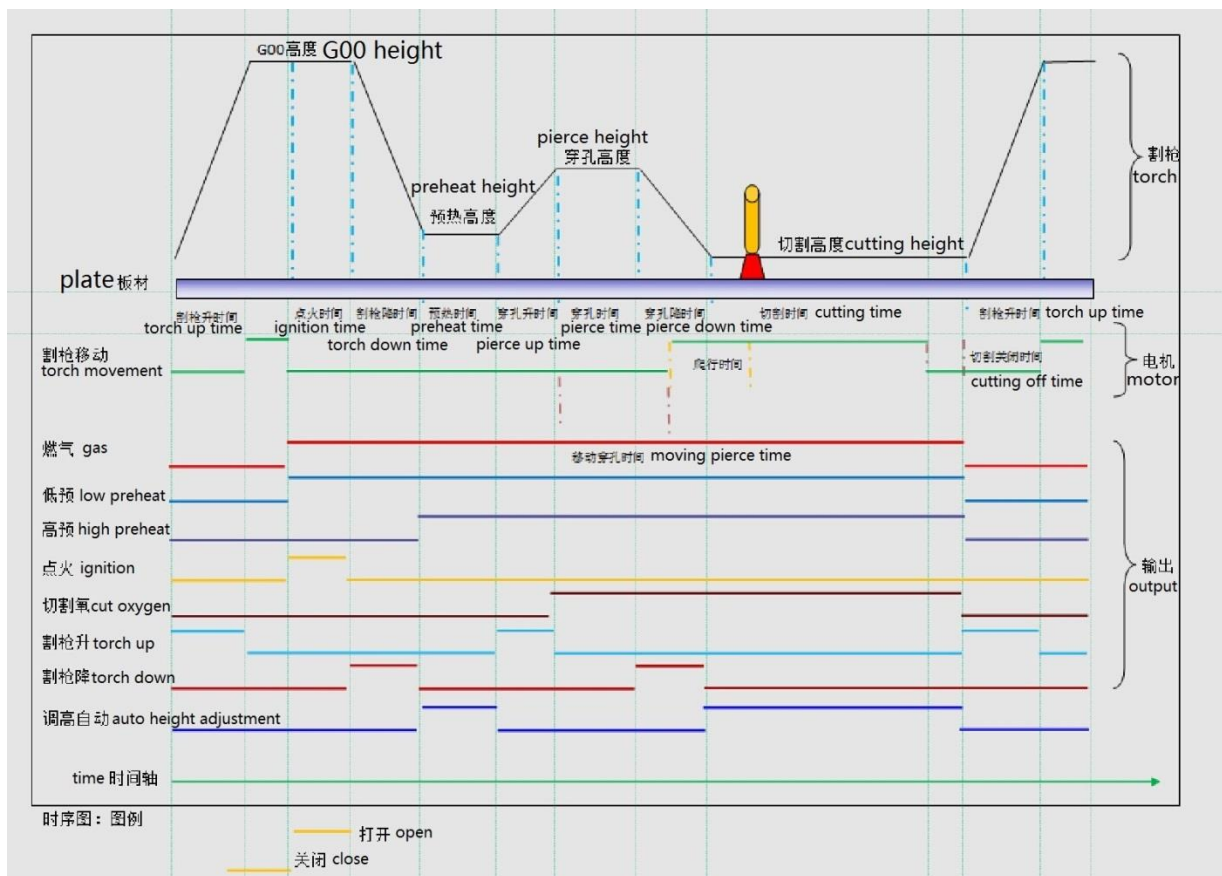
**High Preheat Oxygen:** when set 0, don't use high preheat, when set 1, use high preheat to assist preheat

**Low Preheat:** 0 to close low preheat during cutting, 1 to keep low preheat during cutting

**High Preheat:** 0 to close high preheat during cutting, 1 to keep high preheat during cutting

Note: can't set 0 at the same time of keep low preheat and keep high preheat

## Flame cutting procedure



## Plasma

Para Name	Value	Unit	Range
Torch Up Time	1.0	s	0.0~10.0
Torch Down Time	0.8	s	0.0~10.0
Location Up Time	0.5	s	0.0~3.0
Arc Strike Time	0.3	s	0.0~3.0
Pierce Time	0.3	s	0.0~10.0
First Pierce Time	0.3	s	0.0~10.0
Move Pierce Time	0.0	s	0.0~10.0
Auto THC Delay	0.0	s	0.0~10.0
Close THC Speed Down Scale	90	%	0~100
Arc Break Distance	0.0	mm	0.0~90.0
Location Feedback	0	0~1	0~1

Para Tips: torch up time after cut finish

Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>
------	------	------	------	------	------	------	----

Para Name	Value	Unit	Range
Location Up Time	0.5	s	0.0~3.0
Arc Strike Time	0.3	s	0.0~3.0
Pierce Time	0.3	s	0.0~10.0
First Pierce Time	0.3	s	0.0~10.0
Move Pierce Time	0.0	s	0.0~10.0
Auto THC Delay	0.0	s	0.0~10.0
Close THC Speed Down Scale	90	%	0~100
Arc Break Distance	0.0	mm	0.0~90.0
Location Feedback	0	0~1	0~1
Pause Location Feedback	0	0~1	0~1
Arc Strike Feedback	0	0~1	0~1

**Para Tips:** whether check arc strike success feedback signal input, plasma power or THC has the signal output, connect to CNC, set 1

Syst	Spee	Ctrl	<b>Craf</b>	Swit	Figu	Save	>>
------	------	------	-------------	------	------	------	----

1	Torch Up Time	Time of torch moving up after cutting
2	Torch Down Time	Torch lifter has no location switch (zero point switch), location feedback set 0, torch down time, torch height is arc strike height; when check location feedback, down all the time till zero point
3	Location Up Time	When location feedback valid, check location switch signal input, close torch down output, open torch up output, keep location up time and then close, torch height is location height (arc strike height)
4	Arc Strike Time	Time of opening arc strike switch, end till check arc strike success feedback signal
5	Pierce Time	Time of torch at pierce height, to pierce though plate
6	Move Pierce Time	Keep output during pierce, XY axis start to move
7	Climb Time	After finish cutting, time of torch moving at climbing speed
8	Stop time	After finish cutting, time of torch stopping movement
9	Auto THC Delay	After torch starts to move, open height adjustment auto signal output
10	Close THC Speed Down Scale	During cutting, speed down to setting range, close THC auto signal output, reduce arc voltage THC wrong action
11	Arc Break Distance	Set a position before end point, close arc strike output in advance, finish left cutting by left temperature to reduce overburn, close THC auto output after arc break
12	Location Feedback	Torch lifter has location switch (zero point switch), set 1
13	Arc strike Feedback	After arc strike, whether check arc strike success feedback signal input, plasma power or arc voltage auto THC has the signal, can connect to the controller, set 1

**Torch Up Time:** after cutting, time of torch moving up

**Torch Down Time:** torch lifter has no location switch (zero point switch), location feedback set 0, torch down time end, torch height is arc strike height

Note: when check location feedback, torch down time invalid

**Location Up Time:** when check location feedback valid, check location switch signal input, close torch down output, open torch up output, keep location feedback and close, torch height is location height (arc strike height)

Note: when don't check location feedback, location up time invalid

**Arc Strike Time:** time of arc transfer

**Pierce Time:** torch up to pierce position, start to pierce

**Move Pierce Time:** after torch starts pierce, before torch down to cutting height, XY start to move, this period of time to avoid steel slag

**Auto THC Delay:** after pierce, open the time

Note: set the time, help THC to avoid unsteady arc voltage time and reduce torch shake

**Close THC Speed Down Scale:** during cutting, speed change is in the range, close auto height adjustment, reduce arc voltage auto THC wrong action caused by speed change, set 99, cutting speed is 99% of set speed, don't close THC auto output caused by speed change

**Arc Break Distance:** set a position before the end point, close arc strike output in advance, finish left cutting by left temperature, to avoid overburn.

Note: close THC when break arc

**Arc Break Time:** check arc strike success feedback valid, set time, so that torch continues to move after arc break

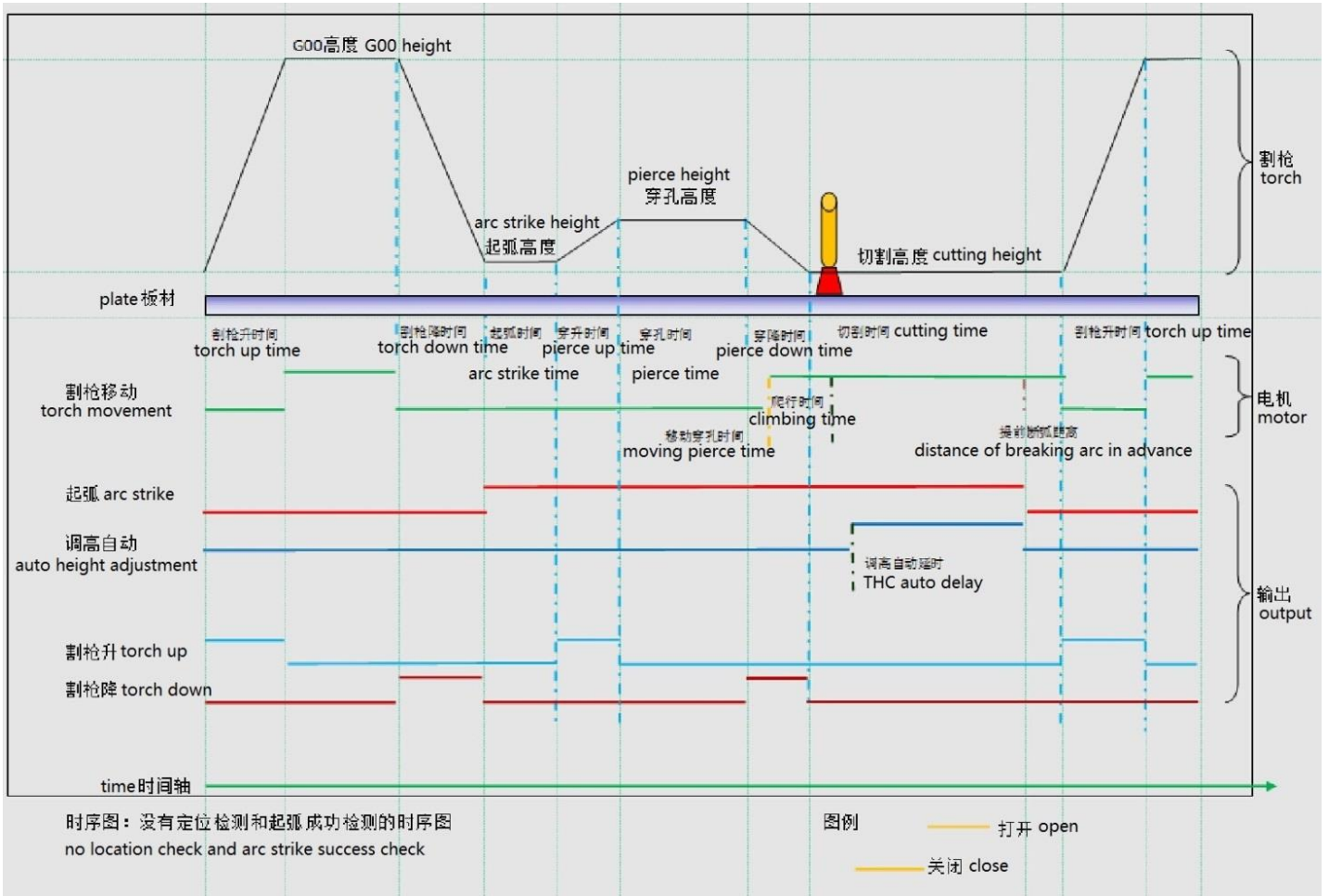
Note: don't check arc strike success feedback, time of arc break invalid

**Location Feedback:** torch lifter has location switch (zero point switch), can set 1, choose check location feedback, or set 0

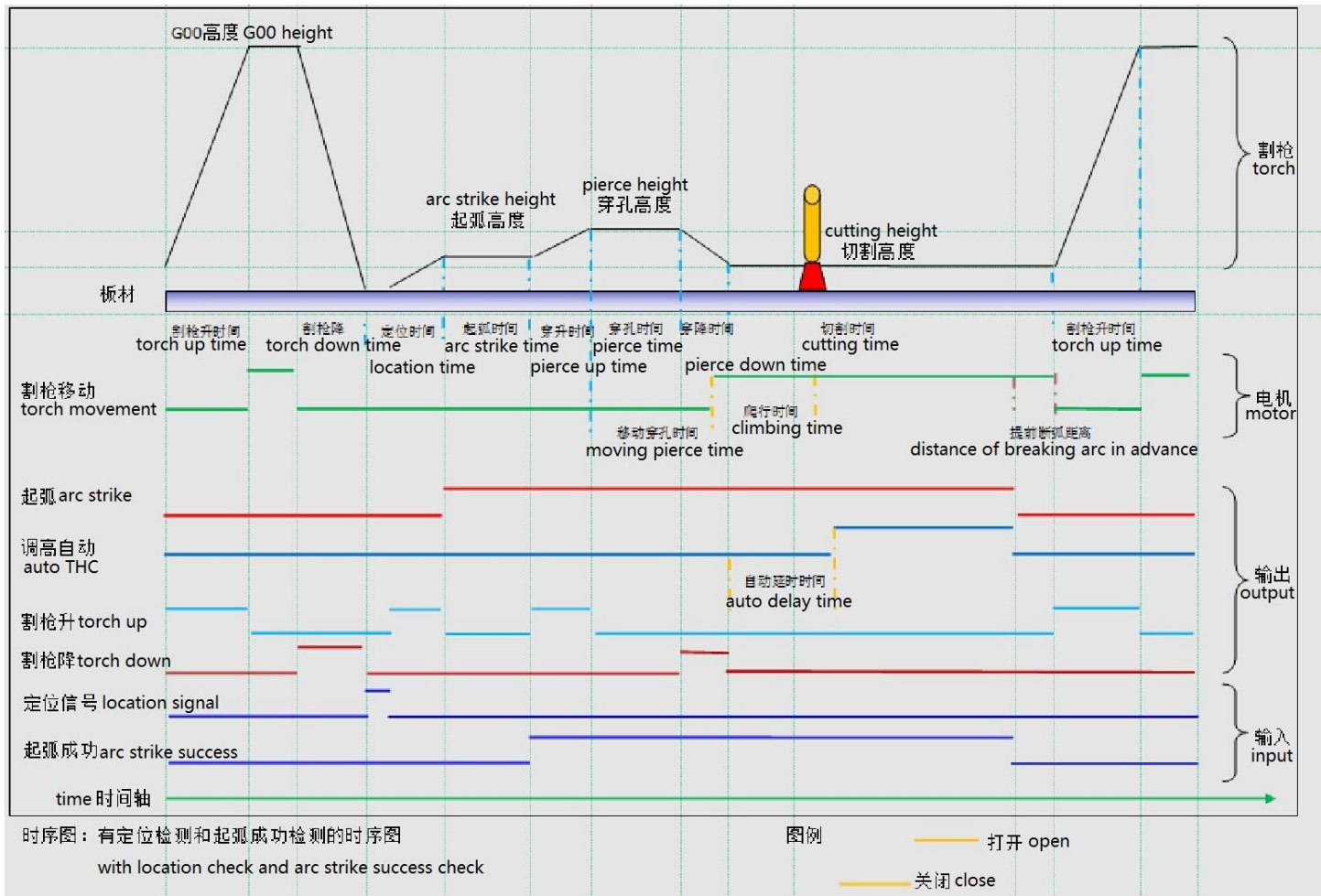
Note: set 1, torch location, keep torch down output, till check location switch signal input close

**Arc Strike Feedback:** open arc strike output, whether check arc strike success feedback signal input, plasma power or arc voltage auto THC has the signal output, can connect to controller input, set 1

Plasma cutting procedure (no location check and arc strike success check)



### Plasma cutting procedure (with location check and arc strike success check)



## Figu (Figure) parameters

Para Name	Value	Unit	Range				
Pretreat Figure	1	0~1	0~1				
Kerf Display	1	0~1	0~1				
Outline Display	0	0~1	0~1				
Pierce No. Display	0	0~1	0~1				
Para Tips:do not pretreat large file figure							
Syst	Spee	Ctrl	Craf	Swit	Figu	Save	>>

1	Pretreat Figure	You'd better not choose figure pretreatment for oversized file
2	Kerf Display	Cancel kerf line display to simplify figure display
3	Outline Display	Cancel outline display to simplify figure display
4	Pierce No. Display	Cancel pierce number display to simplify figure display

Figure pretreatment: set whether preview figure before cut, when file is over 1M, can choose don't pretreat figure to save time

Note: no effect on cutting path display

## Mach (Machine) parameters

Para Name	Value	Unit	Range			
External Limit Valid	1	0~1	0~1			
Soft Limit Valid	0	0~1	0~1			
Torch Collision	0	0~1	0~1			
Dual Side XZ/YZ	0	0~1	0~1			
Pneumatic Lifting	0	0~1	0~1			
Zero Point Switch	0	0~1	0~1			
Go To StartPoint?	0	0~1	0~1			
Para Tips:use limit switch,1 use,0 no						
<<		Mach	Circle		High	Save

1	External Limit Valid	1 use, 0 don't use
2	Soft Limit Valid	1 valid, 0 invalid
3	Torch Collision	1 use, 0 don't use
4	Dual Side XZ/YZ	1 YZ axis, 0 XZ axis



1	To Default	All parameters become default
2	Save As Default	Save all parameters as default
3	Lead out Parameter	Create parameter file in SD card, expanded name "PAG", existed parameter file will be replaced, please backup
4	Lead in Parameter	Lead in parameter file in SD card to replace all parameters, if from U disk, firstly by manager, save all parameter file in SD card
5	Parameter	Set parameter revise permission

Note: 1, restore and save default, need to input password 999, after testing machine, the machine supplier should save parameter default before sales.

2, machine users can save as default, but cover machine maker's parameters, if cover and want to restore machine maker's default, can use lead-in parameter file.

## Chapter 6 Edit

Main menu press F3 Edit

Edit		Prog110271		Tot Ln 000001			
00001							
00002							
00003							
00004							
00005							
00006							
00007							
00008							
00009							
00010							
00011							
00012							
00013							
00014							
00015							
00016							
00017							
00018							
00019							
00020							
New	Open	View	Save	SaveAs	Manage	Del Ln	Line

### 6-1 edit function

F1 New

### 6-2 codes instruction

Every action of CNC machine running according to regulate program, every machine program be composed of some instruction segment, and every instruction segment be composed of some function word, each function word must start by letter, parameter follow.

Definition of function word:

N: The No. of instruction segment

G: Prepare function

M: Assistant function

T: Knife function (it's kerf width in this controller)

L: Cycle times or delay time

X: X axis absolute coordinate

Y: Y axis absolute coordinate

U: distance of X axis relative points

V: distance of Y axis relative points

I: When cutting arc, the value of the coordinate of the circle centre subtract X axis start point value

J: When cutting arc, the value of the coordinate of the circle centre subtract Y axis start point value

R: Specified arc radius

H: Chord height of the arc

A: assistant variable

F: Specified moving speed, used for G01, G02 and G03

**Attention 1:** There are some appointments:

X [U]n -- It can be X or U, n express a value, but only appear once.

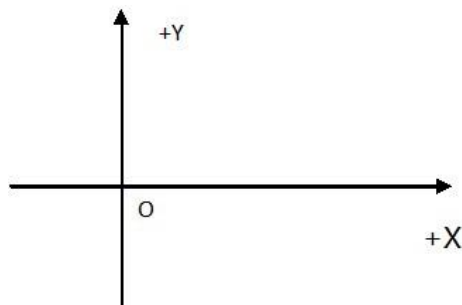
Y [V]n -- It can be Y or V, n express a value, but only appear once also.

PPn -- It can be assembled random axis, at least include one axis, also can include two axes.

**Attention 2:** The instruction executes order is sequence (except transfer and call sub program instruction); In same program the M,S and T will be executed before G instruction.

### 6-3 Coordinate System

This controller uses standard right angle coordinate system, as below



### 6-4 G command (Basic Prepare Command)

#### 1) G92 reference point setup

When set up a program, coordinate value of fabricating starting point (reference point) must put in front of program and set up with absolute coordinate.

Format: G92 Xn Yn

If behind G92, there is no X, Y, then make current X, Y coordinate as reference point. Generally to locate with machine origin, there is no X, Z behind G92.

#### 2) G90/G91

Absolute coordinate G90 (default) / relative coordinate G91;

Using G90, X, Y are coordinate values, U, V are relative values for current point; using G91, X, Y and U, V all are relative values for current point.

Format: G90

Format: G91

e.g. 1: G92 X0 Y0

G91 // relative coordinate

G00 X100 Y100 // rapidly locate to (100, 100), equal to G00 U100 V100

G01 X500 Y100 // straight line to the position (600, 200), equal to G01 U500 V100

e.g. 2: G92 X0 Y0

G90 // absolute coordinate, default  
G00 X100 Y100 // rapidly locate to (100, 100)  
G01 X600 Y200 // straight line to (600, 200)

### 3) G20/G21 British system/ metric system instruction

G20 British system, X, Y, I, J, R, U, V, H, F, behind G20, all are British system unit

G21 Metric system (default), X, Y, I, J, R, U, V, H, F, behind G21, all is metric system unit

Format: G20

Format: G21

### 4) G00 point movement

This command is to go to specified position rapidly. When two axes have displacement, the controller uses max. limit speed by multiplying power, from starting point to finishing point move straightly. G00 moves, affected by speed multiplying power.

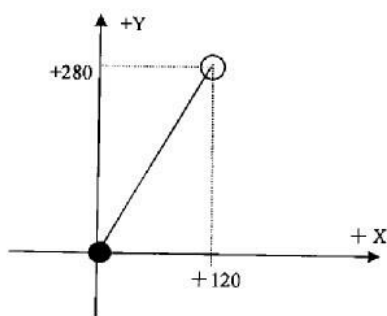
Format: G00 X [U]n Y[V]n

Or G00 PPn

e.g.: G92 X0 Y0

G00 X120 Y280

(or G000 U120 V280)



● current torch position

○ torch expectant position

### 5) G01 straight line cut

This command is to make cutting tool to straightly go to specified location, as cutting movement command, one axis or two axes straight-line interpolation movement. Movement speed can be specified by F.

Format: G01 X[U]n Z[W]n [Fn]

Or G01 PPn [Fn]

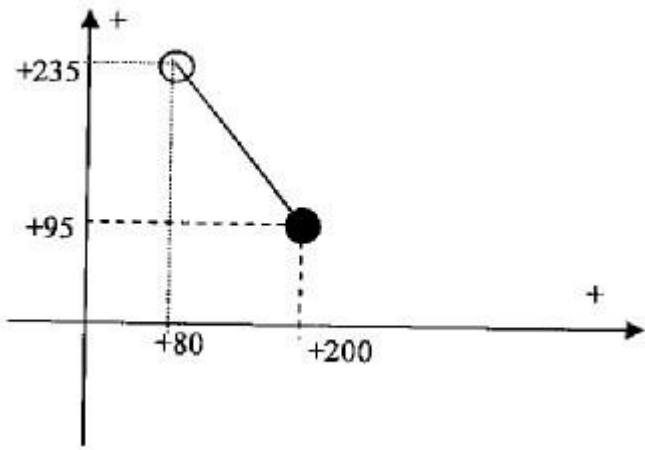
e.g.: G92 X0 Y00

G00 X200 Y95

G01 X80 Y235

(or G01 U-120 V145)

M02



- current torch position
- torch expectant position

#### 6) G02/G03 arc cut

This command is for arc interpolation, clockwise arc G02, anticlockwise arc G03,

Format: G02[03] X[U]n Y[V]n I n Jn [Fn] or G02[03] X[U]n Y[V]n I n Rn [Fn]

G02[03] PPn I n Kn [Fn] or G02[03] PPn Rn [Fn]

e.g. (G02)

G92 X0 Y0

G00 X40 Y50

G02 X160 V0 I60 J20

G28

M02

e.g. (G03)

G92 X0 Y0

G00 X40 Y50

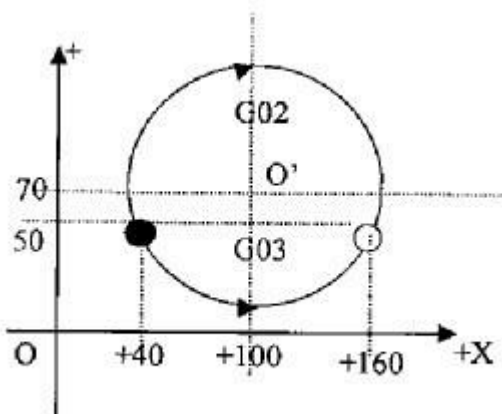
G03 X160 V0 I60 J20

(or G03 X160 V0 R63.25)

G28

24

M02



- current torch position
- torch expectant position

Instruction:

I, J are X axis, the center of the circle in Y axis has a increment for starting point

R is the radius of the circle (R is positive value, when arc  $\leq 180$  degree, R is radius)

If I、 J are specified, don't use R; vice versa

#### 7) G04 pause / delay command

This command is to set up delay, when program run to this command, program will be delayed as L specified time, unit is second

Format: G04 Ln

e.g.: G04 L2.4 (delay 2.4 s)

When run G04, press [start] to stop delay, to continue the program after G04, press [esc] to stop current program

#### 8) G26, G27, G28 back to reference point

This command is to make cutting tool back to the reference point

Format: G26 X axis back to reference point

G27 Y axis back to reference point

G28 X, Y axis back to reference point at the same time

e.g.: G28 (X, Y axis back to reference point at the same time, equal to G00)

#### 9) G22/G80 loop statement

This command is for program loop, G22 is the start of loop, and the number of loops, G80 is the end of the loop, can nest loop, not over 5 levels, G22 and closest G80 is a loop.

Format: G22 Ln\_ (L is the number of loop)

Loop

G80

e.g.: N000 G92 X100 Y100

N001 G00 X60 Y80

N002 G22 L5-----start of the first-level loop

N003 G00 V50 U-25

N004 G22 L5-----start of the second-level loop

N005 G01 U5 V-10

N006 G80-----end of the first-level loop

25

N007 G80-----end of the second-level loop

N008 G28

N009 M02

#### 10) Cutting tool radius compensation statement (G40、 G41、 G42)

Format: G41 (or G42) Rn

.

Program section in need of compensation

.

.

G40

Remark: G41 is along fabricating route, left compensation half of flame diameter

G42 is along fabricating route, right compensation half of flame diameter

G40 is excursion end

Because cutting tool compensation is finished automatically, before G41, G42, there should be G00 rapid location statement, so that the nozzle adjusts the position; after G40 cancels compensation, it needs a G00 statement to adjust the position back.

Finish M80 all output ports are closed

## 6-5 M assistant function

M00: program pause command, press [Start] to continue

M02: program end command, program is in the state of wait

M30: same as M02

M10/M11: gas (acetylene) valve switch, M10 (on), M11 (off)

M12/M13: cut oxygen valve switch, M12 (on), M13 (off)

M14/M15: torch up switch, M14 (on), M15 (off)

M16/M17: torch down switch, M16 (on), M17 (off)

M24/M25: preheat switch, M24 (on), M25 (off)

M20/M21: ignition switch, M20 (on), M21 (off)

M07: pierce fixed cycle (enter M07, can't return, can move torch)

M08: close cut fixed cycle

Flame cut operation as below,

M07

If gas (acetylene) valve is closed, then open gas (acetylene) ignition

Torch down (torch down delay, M71)

Turn on preheat oxygen valve, preheat delay start, if preheat time is not enough, press [Pause] key, preheat delay can automatically be longer to 100s, if preheat is ready, press [Start] key, preheat is over, and press F7 [Set] to end preheat and save parameter.

Note: it is different from SH series controller, and there are 3 options of extend, set and skip.

4, Torch up (pierce torch up delay, M72)

5, Turn on cut oxygen valve (M12), after delay pierce, torch down (pierce torch delay M73)

6, Turn on torch height controller (M38), start to run next program

Plasma cut operation as below:

M07

1, Torch down (torch delay, M71)

2, If choose pierce location (parameter setup) valid, then torch down, touch low limit switch, stop; torch up, after pierce location delay, torch stop

3, Turn on arc switch

4, check "arc voltage success" signal, if choose 0 (not check) in the parameter setup, then don't check arc voltage, after start arc is successful, delay pierce (s)

5, Turn on torch height controller (M38), start to run next program

M08 turn off cut fixed loop

Flame cut operation as below:

1, Turn off cut oxygen (M13)

2, Turn off torch height controller (M39)

3, Torch up (M70)

Plasma cut operation as below:

1, Turn off arc voltage switch (M13)

2, Turn off torch height controller (M39)

3, Torch up (M70)

M50 pierce

1, torch up (M72), plasma has no this movement

2, Turn on cut oxygen (M12), or plasma start arc, check signal of "arc voltage success"

3, torch down (M73), plasma has no this movement

4, Turn on the torch height controller (M38)

M52 ignition fixed cycle

Turn on gas (acetylene) valve (M10), turn on high voltage ignition (M20), delay ignition, turn off high voltage ignition (M21)

M70 torch up fixed cycle

It's used for the start and the end of a program, torch up, to make torch move to another position. Turn on torch up switch (M14), delay torch up (7.3 flame parameter), turn off torch up switch (M15)

M71 torch down fixed cycle

It's used before piercing, has adverse function of M70, the value is small, because of gravity, down is faster than up. Turn on torch down switch (M16), delay torch down (7.3 flame parameter), turn off torch switch (M17)

M72 pierce torch up cycle

It's used after preheat, torch up, avoid flying slag blocking the nozzle when turning on cut oxygen. Turn on torch up switch (M14), delay pierce torch up (7.3 flame parameter), turn off torch up switch (M15)

M73 pierce torch down cycle

It's used after preheat, finish M72, after turning on cut oxygen, torch is in cutting position, the adverse movement of M72, and value is small, because of gravity, down is faster than up. Turn on torch down switch (M16), delay pierce torch down (7.3 flame parameter), turn off torch down switch (M17)

M75 torch location delay

Plasma torch location, firstly torch down (M16), touch low limit (input port 8 XXW), torch down stop (M17), then torch up turn on (M14), after torch location delay (7.4 plasma parameter), torch up stop (M15)

M62 draw line function starts

After M62, torch offsets a unit of a draw line offset (parameter-system) till M63. There is no kerf compensation when drawing line.

M63 draw line function ends

After running M63, draw line function is over, torch return an offset from current position

M80 close

Execute M80, all output ports are closed

## **6-6 file manager**

In edit interface, press F6 Manage to open file manager

File		Mana					
Name	Info	Select					
3.bmp	768072	<input type="checkbox"/>					
<b>TK30.TXT</b>	947	<input type="checkbox"/>					
4.bmp	768072	<input type="checkbox"/>					
TK32.TXT	1124	<input type="checkbox"/>					
5.bmp	768072	<input type="checkbox"/>					
6.bmp	768072	<input type="checkbox"/>					
TK00.TXT	175	<input type="checkbox"/>					
1027	175	<input type="checkbox"/>					
7.bmp	768072	<input type="checkbox"/>					
10271	1098	<input type="checkbox"/>					
0.bmp	768072	<input type="checkbox"/>					
Space: 0.947G				1. bmp			
Used: 0.007G				(0.00, 0.00)			
Subjec 17							
Disk	<b>UDisk</b>	View	Search	New	Copy	OK	

F1 Disk (local disk), display local disk directory

F2 U disk, display U disk directory

F3 View (preview), display current part figure

F4 Search, search file as file name

F5 New, build file folder

F6 Copy, copy file to U disk and local disk

F8 OK, confirm input or choose

Enter key: choose current file

Del: delete current file

PgUp: pageup

PgDn: pagedown

Right key: enter file

Left key: exit file

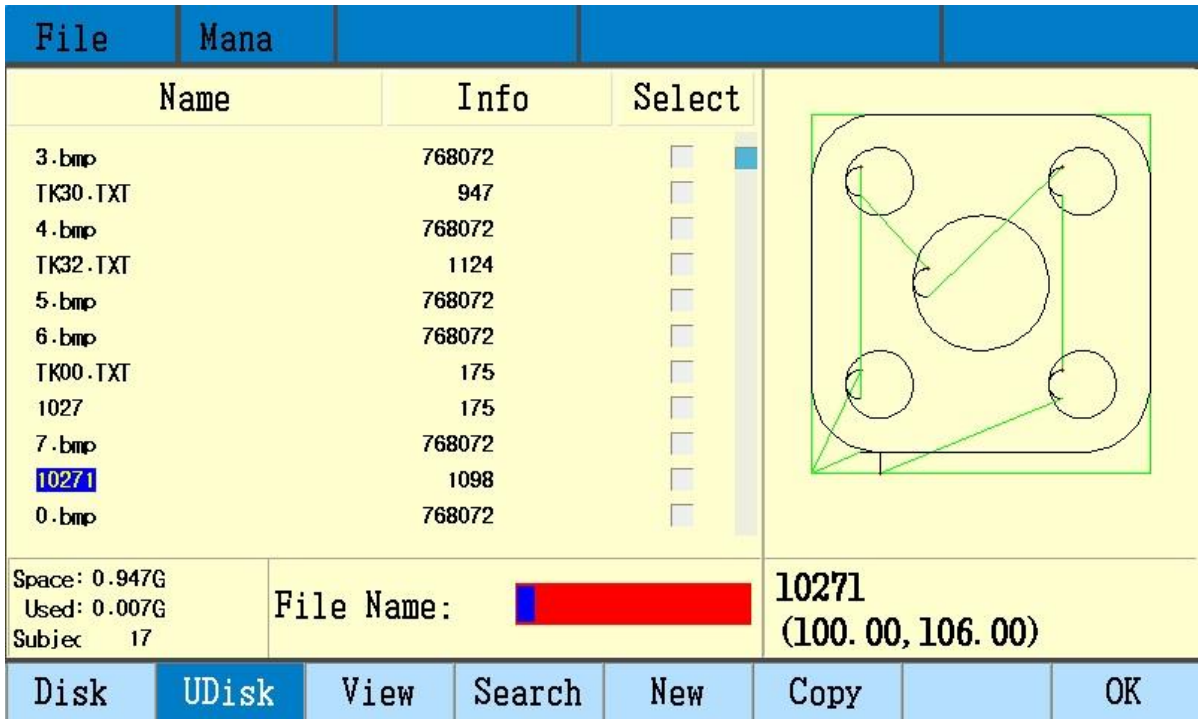
F3 preview current parts figure

File		Mana					
Name	Info	Select					
3.bmp	768072	<input type="checkbox"/>					
TK30.TXT	947	<input type="checkbox"/>					
4.bmp	768072	<input type="checkbox"/>					
TK32.TXT	1124	<input type="checkbox"/>					
5.bmp	768072	<input type="checkbox"/>					
6.bmp	768072	<input type="checkbox"/>					
TK00.TXT	175	<input type="checkbox"/>					
1027	175	<input type="checkbox"/>					
7.bmp	768072	<input type="checkbox"/>					
<b>10271</b>	1098	<input type="checkbox"/>					
0.bmp	768072	<input type="checkbox"/>					
Space: 0.947G				10271			
Used: 0.007G				(100.00, 106.00)			
Subjec 17							
Disk	<b>UDisk</b>	View	Search	New	Copy	OK	

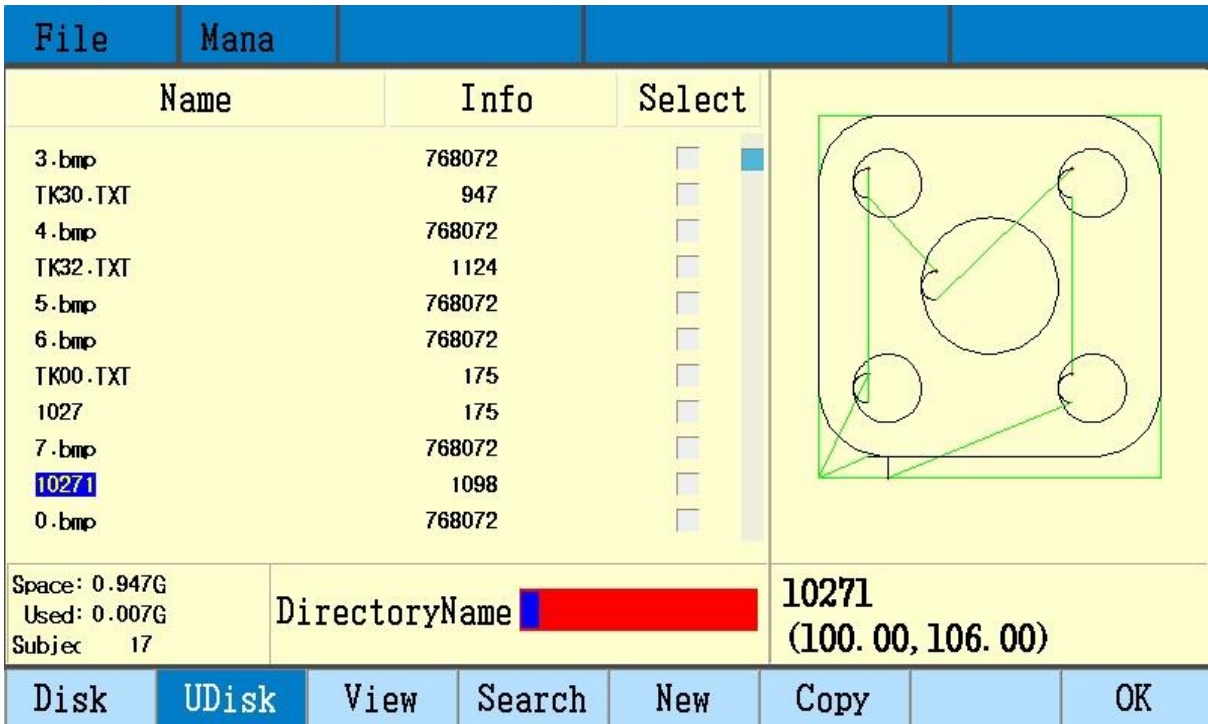
- 1, U disk format is FAT32
- 2 can copy and delete several files at the same after select
- 3, there is operation tip when cursor moves to file folder

F4 search parts

Input file name to search



F5 New, input file folder name to build



## Chapter 7 Diagnose

Main menu press F5 Diagn (diagnose)

7-1 diagnose

Name	Level	State	Name	Level	State
+ Limit	H	No	Locatin	H	No
- Limit	H	No	Torch Collide	H	No
GunUp	H	No	X OPoint Switch	H	No
GunDn	H	No	Y OPoint Switch	H	No
Arc Feedback	H	No	No use	H	No
External E-stop	H	No			
External Pause	H	No			
External Start	H	No			
Port Tip +limit switch, set port or change level <input type="checkbox"/> logic					
Input	Output			State	Save

F1 Input, display input state

F2 Output, display output state

F7 State, set current port state logic

F8 Save, save current port state logic

## Input

Display current input port level high/low, can set current level high/low and logic, logic has "Yes", "No" and "disable".

"Yes", current level has output signal.

"No", current level has no output signal.

"Disable", don't send command to current port.

## Output

Display current output port level high/low, can set current level high/low and logic, logic has "Yes", "No" and "disable".

"Yes", current level has output signal.

"No", current level has no output signal.

"Disable", don't send command to current port.

Name	Level	State	Name	Level	State
Height Auto M38	H	No			
CutOxy/Arc M12	H	No			
Gun Up M14	H	No			
Gun Down M16	H	No			
Gas/PreheOxy M10	H	No			
Ignition M20	H	No			
High PreheatM22	H	No			
Preheat M24	H	No			
Port Tip Oxy/PreheOxyM10					
Input	Output		Reverse	State	Save

F5 Reverse, change output port level high/low.

## Adjust moving precision

Start ---> parameter-system (numerator:2, denominator: 1) ---> manual-point move-increment:100 ---> move-direction buttons-measure actual moving distance ---> parameter-system-calculation-input actual distance-press Enter, numerator & denominator change-save parameters ---> manual-point move verification ---> right or not ---> yes ---> end.

## Controller upgrade

Start ---> connect U disk (FAT32 format, with upgrade file) ---> main menu GG9 ---> confirm upgrade ---> F2 Update ---> automatic upgrade, restart the controller ---> end.

Start ---> connect U disk (FAT32 format, with upgrade file) ---> press upgrade button and restart the controller ---> F2 Update ---> automatic upgrade, restart the controller ---> end.

## Special setting after turn on the controller

Operation	Setting	Instruction
GG1	Check controller ID	Display controller ID
GG2	Revise time	Display or revise controller time
GG3	Format	Delete all programs in local disk
	Paralinitial (parameters initialization)	All parameters become controller factory default, if become machine supplier parameter settings, press "Parameter" – "High" – L1 back to default setting
	SetInitial (settings initialization)	All settings become controller factory default, such as "speed limitation", "kerf" and other settings in auto and manual mode.
	Chinese/English	Chinese/English
	New Code	Set power-on password
GG5	User No.: Code:	Input machine supplier ID and verification code, we offer that ID for encryption.
GG6	Upgrade Word?	Upgrade word stock and power-on background picture
GG7	Version Info	Check controller software version
GG8	Is Change Logo Name	Connect U disk with company name
GG9	Upgrade?	Upgrade controller software
GG90	Log in	There is a 6-digit number