catalogue

Chapter 1   system operation panel

【F1】-【F8】: Function keys, under different interface, with the corresponding prompt functions;

【F+】：to speed up the speed

【F-】：to slow down speed

【S+】：Torch up key；

【S-】：Torch down key；

【K1】—【K6】：Shortcut keys, press the screen prompt to open or close the corresponding output;

 Move the Torch or move the cursor up, down, left, and right；

 The enter key to confirm the input value or select the project；

 Escape key to exit the current interface or deselect;；

 The blank space key, press button to enter automatic processing interface under the main interface；

 Start button；

 Pause keys；

Chapter 2   main interface description

2.1 main screen button description

After starting up the system, as shown in the figure below:
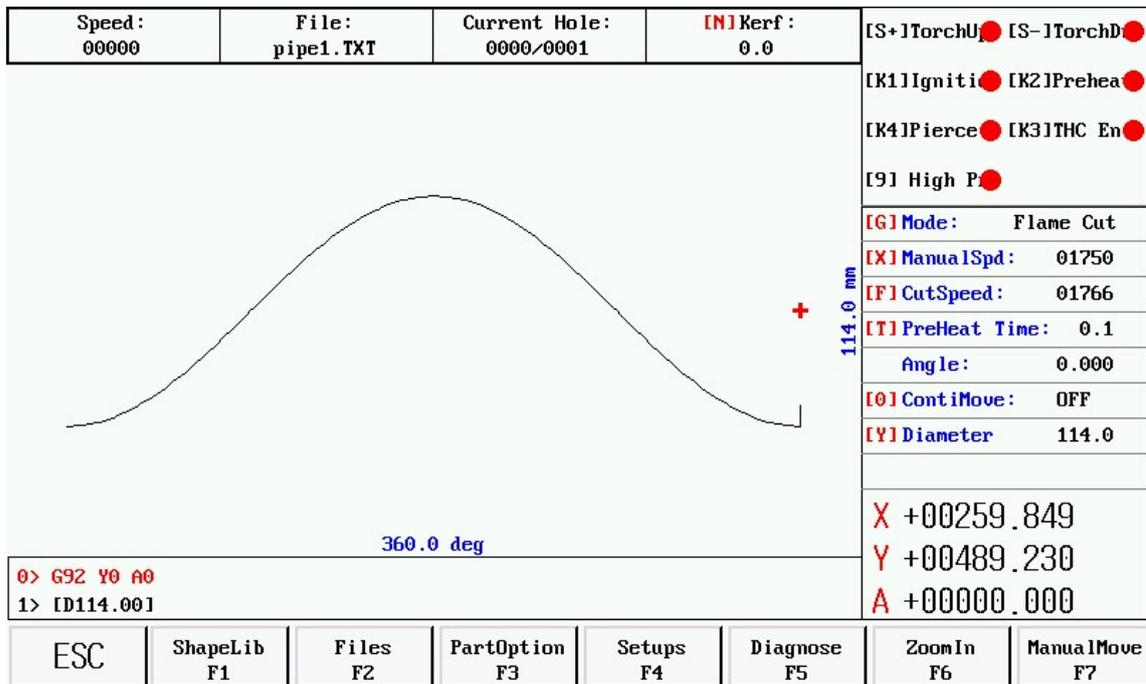
Under the main interface, the key functions are as follows：

【F1】Gallery: enter the graphics library, most of which are available in sheet size and hole size. You can also enter the nesting screen.

【F2】 File: select local file, U disk file, file edit, file delete, file import export and other operations.

【F3】 Part options: mirror, rotate, starting point, rotate correction, scale, segment selection, etc.

【F4】 Process parameters: all parameters can be set here.

【F5】 Diagnostic Settings: input/output diagnostics, system Settings, port customization, etc.

【F6】 Graphic information: enlarge graphics, view punch points, and cut information display.

【F7】Manual: manually move the machine tool, reset system coordinates, return parameters, and select breakpoints.

【G】 Set cutting mode: press this button to switch the three modes of flame, plasma and demonstration.

【X】 Manual speed: sets the manual movement speed.

【F】 Cutting speed: set the automatic cutting speed.

【T】 Preheating time: set the preheating delay.

【N】 Slot: the slot size can be set before the cutting operation starts.

【0】Continuous walk: after the function is turned on, press the direction button when manually moving the gun, the cutting gun will keep walking, and then press the direction button or pause button again to stop.

【 】：Start cutting;

【 】：Pause or stop cutting.

2.2 Manual function description

Under the main screen, press [F2] to enter the manual screen, as shown in the figure below：
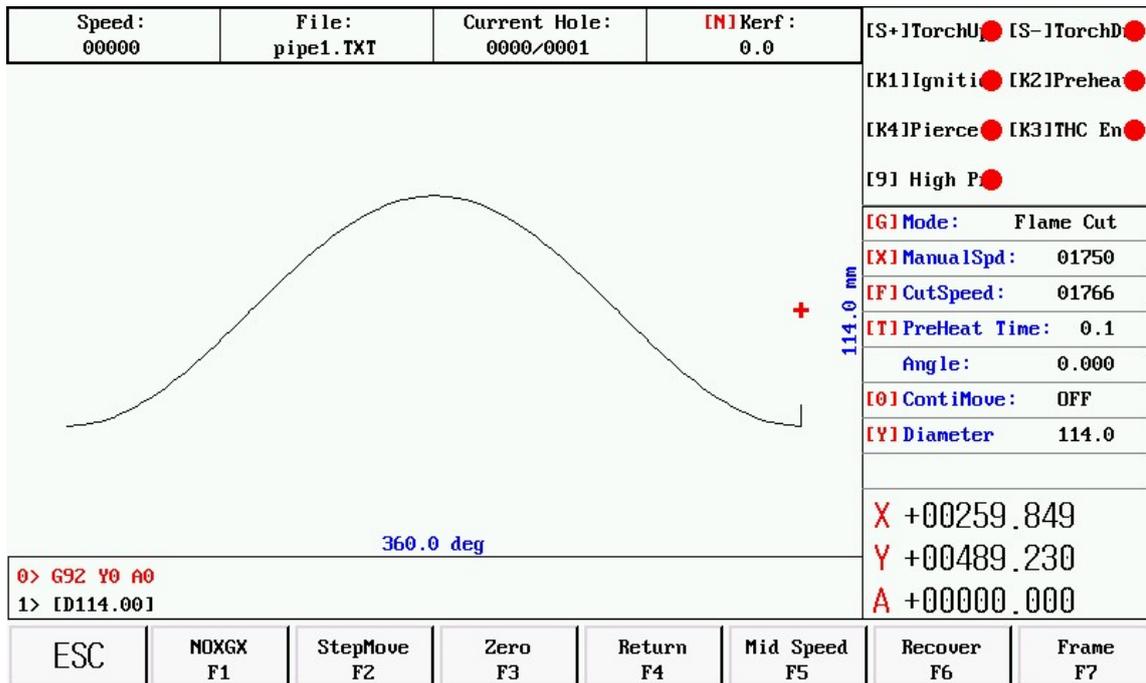
[F1] Non-intersecting: open and close non-intersecting function, non-intersecting function can be plane nesting program cut in the pipe, to achieve some complex shape cutting, such as cutting word.

[F2] tapping: after pressing this key to input the tapping increment, press the direction key once to cut the gun to a certain length, and then press it again to cancel the tapping.

[F3] coordinate clearing: coordinate clearing function.

[F4] return parameter: press this key to select "return to reference point" or "return to machine tool origin".

[F5] High/low speed switching: When manually moving the gun, press this key to switch high, Medium and low speed.

[F6] find the breakpoint: if the cutting was not completed last time, press this button. After the breakpoint is found, press the start button to continue cutting.

[F7] contour walk: press this key and the cutter will walk a rectangle along the graph size to detect the cutting range.

```
                                    main
   ┌──────┬─────────┬──────────┬─────────┬──────────┬──────────┬──────────┐
F1 ShapeLib  F2 Files  F3          F4 Setups  F5 Diagnose  F6 Zoom In  F7
                       PartOption                                        ManualMove

F1 Plate   F1 Disk File  F1 StartPoint  F1 Speed    F1 Input    F4 Zoom Out  F1 NOXGX
F6 Pipe    F2 USB File   F2 Steel       F2 System   F2 Output   F5 Zoom In   F2 StepMove
                          Adjust
           F3 Edite File F3 Array       F3 Flame    F3          F6 Return    F3 Zero
           F4 Del File   F4 Angle       F4 Plasma   F4 System   F7 Info      F4 Return
                                                     Def
           F5            F5 SelPierce   F5 Control  F5                       F5 High
           CopyToUDisk                                                       Speed
           F6            F6 EditFile    F6          F6                       F6 Recover
           NewFolder
           F7 OK         F7 Revert      F7 Save     F7 IO Define             F7 Frame
```

7

Chapter 3 cutting process

Automatic cutting process diagram

```
main interface
      |
      v
Select file  ------>  library
      |
      |       ------>  file  ------>  From system
      |                       ------>  From U disk
      v
Parts options  ------>  Calibrate plate
      |         ------>  Move torch
      |         ------>  Rotating mirror discharge scale
      v
automatic  ------>  Selecting perforation, adjust delay
      |      ------>  Set the slot, processing speed
      v
Start cutting  ------>  pause  ------>  fallback  ------>  perforate
      |
      v
End
```
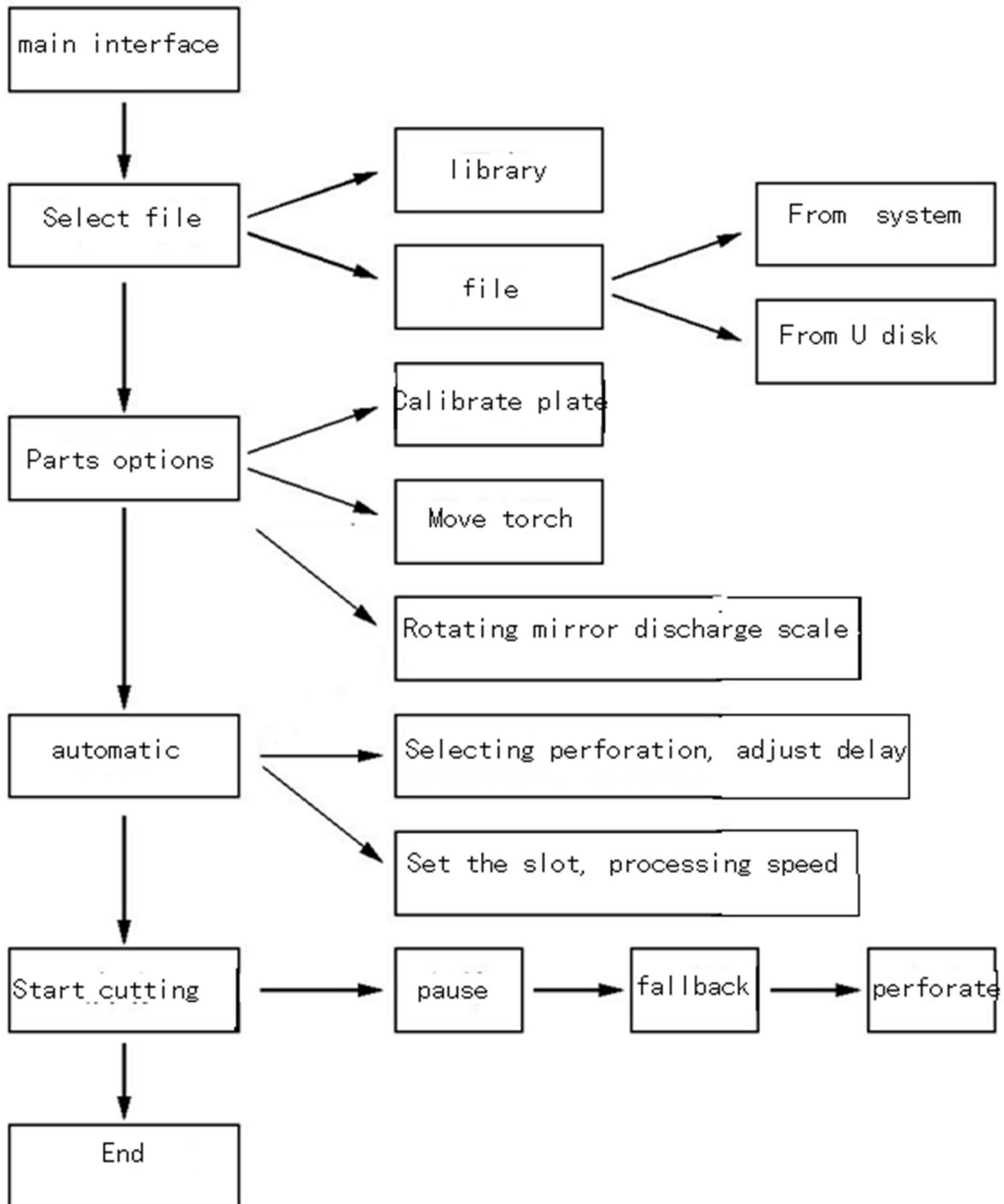
3.1 select machining graphics

The system can choose file from the system library to choose processing graphics and from the U disk or storage

area into the user processing graphics

3.1.1 gallery function

Press [F1] on the main interface of the system to enter the main screen of gallery function, as shown in the figure

below:
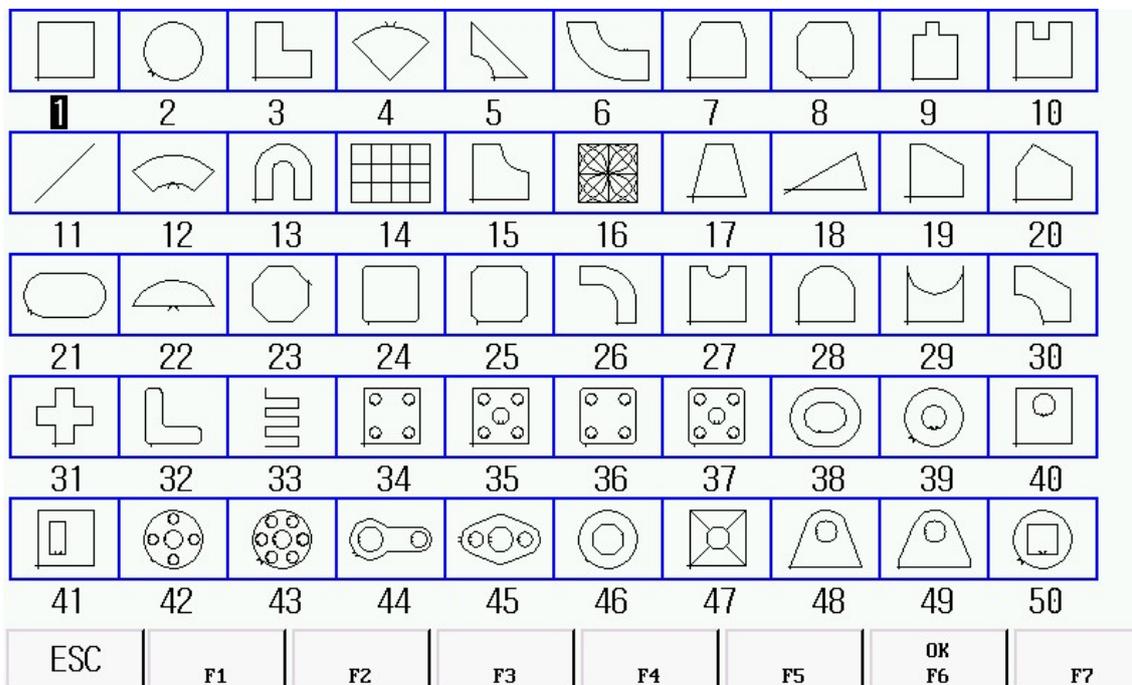
Selection of graphic parts:

At present, the system provides 50 graphics units, press the direction key【↑】【↓】【←】【→】 to move the highlighted

cursor, select the required graphics, press the [Enter] key or [F6] to confirm, and Enter the graphic parameters

interface after confirmation.

Graphic parameter interface:
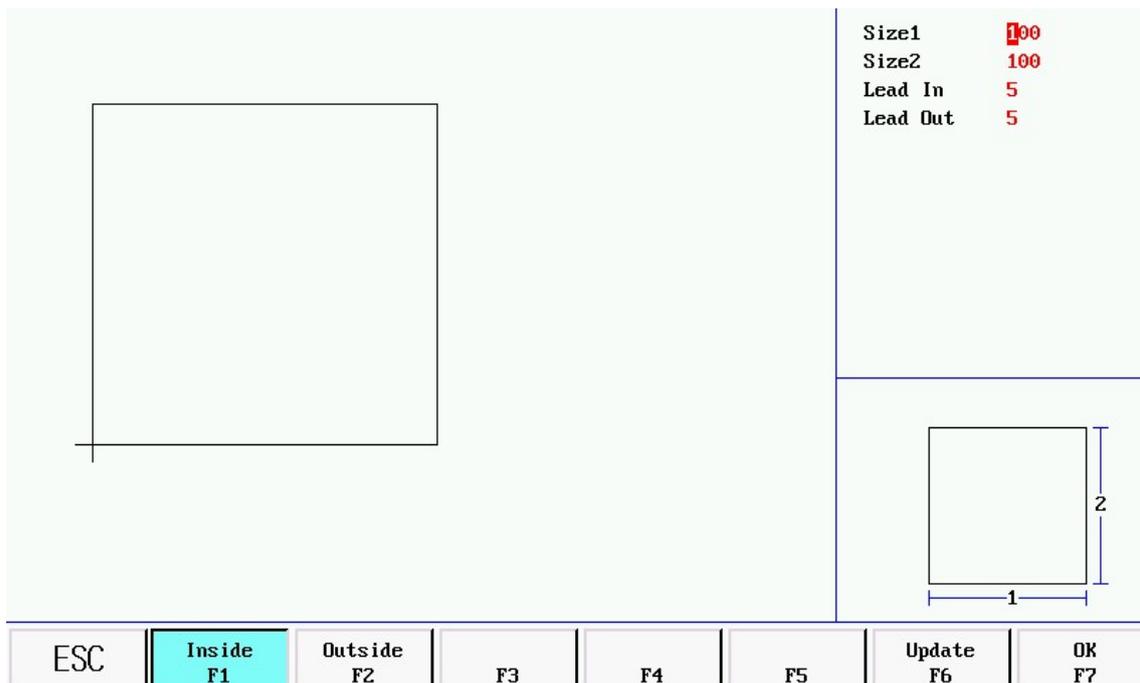
Press the direction key 【↑】【↓】【←】【→】 to move the highlighted cursor and modify the graphic parameters.

[F1] artifact: switch to artifact mode.

[F2] hole shape: switch to opening mode, some parts do not have opening mode.

[F6] refresh: after setting the size data, press this key to refresh the graph, and press the arrow key to refresh the

graph automatically.

[F7] confirm: confirm cutting the current graph, and then the system returns to the cutting screen and displays the

selected graph.

3.1.2 selection of processing documents

Press [F2] on the main interface to enter the file management interface, as shown in the figure below:

PATH(CNC): \

Filename	Size
123.TXT	5.683 K
1016-1.TXT	0.116 K
114横撑448.cnc	17.943 K
123456789123456789123456789.TXT	4.008 K
1569.TXT	4.008 K
222	0.502 K
234.TXT	0.354 K
TK39.NC	0.198 K
TK01.NC	0.116 K
T10mm-130A-1-解释2.TXT	2.433 K
TK15.NC	0.339 K
TK00.NC	0.111 K
pipe1.txt	3.896 K

[G] Preview   [F] Search File

ESC	Disk File F1	U Disk F2	Edit File F3	Del File F4	CopyToUDisk F5	NewFolder F6	OK F7
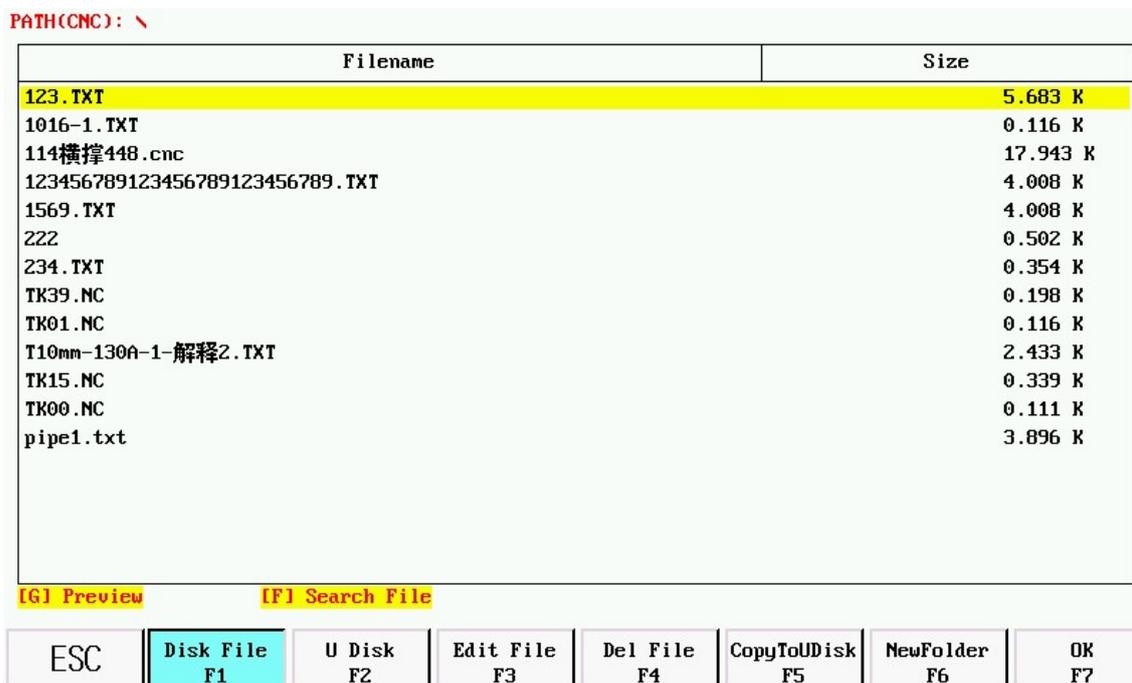
Local file operation:

[F1] native file: displays the native file.

[F2] usb flash drive: displays usb flash drive files.

[F3] edit file: edit the native file at the current cursor.

[F4] delete file: delete the file at the current cursor.

[F5] copy to U disk: copy the file at the current cursor to the external U disk.

[F6] new: create a new file or folder in the root directory.

[F7] confirm: confirm the file processing at the current cursor and return to the cutting screen.

U disk file operation:

Under the file management screen, press [F2] to enter the U disk file interface, as shown in the figure below:
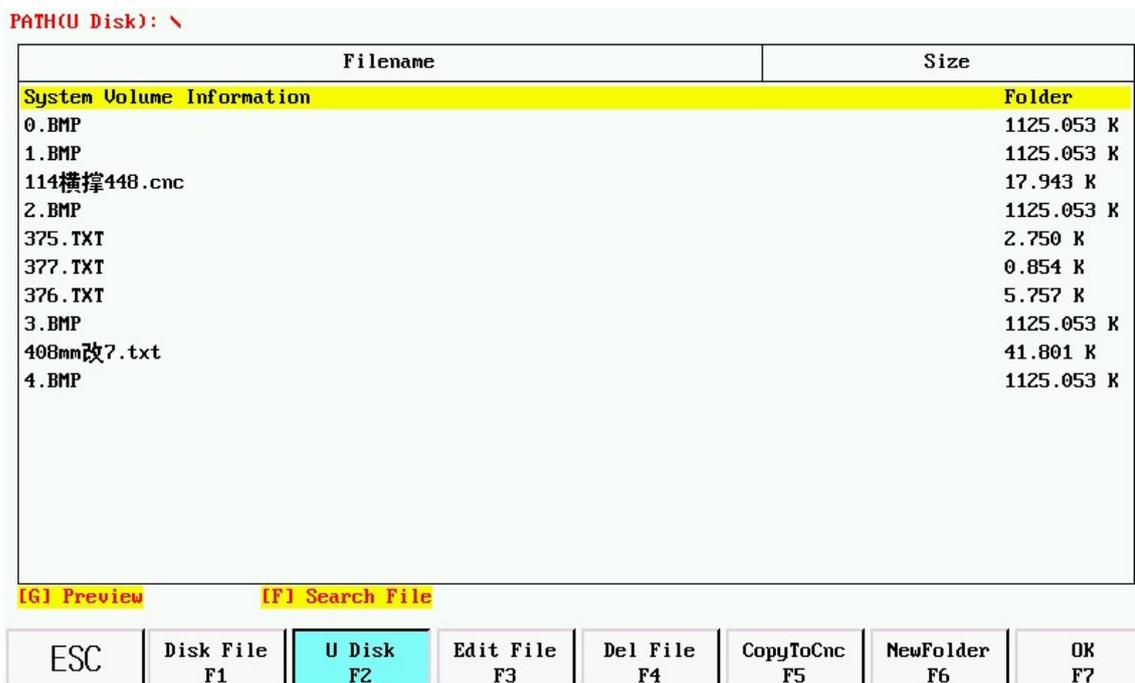
PATH(U Disk): \

Filename	Size
System Volume Information	Folder
0.BMP	1125.053 K
1.BMP	1125.053 K
114横撑448.cnc	17.943 K
2.BMP	1125.053 K
375.TXT	2.750 K
377.TXT	0.854 K
376.TXT	5.757 K
3.BMP	1125.053 K
408mm改7.txt	41.801 K
4.BMP	1125.053 K

[G] Preview   [F] Search File

ESC	Disk File F1	U Disk F2	Edit File F3	Del File F4	CopyToCnc F5	NewFolder F6	OK F7

[F1] native file: displays the native file.

[F2] usb flash drive: displays usb flash drive files.

[F3] edit file: edit the file at the current cursor.

[F4] delete file: delete the file at the current cursor.

[F5] copy to local: copy the file at the current cursor from the U disk to the local machine.

[F6] new: create a new folder under the root directory of the U disk.

[F7] confirm: confirm the file processing at the current cursor and return to the cutting screen.

Edit current file:

Under the file interface, move the cursor to the file name to be edited, and press [F3] to edit the file.

```
PATH(U Disk): ﹨
0000: 92 X0 Y0
0001:G70
0002:G91
0003:G00X12.0Y23.5
0004:G41
0005:M04
0006:G01X0.0Y4.0
0007:G01X0.0Y823.6
0008:G01X65.0Y0.0
0009:G01X0.0Y7.0
0010:G01X30.0Y0.0
0011:G03X243.0Y243.0I0.0J243.0
0012:G01X-0.0Y30.0
0013:G01X7.0Y0.0
0014:G01X0.0Y65.0
0015:G01X2200.0Y0.0
0016:G01X0.0Y-65.0
0017:G01X7.0Y0.0
0018:G01X0.0Y-30.0
0019:G01X-247.0Y-1073.6
```

ESC	Add Row F1	Del Row F2	NewFile F3	F4	F5	Preview F6	Save F7

In the edit code:

[F1]insert a line above the current edit line;

[F2] delete the current edit line;

[F3] create a new file;

[F6] preview graphics;

[F7] save documents;

3.1.3 part selection function

Press [F3] on the main interface to enter the part selection interface

| Speed: 00000	File: pipe1.TXT	Current Hole: 0000/0001	[N]Kerf: 0.0

[X] X Mirror
[Y] Y Mirror

114.0 mm

+

[G] Mode: Flame Cut
[X] ManualSpd: 01750
[F] CutSpeed: 01766
[T] PreHeat Time: 0.1
     Angle: 0.000
[O] ContiMove: OFF
[Y] Diameter   114.0

X +00259.849
Y +00489.230
A +00000.000

360.0 deg

0> G92 Y0 A0
1> [D114.00]

ESC	StartPoint F1	Steel Adjust F2	Array F3	Angle F4	SelPierce F5	EditFile F6	Revert F7
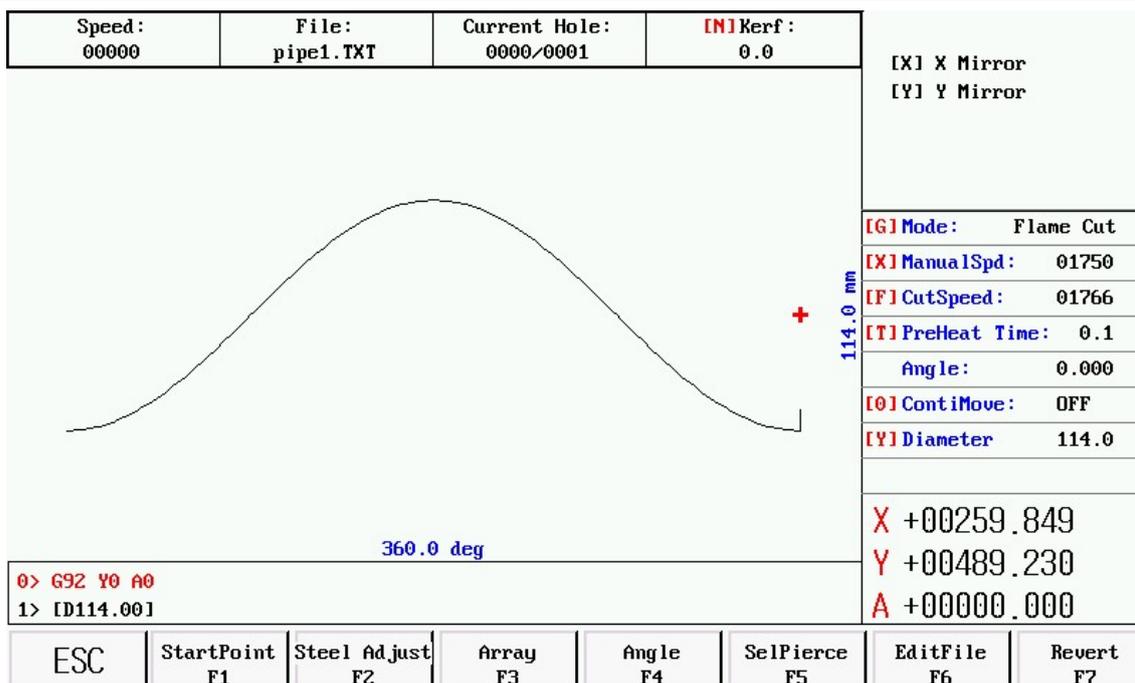
[F1] select starting point: press this key continuously to select the starting point of cutting gun positioning, and the sequence is the bottom left corner the upper left corner the upper right corner the lower right corner the center point.

[F2] Plate calibration: press this button to enter the plate calibration screen.

Steel plate correction: after entering the rotation correction interface, move the cutter gun to the starting position of plate processing, set the starting point according to [F1], and the system coordinates will clear automatically. Then move the cutter gun to the other corner of plate side of the same side of the plate, set the end point according to [F2], and the system will automatically rotate the figure. After correction, the system will prompt whether to return to the starting point. If press [ENTER], the system will return to the starting point of correction. If press [ESC], the system will return to the graphical interface without any operation.

[F3] layout: arrange the processed parts in a matrix. Note that if staggered arrangement is selected, the even rows are one less than the odd rows.

[F4] graphics rotation: sets the rotation Angle of the graphics.

[F5] Punch point: under this screen, select the punch point and press the start button to cut directly from the punch point.

[F6] code editing: edit the current cutting file.

[F7] graphic restoration: cancel the operations of graph rotation, mirroring, scaling and discharge, and the graph will be restored to the original state, but the Angle of steel plate correction will not be cleared. If the Angle of steel plate correction is needed, enter the screen of manual steel plate correction.

[X]X mirror: the figure is mirrored on the X axis.

[Y] Y mirror: the graph is mirrored on the Y-axis.

3.2 preparation for cutting

3.2.1 parameters to be set before processing

Cutting mode [G] : press the keyboard key G to switch the cutting mode between flame, plasma and demonstration.

Cutting speed [F] : press the keyboard key F, change the value to change the cutting speed, and press enter to confirm.

Manual speed [X] : press the keyboard key X, change the value to change the cutting speed, and press enter to confirm.

Slot [N] : press the keyboard key N, change the value, change the slot size, and press enter to confirm.

Preheating delay [T] : press the keyboard key T, change the value behind to change the preheating delay, and press enter to confirm.

3.2.2 press the space on the main interface to enter the processing interface

[F1] fallback: the cutting nozzle returns along the original path (at this time, only a blank line is left without cutting);

[F2] advance: the cutting nozzle advances along the cutting path (only blank line, no cutting);

[F3] return parameter: the cutting nozzle returns to the starting point, that is, the starting point of the current

workpiece;

[F4] select perforation point: after selecting the perforation point, the cutter will automatically move to the selected

perforation point.

[F5] graphic amplification: enlarge graphics;

[F6] increase delay: increase the preheating time by 15 seconds at a time.

[F7] reduce the delay: reduce the preheating time, skip the remaining preheating time, note: the system does not

remember the preheating time.

3.2.3 start processing

After selecting the machined parts and setting machining parameters, press the down START button on the main

interface. The system interface is as follows:

Speed: 00000	File: pipe1.txt	Current Hole: 0000/0001	[N]Kerf: 0.0

[S+]TorchUp● [S-]TorchDo●

[K1]Igniti● [K2]Prehea●

[K4]Pierce● [K3]THC En●

[9] High P●

[G]Mode:	Flame Cut
[X]ManualSpd:	01750
[F]CutSpeed:	01766
[T]PreHeat Time:	0.1
Angle:	0.000
[0]ContiMove:	OFF
[Y]Diameter	114.0

STARFIRE CNC

Start Cut

Cancel(Esc)   Ok(Enter)

360.0 deg

114.0 mm

0> G92 Y0 A0
1> [D114.00]

X +00259.849
Y +00489.230
A +00000.000

ESC	ShapeLib F1	Files F2	PartOption F3	Setups F4	Diagnose F5	ZoomIn F6	ManualMove F7

At this point, press the [Enter] key to start automatic processing. Press the [ESC] key to exit the system and return to the main interface

At this point, the system starts to work automatically!

Chapter 4 processing

This chapter describes the processing process needs to be carried out in the introduction

4.1 pause operation

During the processing, if there is a break of fire, arc, or other situations that need to be suspended, press the button PAUSE and the system will stop working. The interface is as follows:
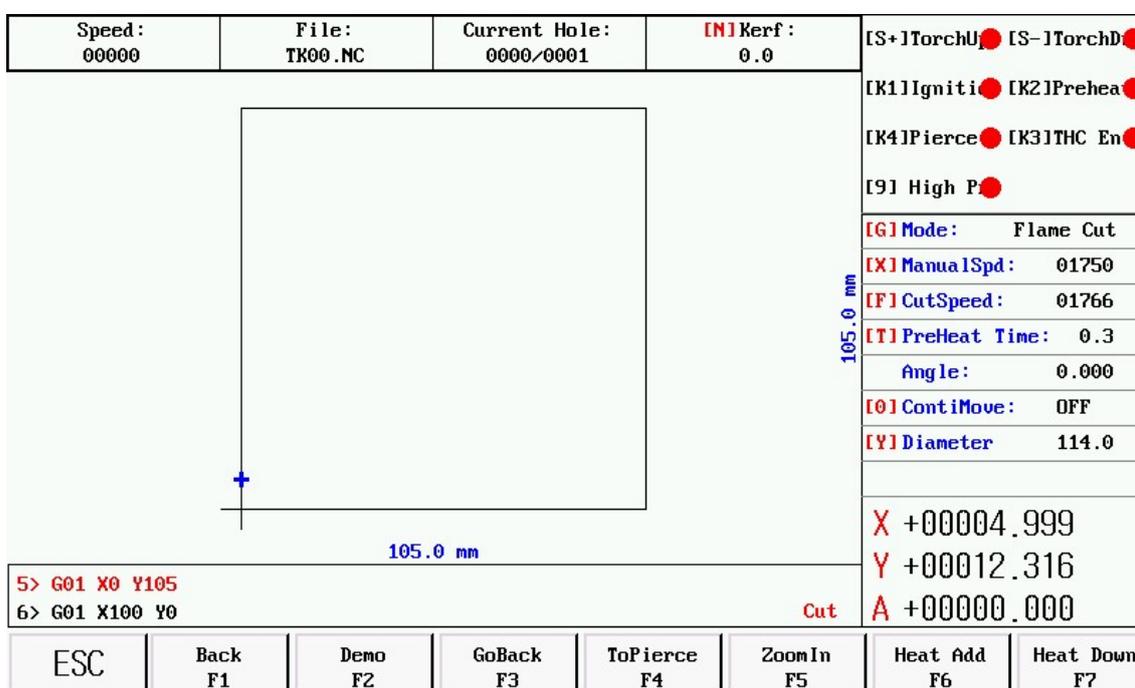
[F1] back: the cutting nozzle returns along the original path without cutting;

[F2] advance: the cutting nozzle advances along the cutting path without cutting;

[F3] return parameter: the cutting nozzle returns to the starting point, that is, the starting point of the current workpiece;

[F4] punch points: jump to other punch points;

[F5] graphic amplification: enlarge graphics;

[F6] increase delay: increase the preheating time by 10 seconds at a time;

[F7] end delay: end the preheating time, skip the remaining preheating time;

Note: press [F7] to end the preheating delay. At this time, only the current delay will be ended and will not be recorded into the system. If the current time needs to be remembered as the system preheating delay, press the START end delay (remember at the same time) to start the perforation processing.

4.2 move the punch position or cut position after suspension

After the pause, move the cutter, and then press start, the following interface appears
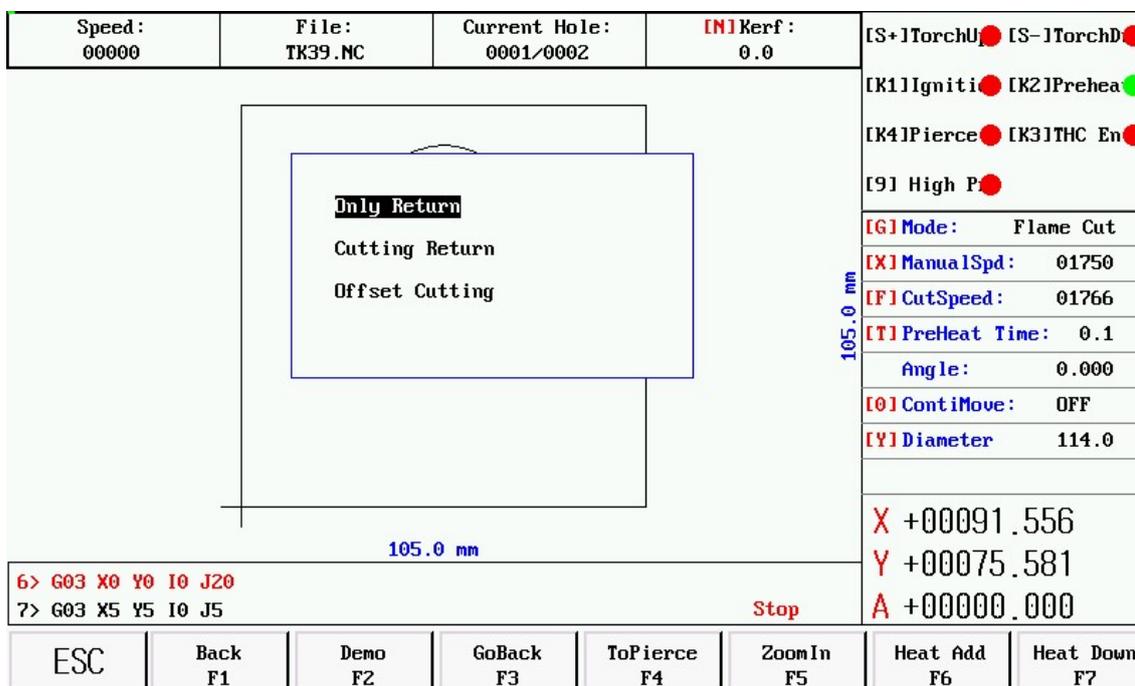
Press the arrow UP DPWN to select the corresponding function and press START or ENTER to perform the

corresponding action

1) return the same way

Return to the starting point of adjustment at maximum speed, and wait for further operation; At this time can press

the corresponding strong electric function key (such as ignition, preheat perforation, open cut oxygen, etc.).

Suggestion: after preheating, press the key of [perforation], then the system will continue processing from the

breakpoint position.

2) cutting return

First perforation, and then along the cutting speed along the line from the current position to adjust the starting point,

do not stop according to the original trajectory to continue processing, a bit like epitaxial perforation, so that the

perforation point more smooth;

3) offset cutting

Punch first, adjust the current coordinate to the coordinate when suspended, and continue processing according to

the original track to realize the function of transfer punch.

4.3 original track back processing

In the process, if the original track needs to be retreated due to non-cutting, it can be processed as follows:

Press the key PAUSE   to make the running system slow down and stop. The system displays the "pause" mark and

prompts the figure below.

Press the [F1] key to perform the original track regression of the system, and the regression speed is set in the

parameter -- speed -- regression speed.

Press [F2] key to advance the original track on the basis of backtracking. During the fallback process, if the desired

position is not reached, press the [pause] button again and repeat the above process until appropriate.

Retreat on G00

During the fallback process, when the G00 (reaching a punch point) system is suspended, the operator can choose

whether to continue the fallback or advance.

Back off operation

After returning to the specified position, wait for preheating, and then press the perforation key to start processing;

In the case of flame, the cutting gun is raised, the cutting oxygen is opened, the cutting gun is lowered, and the

system continues to operate;

In the case of plasma, the arc is started, and the system continues to run after the arc is over.

The above operation can be repeated until the desired results.

4.4.1. The breakpoint resumes after a power failure

If the electric power is interrupted in the cutting process, the system will automatically save the position of the

moment before the power off as a break point.

After reboot, the system will prompt as shown below:
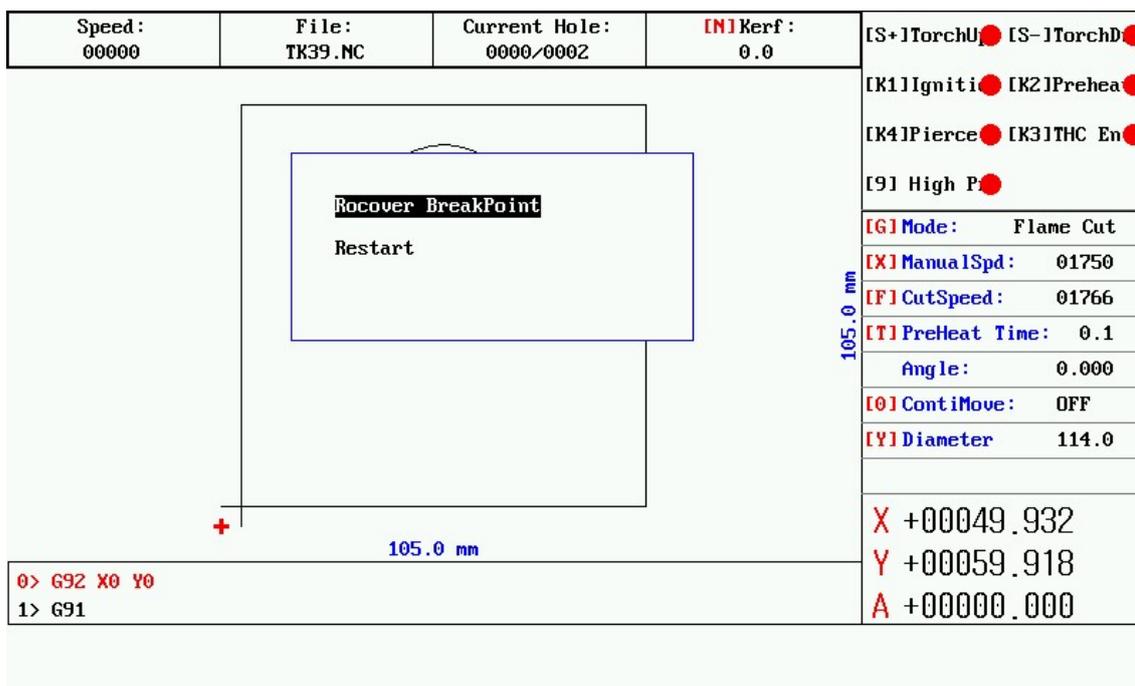
If you need to continue cutting, select "select breakpoint recovery", press "enter" to confirm, and then press "start"

to continue cutting .   If you want to re-cut, select "normal machining" and press the "enter" button to confirm. After

pressing the "start" button, the system will start cutting again. The breakpoint will be cleared.

If you want to continue cutting again (provided no other files are brought in) after the cutting is stopped, you can

press [F7] to enter the manual screen, then press [F6] to find the break point, and then press [start] to continue

cutting.

Note: breakpoint recovery after pause and breakpoint recovery after power off must not change, rotate Angle, scale

(these conditions will be automatically saved by the system, not affected by the switch), otherwise the system may

not find the breakpoint.

The select perforation point function can start cutting from any perforation point in the program. It is generally used

to move the cutting gun after the power is cut off, so that no break point can be found.

4.5.1 positioning of cutting starting point

If you can find the cutting starting point of the steel plate, you can move the cutter gun to this place and press [space]

to enter the pre-cutting screen. The menu is shown as follows:

ESC	Back F1	Demo F2	GoBack F3	ToPierce F4	ZoomIn F5	Heat Add F6	Heat Down F7

On this screen, press [F4] the perforation point, as shown below:

```
Select Pierce: 0

   [ESC]Cancel     [F1]OK
```

Enter the punch point number, press [F1] to confirm, and then press [start], as shown below:

```
Pierce Here

Move Pierce Position

Not Pierce
```
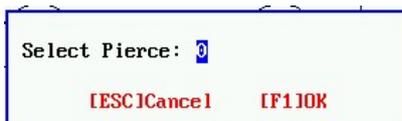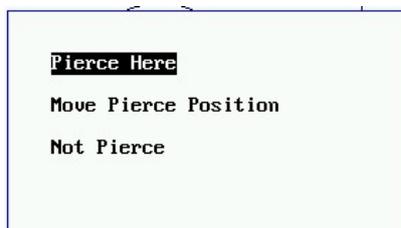
Press the up and down arrow to select "reference point positioning", then press the "enter" button to confirm, the

cutter gun moves to the position of the perforation point, and then press the "start" button to start cutting.

4.5.2 punch point positioning

If you can find the position of a perforation point on the current cutting path, you can move the cutter gun to this

place and press [space] to enter the pre-cutting screen. The menu is shown as follows:

ESC	Back F1	Demo F2	GoBack F3	ToPierce F4	ZoomIn F5	Heat Add F6	Heat Down F7

On this screen, press [F4] the perforation point, as shown below:

```
Select Pierce: 0

      [ESC]Cancel    [F1]OK
```

Enter the punch point number, press [F1] to confirm, and then press [start], as shown below:

```
Pierce Here

Move Pierce Position

Not Pierce
```
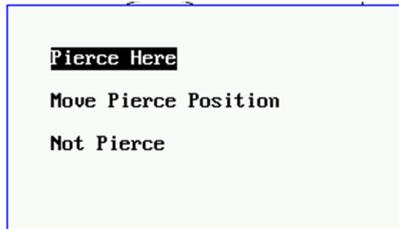
Press the up and down arrow to select "current position", then press "enter" to confirm, and press "start" to start cutting.

4.5.3 find the perforation point after cutting pause

If you want to skip to the specified punch point to continue cutting during cutting or blank line, you can press the "pause" button to pause cutting during running. The menu is shown as follows:

ESC	Back F1	Demo F2	GoBack F3	ToPierce F4	ZoomIn F5	Heat Add F6	Heat Down F7

On this screen, press [F4] the perforation point, as shown below:

```
Select Pierce: 0

      [ESC]Cancel    [F1]OK
```

At this point: enter the perforation number, press [F1] for confirmation, then the cutter gun will run to the perforation point, and press [start] to start cutting from the current point.

4.6 edge perforation of thick plate

1) during automatic machining, edge perforation method should be used for thick plate processing.

2) the method of edge perforation is: move the cutter gun to the nearest edge of the steel plate before perforation.

3) start preheating. When the preheating is finished, press the [start] button to cut the cutter along the straight line and at the selected cutting speed to the perforation point, and then continue cutting.

4) when using edge perforation, first change the selection of edge perforation in the control menu in the parameter to 1 (indicating that the selection is valid). In this way, when each hole is punched, the system first prompts the following figure:

1) the operator can press 【↑】【↓】【←】【→】key to adjust the position of the cutting gun to the outer edge of the steel plate and start preheating;

2) when the preheating is finished, press the [start] button to cut the gun along the straight distance and selected cutting speed to the perforation point, and then continue cutting.

Don't punch

Without a punch, the system runs directly from the current punch position. Blank line to the next punch point, a new punch prompt appears.

On the main screen, press [F1] key to enter the gallery, then press [F2] key to enter the pipe screen, as shown below:
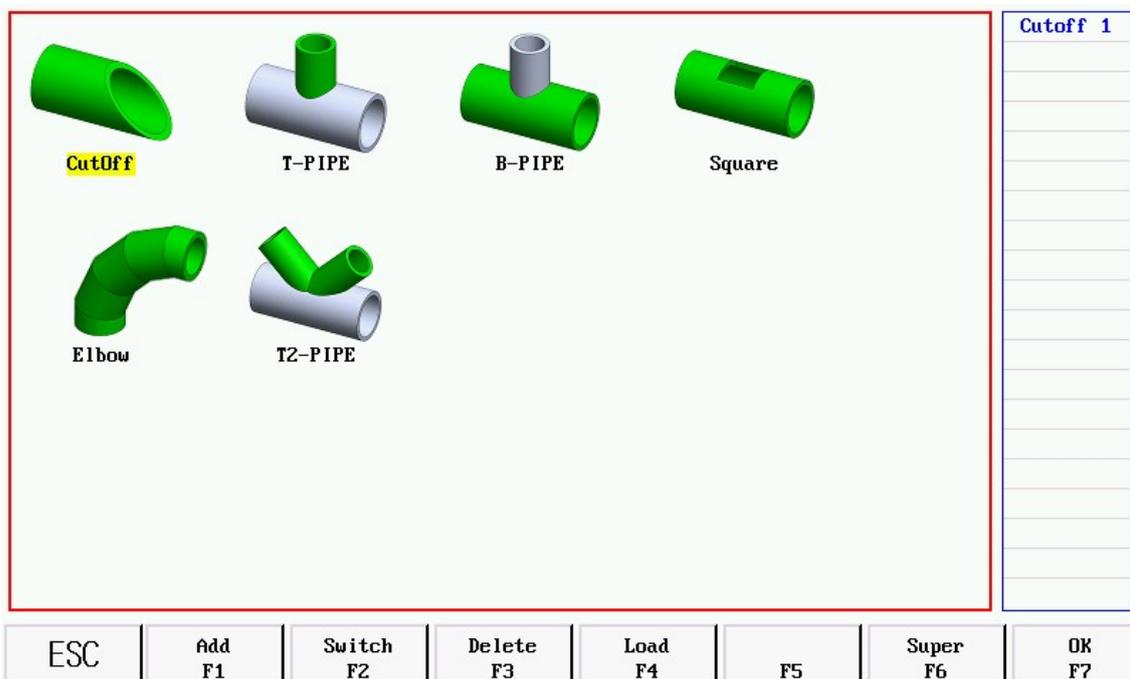
[chuck positive direction 0/ negative direction 1] : move the cutter gun along the pipe. If the chuck is in positive

direction, set it to 0. If the chuck is in negative direction, set it to 1. The default value is 0.

[pipe translation axis Y axis 0/X axis 1] : the axis along the pipe, if connected to the Y axis, set it as 0, X axis, set it as 1,

default value is 0.

[chuck 0/ friction disc 1] : pipe rotation axis, if chuck, set to 0, if friction disc, set to 1, default value is 0.

[intersected line step Angle] : it refers to the resolution of the rotation of the pipe. The unit is Angle. The default value

is 2.0 °.

After parameter setting, press [F7] to save the parameter. It is not necessary to set this parameter in the future.

Note: the above parameter Settings are only for the manufacturer to modify the parameters according to the design

of the machine tool. Users should not modify the parameters, otherwise the machine will not be used.

into the home page, click the arrow keys to select you need to add graphics, press [F1] add, add graphics to the image

list on the right side, and then press "enter" button, switch to the file list, press the "enter" button, once again and

into graphics parameters screen, press the right side of the icon, set the corresponding parameters, set to end, press

submit F7 】【, exit parameters screen, press a key, F7 】【 input filename, confirmation, back to cutting the picture.

Add graphics: if the red box is in the right graphics list, press the left arrow key or [F2] switch key to switch to the icon

area, then press the arrow key to select graphics, press [F1] key to add graphics to the right graphics list area.

Delete graph: if the red box is in the left icon area, press [F2] switch key or [F3] delete key to switch the red box to the

right graph list, press the up and down arrow to move the cursor, and press [F3] key to delete the currently selected

graph.

If you have saved the cut file before and want to make local changes to this file, you do not need to add the graph

setting parameters again.

Under the first page of the intersecting line, press [F4] file adjustment key to display all files saved by the CNC

machine. Select the files to be imported and press [enter] key to confirm.

If the imported file is correct, it shows "file data has been imported", and you can enter the graph list for

modification.

If the imported file is incorrect, it shows "no valid data", so you can only create a new graph list and reset it.

5.4.1 truncation parameter
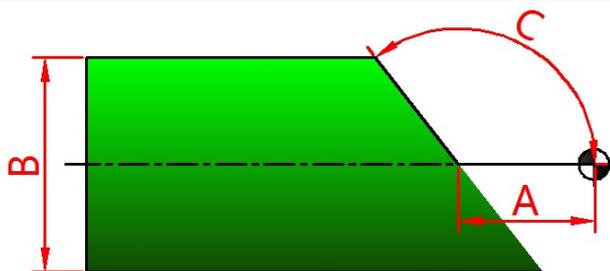
This function is used to cut the pipe, straight cut or oblique cut.

[distance A from the origin] : the distance between the truncation center and the tube head, as shown in the figure.

[round pipe outer diameter B] : refers to the outer diameter of the pipe, as shown in the figure.

[cutting Angle C] : from the side of the pipe, the pipe head is on the right hand side. The Angle at this time is shown in

the figure.

[rotation Angle] : starting position of pipe cutting, set range 0-360.

[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.
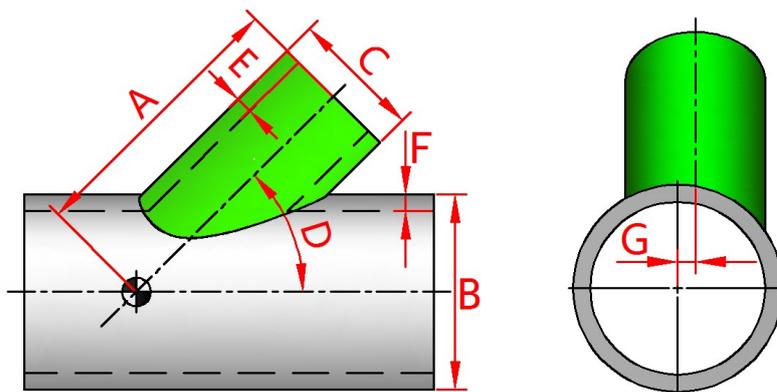
Function used for connecting two pipes and cutting branch pipe.

[distance from the origin A] : distance from the origin refers to the angular distance from the center line of the mother

tube and branch tube, as shown in the figure.

[mother tube outer diameter B] : refers to the outer diameter of the mother tube, as shown in the figure.

[outer diameter of branch pipe C] : refers to the outer diameter of branch pipe, as shown in the figure.

[branch pipe Angle D] : when viewed from the side of the pipe, the pipe head is on the right hand side. The Angle at

this time is shown in the figure.

[side pipe wall thickness E] : refers to the side pipe wall thickness, as shown in the figure.

[mother tube wall thickness F] : refers to the wall thickness of the mother tube, as shown in the figure.

[branch tube offset G] : it means that the center line of the mother tube and the center line of the branch tube are not

the same line. The deviation to the right is set as positive value, while the deviation to the left is negative value, as

shown in the figure.

[rotation Angle] : starting position of pipe cutting, set range 0-360.

[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.

Function for tee, mother tube opening part.

Distance from the center of the branch tube to the origin A: distance from the origin refers to the angular distance

from the center line of the parent tube and the branch tube to the tube head, as shown in the figure.

[mother tube outer diameter B] : refers to the outer diameter of the mother tube, as shown in the figure.

[outer diameter of branch pipe C] : refers to the outer diameter of branch pipe, as shown in the figure.

[branch pipe Angle D] : when viewed from the side of the pipe, the pipe head is on the right hand side. The Angle at this time is shown in the figure.

[side pipe wall thickness E] : refers to the side pipe wall thickness, as shown in the figure.

[mother tube wall thickness F] : refers to the wall thickness of the mother tube, as shown in the figure.

[branch tube offset G] : it means that the center line of the mother tube and the center line of the branch tube are not the same line. The deviation to the right is set as positive value, while the deviation to the left is negative value, as shown in the figure.

[rotation Angle] : starting position of pipe cutting, set range 0-360.

[connection mode] : 0-riding, the hole of the mother tube is smaller than the inner diameter of the branch tube; 1-inserted, the inner edge of the mother tube opening and the inner edge of the branch tube are just in line. 3-threading type. The hole size of the mother tube is the same as the outer diameter of the branch tube. The branch tube can be inserted into the hole.

[linear length of round hole] : if you want to open a racetrack shaped hole, you can set this parameter, as shown in the following figure:
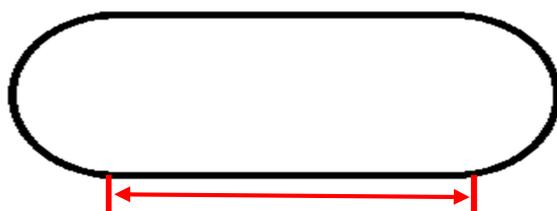
[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.
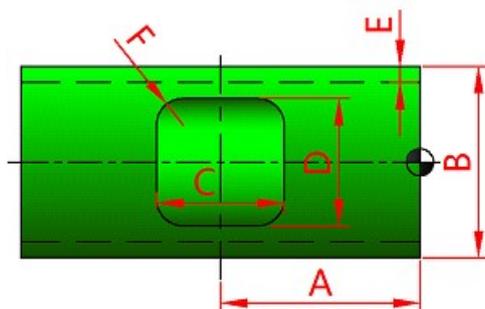
This function is used to open a square hole in the pipe.

[distance A from the center to the origin] : the distance between the center of the square hole and the tube head, as

shown in the figure.

[round pipe outer diameter B] : refers to the outer diameter of the pipe, as shown in the figure.

[axial width C] : the width from the axial direction of the pipe, as shown in the figure.

[radial width D] : the width from the direction of pipe diameter, as shown in the figure.

[E] : the wall thickness of this pipe is shown in the figure.

[chamfer radius F] : chamfer radius of 4 corners of the square hole, as shown in the figure.

[axial width C] : the width from the axial direction of the pipe, as shown in the figure.

[rotation Angle] : starting position of pipe cutting, set range 0-360.

[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.
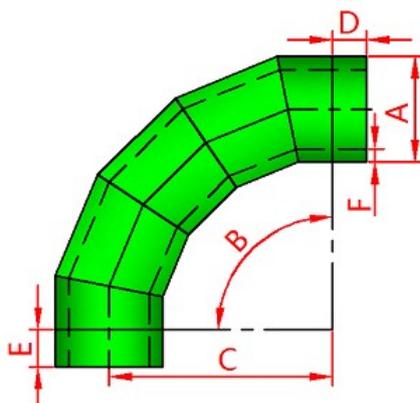
This function is used for cutting elbows.

[outer diameter of round pipe A] : refers to the outer diameter of the pipe, as shown in the figure.

Elbow Angle B: refers to the Angle of elbow after assembly, as shown in the figure.

Elbow radius C: refers to the radius after elbow assembly, as shown in the figure.

[top extension D] : additional extension length of elbow end, as shown in the figure.

[bottom extension E] : additional extension length of elbow end, see the figure.

[pipe wall thickness F] : the wall thickness of the pipe.

Elbow number: elbow consists of several sections.

[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.
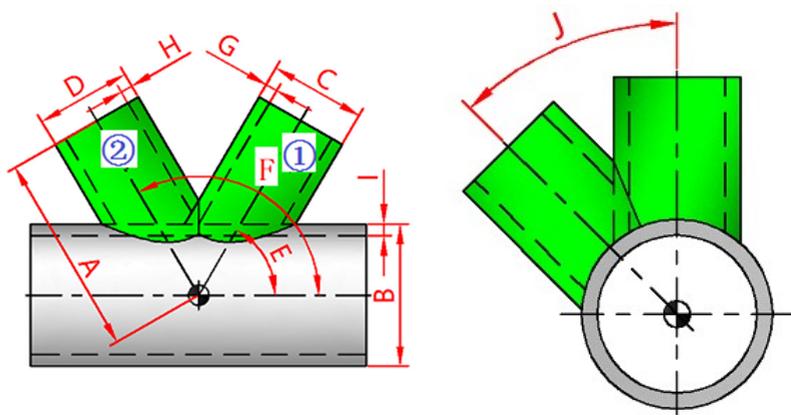
The double and triple pipes are similar in use and are put together here.

It is used for connecting two or three branch pipes to the mother pipe and cutting branch pipe parts.

[distance from the origin A] : distance from the origin refers to the angular distance from the center line of the mother tube and branch tube, as shown in the figure.

[mother tube outer diameter B] : refers to the outer diameter of the mother tube, as shown in the figure.

[outer diameter of branch tube 1 C] : refers to the outer diameter of branch tube 1, as shown in the figure.

[outer diameter of branch tube 2 D] : refers to the outer diameter of branch tube 2, as shown in the figure.

[Angle E of branch pipe 1] : from the side of the pipe, the pipe head is on the right hand side. The Angle at this time is

shown in the figure.

[Angle F of branch tube 2] : from the side of the tube, the tube head is on the right hand side. The Angle at this time is shown in the figure.

[wall thickness G of branch tube 1] : refers to the wall thickness of branch tube 1, as shown in the figure.

[2 branch tube wall thickness H] : refers to the wall thickness of branch tube 2, as shown in the figure.

[mother tube wall thickness I] : refers to the wall thickness of the mother tube, as shown in the figure.

[1-2 Angle J of branch pipe] : see the Angle between two branch pipes from the direction of the section of the mother pipe, as shown in the figure.

[select branch tube 1/2] : select cut branch tube 1 or branch tube 2.

[rotation Angle] : starting position of pipe cutting, set range 0-360.

[lead length] : length of lead wire.

[cutting speed] : set the speed according to the wall thickness of the pipe. The default value is 2000.

Chapter 6   parameter setting

Press [F4] in the main screen to enter the parameter screen, as shown in the figure below:

```
1.[G G 2],Modify pulse equivalent.
2.[G G 3],Para Recover, Clear All File, Change Language.
```

ESC	Speed F1	System F2	Flame F3	Plasma F4	Control F5	F6	Save F7
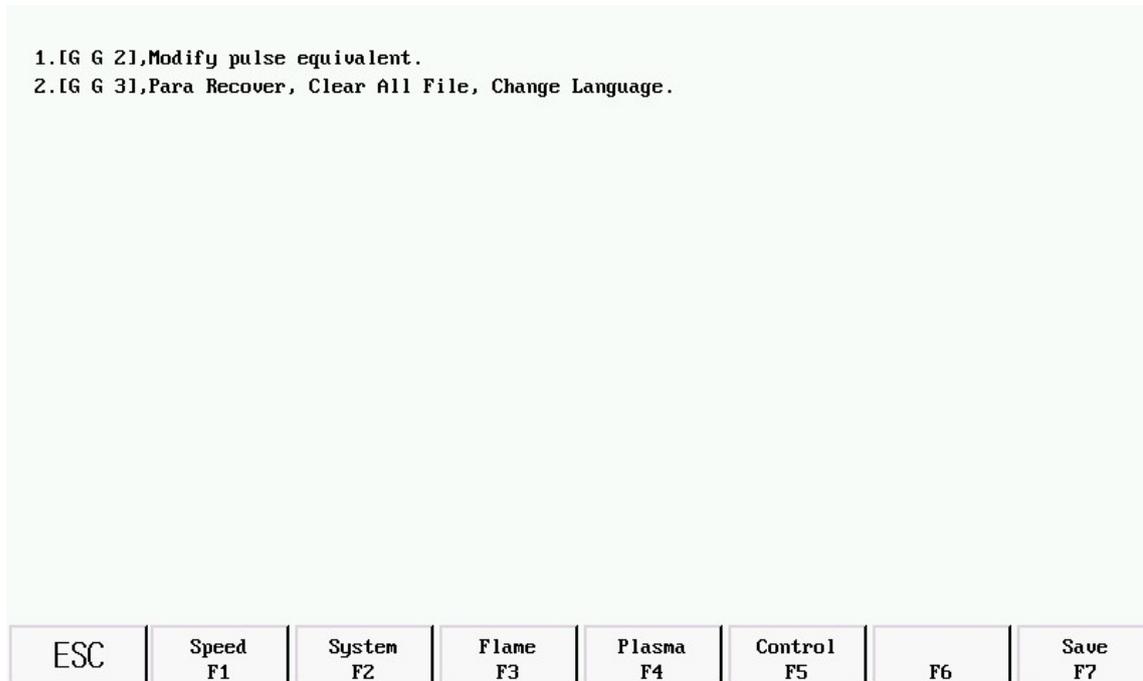
[speed] : set speed related parameters.

[system] : set coordinate system, electronic gear and other related parameters.

[flame] : set parameters related to flame process.

[plasma] : setting parameters related to plasma process.

[control] : set external signals and other relevant parameters.

[save] : save parameters.

[advanced] : backup, restore, import, export parameters and switch the metric system.

6.1 speed parameters

Start speed(mm/min)	100	(20 < P < 2000)
Acc time(S)	0.20	(0.05 < P < 3.00)
Acceleration(S)	0.15	(0.03 < P < 1.50)
G00 move speed(mm/min)	3500	(20 < P < 50000)
A G00 move speed(mm/min)	2000	(20 < P < 50000)
Return origin speed(mm/min)	3000	(100 < P < 50000)
Demo/back Speed(mm/min)	800	(100 < P < 50000)
Spd Tran Angle	65.0	(20.0 < P < 300.0)
Corner Radius(mm)	30.0	(2.0 < P < 1000.0)
Small Arc Limit(mm/min)	500	(0 < P < 50000)
Limited Speed below Radius(mm)	0.0	(0.0 < P < 1000.0)

ESC	Speed F1	System F2	Flame F3	Plasma F4	Control F5	F6	Save F7

[starting speed] : the starting speed of the motor, the recommended value of the stepping motor is 200-500, and the recommended value of the servo motor is 1000.

[adjustment time] : motor speed regulation time, the smaller the time, the faster the rise and fall speed, but too fast will cause the motor to block or machine vibration, the recommended value is 0.3.

[uniform acceleration time] : motor speed regulation auxiliary parameters, the greater the inertia of the machine tool, the smaller the setting value, the recommended value is 0.2.

[blank speed] : the blank speed of cutting gun, namely the maximum blank speed that the machine tool can bear. The recommended value is 4000.

[reset speed] : the speed of the machine tool back to the mechanical zero. If the speed is set too high, it will overshoot at zero. The recommended value is 2000.

[fallback/forward speed] : the walking speed when pressing the fallback key or the forward key, generally used for accurate positioning of the cutting gun, the value is 1000.

[corner velocity conversion Angle] : -- when the running direction between program segments changes beyond this Angle, the system corners will slow down to the starting speed.

This value is usually chosen to be smaller when the system is heavier. The timing can be determined according to the

processing speed and vibration of the machine tool. Large vibration, select small value.

[corner arc transition radius] : when running small line segment program at high speed, if the machine tool has

vibration, the radius can be appropriately increased, generally in 3-5mm, the recommended value is 5.

[arc speed limit] : the speed when cutting the arc, generally used for cutting small round holes, the recommended

value is 500.

[arc speed limit radius] : when cutting an arc, the speed limit starts when the radius of the arc is less than this value.

6.2 system parameters

Pulse Equivalent	X: 0.00141747	Y: 0.00141747	A: 0.00177480	(0.00000001 < P < 1.0(
Machine Origin Point	X: 0.0	Y: 0.0	A: 0.0	(-3000.0 < P < 30000.(
Reference Point	X: 0.0	Y: 0.0	A: 0.0	(-3000.0 < P < 30000.(
Drill Offset	X: 0.00	Y: 0.00	(-300.00 < P < 3000.00)	
Clearance	X: 0.00	Y: 0.00	A: 0.00	(0.00 < P < 10.00)
Dir-Origin	X: 0	Y: 0	A: 0	(-1 < P < 1)
Max Limit+	X: 9000.0	Y: 9000.0	A: 0.0	(-31000.0 < P < 31000
Min Limit-	X: -9000.0	Y: -9000.0	A: 0.0	(-31000.0 < P < 31000

ESC	Speed F1	System F2	Flame F3	Plasma F4	Control F5	F6	Save F7

[pulse equivalent] : it is used to adjust the machining accuracy of the machine tool. It shall be calculated or accurately

measured according to the design of the machine tool. The unit is mm/pulse. Press G, G and 2 on the parameter

home page, and press the prompt to set the pulse equivalent automatically.

[machine tool origin offset] : after the machine tool returns to the mechanical zero, offset the distance again, and

then set this position as the mechanical coordinate 0.

[reference point] : in the program, the origin of coordinates set after G92 execution is generally 0.

[Line offset]: the offset between the drill hole, the powder gun, and the cutting gun.

[reverse clearance] : the reverse clearance generated in the manufacturing process of the machine tool can be set to make up for the error, but this compensation is only rough compensation. It is suggested to adjust the mechanical part to eliminate the error.

[reset direction] : the direction of the machine tool back to the origin, 0 is no longer the position, -1 is to the negative direction reset, 1 is to the positive direction reset.

[soft positive limit] : machine tool coordinate limit value. When the coordinate value reaches this value, the machine tool will stop running.

[soft negative limit] : machine tool coordinate limit value. When the coordinate value reaches this value, the machine tool will stop running.

6.3 flame parameters

```
            Ignition Time  [0.5          ]   (0.0 < P < 50.0)
          Low Preheat Time  [100.0        ]   (0.0 < P < 999.9)
        Torch Up Time(M70)  [2.0          ]   (0.0 < P < 100.0)
      Torch Down Time(M71)  [1.8          ]   (0.0 < P < 100.0)
        Pierce Up Time(M72)  [1.0          ]   (0.0 < P < 100.0)
      Pierce Down Time(M73)  [0.80         ]   (0.00 < P < 10.00)
               Pierce Time  [0.5          ]   (0.0 < P < 100.0)
        Over Cut Delay Time  [0.00         ]   (0.00 < P < 10.00)
            Line Delay Time  [0.0          ]   (0.0 < P < 100.0)
          High Preheat Time  [0.0          ]   (0.0 < P < 9999.9)
Hold Preheat after Cutting end(0/1)  [0    ]   (0 < P < 1)
```

ESC	Speed F1	System F2	Flame F3	Plasma F4	Control F5	 F6	Save F7

[Ignition delay]: when the flame gun is ignited, the time for the ignition to open is 0.5.

[low-pressure preheating delay] : the low-pressure preheating delay will be automatically adjusted in the cutting process, and the recommended value is 100.

[cutting gun rising delay] : when the cutting is finished and the cutting gun rises, the recommended value is 2.0.

[cutting gun drop delay] : the recommended value is 1.8.

[rising delay of perforating gun] : when perforating, it can prevent molten iron from blocking the cutting nozzle.

Generally, the cutting gun should move up and down. Set here, the rising time of the cutting gun during perforating is

recommended to be 1.0.

[dropping delay of perforating gun] When perforating, the time for the gun to rise and then fall.

[perforation delay] : the machine can only run after the steel plate is penetrated during the perforation. The waiting

time is set here, and the recommended value is 0.5.

[cut-off delay] : after cutting parts, turn off cutting oxygen, wait for this delay, and then go to the next hole point to

prevent the nozzle tail fire damage to the workpiece.

[interval delay] : when cutting thick steel plates (greater than 80mm), in order to ensure that the lower surface of

steel plates can be cut well, we need to wait after each program segment, and the default value is 0.0.

[high-voltage preheating delay] : if high-voltage preheating is used, the high-voltage preheating delay is set at this

time, and the default value is 0.0.

[exhaust delay] : after the cutting of parts, the time to close the cutting oxygen and open the exhaust valve is 0.0 by

default.

[end off output] : when set to 1, do not close the preheating oxygen after the completion of the whole program

cutting; when set to 0, close.

6.4 plasma parameters

Position Check(0/1)	0	(0 < P < 1)
Position Up Time	0.5	(0.0 < P < 29.9)
Torch Up Time(M70)	2.0	(0.0 < P < 100.0)
Torch Down Time(M71)	1.8	(0.0 < P < 100.0)
Watch Arc Enable(0/1)	0	(0 < P < 1)
Arcing Check Time	0.0	(0.0 < P < 120.0)
Pierce Time	0.3	(0.0 < P < 120.0)
Arc Off Delay Time	0.0	(0.0 < P < 120.0)
Time to lock THC	1.0	(0.0 < P < 90.0)
Distance to lock THC	10	(0 < P < 1000)
Speed to lock THC	0	(0 < P < 10000)
Distance to Off arc before end of cutting	2.0	(0.0 < P < 90.0)
Distance to Lock THC before end of cutting	0.0	(0.0 < P < 100.0)
Turn On Water when arc on(0/1)	0	(0 < P < 1)
Time to turn on water before arc on(S)	0.0	(0.0 < P < 120.0)

ESC	Speed F1	System F2	Flame F3	Plasma F4	Control F5	F6	Save F7

[initial positioning detection selection] : if numerical control is required for initial positioning, this value is set to 1 and

the default value is 0.

[cutting gun positioning delay] : when the numerical control does the initial positioning, the rising time of the cutting

gun, the default value is 0.5.

[cutting gun rising delay] : when the cutting is finished and the cutting gun rises, the recommended value is 2.0.

[cutting gun drop delay] : the recommended value is 1.8.

[arc pressure detection selection] : if set to 1, the nc needs to detect the successful arc starting signal with the

adjustment, and then the machine can continue cutting. The default value is 0.

[perforation delay] : the machine can only run after the steel plate is penetrated during the perforation. The waiting

time is set here, and the recommended value is 0.5.

[After the end of cutting, the arcing is delayed and closed] After cutting, delay to close the arc: after cutting the parts,

wait for a certain time, close the arc and ensure the cutting is completed.

[delay of automatic signal for raising] : at the beginning of cutting, arc pressure is unstable. In order to ensure the

stability of raising, it is necessary to wait for a certain time before turning on automatic raising.

[corner clearance height] : when the distance from the corner is much, close and raise it to ensure the stability of

corner elevation. The default value is 10.

[turn off raise speed] : when cutting at low speed, arc pressure is unstable and it needs to turn off and raise. When

cutting speed is less than this value, turn off and raise automatically. If this function is not needed, set it to 0, and the

default value is 0.

[end point advance arc breaking distance] : when cutting the last program segment, this value can be set to turn off

the arcing signal ahead of time, and the default value is 2.0.

[end point advance close for raising distance] : this value can be set when cutting the last program segment. Turn off

the automatic signal of raising ahead of time, and the default value is 0.0.

6.5 control parameters

```
            Auto Lode Next File(0/1)  [0           ]   (0 < P < 2)
           Edge Cutting Enable(0/1)  [1           ]   (0 < P < 1)
                   Forbidden F(0/1)  [0           ]   (0 < P < 2)
                   No Previwe(0/1)  [0           ]   (0 < P < 1)
                Calculate Precision  [0.100        ]   (0.010 < P < 0.500)
Remote Controller No-0/wired-1/wireless-2  [0           ]   (0 < P < 2)
          Clear Coor before cut(0/1)  [0           ]   (0 < P < 1)
                Use Cylinder THC(0/1)  [0           ]   (0 < P < 1)
             Return zero after cut(0/1)  [0           ]   (0 < P < 1)
               Enable limit port(0/1)  [1           ]   (0 < P < 1)
                Enable Limit coor(0/1)  [0           ]   (0 < P < 1)
                  Collide Detect(0/1)  [0           ]   (0 < P < 1)
       Pause(0)/Torch Up(1) after Collide  [1           ]   (0 < P < 1)
               Torch Up after pause(0/1)  [0           ]   (0 < P < 1)
              Display LOGO-0/TEXT-1  [0           ]   (0 < P < 2)


ESC    Speed    System    Flame    Plasma    Control         Save
        F1       F2        F3       F4        F5       F6      F7
```

[edge perforation selection] : when set to 1, the system will automatically prompt the need for edge perforation at

each perforation point.

[F instruction valid :1/ invalid :0] : set it to 1. If F instruction is included in the program, the cutting speed will be set

according to F; When set to 0, the F instruction is invalid.

[no graphics preprocessing] : set it to 1, the screen does not show graphics, direct cutting, generally used for very

large programs, the picture will take a long time.

[calculation control precision] : automatically optimize the program line to ensure smooth cutting, and the recommended value is 0.01.

[remote control selection] : 0 -- do not test the remote control; 1 -- select the wired remote control; 2 -- select the wireless remote control.

[automatic coordinate clearing before machining] : when set as 1, the current coordinate is set as 0 automatically before cutting, generally used in the case that there is no G92 at the beginning of the program.

[pneumatic height adjustment] : when set to 1, select pneumatic height adjustment; At this point, only the cut gun down output signal, cut gun up no output.

[automatic reference at the end of processing] : when set to 1, the end of cutting will automatically return to the starting point of cutting.

[effective external limit] : 0 -- no detection of external limit signal, 1 -- detection.

0 -- soft limit range is not detected, 1 -- detection, limit range can be set in system parameters.

[effective detection of bump gun] : 0 -- signal of bump gun is not detected; 1 -- detection.

[pause/lift after bump gun] : 0 -- cut pause after bump gun; 1 -- the cutting gun rises after the collision (the rising time is determined by plasma parameter the positioning delay of the cutting gun), and the cutting is not suspended.

[Start screen display] 0 -- startup shows the company logo; 1 - display blue background + company name on startup.

Chapter 7 definition of wiring

7.1 wiring instructions

Input

	Port	Type			Port	Type
X+ limit	01	NO		IHS signle	05	NO
X- limit	14	NO		Pause	18	NO
Y+ limit	02	NO		Plasma Collision	06	NO
Y- limit	15	NO		Move X+ input	19	NO
Emergency stop	03	NO		Move X- input	07	NO
TorchUp/X Zero	16	NO		Move Y+ input	20	NO
Arc Feedback	04	NO		Move Y- input	08	NO
TorchDn/Y Zero	17	NO		Start	21	NO

[Up/Down]Move Cursor [1]On/[0]Off   59-11-11 29:31:06   VER:3.0-C-5.3.42-BG-FAT

| ESC | Input F1 | Output F2 | F3 | System Def F4 | F5 | F6 | IO Define F7 |

Output

	Port	Type			Port	Type
Preheat(M10)	01	NO		Plasema THC(M38)	18	NO
Pierce(M12)	14	NO		Flame THC(M48)	20	NO
TorchUp(M14)	02	NO				
TorchDn(M16)	15	NO				
Ignition(M20)	03	NO				
Arc Staring(M32)	16	NO				
Warter(M22)	04	NO				
High Preheat(M24)	17	NO				

[Up/Down]Move Cursor [1]On/[0]Off   59-11-11 29:31:11   VER:3.0-C-5.3.42-BG-FAT

| ESC | Input F1 | Output F2 | F3 | System Def F4 | F5 | F6 | IO Define F7 |

Above is the system input screen. In the figure above, [serial number] is the pin number on the plug, and [normally open and normally closed] is the default state of the signal. The input pin is green when there is a signal and gray when there is no signal.

7.1.1 input principle
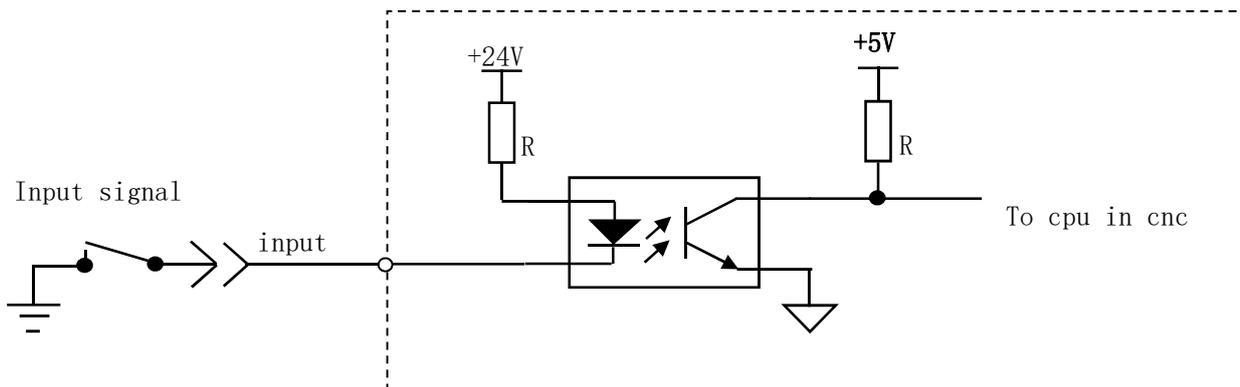
7.1.2 default input definition (DB25-pin)

Pin number	instructions	Pin number	instructions
1	X+ limit/X Zero	5	IHS signle
14	X- limit/X Zero	18	Pause
2	Y+ limit/Y Zero	6	Plasma Collision
15	Y- limit/Y Zero	19	Move X+ input
3	Emergency stop	7	Move X- input
16	TorchUp	20	Move Y+ input
4	Arc Feedback	8	Move Y- input
17	TorchDn	21	Start
12,24		13,25	24V- GND

In the figure above, [pin number] is the pin number on the plug, and [normally open and normally closed] is the default state of the signal. Press 【↑】【↓】 key to move the cursor position, press [1] to open the output, the state is green. Press [0] to close the output, and the state is gray.

7.1.3 output principle
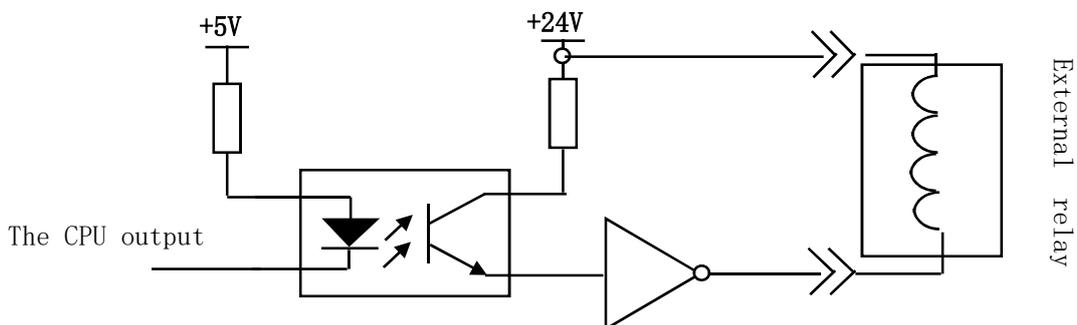
7.1.4 default output definition (DB25-pin)

Pin number	instructions	Pin number	instructions
1	Preheat	5	
14	Pierce	18	Plasema THC
2	TorchUp	6	
15	TorchDn	19	
3	Ignition	7	
16	Arc Staring	20	Flame THC
4	Warter		
17	High Preheat		
12,24		13, 25	24V- GND

7.2 interface definition and modification of normally open and normally closed

Under the diagnosis interface, press the "port definition" key, enter the password 1928 and enter the port definition interface. As shown below:

Definition of Output

	Port	Type			Port	Type
● Preheat(M10)	01	NO		● Plasema THC(M38)	18	NO
● Pierce(M12)	14	NO		● Flame THC(M48)	20	NO
● TorchUp(M14)	02	NO				
● TorchDn(M16)	15	NO				
● Ignition(M20)	03	NO				
● Arc Staring(M32)	16	NO				
● Warter(M22)	04	NO				
● High Preheat(M24)	17	NO				

[Up/Down]Move Cursor [PgUp][PgDn]Change

ESC	Input F1	Output F2	Motor F3	Axes F4	F5	Default F6	Save F7

Definition of Input

	Port	Type			Port	Type
● X+ limit	01	NO		● IHS signle	05	NO
● X- limit	14	NO		● Pause	18	NO
● Y+ limit	02	NO		● Plasma Collision	06	NO
● Y- limit	15	NO		● Move X+ input	19	NO
● Emergency stop	03	NO		● Move X- input	07	NO
● TorchUp/X Zero	16	NO		● Move Y+ input	20	NO
● Arc Feedback	04	NO		● Move Y- input	08	NO
● TorchDn/Y Zero	17	NO		● Start	21	NO

[Up/Down]Move Cursor [PgUp][PgDn]Change

ESC	Input F1	Output F2	Motor F3	Axes F4	F5	Default F6	Save F7

The above is IO definition interface, press 【→】【←】【↑】【↓】 key to move the cursor, press [PgUp] [PgDn] key to change the serial number and the normally open and normally closed state, or press [Enter] key to select, after setting, press [save] key.

Restore factory value: press this key to restore the serial number to factory status (password: 1928).

7.3 modify the motor direction

If the machine tool running direction and system coordinate display direction is not consistent, can modify the motor direction.

In the figure above, press 【↑】【↓】 to move the cursor, press [1] [0] to change the direction, and press [save] after setting.

7.4 Modify coordinate system

If the position of the system is inconsistent with the coordinate direction of the machine, the coordinate system can be modified.

Coordinate Definition(Press [ENTER])

Right Key:X+

Up Key: Y+

| ESC | Input F1 | Output F2 | Motor F3 | Axes F4 | F5 | Default F6 | Save F7 |
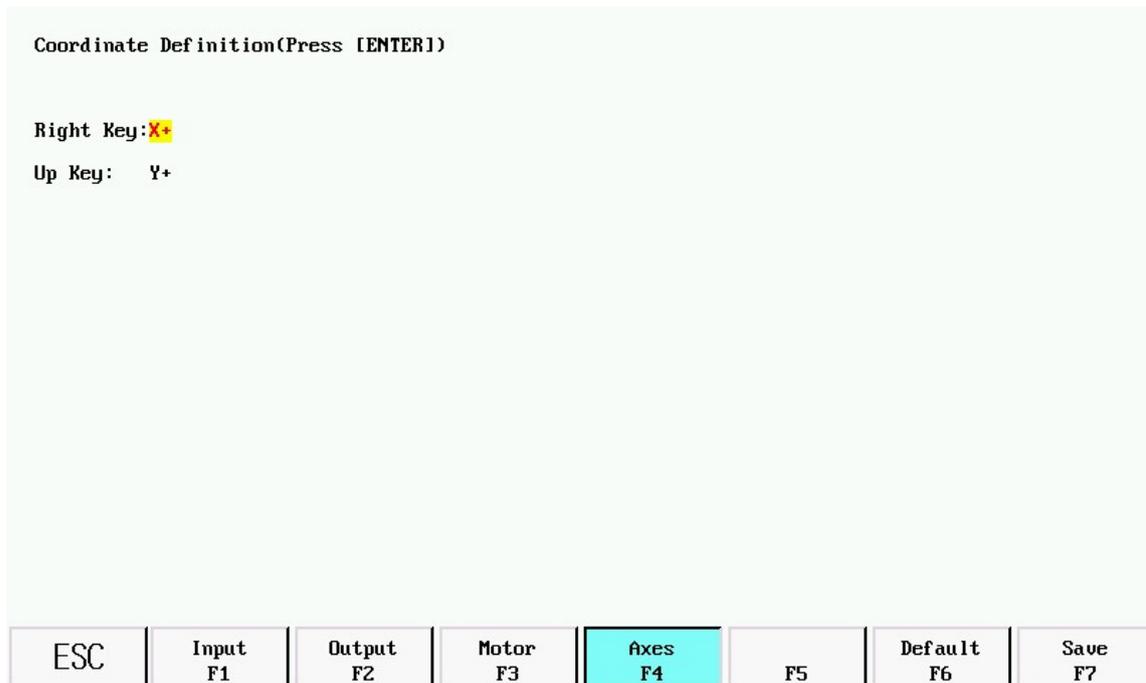
In the figure above, press [↑] [↓] to move the cursor, press [Enter] to modify the direction definition, and press [save] after setting.

7.4 definition of motor wiring

电机 1

| Pin number	Explain
1	X DIR+
9	X DIR-
2	X PUL+
10	X PUL-
3	Y DIR+
11	Y DIR-
4	Y PUL+
12	Y PUL-
5	A DIR+
13	A DIR-
6	A PUL+
14	A PUL-
7	5V+

7.5 differential driver connection
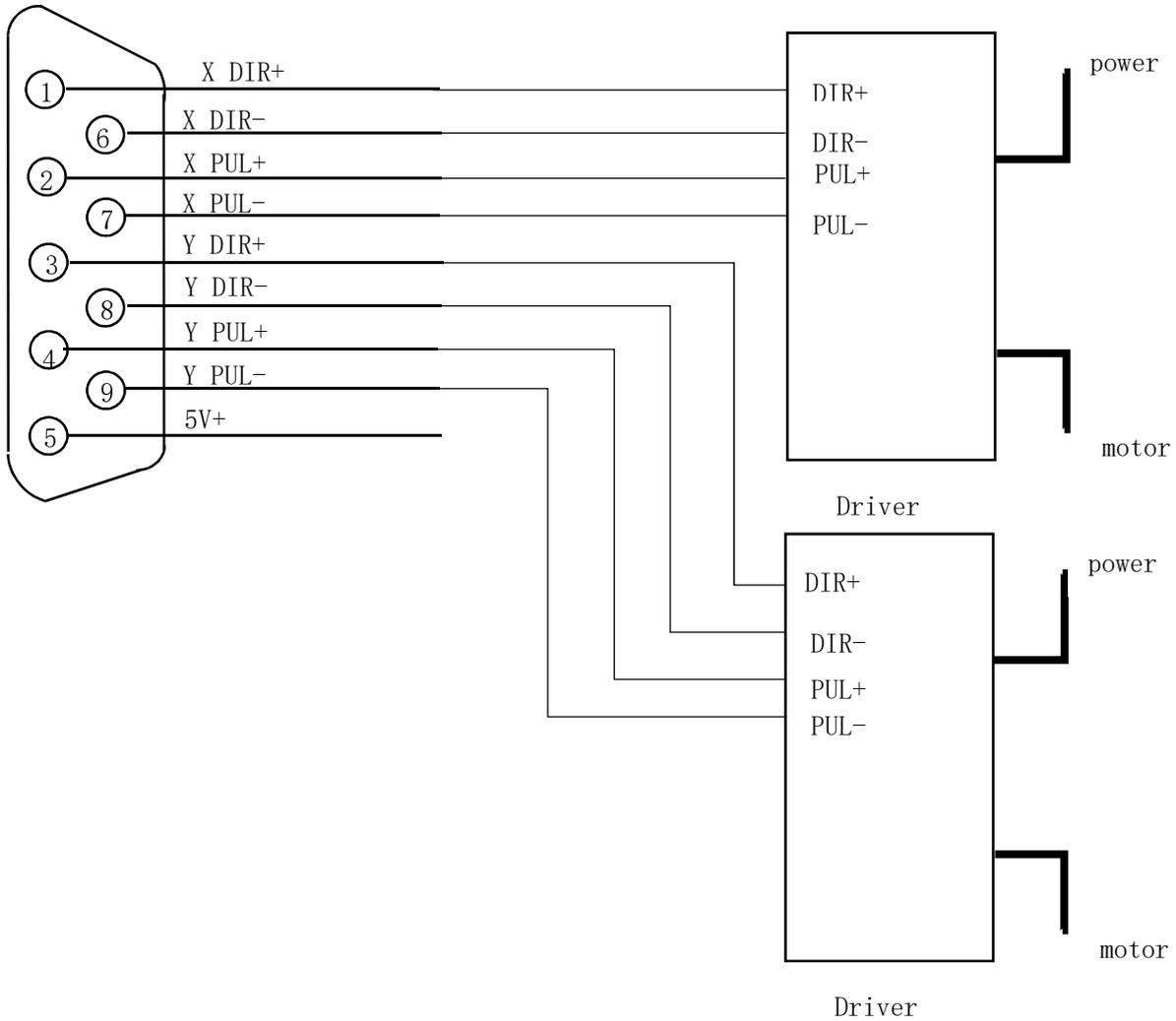
# 7.6 total positive drive connection
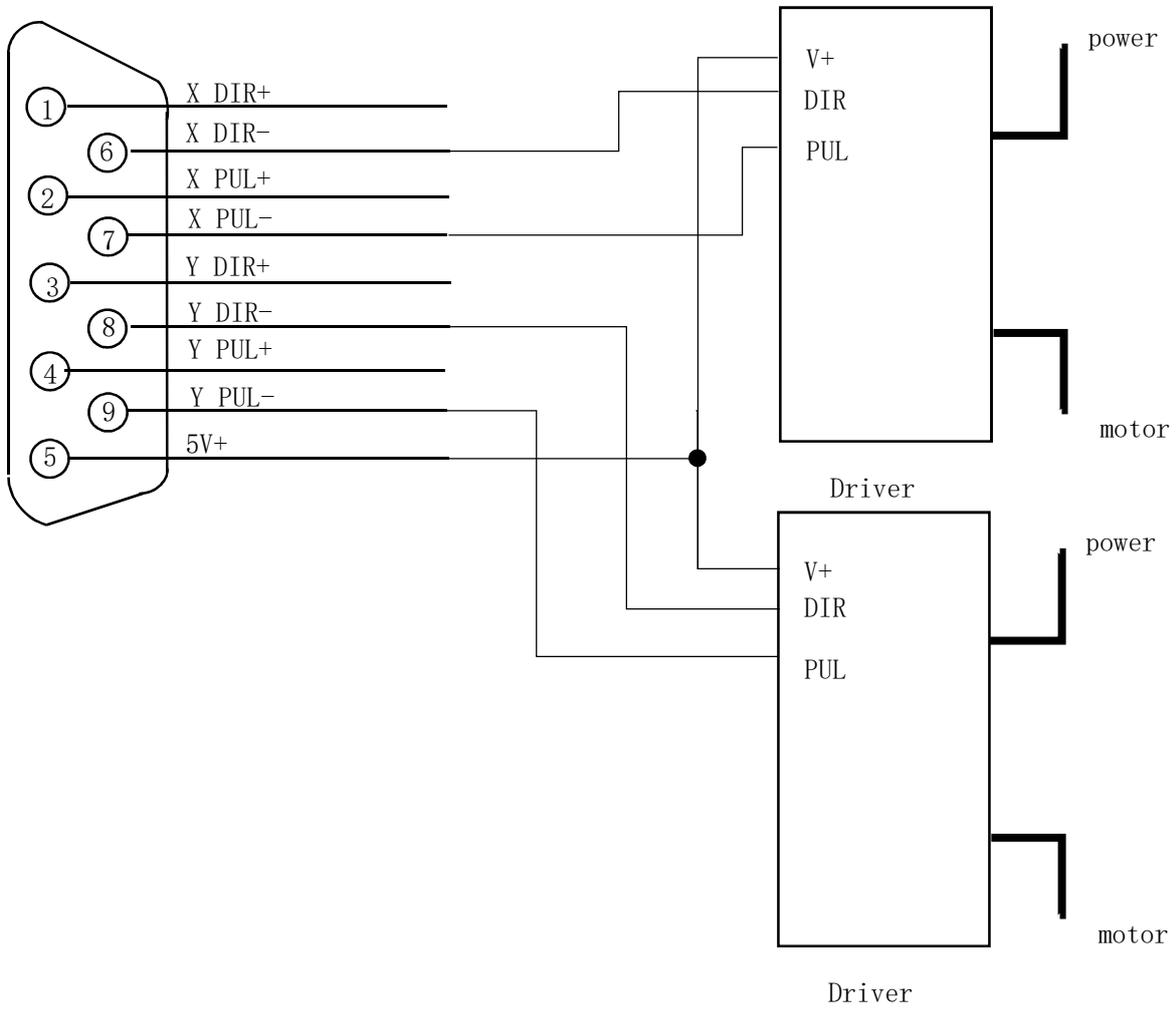
7.7 panasonic servo connection

松下 A4/A5

Panasonic A4/A5
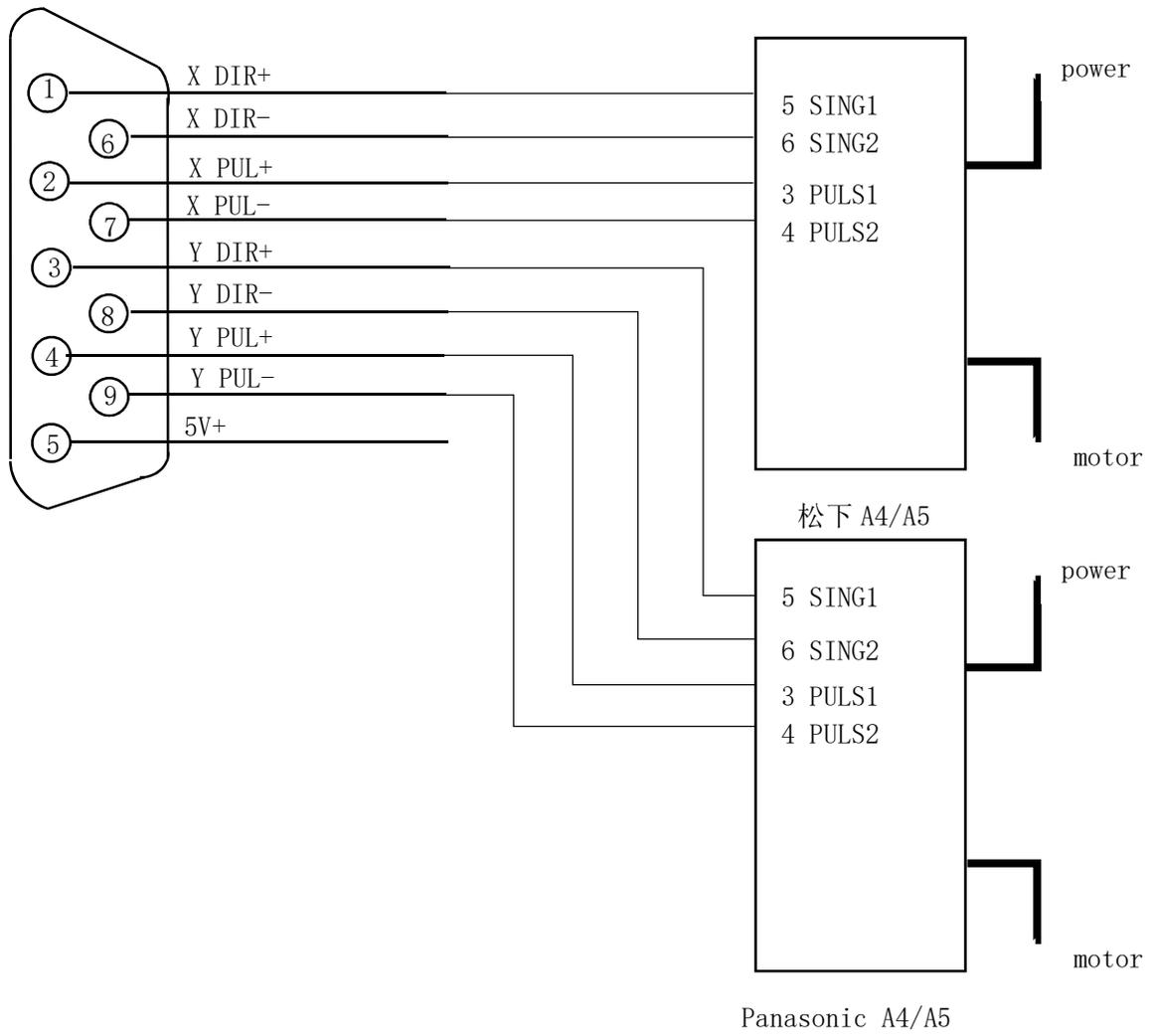
Chapter 8 wiring definition of nc and height controller

8.1 connection of CNC SF-2100C-BG with sf-hc25K height controller

arc feedback ③

CNC Input

24V+   24V−

24V+
24V−
0 - OK
DOWN   torch up   ②
UP   torch down   ⑮
AUTO   arc on   ⑯
ARC   plasma THC auto ⑲

THC

CNC Output
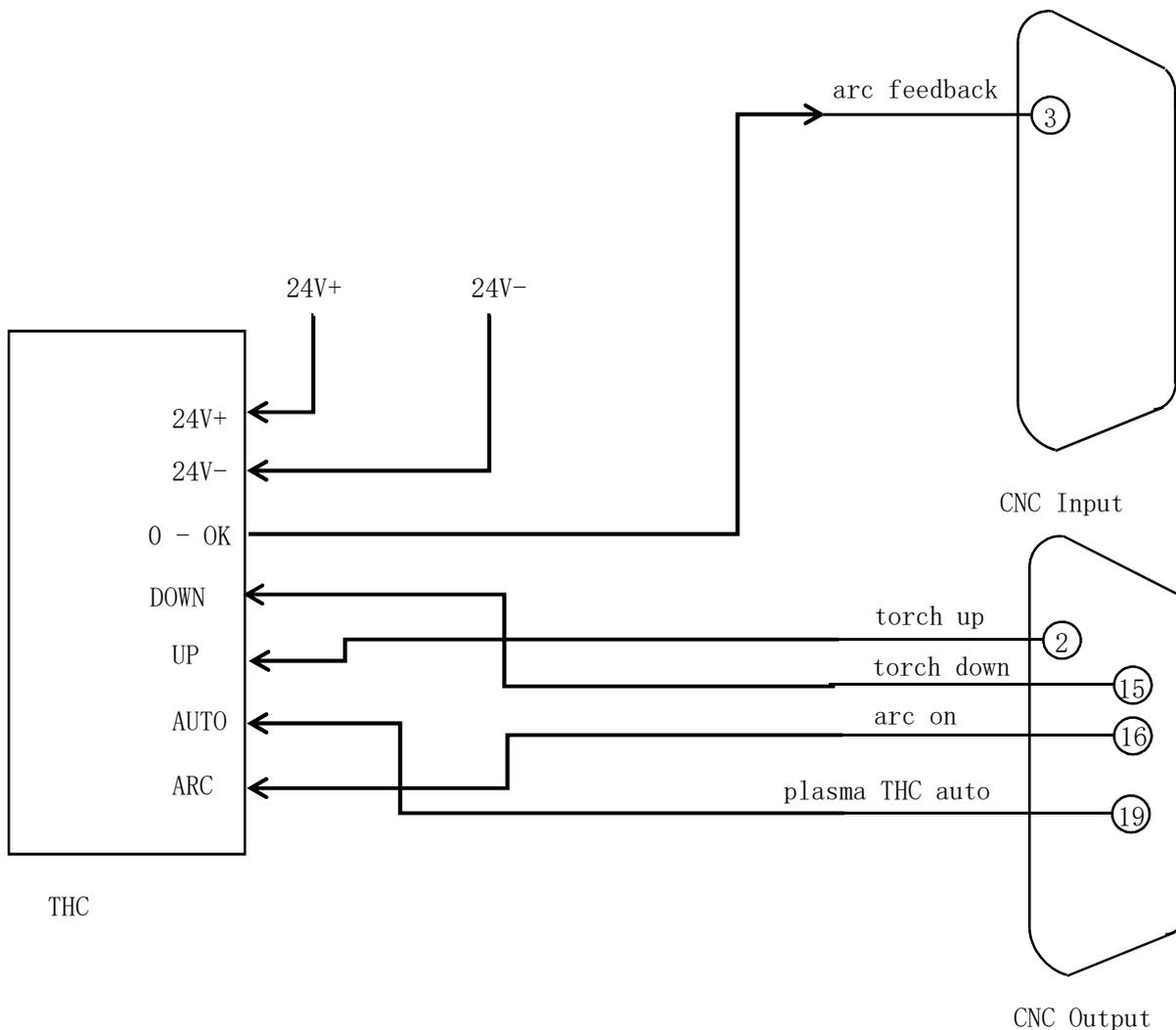
8.2 connection of CNC SF-2100C-BG with sf-hc25c3 height controller
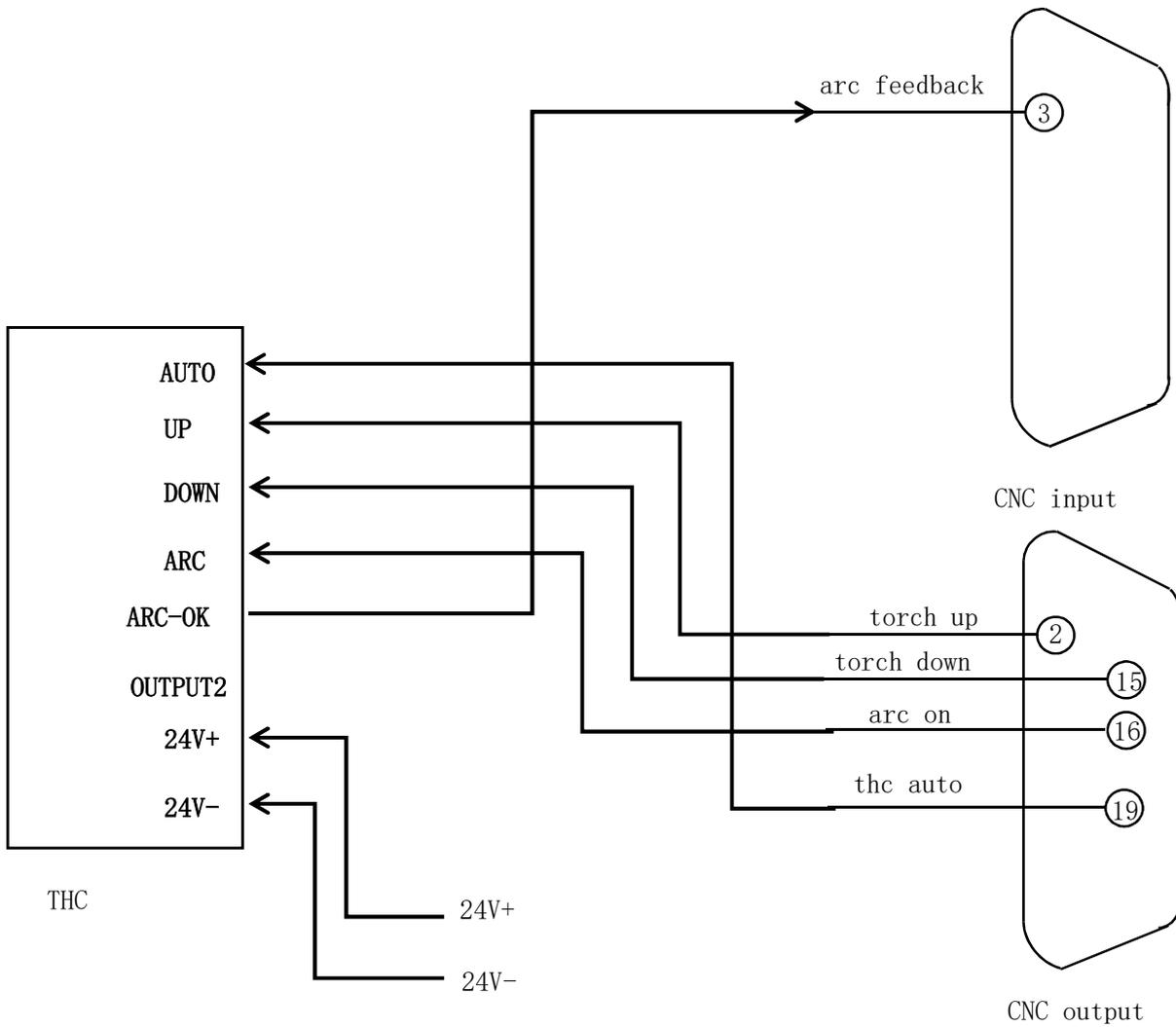
8.3 Connection of CNC SF-2100C-BG with sf-hc30a height controller

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