CRUXWELD®

INDUSTRIAL EQUIPMENTS PVT. LTD.

NEXOR 1140

CNC Plasma Pipe Cutting Machine

Round pipe 19 – 114 mm | 6000 mm cutting length | up to 5 mm wall | 220 V single phase



USER MANUAL

Part I – Machine | Part II – CNC Controller

Please read this manual carefully before installing and using the machine.

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Contents

1 Safety precautions 3

2 General description 5

3 Technical specifications 7

4 Machine overview 10

5 Installation 13

6 Operation 15

7 Cutting guide 18

8 Maintenance 19

9 Troubleshooting 20

10 Warranty 21

Part II – NEXOR 1140 CNC Controller Operating Manual 22

> This manual has two parts. **Part I** describes the NEXOR 1140 machine: safety, installation, daily operation and maintenance. **Part II** is the complete operating manual of the NEXOR 1140 CNC controller (screens, parameters, shape library, diagnostics and wiring). Part II pages are numbered II-1, II-2 and so on.

Cruxweld improves its products continuously. The contents of this manual may be revised without prior notice. Please read this manual before installing and operating the machine, and keep it near the machine.

Signs used in this manual

Sign	Meaning
▲ **DANGER**	Immediate danger which will cause death or serious injury if it is not avoided.
▲ **WARNING**	A potential hazard which may cause death or serious injury if it is not avoided.
▲ **CAUTION**	A hazard which may cause injury or damage to the machine if it is not avoided.
Note	Useful information for correct operation.

1 Safety precautions

The NEXOR 1140 cuts steel pipe with a plasma arc while the pipe rotates and moves. Plasma cutting and moving machinery can be dangerous to the operator and to people nearby. Installation, operation and maintenance must be carried out only by trained persons who have read this manual and the manual of the plasma cutter.

1.1 Electric shock

- The machine and the plasma cutter must be connected to a properly earthed supply. Earth the machine bed and the workpiece as described in Chapter 5.
- The plasma torch and the work lead carry a high open-circuit voltage. Never touch the torch nozzle, the electrode or the pipe while the plasma cutter is switched on.
- Switch off and isolate the mains supply of the machine and of the plasma cutter before changing torch parts, opening the control cabinet or carrying out maintenance.
- Do not operate the machine with the control cabinet door open or with damaged cables.

1.2 Moving parts

- During cutting the pipe rotates and the rear chuck carriage travels along the bed. Keep hands, hair, gloves and loose clothing away from the chuck, the pipe and the carriage.
- Keep the area along the full 6 m bed and at the pipe ends free of people and objects. A long pipe swings a large circle when it rotates.
- Know the position of the **emergency stop** button on the control cabinet. Press it at once in any dangerous situation.
- Never reach into the cutting head or the chuck while the controller is in automatic cutting mode.

1.3 Arc rays, sparks and hot metal

- The plasma arc emits intense ultraviolet and visible light. Wear a face shield or goggles with a filter of shade 5 – 8 (according to current), and protect people nearby with screens.
- Wear flame-resistant clothing, leather gloves and safety shoes. Cut parts, slag and the inside of the pipe stay hot for a long time after cutting.
- Sparks and molten metal are blown out of the pipe and through the far end of the pipe. Remove all flammable material from the work area and from in front of the open pipe ends. Keep a fire extinguisher ready.

1.4 Fumes, gases and noise

- Plasma cutting produces fumes and gases, especially on galvanised, coated, painted or stainless steel. Provide good ventilation or fume extraction at the cutting head.
- Plasma cutting is noisy. Wear hearing protection when cutting for long periods.

1.5 Compressed air

- Use only clean, dry, oil-free compressed air at the pressure recommended by the plasma cutter manual. Release the pressure before disconnecting air hoses.

▲ DANGER

Persons with a cardiac pacemaker or other implanted medical device must consult their doctor before working near plasma cutting equipment.

1.6 Intended use

The NEXOR 1140 is designed for plasma cutting of round mild steel and stainless steel pipe within the ranges given in Chapter 3. Any other use, modification of the machine or removal of safety devices is not permitted. Cruxweld cannot be held liable for damage resulting from improper use.

2 General description

The Cruxweld NEXOR 1140 is a CNC plasma pipe cutting machine for round pipe from 19 mm to 114 mm diameter and up to 6000 mm long. The plasma torch stays fixed at the front cutting head, while the CNC controller rotates the pipe and feeds it forward. In this way holes, saddle (fish-mouth) joints, slots, mitres and straight cut-offs are cut automatically and accurately, ready for welding.

The controller has a built-in shape library. The operator chooses a shape, enters the pipe diameter and the sizes, and presses Start – no drawing and no programming are needed. G-code files and graphics can also be loaded through the USB port.



Fig. 2.1 Cutting head with a saddle-cut branch pipe

2.1 How it works

1. **Load** – lay the pipe on the bed, clamp the rear end in the 3-jaw chuck of the rear carriage and pass the front end through the 3-jaw fixture of the cutting head.
2. **Select** – choose a shape on the controller and enter the pipe diameter, wall thickness and sizes.
3. **Cut** – press Start. The pipe rotates (one axis) and travels forward (second axis) while the plasma torch cuts the profile.
4. **Weld** – remove the finished part. It fits the mating pipe without grinding.

2.2 Main features

- Built-in pipe shape library: cut-off, end cut, saddle / branch joint, round hole, square hole, slot hole, elbow (mitre) cut and railing pattern.
- 4-axis CNC controller with colour LCD, membrane keypad, front USB port, G-code and graphic import.
- Automatic pipe rotation and feed through a precision rack and pinion drive.
- Front 3-jaw fixture and rear 3-jaw chuck keep the pipe centred under the torch.
- Double cylindrical guide rails for straight, smooth travel of the rear carriage along the 6 m bed.
- Power-failure breakpoint recovery: an interrupted cut can be resumed.
- Fixed vertical machine torch holder with manual height adjustment.
- Modular bed in three bolted sections of about 2.2 m for easy transport and installation.
- Runs on 220 V single-phase supply.

2.3 Applications

Stainless steel railings and handrails, gates, grills and fencing, steel furniture and frames, pipe trusses, sheds and canopies, roll cages and exhaust tubes, gym, playground and farm equipment.

3 Technical specifications

Cutting capacity	
Pipe type	Round pipe / tube
Pipe diameter	19 – 114 mm
Maximum cutting thickness	5 mm
Effective cutting length	6000 mm (longer on request)
Unusable tail length	200 mm
Materials	Mild steel, stainless steel
Cutting process	Air plasma
Accuracy and speed	
Cutting accuracy	±0.5 mm
Repeat positioning accuracy	±0.01 mm
Cutting speed	0 – 8000 mm/min (adjustable)
Machine construction	
Control axes	2 linked axes – pipe rotation + linear feed
Drive	Precision rack and pinion
Guide rails	Double-sided cylindrical guide rails
Pipe clamping	Front 3-jaw fixture + rear 3-jaw chuck
Torch mounting	Fixed vertical machine torch holder
Loading	Manual loading – automatic feeding and cutting
Bed frame	100 × 50 × 3 mm square tube, 3 bolted sections
CNC control system	
Controller	4-axis CNC cutting controller
Display	Colour LCD with membrane keypad
Built-in shape library	Cut-off, end cut, saddle / branch joint, round hole, square hole, slot hole, elbow (mitre) cut, railing pattern
Programme input	Built-in shapes (no programming), G-code, graphic import
File transfer	Front USB port
Memory	Power-failure breakpoint recovery
Menu language	English (multi-language)
Power and air	
Power supply	AC 220 V, 1-phase, 50 Hz
Controller supply	DC 24 V (internal)
Air supply	Compressed air, clean and dry (for the plasma cutter)
Dimensions and transport	
Machine dimensions (L × W × H)	6600 × 500 × 1100 mm
Net weight	Approx. 220 kg
Transport	Bed splits into 3 sections of approx. 2.2 m each

Specifications may change without notice as a result of continuous improvement. The plasma cutter is a separate unit; its data are given in its own manual.

3.1 Scope of supply

No.	Item
1	6 m machine bed in 3 bolted sections with double guide rails and legs
2	Front cutting head with 3-jaw pipe fixture and machine torch holder
3	Rear chuck carriage with 3-jaw chuck, automatic rotation and feed drive
4	CNC control cabinet with controller, emergency stop and USB port
5	Interconnecting cables
6	User manual

> **Note:** The plasma cutter, machine torch and spare parts are supplied as listed on your quotation. Clean, dry compressed air is arranged by the customer.

3.2 Recommended plasma cutters

Model	Current	Best for
FINELINE 100IC	20 – 100 A	Compact workshops – built-in air compressor, no separate compressor needed
FINELINE 120	20 – 120 A, 3-phase	Daily production cutting
FINELINE 160	20 – 160 A, 3-phase	Heavy-duty shops; the same source can also cut thicker plate

Use a CNC-ready plasma cutter with a machine torch and a remote arc-start interface. Contact Cruxweld to choose the right model for your pipe sizes.

4 Machine overview

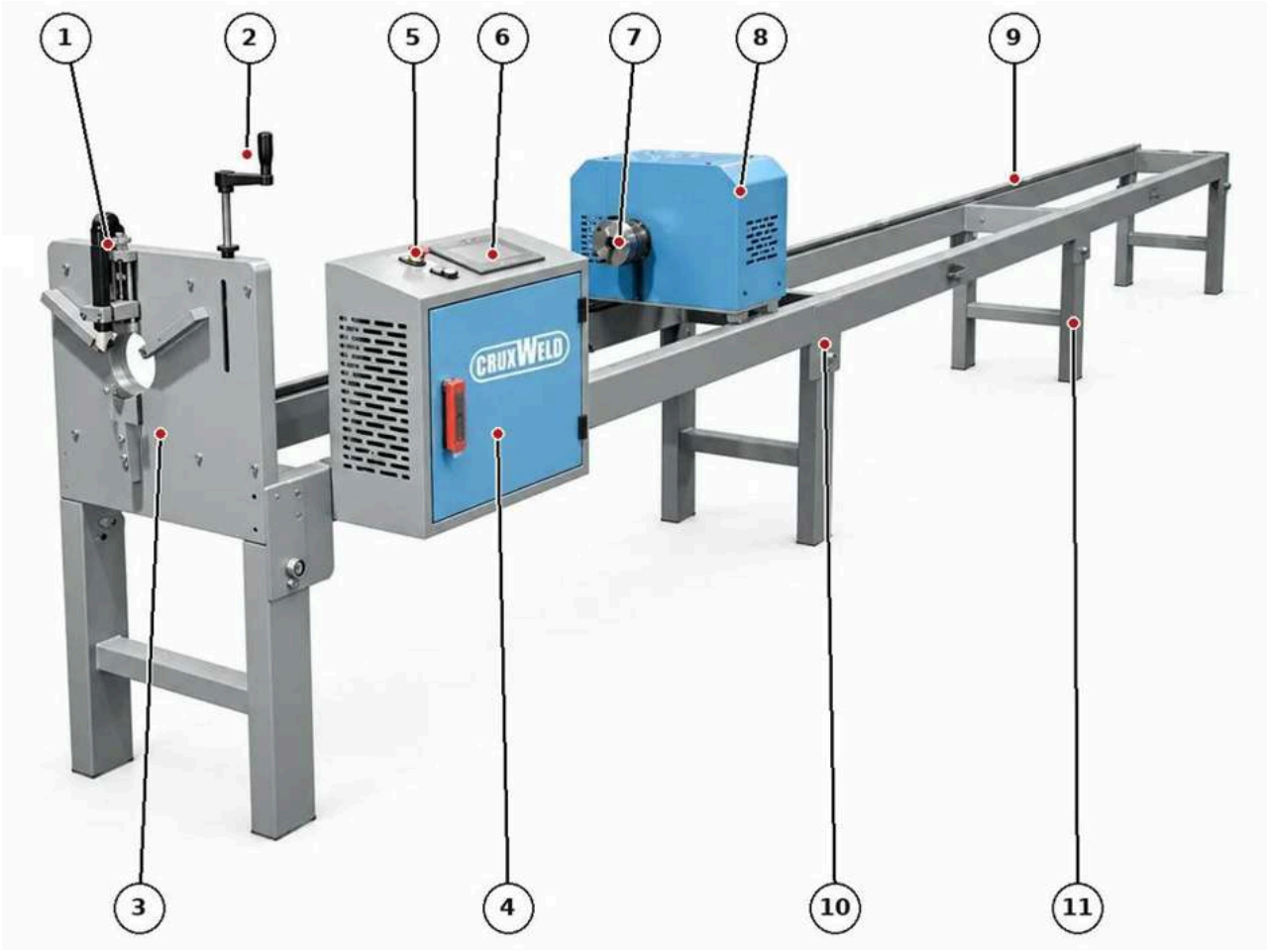


Fig. 4.1 Main parts of the NEXOR 1140

1	Machine torch holder	**7**	Rear 3-jaw chuck
2	Torch height adjustment handle	**8**	Rear chuck carriage (rotation and feed drive)
3	Front cutting head with 3-jaw pipe fixture	**9**	Double cylindrical guide rails
4	CNC control cabinet	**10**	Machine bed (3 bolted sections)
5	Emergency stop button	**11**	Bed legs with levelling bolts
6	CNC controller (display and keypad)		

4.1 Front cutting head

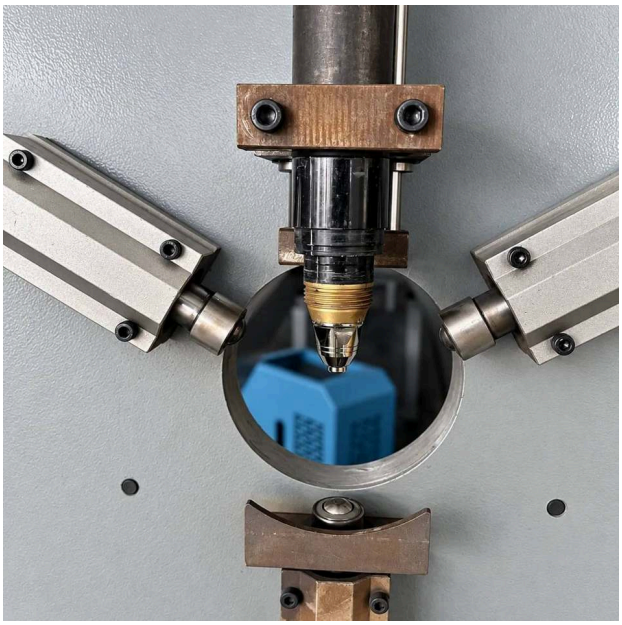


Fig. 4.2 Torch and pipe clamping rollers



Fig. 4.3 Front cutting head

The front cutting head carries the machine torch holder and the 3-jaw pipe fixture. The three clamping arms with rollers hold the pipe centred under the torch while it rotates and slides forward. The torch moves up and down on a slide; the height is set with the handle at the top of the head.

4.2 Rear chuck carriage and bed



Fig. 4.4 Rear chuck carriage feeding a pipe



Fig. 4.5 6 m bed with double guide rails

The rear carriage holds the end of the pipe in a 3-jaw chuck. Its motors rotate the pipe and move the carriage along the bed on the double guide rails by rack and pinion. The bed consists of three bolted sections made of 100 × 50 × 3 mm square tube.

4.3 CNC controller

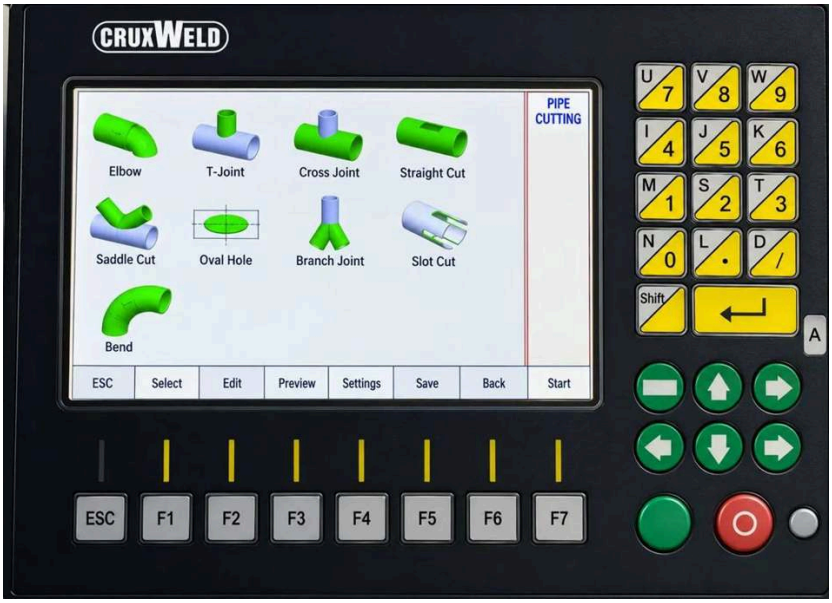


Fig. 4.6 Controller operation panel with the pipe shape library

The controller has a colour LCD, function keys F1 – F8 (shown on the screen bar), numeric and letter keys, direction keys for manual movement and the Start (green) and Stop (red) keys. The complete description of the keys and screens is given in Part II, Chapter 2.

5 Installation

5.1 Location

- Install the machine indoors on a flat, firm concrete floor. Allow at least 7.5 m length and 1.5 m free space on the operator side.
- Leave free space beyond the front of the cutting head for the cut-off parts and the spark stream.
- Protect the machine from rain, dust, corrosive gases and strong vibration. Ambient temperature 0 – 45 °C, relative humidity below 90 % without condensation.
- Keep the controller away from high-voltage equipment and sources of high-frequency interference.

5.2 Unpacking and checking

Check the machine and accessories against the packing list and look for transport damage. Report any damage to the transporter and to Cruxweld at once. Lift the bed sections with suitable lifting gear; do not lift the machine by the cabinet, the carriage or the cutting head.

5.3 Assembling the bed

1. Place the three bed sections in line on the floor in the order marked on them.
2. Bolt the sections together at the joint plates. Tighten the bolts lightly first.
3. Check that the guide rails and the rack are in line across the joints, with no step. Then tighten all bolts fully.
4. Level the bed lengthwise and crosswise with a spirit level by turning the levelling bolts of the legs. The bed must be straight and level over the full length.
5. Move the rear carriage by hand (with the power off) over the whole bed. It must run smoothly over the joints.

> **▲ CAUTION**
> A bed that is not straight or level makes the pipe run out of centre and causes inaccurate cuts. Re-check the levelling after the first week of use.

5.4 Electrical connection

1. Connect the interconnecting cables between the control cabinet, the rear carriage and the cutting head. Each plug fits only its own socket.
2. Connect the machine to a 220 V single-phase, 50 Hz supply with a protective earth, through a switch or MCB of suitable rating.
3. Connect the machine bed to a good earth with a copper earth cable.

> **▲ DANGER**
> The supply connection must be made by a qualified electrician. The machine must always be earthed.

5.5 Connecting the plasma cutter

1. Mount the machine torch in the torch holder of the cutting head so that it is vertical (perpendicular to the pipe axis) and points at the centre of the pipe.
2. Connect the arc-start (CNC) cable of the plasma cutter to the arc output of the controller in the control cabinet. If the plasma cutter has an arc-OK (arc transfer) signal, connect it to the arc feedback input. The wiring of the controller inputs and outputs is shown in Part II, Chapter 9.
3. Connect the work (earth) cable of the plasma cutter to the machine bed close to the cutting head, so that the cutting current flows through the pipe and the front fixture.
4. Connect clean, dry compressed air to the plasma cutter (not needed for the FINELINE 100IC, which has a built-in compressor).
5. Set the plasma cutter to CNC / machine-torch mode as described in its manual.

> **Note:** In the controller, select plasma cutting mode (see Part II, Chapters 3 and 6) so that the arc output, not the oxy-fuel gas outputs, is used.

6 Operation

6.1 Before starting

- Check that the bed is clear, the cables are undamaged and the emergency stop is released.
- Check the torch consumables (nozzle and electrode) and the air supply of the plasma cutter.
- Wear the protective equipment listed in Chapter 1.

6.2 Switching on

1. Switch on the main supply of the machine. The controller starts and shows the main screen (Part II, 2.2).
2. If the machine has reference (home) switches, return the axes to the reference point (Part II, 3.6 and 7.6.7).
3. Switch on the plasma cutter.

6.3 Loading the pipe

1. Move the rear carriage to the rear end of the bed with the direction keys (manual mode, Part II, Chapter 4).
2. Lay the pipe on the bed. Pass the front end through the 3-jaw fixture of the cutting head and clamp the rear end in the 3-jaw chuck of the carriage.
3. Adjust the three arms of the front fixture so that the rollers just touch the pipe and the pipe turns freely and stays centred.
4. Check that the pipe is straight. A bent pipe makes the torch height change during the cut.

> **▲ WARNING**
> Keep hands away from the chuck and the pipe while the controller is moving the axes.

6.4 Setting the torch height

Loosen the slide and turn the height handle so that the nozzle stands about **3 – 5 mm** above the top of the pipe for piercing and cutting (see Chapter 7). Re-check the height whenever the pipe diameter changes.

6.5 Choosing a shape and entering sizes

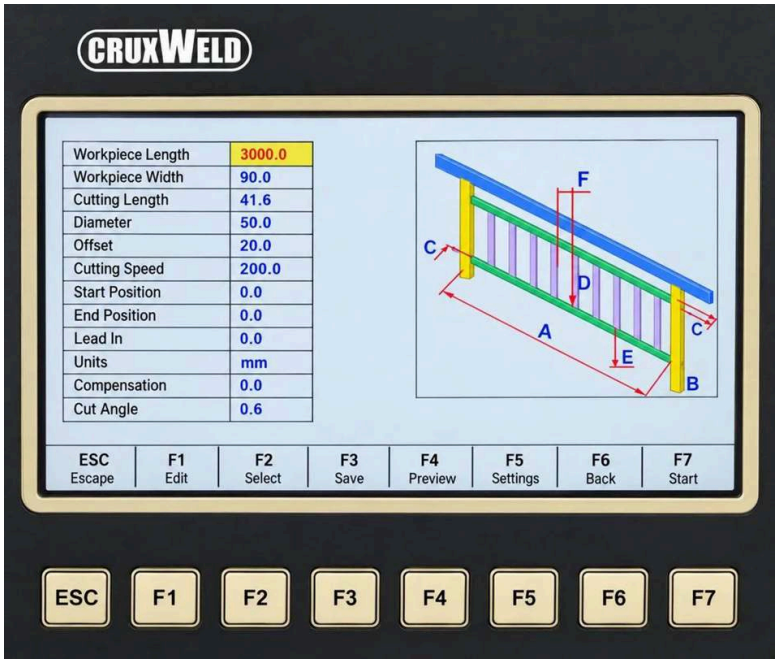


Fig. 6.1 Parameter screen of the railing pattern

1. Press the shape library key on the main screen. The library of round-pipe shapes opens (Part II, 8.1).
2. Select the shape. The parameter screen shows a drawing of the shape with the dimension letters.
3. Enter the pipe diameter, wall thickness and the dimensions of the shape. Use the cursor keys to move between fields.
4. Check the result in the drawing preview (Part II, 8.1.3) and save the program.

Shape (job)	Library item	Typical use
Straight cut-off	Truncation	Cutting pipes to length, square or angled ends
End cut	Terminal head	Shaped pipe end to fit another pipe
Saddle / branch joint	Branch tube / double branch tube	T-joints and Y-joints, truss members
Round hole	Mother tube opening	Holes for branch pipes and balusters
Square hole	Square hole	Square openings in the pipe wall
Slot hole	Waist hole	Slots and long holes
Elbow (mitre) cut	Elbow	Mitred bends and segmented elbows
Railing pattern	Fence	Handrail pipes with a row of baluster holes

6.6 Test run and cutting

1. Set the cutting speed in the parameters (Part II, Chapter 6) according to Table 7.1.
2. Do a dry run without the arc to check the path and that nothing collides (Part II, 3.3).
3. Press **Start**. The controller fires the plasma arc, waits for the pierce delay and then rotates and feeds the pipe along the programmed profile.
4. Watch the first cut. If needed, adjust the speed during cutting (Part II, 3.2).
5. Press **Stop** to interrupt. After an interruption or a power failure the cut can be resumed with breakpoint recovery (Part II, 4.4).

6.7 Finishing work

1. Remove the cut parts and the remaining pipe. Clean slag from the fixture rollers.
2. Switch off the plasma cutter, then the machine. Close the air supply.

7 Cutting guide

Table 7.1 gives starting values for air plasma cutting of mild steel pipe. The best values depend on the plasma cutter, consumables, air quality and pipe material, and must be found by a trial cut. For stainless steel reduce the speed by about 20 %.

Wall thickness (mm)	Cutting current (A)	Cutting speed (mm/min)	Pierce delay (s)	Torch height (mm)
1	25 – 30	3000 – 4000	0 – 0.2	2 – 3
2	30 – 40	2500 – 3200	0.2 – 0.3	3
3	40 – 60	1800 – 2500	0.3 – 0.4	3
4	60 – 70	1400 – 2000	0.4 – 0.5	3 – 4
5	70 – 80	1100 – 1600	0.5 – 0.6	3 – 4

Table 7.1 Guide values, air plasma, mild steel pipe

7.1 Cut quality

Problem	Cause	Remedy
Heavy dross on the inside / bottom edge	Speed too low or too high; current too low	Adjust speed; increase current
Bevelled or uneven cut edge	Torch not vertical; torch too high; worn nozzle	Align the torch; lower the torch; replace nozzle
Arc does not cut through	Current too low; speed too high; low air pressure	Increase current; reduce speed; check air
Shape out of size or joints do not fit	Wrong pipe diameter or thickness entered; pipe not centred; bent pipe	Check the parameters; adjust the front fixture; use straight pipe
Holes not where expected	Wrong start position or chuck rotation angle	Check the start reference and the angle parameters (Part II, 8.1.2)

Note: Kerf compensation and lead-in / lead-out lengths are set in the shape parameters. A short lead-in reduces the mark at the start of a hole.

8 Maintenance

▲ WARNING

Switch off and isolate the supply of the machine and of the plasma cutter before any maintenance.

Interval	Work
Daily	Remove slag and spatter from the front fixture, rollers and torch holder. Check the torch consumables. Wipe the guide rails and the rack. Check cables and hoses for damage.
Weekly	Clean and lightly oil the guide rails; grease the rack and pinion. Clean the 3-jaw chuck and check that the jaws move freely. Drain water from the air filter of the plasma cutter.
Monthly	Check the tightness of the bed bolts and the levelling of the bed. Check the chuck carriage wheels and pinion for wear and play. Blow dust out of the control cabinet with dry, low-pressure air (power off).
Every 6 months	Check all electrical connections and the earth connection. Back up the controller parameters (Part II, 7.6.1).

- Keep the controller screen and keypad clean and dry. Do not splash acids, alkalis or other corrosive liquids on the controller.
- Use only genuine spare parts and consumables.

9 Troubleshooting

Fault	Possible cause	Remedy
Controller does not switch on	No supply; fuse or MCB off; emergency stop pressed	Check the 220 V supply and MCB; release the emergency stop
Axes do not move	Emergency stop or limit switch active; drive cable loose; drive fault	Release / reset; check cables; check the input diagnosis (Part II, 7.2)
Pipe does not rotate but carriage moves (or the reverse)	Motor cable loose; wrong axis setting	Check the cable; check the axis / motor settings (Part II, 7.6.4 – 7.6.5)
Arc does not start when Start is pressed	Plasma cutter off or not in CNC mode; arc-start cable loose; air pressure low	Check the plasma cutter, the cable and the air; check the arc output in the output diagnosis (Part II, 7.3)
Machine waits after arc start	Arc feedback signal not received	Check the arc-OK cable, or disable the arc feedback check in the parameters
Cut path wrong or sizes incorrect	Wrong parameters; wrong pulse equivalent	Check the shape parameters; contact Cruxweld service for the axis settings
Pipe wobbles during cutting	Pipe not centred in the chuck or the front fixture; bed not level	Re-clamp the pipe; adjust the fixture rollers; re-level the bed
Carriage runs roughly over the bed joints	Rails or rack not aligned at the joints; bolts loose	Re-align and tighten the bed sections (Chapter 5.3)
Program cannot be loaded from USB	Unsupported file or USB stick format	Use a FAT32 USB stick and supported file types (Part II, Chapter 5)

If a fault cannot be corrected, contact Cruxweld service and state the model and serial number of the machine.

10 Warranty

Cruxweld warrants the NEXOR 1140 against defects in material and workmanship for the period stated on the quotation and invoice. During this period Cruxweld will repair or replace parts that are found to be defective due to faulty material or workmanship.

The warranty does not cover consumable and wearing parts (torch nozzles, electrodes, shields, rollers), damage caused by incorrect supply, missing earth, collisions, transport, misuse, lack of maintenance, or repair or modification by unauthorised persons.

Model	NEXOR 1140
Serial number	
Invoice no. / date	
Customer	
Dealer stamp	

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PART II

NEXOR 1140 CNC Controller

Operating Manual

Part II – Contents

User Guide **II-1**

Chapter 1 Introduction to the control system **II-3**

1.1 Introduction to the system II-3

1.2 System characteristics II-4

1.3 Technical Indicators II-5

1.4 System interface II-5

1.5 Hardware configuration II-6

Chapter 2 System startup **II-8**

2.1 Description of the system operation panel II-8

2.2 Description of system shipment and main interface II-10

2.3 Main interface function index II-12

Chapter 3 Cutting function **II-13**

3.1 Cutting operation index II-15

3.2 Speed regulation II-15

3.3 Forward II-16

3.4 Back II-16

3.5 Edge Cut / Offset Cut / Return II-17

3.6 Return reference function II-18

3.7 Adjustment of oxygen and gas preheating time II-19

3.8 Select the perforation points II-20

3.9 Dynamic magnification II-20

3.10 Exit the cut II-21

Chapter 4 Manual function **II-22**

4.1 Point function II-22

4.2 Connection function II-23

4.3 Fixed length and mobile function II-23

4.4 Breakpoint recovery II-23

Chapter 5 Document Management **II-25**

5.1 Hard disk file II-25

5.2 U disk file II-26

5.3 Find the files II-27

5.4 Code editing II-27

5.5 Create a new file II-27

5.6 Compile the code II-28

5.7 Folder management II-28

5.8 Empty the files II-30

Chapter 6 Parameter settings II-31

6.1 Common parameters II-31

6.2 Oxygen and fuel gas parameters II-32

6.3 Plasma parameters II-35

6.4 System parameters II-37

6.5 Parameter import and export II-39

6.6 Save the parameters II-41

Chapter 7 Diagnostic function II-42

7.1 Diagnosis interface index II-43

7.2 Enter the diagnosis II-43

7.3 Output diagnosis II-43

7.4 Keyboard diagnosis II-44

7.5 Date and time II-45

7.6 System Definition II-46

Chapter 8 Graphic management II-59

8.1 Round tube mode II-59

Chapter 9 Interface description II-74

9.1 Input interface II-74

9.2 Output interface II-77

9.3 Motor interface II-83

9.4 Description of power port (Power In) II-88

Chapter 10 BIOS use II-89

10.1 System upgrade II-89

10.2 System backup II-90

10.3 System restore II-90

Appendix 1 G, M code for quick access II-92

Appendix 2 IO timing diagrams II-93

User Guide

Read this manual

This manual applies to the NEXOR 1140 CNC cutting control system. Please read the
instructions and local safety regulations carefully before using.

Note: Due to the continuous improvement of this product, the technical parameters and hardware parameters involved in this manual are subject to modification without prior notice. If you have other questions or opinions about this product and the contents of this specification are not detailed, please consult in time. We will be happy to answer your questions, suggestions and criticisms. Thank you again for your choice and your trust.

Environmental requirements

- The CNC system is suitable for working at the ambient temperature of 0℃ to 50℃, and the relative humidity is 5-95% without condensation.
- The operating voltage is DC + 24V.
- The controller shall be installed in the console enclosure with dust protection.
- This system is best used away from high pressure and high frequency.

Maintenance

- Hands and feet away from the moving machine, control operation or manual can be performed through the front panel keyboard.
- When operating the machine, you should not wear loose clothes and wired ropes to avoid being entangled by the machine.
- The equipment should be and should only be operated by trained persons.
- Not authorized by Cruxweld technical personnel, it is strictly prohibited to dismantle the machine.
- When using, do not splash acidic, alkaline, corrosive and other items on the control system.

High voltage

- Electric shocks can kill people. It must be installed in accordance with the specified steps and requirements for the packing parts.
- Do not touch the wire and cable when the power supply is connected.

Chapter 1 Introduction to the control system

1.1 Introduction to the system

The product adopts the four-axis digital position control mode, which is suitable for oxygen gas, plasma processing industry. Suitable for all four-axis CNC machines with position control mode.

The control system is light and portable, easy to operate, easy to use, all operations with menu or graphic prompts, silly operation. All the key switch humanized design, comfortable and convenient.

1.1.1 The NEXOR 1140 controller

1.2 System characteristics

- Support Chinese, English, Spanish, Portuguese, French, Russian, Danish, Korean, Japanese and other language menu, language one-click switch, users need to provide translation files. All languages except Arabic.
- Support flat plate cutting and pipe cutting, four-axis welding, etc.
- Custom graphics library.
- Support EIA code (G, code) and FastCAM, FreeNest, SmartNest, IBE and other material software. The G codes with the suffix TXT, CNC, NC, MPG, and B3 are supported.
- Compact keyboard design that makes the manual input files more comprehensive.
- You can customize the type (normally open or normally closed) and number of all input and output ports.
- It can diagnose all IO status and key status of the system for easy checking and troubleshooting.
- Front-facing U-disk interface, convenient for program transmission.
- The system upgrade adopts the U disk upgrade mode, which is convenient, simple and practical, and provides a lifetime upgrade service.
- Support system backup and system restore function, system restore can only restore the operating system, but also restore to the factory state.
- All the functions and processes of the whole system can be upgraded online to avoid the worry of after-sales service.
- Single or all can import and export processing files.
- Parameter backup and parameter restore.
- Support oxygen gas, plasma and demonstration of 3 modes.
- All kinds of processing parameters are complete, which can meet different process needs.
- Oxygen gas and plasma IO are controlled separately.
- Oxygen gas automatic elevation, two-level preheating, three-level perforation.
- Plasma arc pressure feedback, positioning feedback, corner automatically off the arc pressure adjustment.
- Built-in plasma arc pressure automatic / manual adjustment function: can display the actual arc pressure and set the arc pressure, set the arc pressure adjustment parameters, detect the collision / positioning success signal, arc signal control, positioning test.
- Plasma arc pressure control supports the speed and distance of the two closing arc pressure adjustment methods to make the machine tool more stable and safe.
- Support edge cutting and reduce preheating time for thicker plates.
- Exercise can accelerate and slow down in real time.

- According to the thickness of the steel plate, it can be automatically limited at the corner to effectively prevent excessive burning.
- Hand-select the starting row or select the punch point.
- Dynamic / static machining graphics display, graphics zoom in / out, zoom in state dynamic tracking cutting points.
- Set the starting speed and speed time.
- With power failure, breakpoint protection memory function.
- The "Offset cutting" function can avoid the plate waste caused by the discharge calculation error.
- Different management rights and corresponding passwords can be set to safeguard the rights and interests of equipment manufacturers.
- Support the serial port remote control.

1.3 Technical Indicators

1)Control axis number: 4-axis linkage
2)Control accuracy: ± 0.001mm
3)Coordinate range: ± 99999.99mm
4)Maximum pulse frequency: 160 KHz; maximum operating speed: 15 m / min
5)Maximum number of program lines: 80,000 lines
6)Maximum single program: 4M
7) Time-class resolution: 10ms
8)System working power supply: DC + 24V DC power supply input, the power is greater than 80W.
9)Working environment of the system: temperature-10℃to + 60℃; relative humidity 0-95% without condensation

1.4 System interface

a) 15-core male three-axis motor drive interface and DB 9 core motor interface
b) 25-core female head 16-circuit photoelectric isolation output, the maximum reverse current of 300mA
c) 25-core head 16 photoelectric isolated input, the maximum input current of 300mA
d) The front panel has built-in USB interface to transmit cutting code
e) RS 232 Interface

1.5 Hardware configuration

1.5.1 7-inch controller version

1. Display: 7 inches 800 * 480 high resolution 16 million color color high brightness LCD screen
2. Memory: 64M SDRAM
3. User program space: 256M
4. Main frequency: main frequency of 400 MHZ system
5. USB: USB1.1 interface front, support at least 16GB superior disk
6. Keyboard: PCB film keyboard
7. Case:all steel structure completely shielding, really can do anti-electromagnetic radiation, anti-interference, anti-static
8. CPU: Industrial-grade ARM 9 kernel

1.5.2 10.4-inch controller version

1. Display: 10.4 inch 800 * 600 high resolution 16 million color color high brightness LCD screen
2. Memory: 64M SDRAM
3. User program space: 256M
4. Main frequency: main frequency of 400 MHZ system
5. USB: USB1.1 interface front, support at least 16GB superior disk
6. Keyboard: PCB film keyboard
7. Case: all steel structure completely shielding, really can do anti-electromagnetic radiation, anti-interference, anti-static

1.5.3 15 / 17-inch controller version

1. Display: a 15 / 17-inch industrial VGA high-brightness LCD screen
2. Memory: 64M SDRAM
3. User program space: 256M
4. Main frequency: main frequency of 400 MHZ system
5. USB: USB1.1 interface front, support at least 16GB superior disk
6. Keyboard: PCB film keyboard
7. Case: all steel structure completely shielding, really can do anti-electromagnetic radiation, anti-interference, anti-static

1.5.4 Controller version without display

1. Display: None, but supports the standard VGA interface display
2. Memory: 64M SDRAM

3. User program space: 256M
4. Main frequency: main frequency of 400 MHz system
5. USB: USB1.1 interface front, support at least 16GB superior disk
6. Keyboard: none, but support for PS2 interface standard keyboard
7. Case: all steel structure completely shielding, really can do anti-electromagnetic radiation, anti-interference, anti-static

Chapter 2 System startup

2.1 Description of the system operation panel

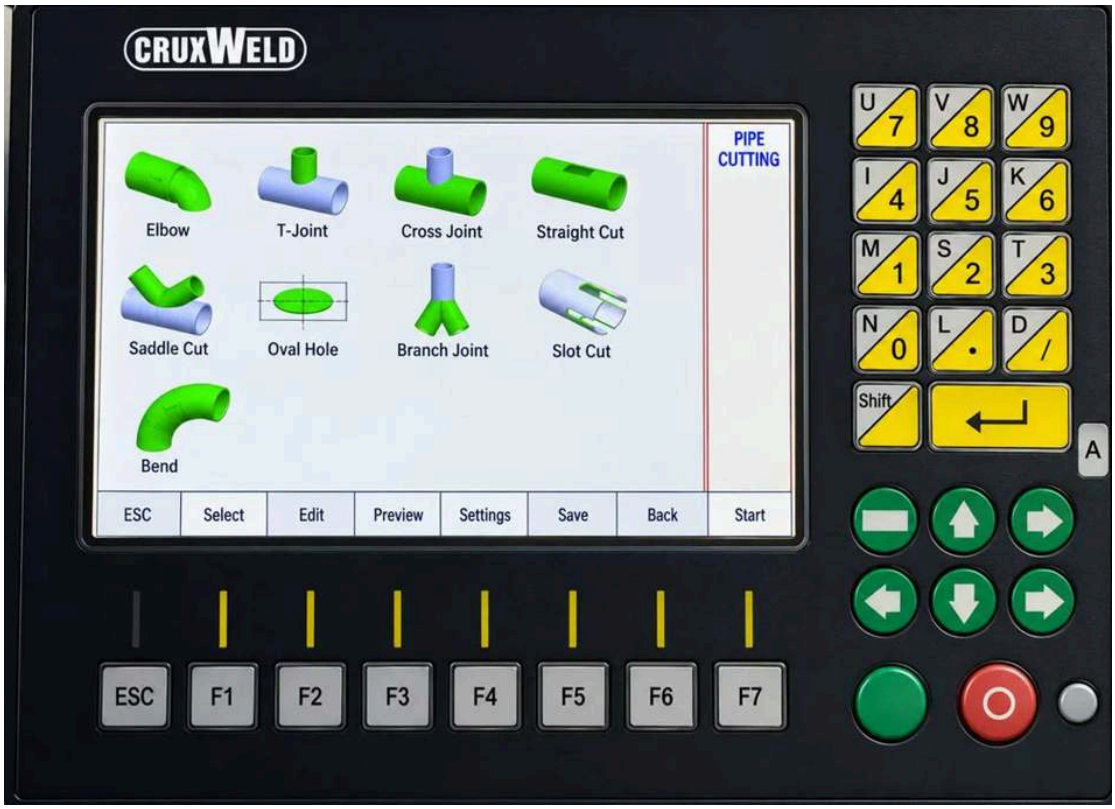


Fig 2.1 The controller operation panel

[F1]-[F8]: Function key, under different interfaces, there are corresponding function prompts

[PgUp]: In the code interface is the page up key, in the other interface is the torch up key

[PgDn]: in the code interface is the page down key, in the other interface is the torch drop key

[Home/C+]: In the code interface is the first key to the code line, and in the other interface is the manual operation key to the C-axis.

[Home/C-]: In the code interface, it is to jump to the code line tail key, and in other interfaces, it is the manual operation key of the C-axis.

[1]-[9]: During the operation of the system, pressing this key can quickly adjust the cutting machine speed to the cutting speed limit. For example, pressing [1] adjusts the speed to 10%, and pressing [2] adjusts the speed to 20%.

[G],[X],[Y],[F]: Common keys, used in the operation prompt box. The parameters can be quickly modified on the main interface.

[X+], [X-]: Manual move operation keys in the X-axis direction. “X+” is the left and “X-” is the right.

[Y+], [Y-]: Manual move operation keys in the Y-axis direction. “Y+” is going counterclockwise and “Y-” is moving clockwise (look away in the tube direction).

[C+],[C-]: Manual operation keys in the C-axis direction. “C+” is counterclockwise and “C-” is clockwise.

[B+],[B-]: Manual operation keys in the B-axis direction. “B+” is counterclockwise and “B-” is clockwise.

[]: The manual shortcut button of the flame capacitance adjustment box can open or close the elevation adjustment box.

[Ignition]: flame cutting mode manual shortcut button, can open or close the ignition output port.

[Preheat]: flame cut mode manual shortcut button, can open or close the low pressure preheating output.

[Cut]: flame cutting mode manual shortcut button, can open or close the high pressure cutting oxygen output port.

[Arc]: plasma cut mode, manual shortcut button, can open or close the arc output.

[Mark]: Manual shortcut button, you can open or close the mark output port.

[Io Off]: Manual shortcut button, you can close all the output ports.

2.2 Description of system shipment and main interface

When first on, the system will first enter the BIOS startup interface:

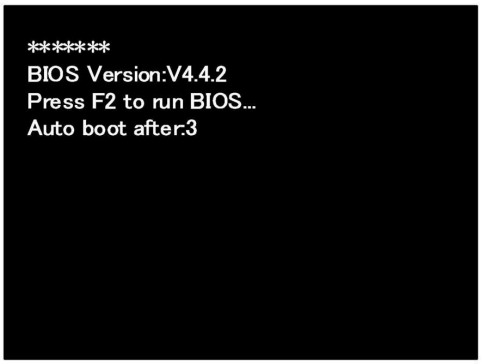


Fig 2.2 System Self-test interface

In the countdown of the startup interface, press the F2 key, then the system enters the BIOS (BIOS operation, please refer to "Chapter 10 BIOS use"), press any other keys, skip the countdown and enter the cutting software. If there is no key to press, the system will automatically enter the cutting software after the countdown reaches 0. The system then enters the welcome interface, as shown in Figure 2.3, which users can replace with their own images. Press any key now, and the system will automatically enter the main interface, as shown in Figure 2.4.

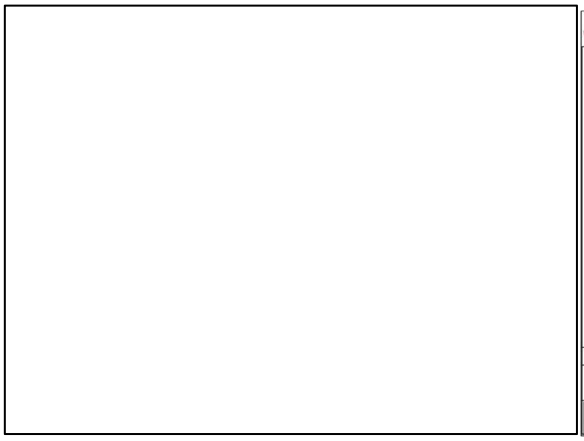


Fig 2.3 Welcome Interface

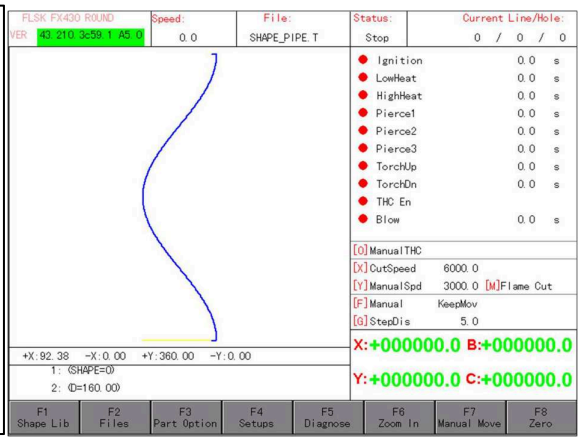


Fig 2.4 Main interface of the system

Under the main interface, press [F1] - [F8] to correspond to the following functions:

[F1] Shape Lib: In plane mode, there are 53 common parts of plane graphics library, mostly with piece size and hole size; in circular tube mode, there are 13 basic figures including right end cut, left end cut, right end, left end, mother pipe opening, square hole, waist hole, elbow, mother pipe, branch pipe-double

branch pipe, groove, fence and the circular tube shape can be arbitrarily combined. In the square tube mode, there are 6 basic figures, including right end cut, left end cut, mother tube opening, square hole, waist round hole and groove.

[F2] Files: enter the optional hard disk files, optimal disk files, find, edit, delete, file import and export and other operations.

[F3] Part option: in plane mode, the processed parts can be mirror, rotate, steel plate correction, arrangement, line selection, code editing, etc. This option is absent in the round tube and square tube mode.

[F4] Setups: All parameters can be set here.

[F5] Diagnose: input and output diagnosis, keyboard diagnosis, system self-test, date and time setting, system customization, etc.

[F6] Zoom in: full-screen enlarged graphics.

[F7] Manual move: Manual shift machine tool, this interface can be power off and breakpoint recovery operation.

[F8] Zero: If the zero function is not enabled, the button shows the coordinates to be cleared before the machine starts cutting or after the cutting is completed. When the zero function is enabled, if the current is not returned to zero, the button displays the machine zero, press the machine performs the zero function; when the zero is completed, the button displays the coordinate zero, press the three options: return to the stop position, the machine back to zero, the coordinate zero, the stop position is the axis directly back to the machine zero.

[X]: Set the cutting speed.

[Y]: Set the manual moving speed.

[F]: Set the manual moving mode, which can keep move, continuous moving and set the length.

[G]: Set the moving distance when moving the fixed length.

[M]: Change the cutting mode, there can be three modes: demonstration mode, oxygen gas cutting and plasma cutting.

[START]: Start the cutting.

[SPACE]: Enter the cutting interface.

2.3 Main interface function index

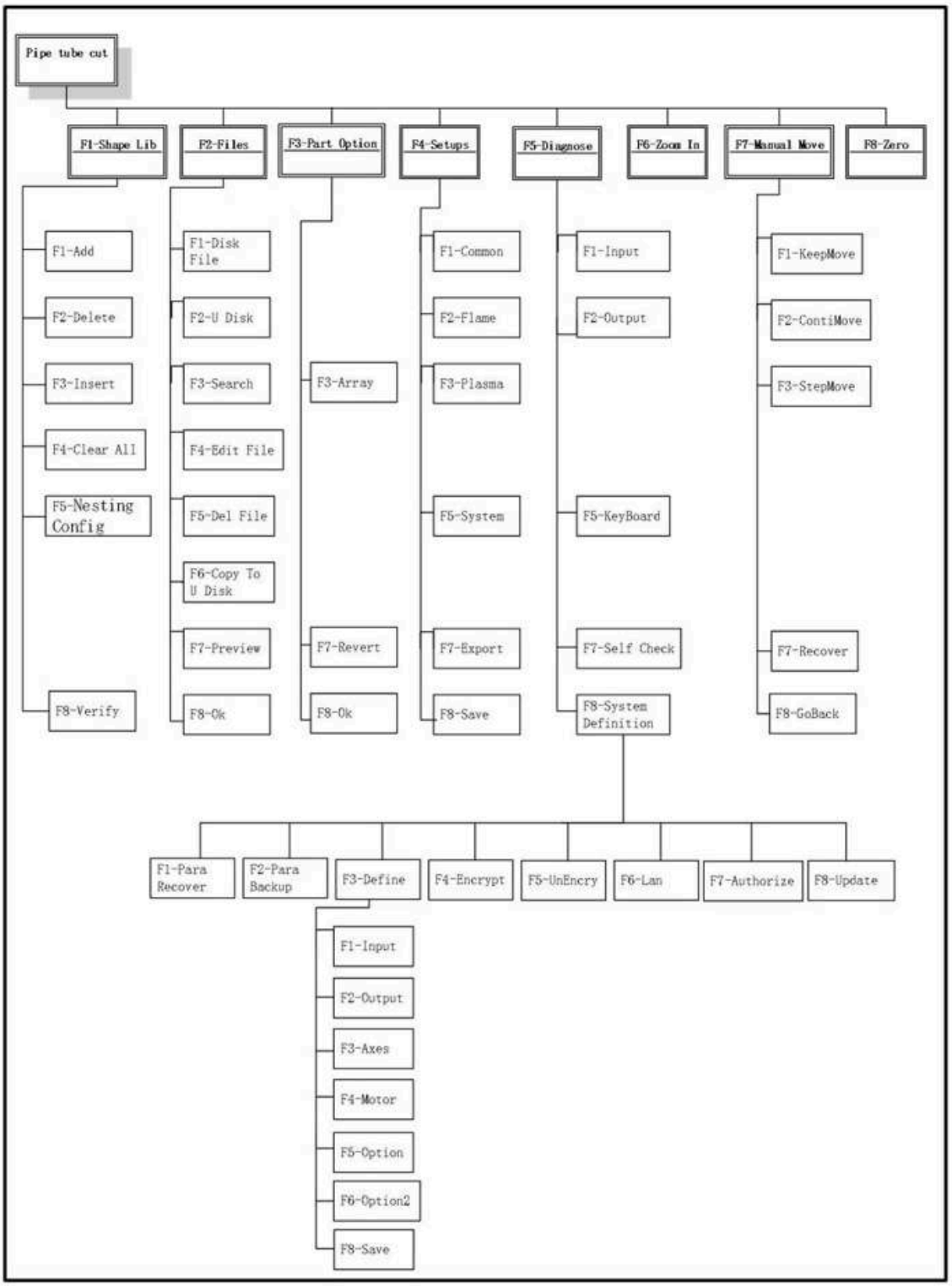


Fig 2.5 Function Index of the main interface

Chapter 3 Cutting function

Under the main interface, press the SPACE to enter the cutting interface, as shown in Figure 3.1

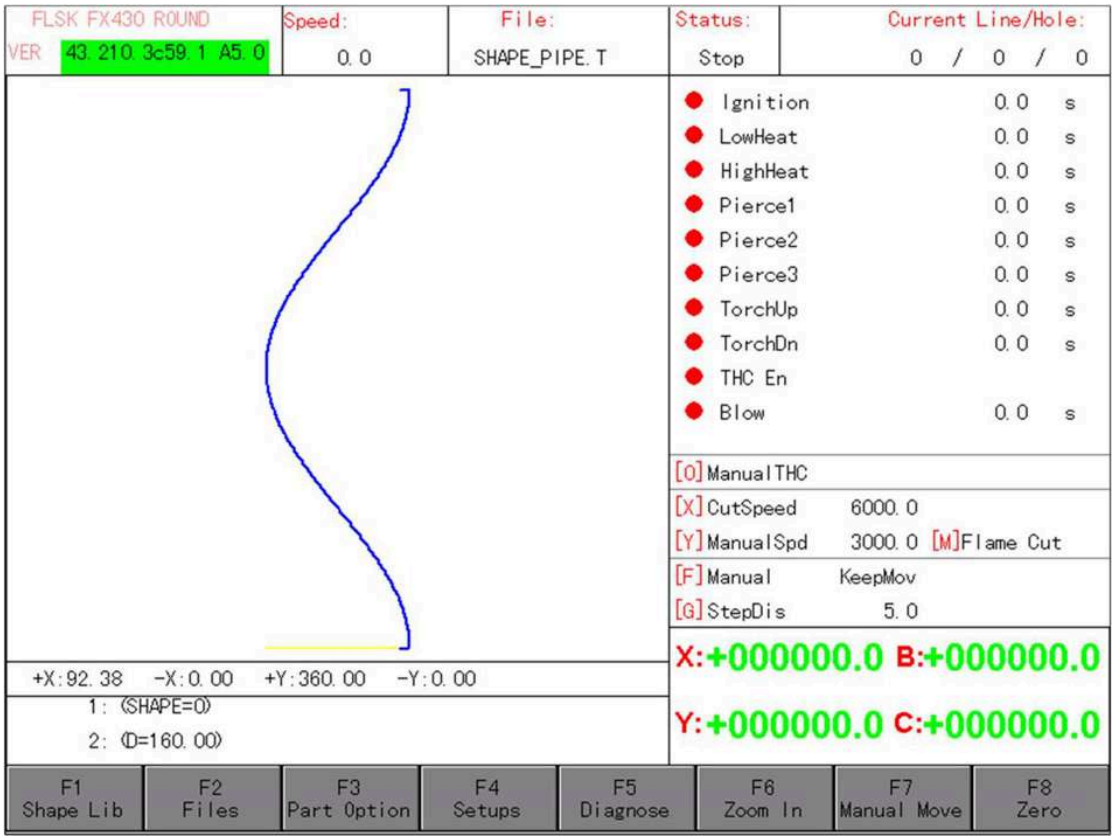


Fig 3.1 Cutting function interface

① Displays the actual trajectory of the current processing piece.

② Show the G code currently being processed, showing the current line and the next row, not displayed during operation, only after pause.

③ Displays the current processing speed, which can be adjusted quickly by pressing the number key of the keyboard [1] - [9]. For example, by pressing the number [3], the speed is automatically adjusted to 30%; by pressing the number [8], the speed is automatically adjusted to 80%. In addition, acceleration can be achieved by pressing F4 and pressing F5.

The X represents the X-axis coordinate in which the current cut mouth is located.

Y is the Y-axis coordinate in which the current cut mouth is located.

B represents the B-axis coordinate in which the current cut mouth is located.

C is the C-axis coordinate in which the current cut mouth is located.

Under the cutting interface:

- Press [X]: to modify the current cutting speed.

- Press [Y]: modify the current manual shift speed.
- Press [F]: Change the current manual mode.
- Press [G]: to modify the fixed length distance of the current fixed length movement.
- START Key (F9 key): Start the cut.
- STOP key (F10 key): stop, can pause all the ongoing action in the system.
- F1 key: the nozzle returns along the original path (the I / O port is closed), and the perforation point will pause when retreating.
- F2 key: the the moves along the cutting track (the I / O port is closed).
- F3 key: When the cutting torch has offset the starting point, press F3 to return to the reference point.
- F4 key: reduce the cut speed by 3%. Reduce the manual moving speed during manual movement.
- F5 key: Increase the cutting speed by 3%. Increase the manual moving speed during manual moving.
- F6 key: reduce the preheating time, skip the remaining preheating time, and the system automatically remembers the preheating time.
- F7 key: Increase the preheating time for 15 seconds each time
- F8 key: the perforation point is selected when the system is suspended, and dynamically amplified when the system starts to move.
- Upper, lower, left and right 4 direction keys: move the cut nozzle manually when passing the torch.

3.1 Cutting operation index

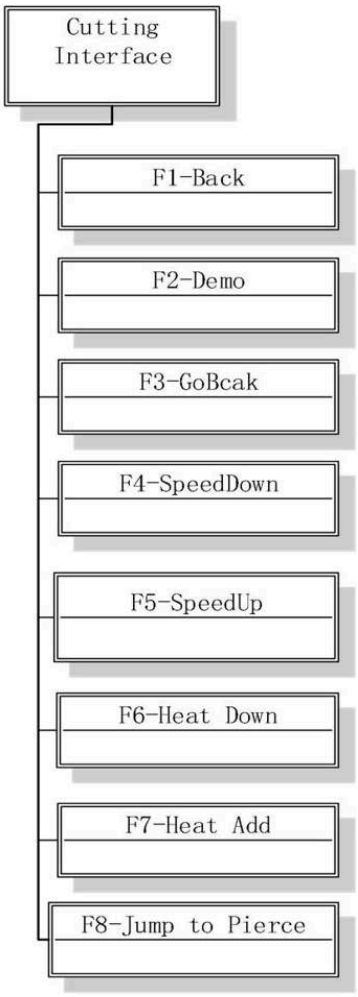


Fig 3.2 Cutting Operation Index

3.2 Speed regulation

3.2.1 Normal speed regulation

Adjust the speed during the automatic operation or when the system is suspended.

Press [F5] on the operation panel by 3% over the current speed. Without [F5], the speed will continuously increase to the maximum cutting speed.

Press [F4] on the operation panel by 3% on the current base. If the [F4] is not released, the speed will be continuously reduced to 1% of the maximum cutting speed.

3.2.2 Fast speed regulation

Speed regulation can be performed at the cutting interface during the automatic operation or when the system is suspended.

Under the cutting interface, press the number key [1] - [9] on the operation panel, then the speed will be quickly adjusted to 10 times the corresponding number. For example, press the number [3], the speed will be automatically adjusted to 30%; press the number [8], the speed will be automatically adjusted to 80%.

3.3 Forward

Press [F2] in the cutting interface, and the system starts to walk empty. This process does not have any IO switch process such as ignition or perforation, and move the cutting mouth along the outline of the cutting figure. Press the [F2] key again, and the system stops running.

This function can also be used before cutting to see if the cutting path is correct or if the code is correct, or if the penetration is required during the process. If you want to stop the empty walk, press the red "stop" button.

The forward speed is set separately from the cutting speed, and the "empty go / backward speed" in the common parameters is the forward speed.

3.4 Back

During processing, if the original track needs to return due to incomplete cutting, it can be performed as follows:

- Press the Stop first to pause the cutter.
- Press the [F1] key in the cutting interface, and the cutting machine returns along the original track. When the nozzle moves back to the position to retreat, press the "stop" key. If it retreats too much, press [F2] to advance empty, and then advance to the required position.

  Note: The empty walk and backward function can be repeated until the slit is in the ideal position.
- During the backward process, press the [F1] key again, and the system stops running.
- When the nozzle is in the ideal position, press the "start" button again. If the current cut code line is G01 or G02 or G03, the system will automatically punch

before executing these procedures, and then continue to run the current program. If the current line is not G01 or G02 or G03, the system directly performs the current line program.

The backward speed and the forward speed are the same speed, which are set separately from the cutting speed. The "empty walk / backward speed" in the common parameters is the backward speed.

3.5 Edge Cut / Offset Cut / Return

When the cutting torch is not in the actual path of the current processing piece, such as manually moving the torch to another place during the cutting, Figure 3.3 indicates:

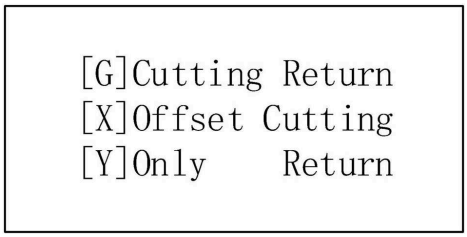


Fig 3.3 Edge perforation

There are two scenarios that cause this cue:

(1) When Yes is selected for the common parameter, the system will automatically pause if the G code of the next processing line is M07. At this point, you can manually move to any edge of the plate, press the "Start" button, the system will appear as above.

(2) When the processing is suspended, it is necessary to move the cutting torch away from the actual processing workpiece due to mechanical failure or other reasons.

- Edge cutting: If [G] is pressed, the system cuts back to the pause point and continues cutting. This function is particularly useful for thicker steel plates, which reduces the preheating time and improves the cutting efficiency; it is the common edge perforation function.
- Offset cutting: If [X] is pressed, the system considers the current point as the pause point and continues cutting. The cutting point is offset. When the cutter is suspended or power off, if the cutter has offset, or the steel plate has translated,

or the user wants to artificially cut, you can press this key. This feature is particularly useful when the torch is moved manually.

- Only return: If [Y] is pressed, the system simply quickly returns to the pause point, and then pauses down. When the cutting process, found that the nozzle fault, or other problems, need to move the nozzle out of the cutting area for maintenance, when the maintenance needs to return to the pause point can press this key. After returning to the pause point, press the "Start" key again, and the system automatically starts to continue cutting.

3.6 Return reference function

During the processing pause, if [F3] is pressed, the system will prompt:

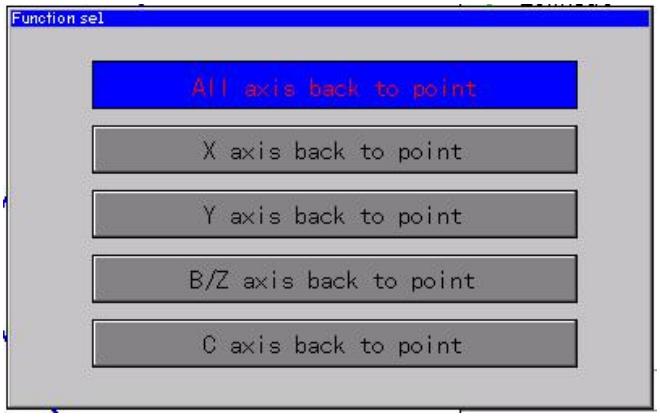


Fig 3.4 Return to the reference prompt

Press the Enter key, the system will automatically return to the starting point of the processing piece, and the return to the origin will automatically switch to the main interface of Figure 3.5

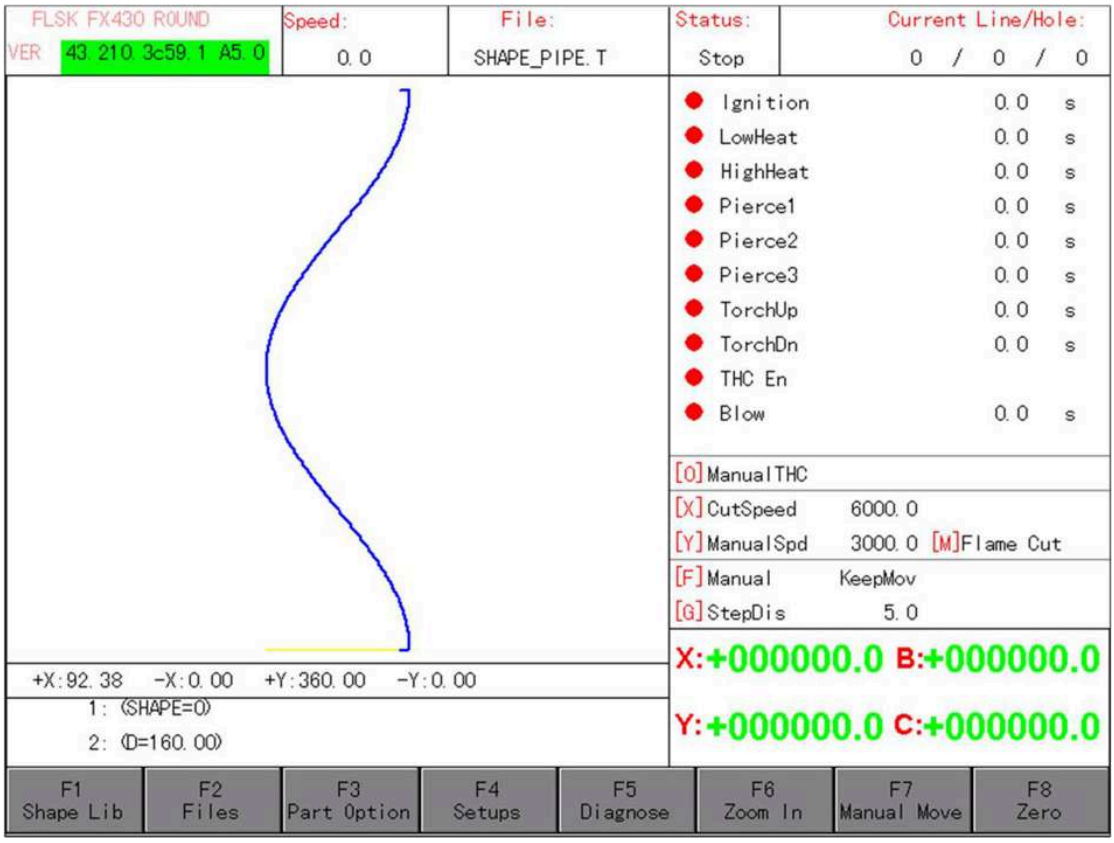


Fig 3.5 Main interface of processing

During the return process, the user can also press "stop" key to stop operation, and can continue to press [F3] to return reference operation, or start key to start cutting again. Return references and stops are not limited by the number of times.

3.7 Adjustment of oxygen and gas preheating time

- During the preheating process, press [START] / [F9] to directly skip the preheating and perforation delay process, and immediately open the perforation signal to start cutting.
- During preheating, press STOP / [F10] to keep the preheating state and wait for [START] / [F9] to press again.
- During the preheating process, press [F6] to end the preheating state and remember the preheat time before encountering M02 or M30 code.

  For example, such as the original system set preheating time for 60 seconds, in need of preheating, there will be seconds on the interface, when normal circumstances read 0, the system began to continue to cut, but if the system reading seconds still remaining 10 seconds in press [F6], the system immediately stop preheating, start cutting run, and record has preheating time for 50

seconds, the system automatically think the user needs preheating time for 50 seconds, in the next preheating, preheating time to 50 seconds.

◆ During the preheating process, press the [F7] key for 15 seconds to increase the preheating time, and the preheating time keeps the increased value until the cutting is finished.

For example: the original preheating time set by the system is 60 seconds, during the system reading period, press [F7] once, the reading second on the interface plus 15 seconds, and the next time need preheating, the initial preheating time becomes 75 seconds.

3.8 Select the perforation points

Before cutting or when cutting pause, [F8] at the function key prompt is "Select perforation point", then press [F8], the system will prompt:

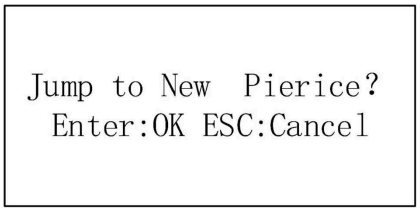


Fig 3.6 Selected perforation points

If [ESC] is pressed, the system will return to the cutting interface. If [ENTER], you is prompted again:

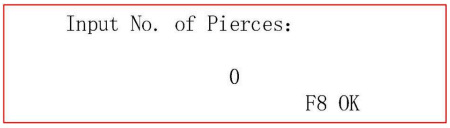


Fig 3.7 perforation prompt

The position of the perforation point can be entered manually. You can also press [ESC] to exit, without manually entering the punch point position, and then press the left and right arrow keys to select the punch point.

3.9 Dynamic magnification

After the processing begins, the [F8] of the cutting interface will become "dynamic amplification". At this time, press the [F8] key, and the processing graphics will be enlarged in full screen, and can be tracked dynamically.

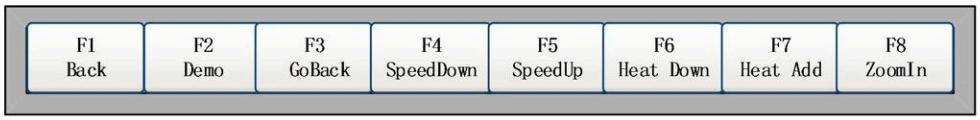


Fig 3.8 Cutting interface function keys at dynamic amplification

- Press the [F8] key continuously, and the system will enlarge the graph step by step.
- Press [ESC] to exit the enlarged display and return to the normal cutting interface.

3.10 exit the cut

When the cutting is not completed, and the cutter is suspended, if the [Esc] key is pressed at the cutting interface, the system will prompt whether to exit the cutting. If pressing [Enter], exit the cut; if pressing [Esc], do not exit the cut and can continue cutting in the original position after entering the cutting interface again.

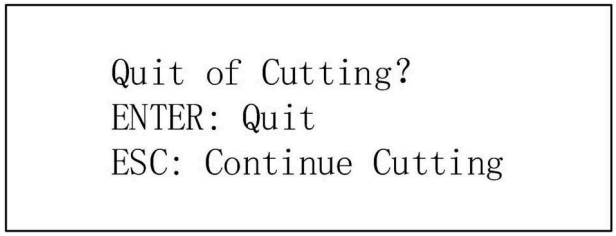


Fig 3.9 Exit the cutting tip

Chapter 4 Manual function

Under the main interface, press [F7] to enter the manual moving function, as shown in Figure 4.1 is the manual operation interface.

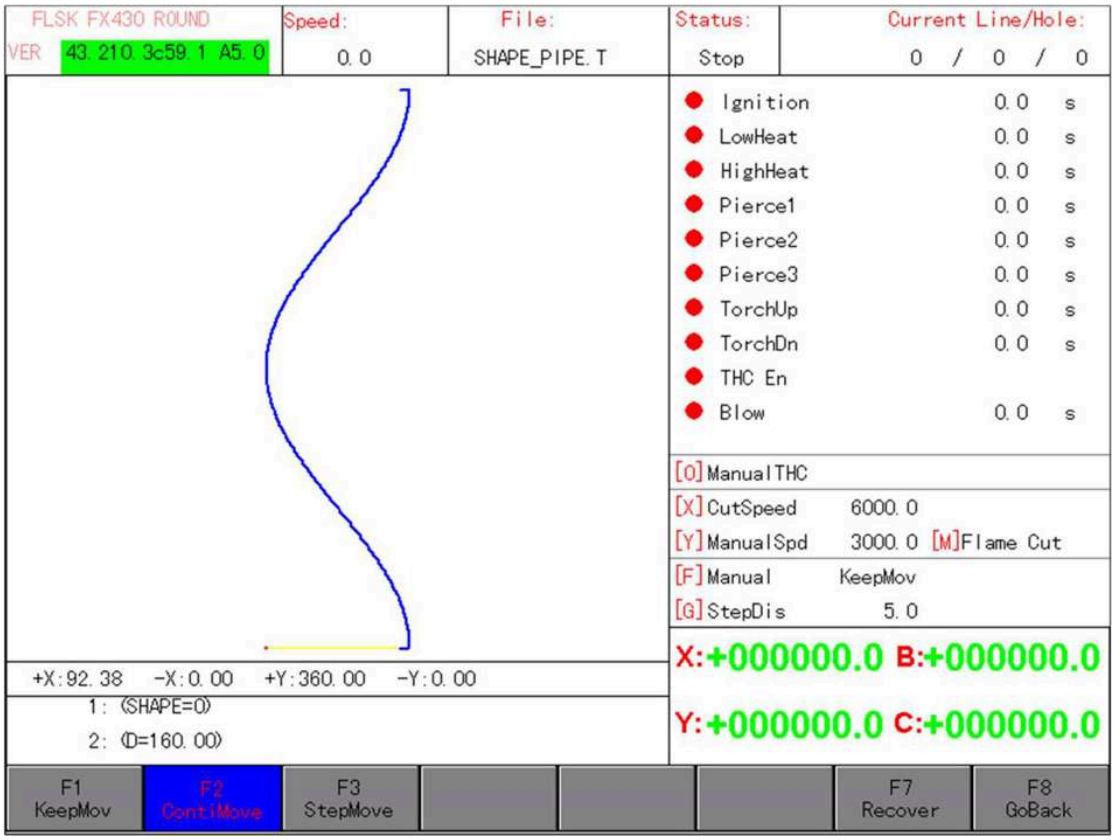


Fig 4.1 Manual Interface

The speed in the manual state is controlled by the manual moving speed parameter in the common parameters. When moving manually, you can adjust the speed of the system by pressing the addition or deceleration key, or pressing the number key under the manual interface, then the system speed is automatically adjusted to the percentage of 10 times the speed of the corresponding number. For example, by pressing the number [3], the speed is automatically adjusted to 30%; by pressing the number [8], the speed is automatically adjusted to 80%.

4.1 Point function

When entering the manual interface for the first time, the system defaults to connect, or press [F1] to select the click function. At this point, press either direction key, the system will move in that direction, release the direction key, and the system stops moving.

4.2 Connection function

Press [F2] in the manual interface to enter the connection function. At this point, press either direction key and release, the system will move in that direction, press either direction key or stop key again, the system stops moving.

4.3 Fixed length and mobile function

Press [F3] to enter the fixed length in the manual interface. System prompts for fixed distance:

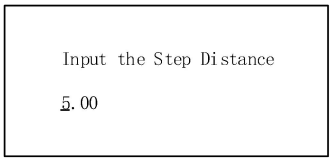


Fig 4.2 Input fixed long distance

Press [ENTER] after entering a fixed distance. At this point, press any direction key and release, the system will move to the long distance and automatically stop. If the direction key or stop key is pressed, the system will also stop moving.

4.4 Breakpoint recovery

To ensure the normal use of the breakpoint recovery function, the following conditions should be met:

1. When the system is in a pause state, the system automatically remembers the current pause point as a breakpoint.
2. The system is in the cutting operation. In the case of power failure, the system will remember the position of the power failure as a breakpoint.

When you need to continue processing from the breakpoint, after the system is powered, do not move the position of the cutting torch, press [F7] to enter the manual function in the main interface, and then press [F7] to restore the breakpoint. After recovery, if the cutting torch has not been moved and is just in the position before the power failure, press the [START] key, and the system will start processing directly from the breakpoint.

Of course, after the power failure is restored, if there is a deviation in the power cut position, you can manually move the cutting torch to the actual breakpoint, and use the offset cutting function to shift the cutting torch to the correct cutting path,

and the power cut recovery can also be realized through the number selection or line selection function.(See section 4.6, line selection). The method is: first exit the cutting, manually move the cutting nozzle to the starting point of the workpiece, select the nearest line (or number) before the power loss by selection (or number), press the "start" key, the system will prompt:

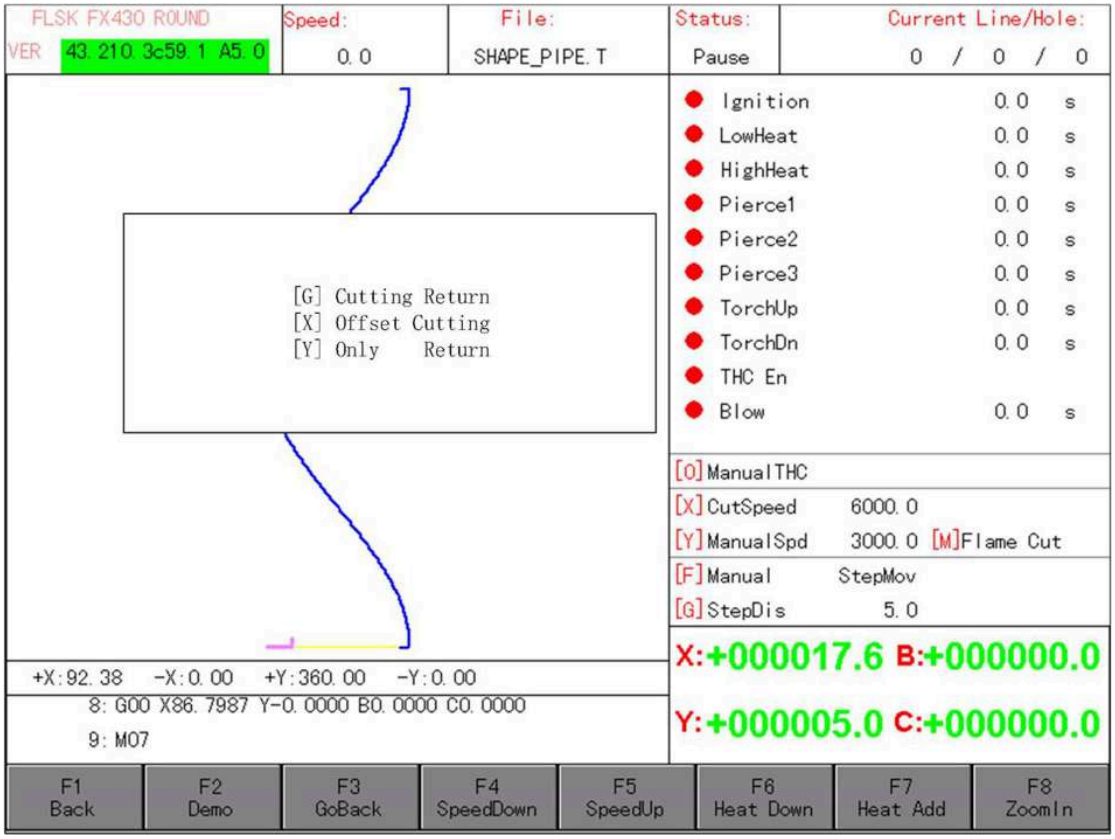


Fig 4.3 Breakpoint recovery

- [G] The system cuts from the current point to the selected line or number, and then continues to work along the normal trajectory.
- [X] The system takes the current point as the starting processing point.
- [Y] The system moves quickly from the current point to the selected line or number, and then pauses it.

Chapter 5 Document Management

The system supports cutting code with txt, cnc, nc, B3, MPG, with the maximum capacity of 4M and the maximum number of lines of 80000 lines. You can edit, compile, delete, export internal files, or import external U disk files.

Press [F2] under the main interface to enter the file management interface, as shown in Figure 5.1 is the file management interface.

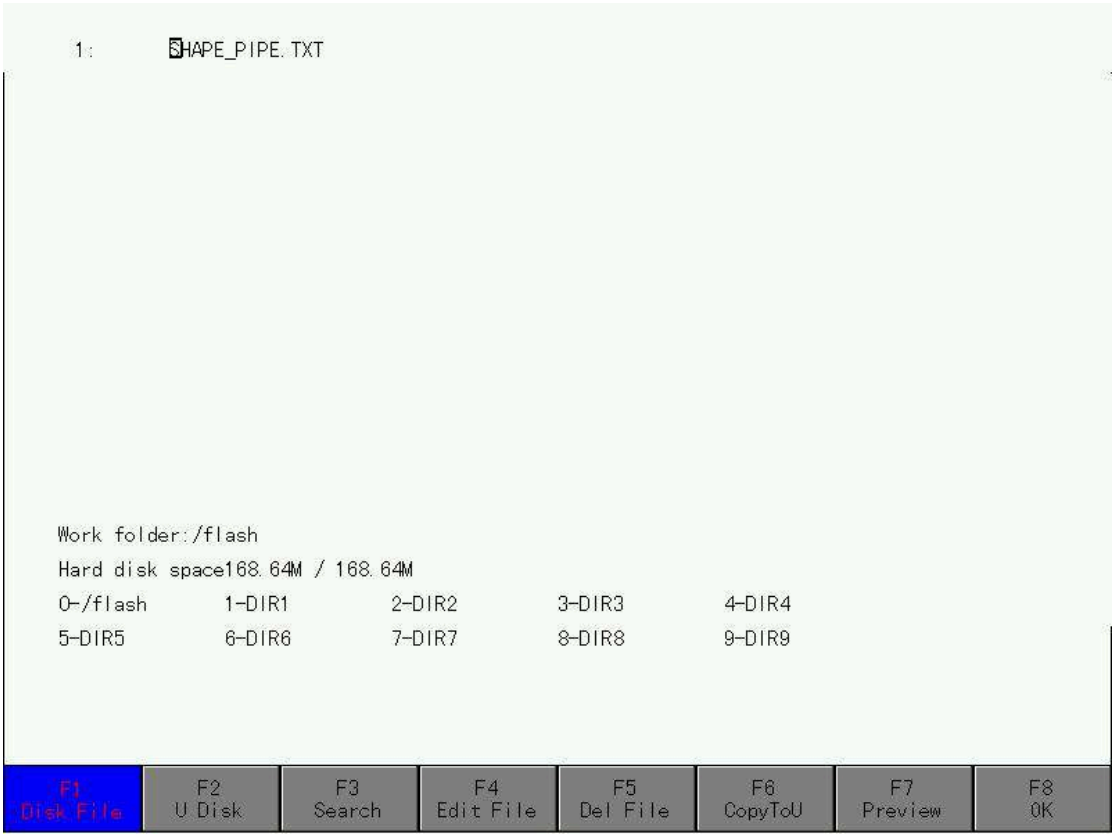


Fig 5.1 File management interface

5.1 Hard disk file

In the file management interface, press [F1] to enter the hard disk file list, as shown in FIG. 5.1, and the system only lists the supported G code files.

- Press [F4 to edit the file] and edit the file if the current cursor is a G code file. Refer to Section 5 description for editing documents 5.4
- Press [F5 to delete the file]. If the G code file is at the current cursor, you can delete the current file.

- Press [F6 to the disk], if the current cursor is G code file, copy the current file to the external U disk, provided that the U disk is inserted in the USB interface of the system.
- Press [F7 Preview Drawing]. If the G code file is located at the current cursor, you can preview the current drawing under the current interface.
- Press [F8 to confirm], if the current cursor is a G code file, transfer the current processing file to the system, after adding the file, the system will automatically return to the main interface.

5.2 Excellent disk file

Under the file management interface, press [F2] to enter the disk file interface, under this interface, [F6] automatically from "to disk" to "to hard disk". After selecting the corresponding cut code, pressing [F6] system will automatically save the file to the internal file.

When the U disk file is saved, the U disk file name is automatically remembered, as shown in Figure 5.2

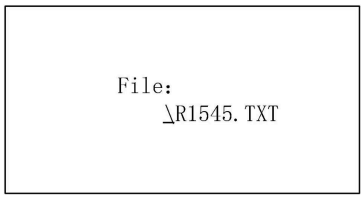


Fig 5.2 U disk file saving

When entering the file name, if you do not want to change the file name, please save it by [Enter], or change the file name by [Enter]. If you already have the same file name in the local file, the system prompts:

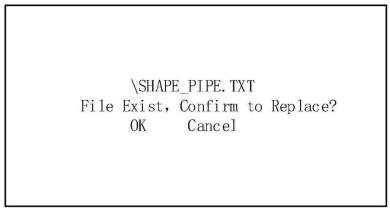


Fig 5.3 Replace files

If you want to replace the internal file, press [Enter]. If you want to change the file name again, press [Esc] and change the file name before saving.

5.3 Find the files

Press [F3] under the file management interface to find the file. Enter part of or all of the characters of the searched file name, and press ENTER to list all of the files containing the input string.

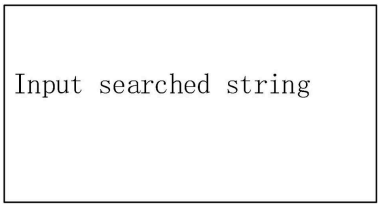


Fig 5.4 Find the file

5.4 Code editing

Under the native code interface, move the cursor to the file name to be edited and press [F4] to edit the code.

When entering characters, some keys are reuse keys, directly press the reuse key, the input character is the lower key of the reuse key, [Shift] and the reuse key at the same time, the input is the upper key of the reuse key.

When editing the code, press [F2] to insert a row behind the current edit line, and press [F3] to delete the current edit line. Press [F + C +], the cursor automatically moves to the first character of the current edit line, and press [FC-] that automatically moves the cursor to the back of the last character in the current line.

Each edit line supports a maximum of 128 characters.

Before starting cutting, must save first, otherwise the system cannot perform breakpoint recovery or power recovery.

After editing the code, press [F8] to save it.

5.5 Create a new file

In the code editing interface (see section 5.4). Press [F4] to create a new file, you can manually build files.

5.6 Compile the code

When creating a new code or editing code, if you want to know if the currently input code is valid, you can press [F1] to compile the code and check if the code is correct.

5.7 Folder management

5.7.1 Work folder selection

This system supports 10 folders, as shown in Figure 5.1.

Current folder: Indicates the folder name.

0- / flash 1-DIR1 2-DIR2 3-DIR3 4-DIR4 5-DIR5 6-DIR6 7-DIR7 8-DIR8 9-DIR 9

These ten prompts are folder prompts, the front number represents the shortcut key, press the corresponding number, then the current working folder is switched to the corresponding folder. For example, press down on the 1, as shown in Figure Figure 5.5

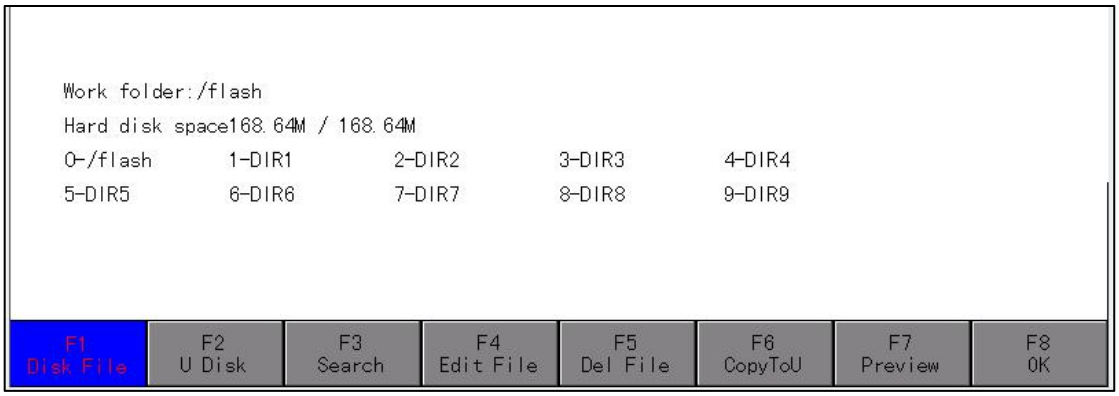


Fig 5.5 Folder

The current folder switches to / flash / DIR 1, and all of the supported G code files in the current directory are displayed.

5.7.2 and create a new folder

Creating a new folder is more complicated, so you need to go to the edit file interface before creating a new folder.

Under the native file, move the cursor to the G code file, as shown in Figure 5.6.

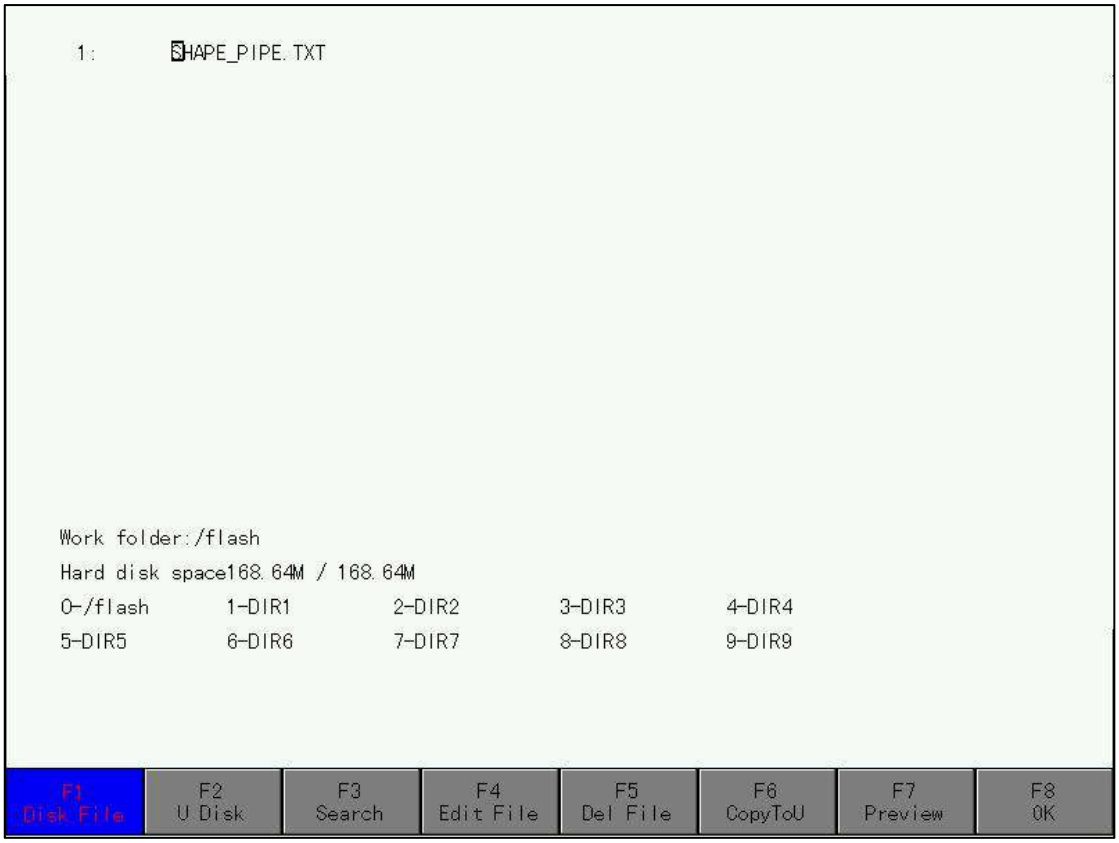


Fig 5.6 cursor to the G code file name

Then press F4 to edit the file, and the function key under the edit file is shown in Figure 5.7

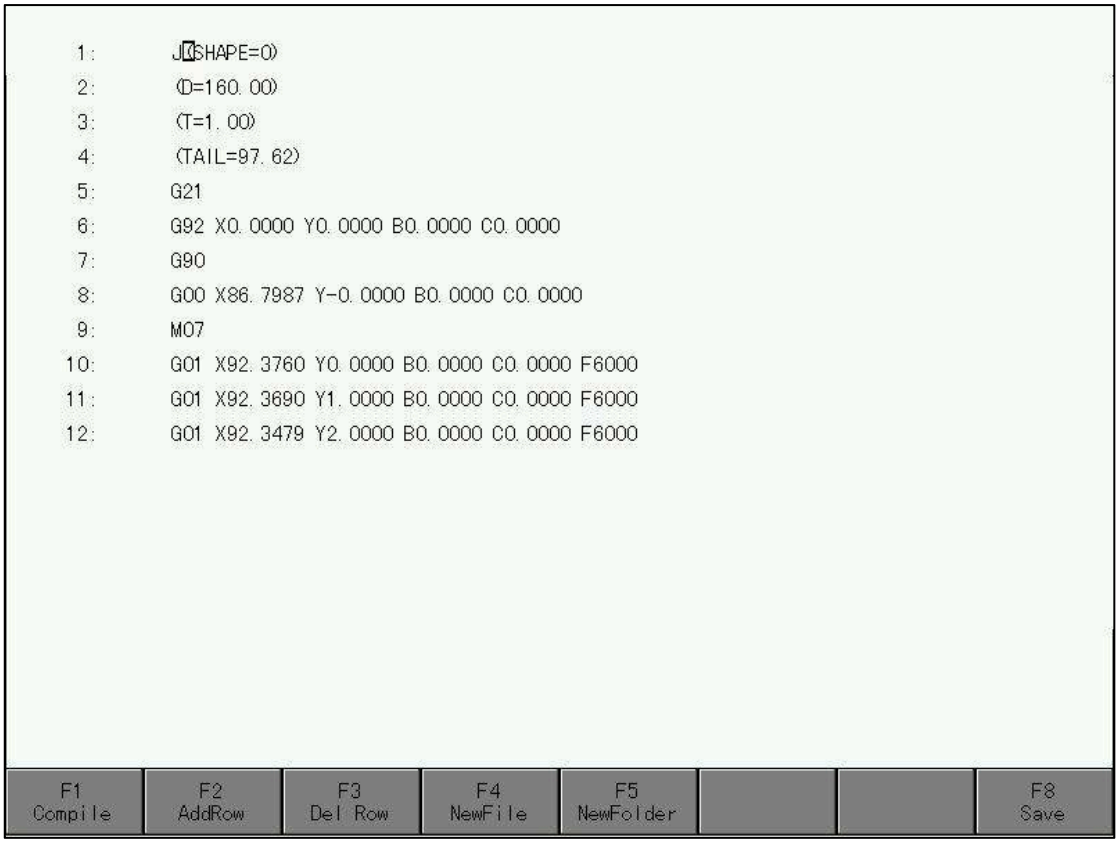


Fig 5.7 Function keys of the edit file interface

Press F5, enter the folder name in the prompt box, and then press Enter.

Note: This machine supports 10 folders, more than 10 folders, the new folder will replace the second folder, the third folder, the fourth folder, etc. The first folder / flash is a reserved folder that cannot be replaced or modified.

5.8 Empty the files

Please refer to Section 7.6.10.

Chapter 6 Parameter settings

Under the main interface, press [F4] to enter the parameter interface, as shown in Figure 6.1 is the parameter function interface.

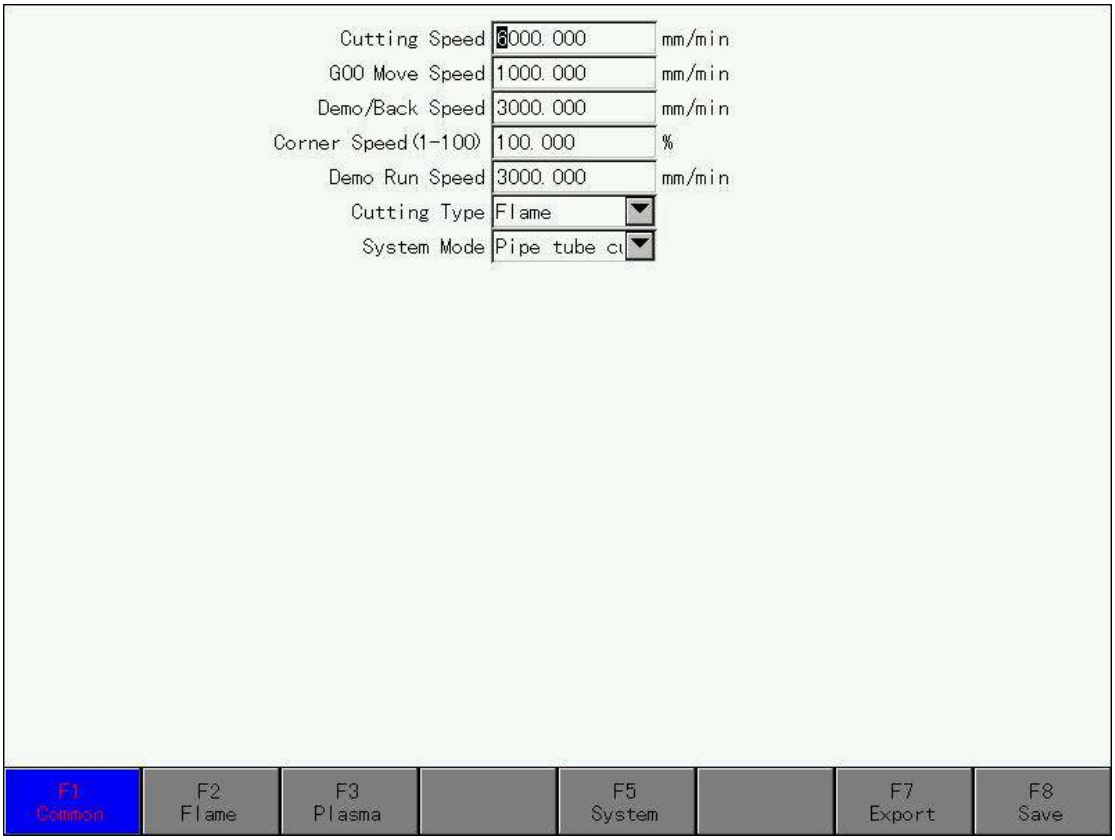


Fig 6.1 Parameter interface

In the parameter interface, the following parameters can be set:

1) Common parameters: maximum cutting speed, empty range speed and empty / backward speed setting, corner speed ratio, system mode selection.
2) Oxygen gas parameters: all parameters used in oxygen gas cutting.
3) Plasma parameters: all parameters used in the plasma cutting.
4) Powder spray parameters: fixed circulation parameters of ignition perforation, spray offset and other parameters.
5) System parameters: the number of system pulses, the maximum speed limit, motor parameters, soft limit and other parameters are set.

6.1 Common parameters

Figure Figure 6.1 is a common parameter of the system.

- Maximum cutting speed: the maximum speed during cutting.

- Empty movement speed: the speed of moving the cutting torch when performing G00 or quick return.
- Air-walk / backward speed: the speed when forward or backward along the path when pause in cutting.
- Corner speed ratio: Corner speed ratio affects the acceleration and deceleration when the torch moves. As shown in Figure 6.2, the tangent direction of the last point of the A cutting line and the tangent direction of the first point of the B cutting line α, and the corner speed ratio determines the transition speed of the cutting torch at the intersection of the two cutting lines, if the normal cutting speed is V, the Angle is α (Angle), the corner speed ratio is h, the cutting torch at the intersection of the two lines of excessive speed V_xFor:

$$V_x = \left(1 - \frac{\alpha}{50\pi} * h\right) * V$$

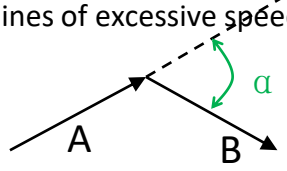


Fig 6.2 Corner

Note: This parameter is the relative value. The values range is 1-100.

- Presentation speed: Speed in demo mode.
- Cutting type: aerobic gas, plasma, demonstration mode is available. Press Enter to open the drop-down box to switch between three modes.
- System mode: there are round tube cutting and square tube cutting and plane cutting. Note: After the system mode switch, the system must be restarted!

6.2 Oxygen and fuel gas parameters

As shown in Figure 6.3, it is all the parameters of oxygen gas, which controls the time delay parameters related to IO operation in the oxygen gas cutting state, and whether the automatic raising box is enabled.

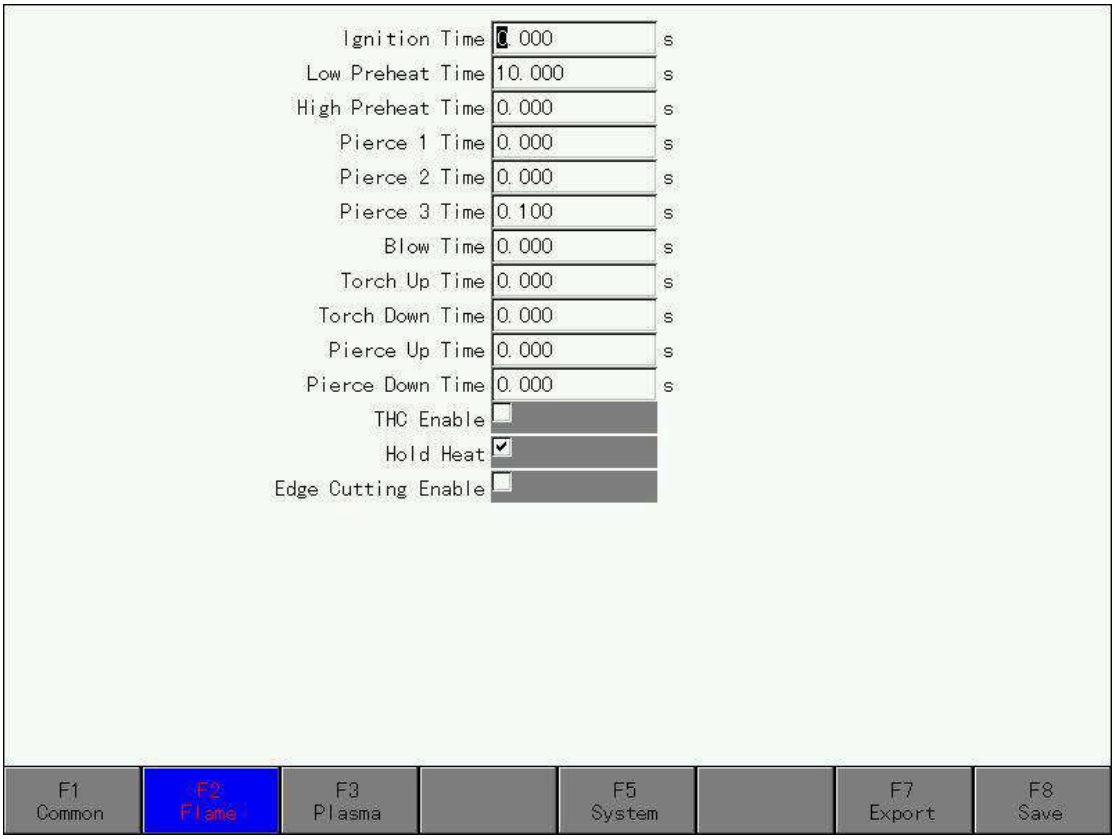


Fig 6.3 Oxygen-fuel gas parameters

- Ignition time: the delay time of opening the high-voltage ignition switch during ignition.
- Low pressure preheating time: low pressure preheating time before perforation. Enter any value of 0, in seconds. In the perforation preheating process, when the system is in the low pressure preheating stage, if feel the preheating time is not enough, you can press the "stop" key or [F7], stop the system indefinite delay, the preheating delay will automatically increase, after the preheating, can press the "start" key, end the preheating delay, start high pressure preheating delay, press the [F7] key, the preheating time will automatically for 15 seconds, and this time will be saved by the system.
- High pressure preheating time: the same as low pressure preheating delay. Only the open IO is different, the high pressure preheating delay before the low pressure preheating delay.
- Primary perforation time: the time of low-pressure cutting oxygen perforation. Enter any value of 0, in seconds. The IO is opened when it is above 0 and the IO is not opened when it is 0.

- Secondary perforation time: the time of medium pressure cutting oxygen perforation. Enter any value of 0, in seconds. The IO is opened when it is above 0 and the IO is not opened when it is 0.
- Triple perforation time: the time of high-pressure cut oxygen perforation. Enter any value of 0, in seconds. The IO is opened when it is above 0 and the IO is not opened when it is 0.
- Exhaust time: the delay of opening the exhaust port when the gas is turned off. Enter any value of 0, in seconds.
- Rising time: the time of the cutting torch to rise when the cutting oxygen is closed. Enter any value of 0, in seconds.
- Time: the time of the torch before preheating. Enter any value of 0, in seconds.
- Perforation rise time: the time before the torch rises and the time before the torch rise is the time when the M08 code or M02 code 20; the perforation rise time is the time at the M07 code.
- Time for the perforation: the difference between the drop time of the torch and the drop time for the opening of the cutting oxygen and the drop time for the completion of the opening of the perforation during the fixed cycle.
- Use the box: select whether to use the box according to the user device configuration.
- Preheated oxygen holding: If this parameter is set to Yes, the low pressure preheating oxygen IO port is always open before the cutting (i. e., before the M02 code). If "No" is selected, the low pressure preheating will be closed when M08 or M02 during processing.
- Edge perforation: press [] or [] to use edge perforation with or without edge perforation, and the cutter will automatically pause with M07 code. When the cutter is suspended, the user can manually move the cutting mouth to the edge of the steel plate, and then press the "Start" key, then the system prompts:

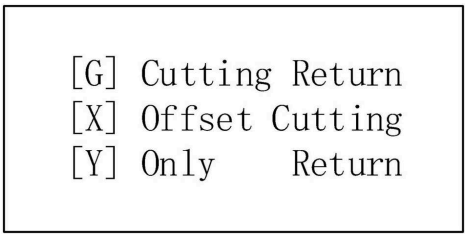


Fig 6.4 Edge perforation

When [G] is selected, the system fires the perforation, cuts to the pause point and continues to cut. This is the function of the edge perforation.

This function is particularly useful when cutting thick steel plates, which are difficult to perforate and have large holes that, if directly punched through the cutting path, may affect the quality of the finished product. The application of edge perforation can speed up the efficiency of perforation, save the cutting time, and improve the product quality.

Of course, without the use of edge perforation, the use of introduced line perforation is also a more effective method.

6.3 of the plasma parameters

As shown in Figure 6.5, there are plasma parameters, which need to be set when the machine tool uses plasma cutting.

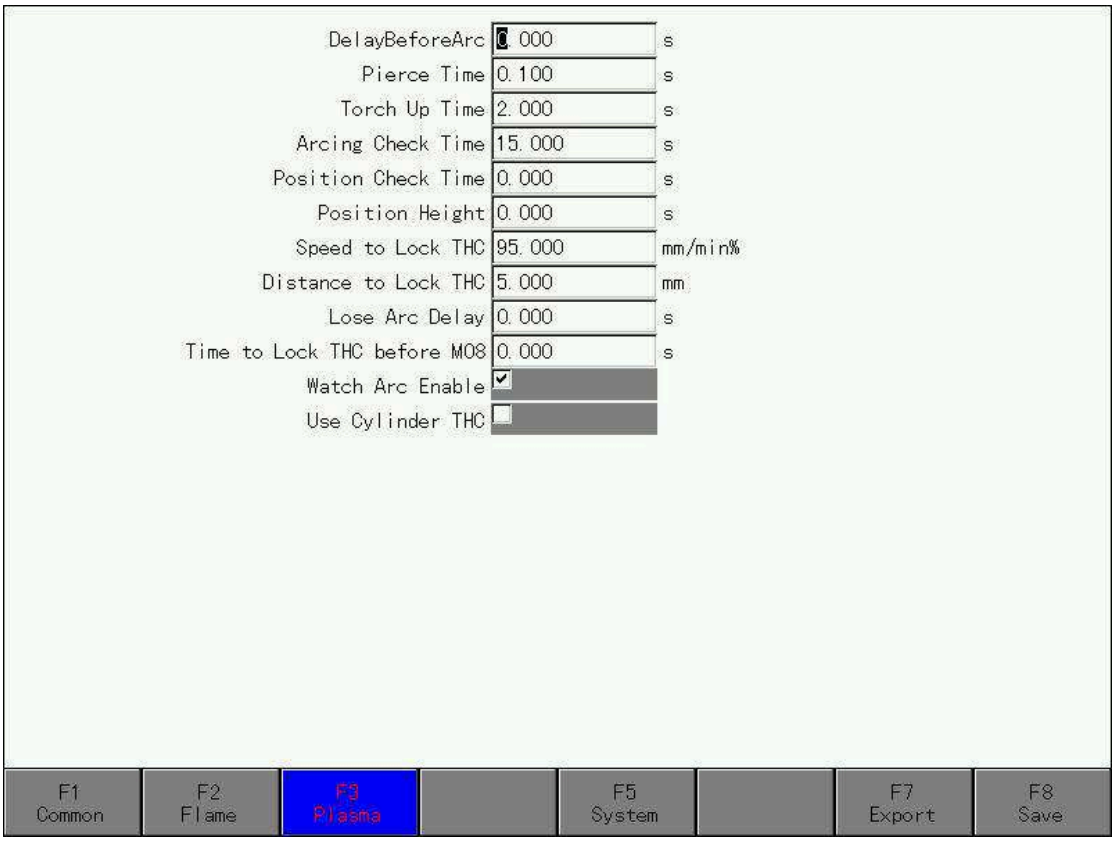


Fig 6.5 Plasma parameters

- Arc delay: the waiting time of the system before the arc. At this point, all output ports close. Enter any value of 0, in seconds.
- Perforation time: that is, enter any value of 0 in seconds.
- The torch rise time: the time of the torch rise after the arc break. Enter any value of 0, in seconds.
- Arc detection time: enter any value of 0 in seconds.

If the successful arc feedback signal is not detected within the detection time, the system prompts the error information, and stops the cutting of the current workpiece, and exits the program according to the breakpoint memory.

If the successful arc input signal is detected during the arc detection time, the system stops the detection and starts the cutting.

- Location detection time: enter any value of 0 in seconds.

  For the time used for positioning detection, if no successful positioning signal input is detected after this time, the positioning is considered unsuccessful and the system alarm occurs. If the successful positioning signal input is detected within the detection time, the positioning detection ends and the positioning rise begins.

- Position rise time: enter any value of 0 in seconds.

  If the successful positioning signal input is detected during the positioning detection, the time.

- Low speed off arc pressure adjustment (corner signal): This parameter is percentage. Open the "close arc pressure automatic increase" port at X% of the cutting speed, keep the cutting torch at a fixed height, prevent the change of the cutting mouth height caused by the arc pressure change at low speed, and burn the cutting mouth in serious cases.unit:%.

- Closing the minimum distance: function with low speed closing arc pressure adjustment (corner signal). However, this signal is not raised according to the speed closing arc pressure, but according to the length of the line segment at the start and end of the current processing curve. Open the "close arc pressure automatic adjustment" port within the minimum distance at the beginning of the curve and the minimum distance before the curve to keep the cut torch at a fixed height.

- Arc break detection delay: when the arc break occurs, the system delay "arc break detection delay" time, if the arc break still occurs, it is considered that the arc break occurs, stop the machine operation and alarm. This function processes the workpiece with the lead line, after the delay, the lead line has passed, and the plasma has not broken the arc, you can directly start processing the next workpiece. This function effectively prevents the false arc breaking phenomenon when cutting the lead line.

- Early close the arc pressure time: under normal circumstances, close the plasma arc pressure at M08. If this value is greater than 0, the plasma arc pressure is

closed early before M08.unit:s. Use this function when the small arc is cut or drawn.

- Arc pressure detection in cutting: If this item is selected, detect the continuity of arc pressure in cutting, and the broken arc breaking alarm will be issued when the arc pressure is missing.
- Use the cylinder elevation: when this parameter is selected, the cutting torch maintains the output.

6.4 System parameters

As shown in Figure 6.6, they are the system parameters, which are related to the accuracy of the driving shaft of the cutting tool, and parameters related to the coordinate axis, parameters related to acceleration and deceleration, limit parameters of small arc processing, etc.

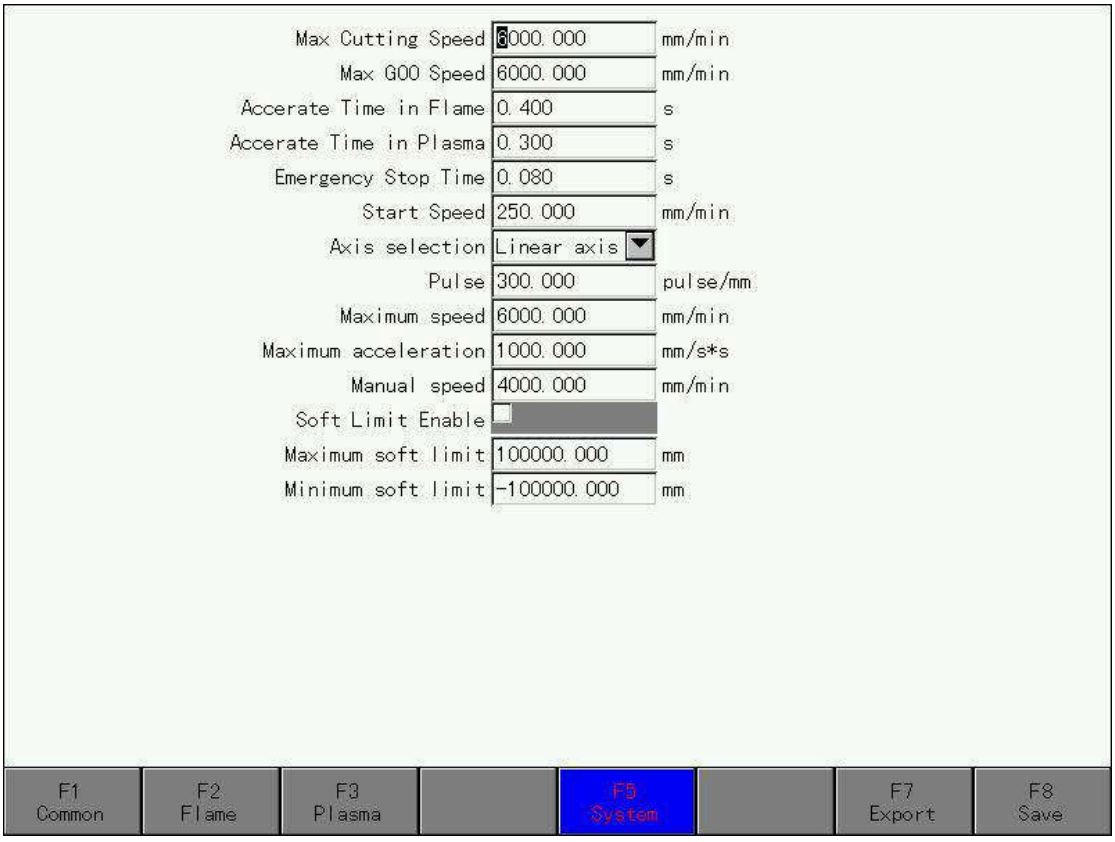


Fig 6.6 System parameters

- Maximum cutting speed limit: limit the maximum speed of cutting operation, in mm / m.
- Maximum speed limit: maximum allowable movement speed during empty

range.

- **Small arc speed limit**[Note 1]: Maximum speed when cutting small arcs. Depending on the cutting speed, the speed-limiting small circular arc is also different. Reference Note 1.
- **Small-circular arc speed-limiting radius**[Note 1]At:> 0, an arc with a radius less than or equal to the value will run at the speed limit. Reference Note 1.
- Emergency stop time: the deceleration time that from the current speed down to 0 when the machine tool encounters the emergency stop input.
- Start speed: the machine tool starts directly from the stationary machine speed, the general machine tool does not need to start from 0 speed, the motor will allow a start speed.
- Axis selection: According to the selection here, the corresponding parameters can be modified.
- Number of pulses: the number of pulses of the current axis. Unit pulse / mm or pulse / deg
- Maximum speed: the maximum operating speed of the current shaft.
- Manual speed: the speed when the current shaft is running manually.
- Soft limit enables: whether the soft limit is used for the current shaft.
- Maximum soft limit: the maximum coordinate of the soft limit.
- Minimum soft limit: the minimum coordinate of the soft limit.

Note 1:

Table 6.1 Definition of small arc

Cutting speed (mm / min)	Small circular arc radius (mm)
0-2000	5
2000-4000	10
4000-6000	15
6000-8000	20
8000-10000	25
10000-12000	30
>12000	35

The relationship between the cutting speed and the radius of the circular arc.

Small circular arc	Small-circular arc	cutting speed

speed limit	speed-limiting radius	
=0	=0	No speed limit
>0	=0	According to Table 7.1, the arc below the radius of the small circle is limited.
>0	>0	Cutting speed = speed limit of small arc (arc radius / speed limit radius of small arc). If the result is less than the start speed, take the start speed. When the starting speed is less than the cutting speed, the value is the cutting speed.

Note: After modifying the small arc speed limit or its radius, you need to re-adjust the cutting file to work.

6.5 Import export

Press [F7] to select the batch import or export parameters. As shown in Figure 6.7, select the import parameters or the export parameters as well.

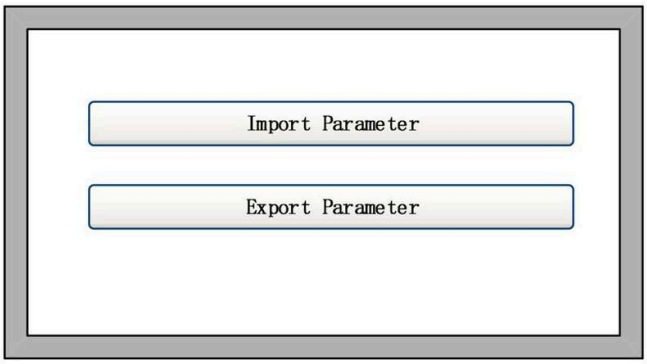


Fig 6.7 Import and Export

6.5.1 Parameter import

Press [F1], then select the imported parameters, the imported parameters must meet two conditions:

1. Parameters derived from the cutter control system of this model (see 6.5.2 parameter export), and the format should be fully compatible. The file format for the import parameter is that of F2300.DAT.

2. This file should be placed under the root directory of the U disk, and the U disk is inserted in the USB interface of the system.

If both conditions 1 and 2 are satisfied, the parameter file F2300.DAT can be imported into the system by confirmation by [Enter] at the interface of FIG. 6.8.

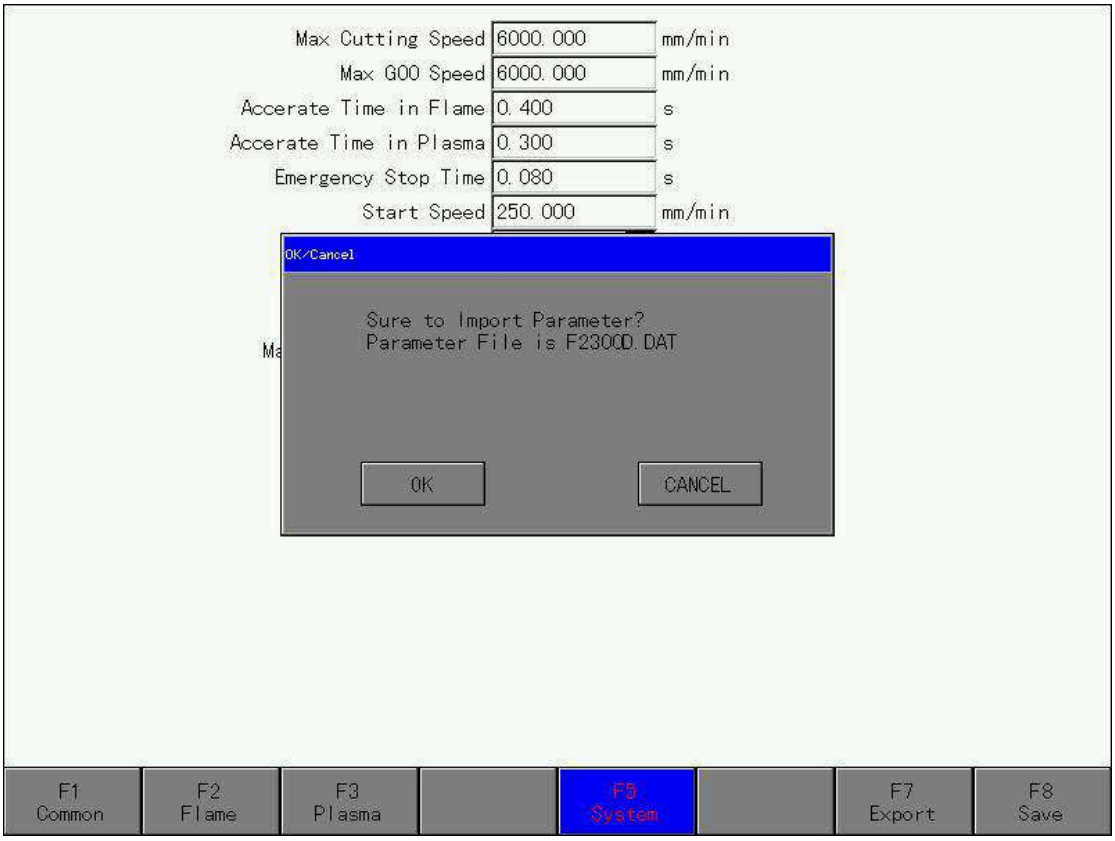


Fig 6.8 the parameter import

6.5.2 Parameter export

When the parameter setting is completed, you can press [F7] under the parameter setting interface, and then press [F2] to conduct the parameter export. Before exporting the parameters, the optimal disk needs to be inserted in the USB interface of the system.

Under the interface prompted in Figure 6.9, after confirming by [Enter], the parameters can be automatically saved in the external disk. Under the root directory of the disk, the file name is F2300.DAT.

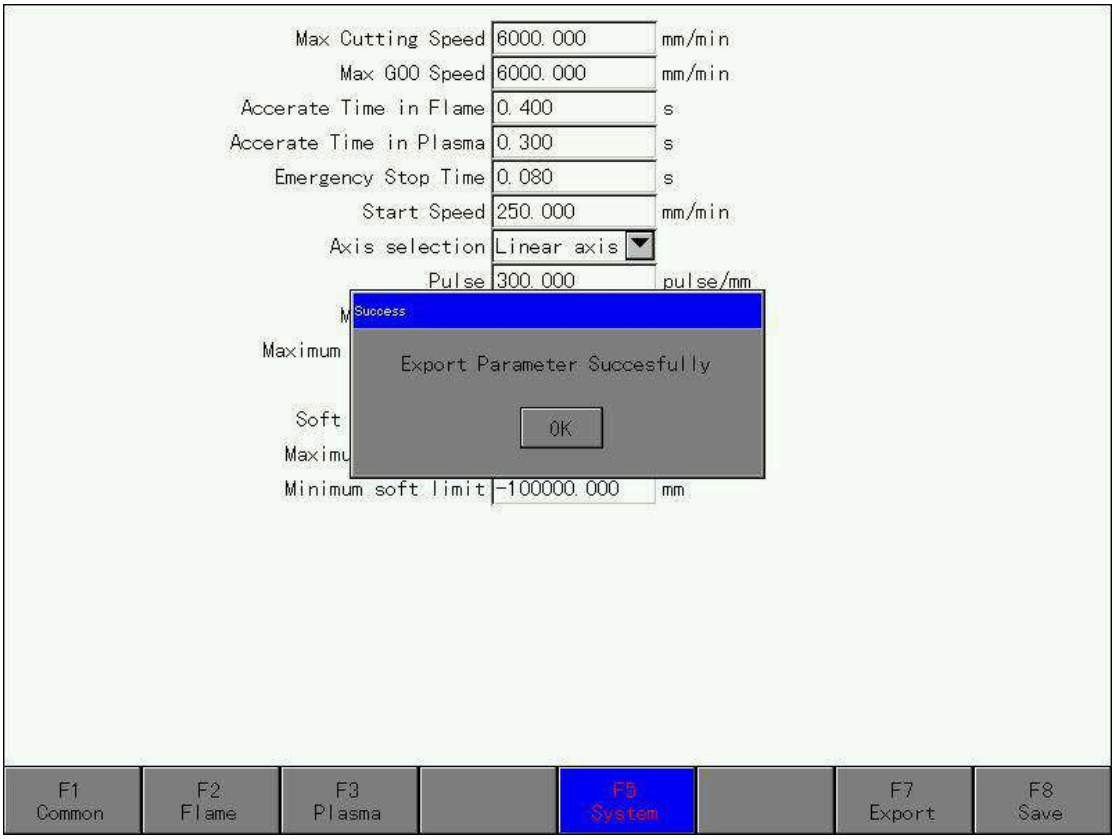


Fig 6.9 Parameter export

6.6 Save the parameters

After modifying the parameters, save them in [F8].

Note: After any parameter is modified, and if it is necessary for the modified parameter to take effect, it must be saved, otherwise, the system still uses the unmodified parameters.

Chapter 7 Diagnostic function

Press [F5] under the main interface to enter the system diagnosis interface, as shown in Figure 7.1

Under the diagnostic interface, the output and input of the system can be diagnosed, as well as the key button, and the system self-test can also be performed.



Fig 7.1 System diagnostic interface

7.1 Diagnosis interface index

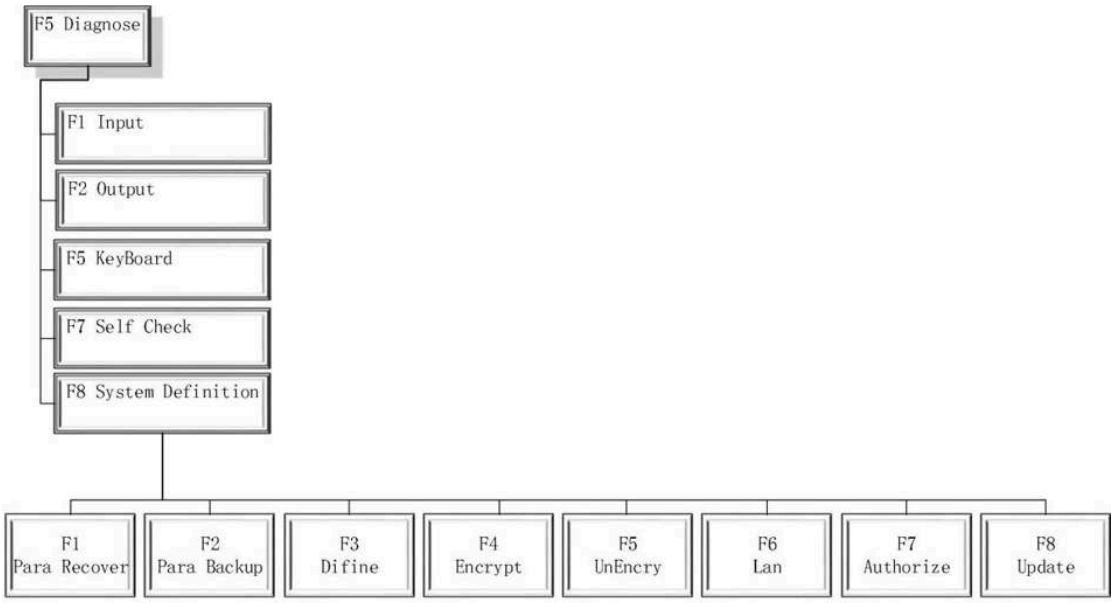


Fig 7.2 Diagnostic interface index

7.2 Enter the diagnosis

In this interface, the system will read the information of the current input IO, and display the information of the current input IO. Green "●" means the input is valid, and red "●" means the input is invalid.

7.3 Output diagnosis

Under the diagnostic interface, press [F2] to enter the output interface, as shown in Figure 7.3

Press [↑], [↓], [←], [→], you can move the cursor to the corresponding output port, open the corresponding output port at [F3] when pressing, and close the corresponding output port when pressing [F4]. Green "●" means the output is valid, and red "●" means the output is invalid.

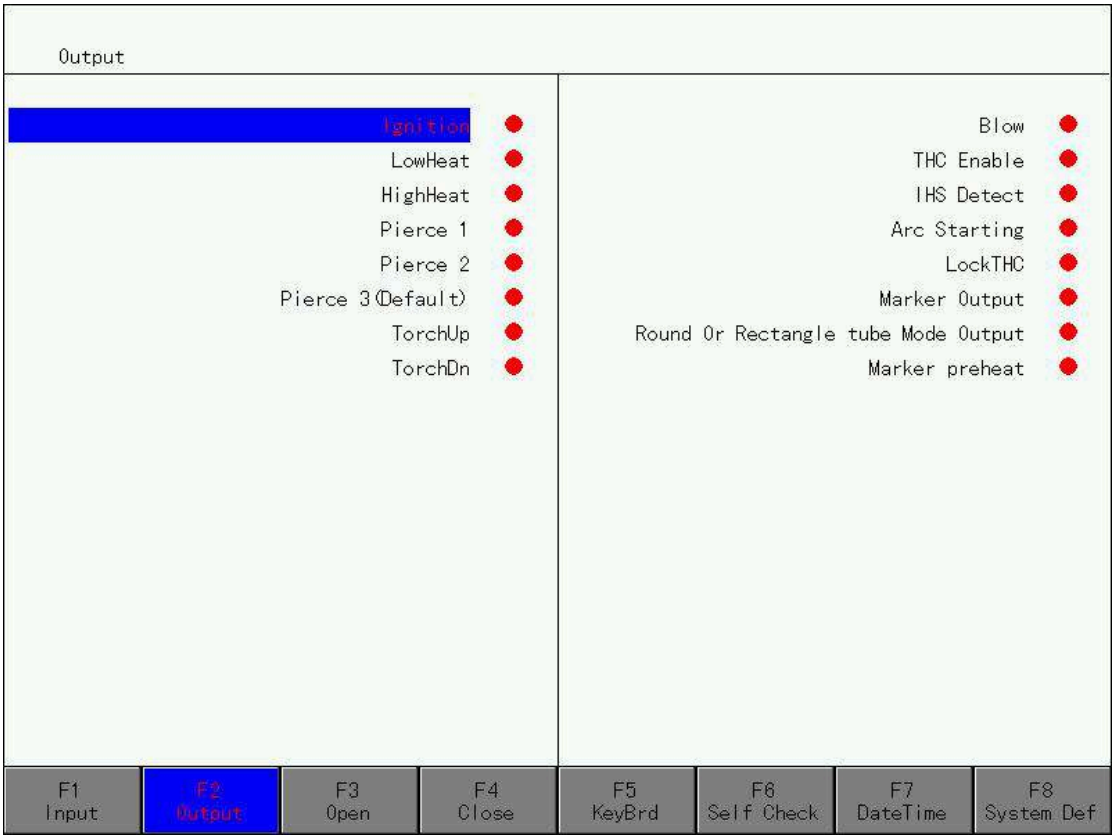


Fig 7.3 Output the diagnostic interface

7.4 Keyboard diagnosis

Press [F5] to enter the keyboard diagnostic interface.

In this interface, press any key of the keyboard, there will be a corresponding keyboard code displayed here, if there is a key not coded here, it means that the key is faulty.

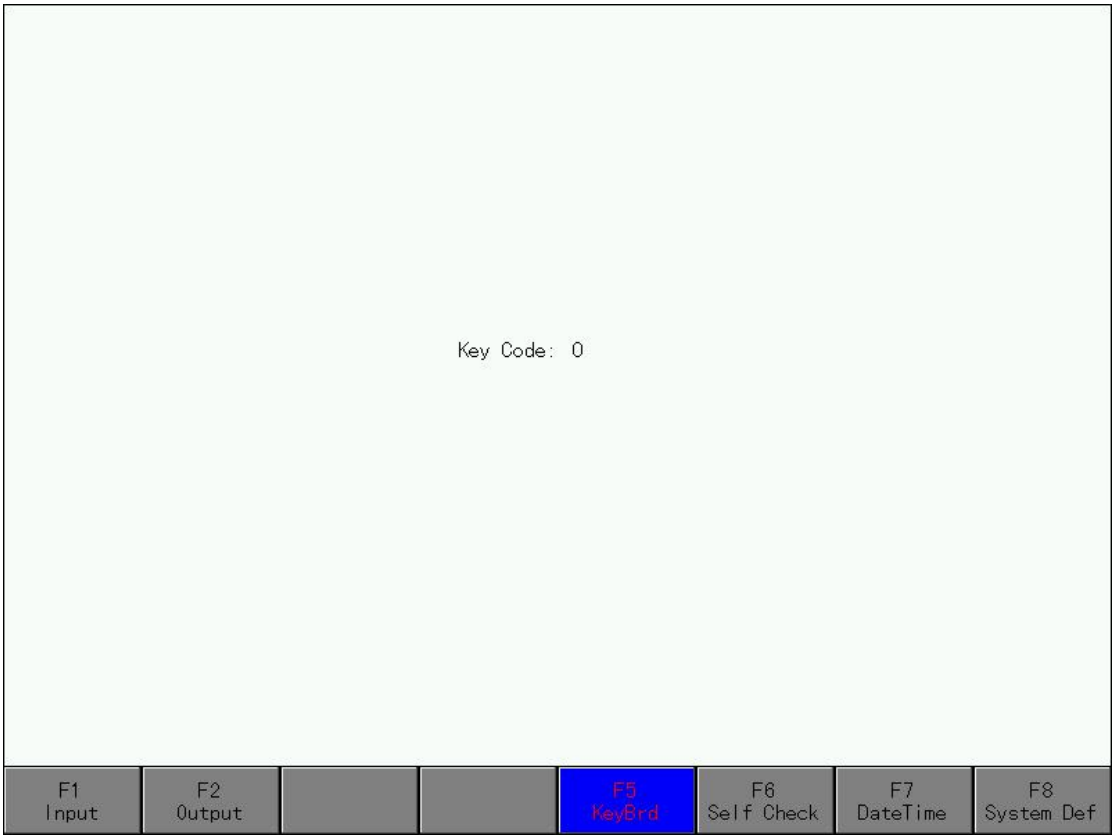


Fig 7.4 Keyboard diagnosis

7.5 Date and time

Press [F7] under the system diagnostic interface to set the date and time of the system.

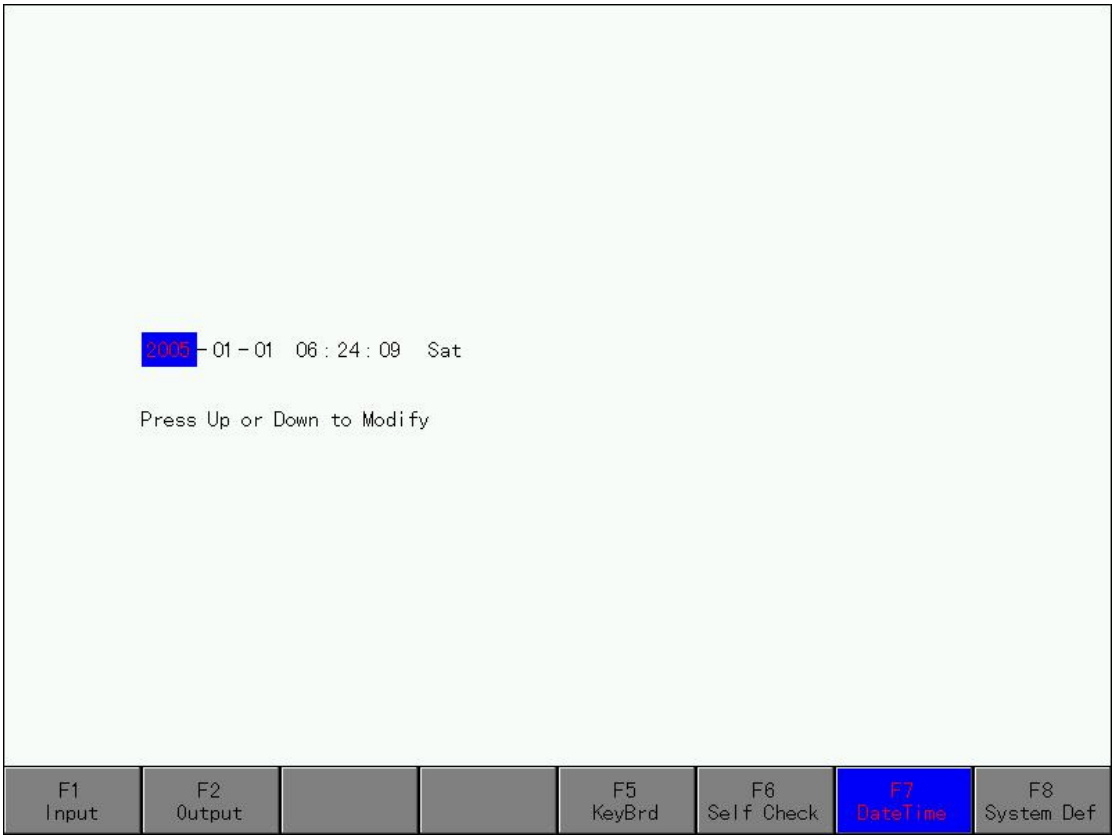


Fig 7.5 System Time

Move the cursor below the corresponding date or time or week, and press [↑] or [↓] to adjust the system time.

7.6 System Definition

Press [F8] under the system diagnosis interface to enter the system customization interface, where the input IO port, output IO port and system coordinates can be set, parameters can be restored and backup, and switch between Chinese and English with one key.

7.6.1 Parameter backup and restore

Parameter backup: The process of backup parameters is to press [F5 System Diagnostic], [F8 System Definition] and [F2 parameter backup] successively under the main interface of the system. The system prompts to enter the password, enter the password "1396", press the [Enter] key, the system will back up the current parameters to the default parameters and pop up a " factory parameters set successfully!"Tip box, press the [Enter] key can be. In future use, if the parameters are damaged or changed, you want to restore the parameters, you only need to restore the parameters.

Note: The equipment manufacturer must do the parameter backup function after completing the installation and debugging of the whole equipment.

Reduction parameters: The process of reducing parameters is to press [F5 System diagnosis], [F8 System Definition] and [F1 reduction parameters] in the main interface of the system. At this point, a pop-up " restore parameter is successful!"Tip box, press [Enter] to confirm.

Note: After the restore parameter is successful, the system needs to be restarted.

7.6.2 Input port definition

The controller can change the definition of the input IO port according to the needs of the user, including the serial number of the changed IO port on the input terminal, and the normally open or normally closed type of the input port. Press [F3] to enter the system definition interface, and then press [F1] to enter the input definition interface. As shown in Figure 7.6

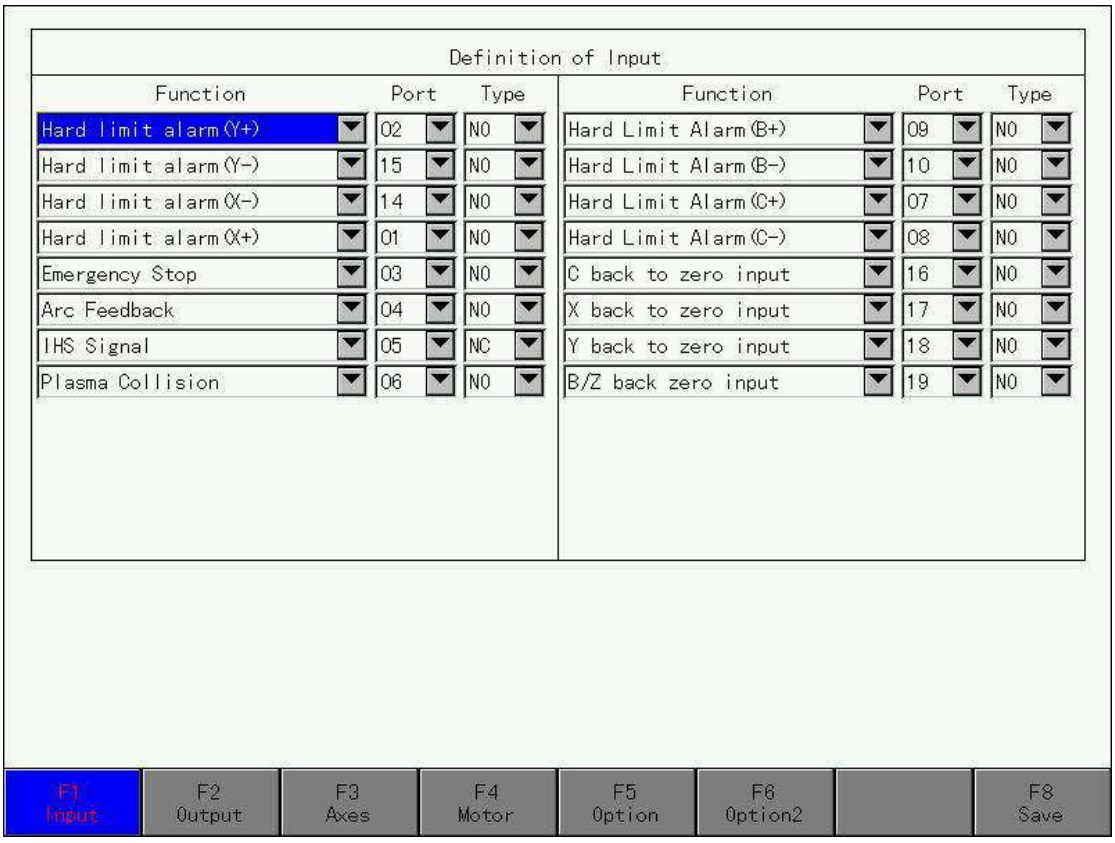


Fig 7.6 Input port definition

Under this interface, press [↑], [↓], [←], [→]on the operation panel.
You can move the cursor to the place where the type or number needs to change, position the cursor to the option to be changed, press [Enter] to open the tab of the

drop-down box where the cursor is, and move the cursor through[↑], [↓], so press [Enter] to set the selected parameters again.

Serial number: 01~10,14~22. Type: NO often open, NC often closed.

7.6.3 Output port definition

The controller can change the definition of the output IO port according to the needs of the user, including changing the serial number of the IO port on the output terminal and the normally open or normally closed type of the output port. As shown in Figure 7.7

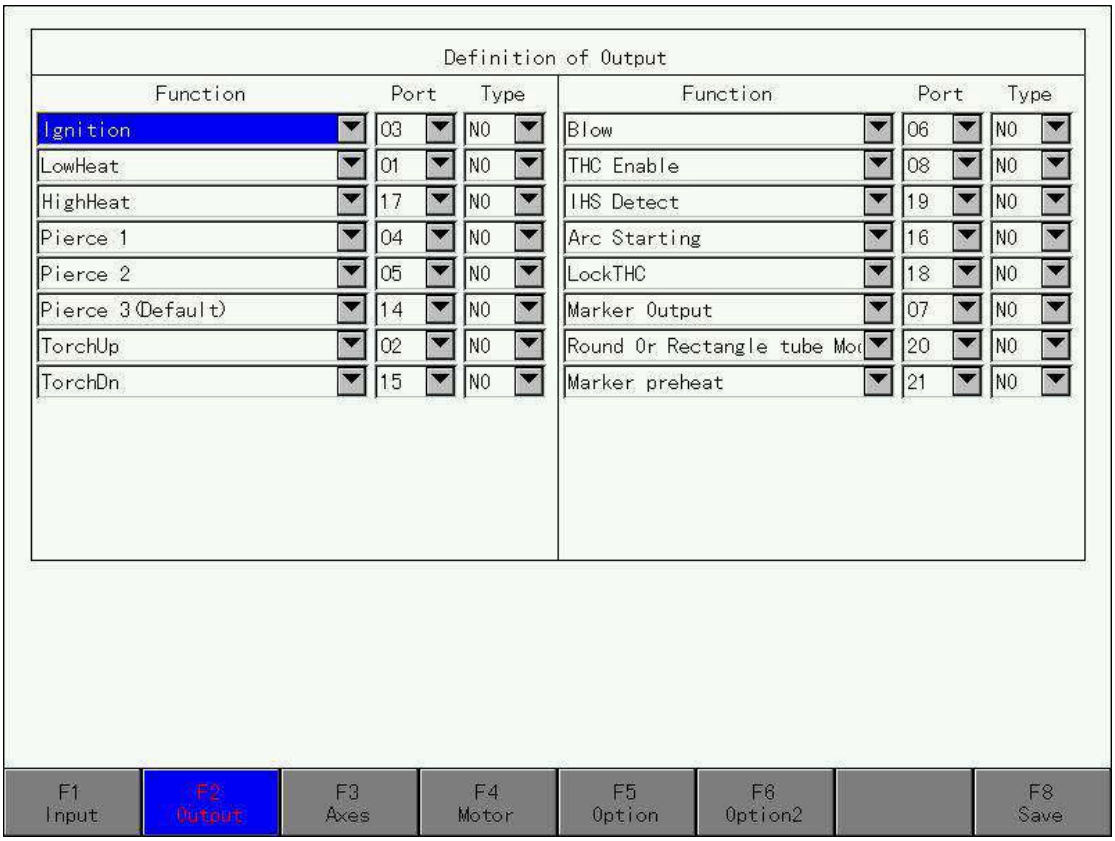


Fig 7.7 Definition of the output ports

Under this interface, press [↑], [↓], [←], [→]on the operation panel to move the cursor to the place where you need to change the type or serial number. Press the [Page Up] or [Page Down] key to change the serial number of the output port, and press the [Enter] key to change the type of the output port.

Output port types are tribode open leakage output type.

The type of red "●" indicates the triode conduction when the output signal is valid. Type green "●" indicates that the triode closes when the output signal is valid.

7.6.4 Coordinate definition

The system can provide the user's definition of the coordinate system, as shown in Figure 7.8

In this interface, by continuously pressing [Enter], the system can transform in eight coordinate systems. Until the user needs the coordinate system, press [F8 Save] to save the set coordinate system.

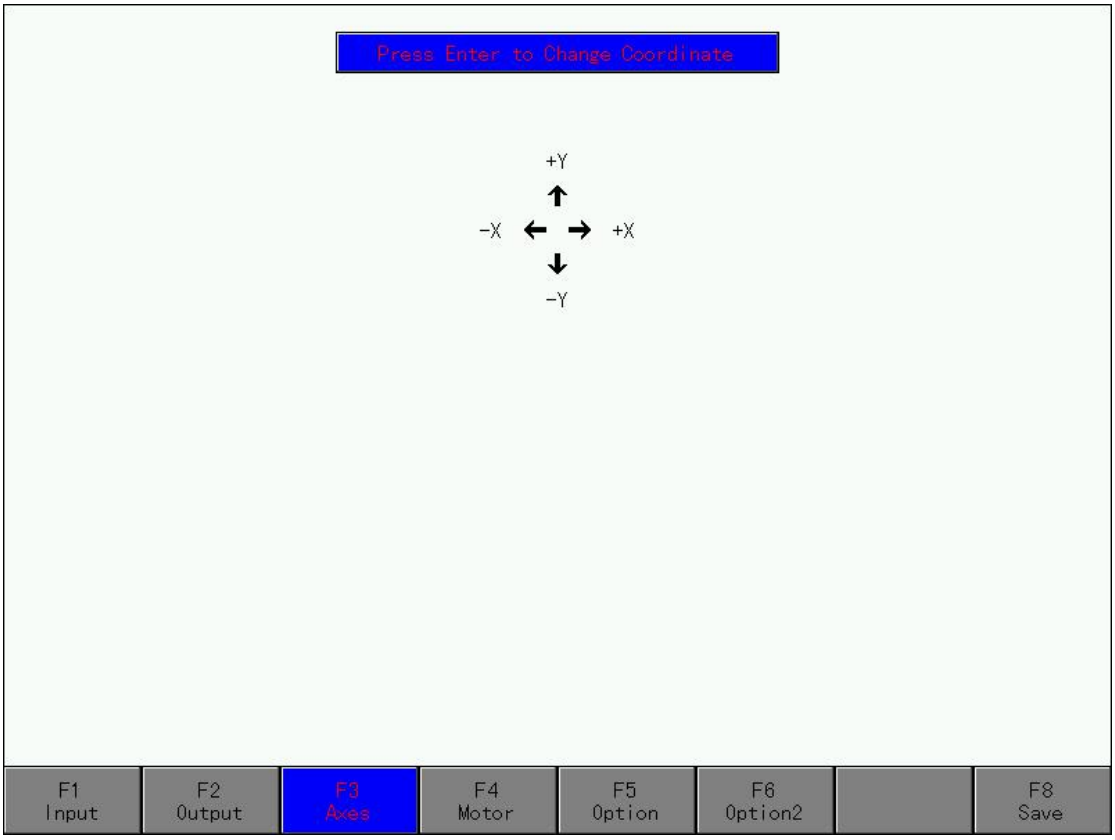


Fig 7.8 The definition of coordinate system

7.6.5 Motor

The motor shaft of this system is divided into actual shaft and virtual shaft.3.1 The actual shaft is motor shaft 1 to motor shaft 4, corresponding to the motor interface and each motor shaft on the motor and serial interface (reference 9 motor interface and 9.3.2 motor and serial interface), and the virtual shaft corresponds to X, Y, B / Z, and C axes in the G code. Each virtual axis corresponds to an actual axis.

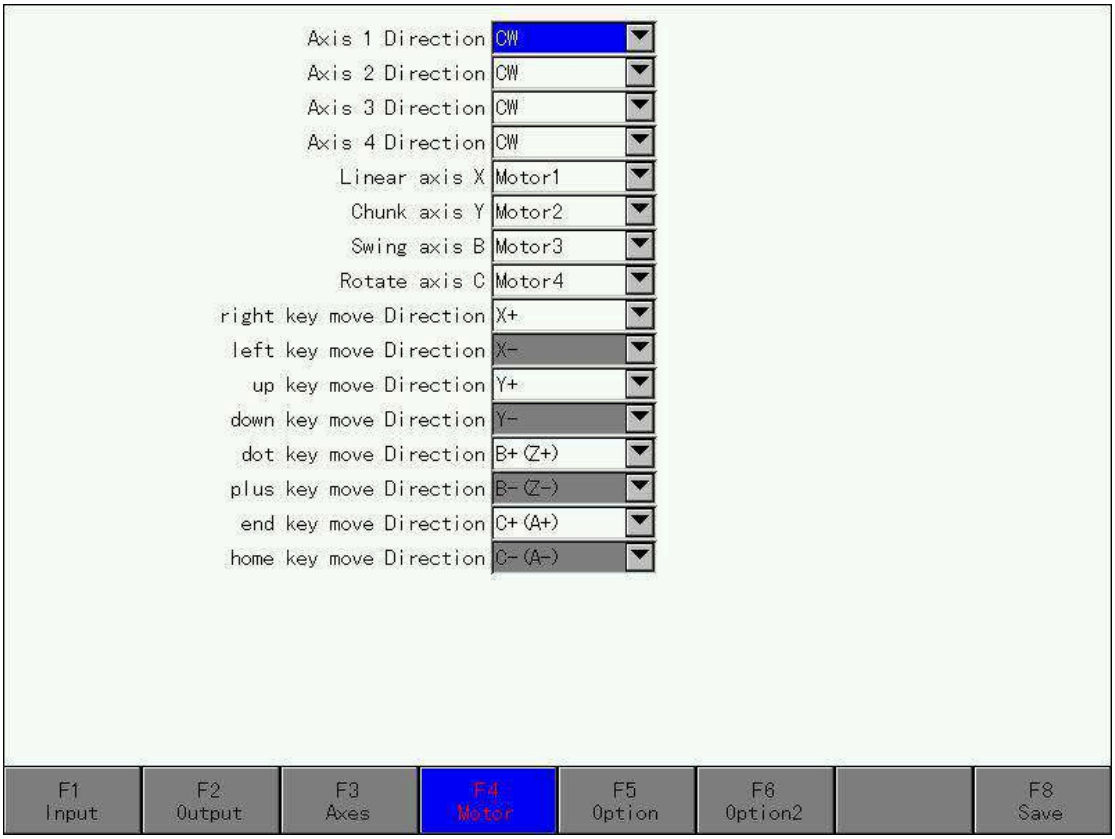


Fig 7.9 Motor direction

In fig 7.9 the rotation direction of each actual axis and the actual axis corresponding to each virtual axis can be set under this interface. The customer can choose the axis direction controlled by the manual shortcut button as X + or X-, etc. Customers can define the axis and its direction controlled by the manual button according to their own operation mode.

Press the up and down arrow keys to move the active focus to the parameters to be changed, then press [ENTER] to open the tab of the drop-down box where the cursor is located, press the up and down arrow keys to move the cursor, and press [Enter] again to set the selected parameters. Note: You cannot correspond the two virtual axes to the same physical axis, otherwise an error will be reported.

7.6.6 Options

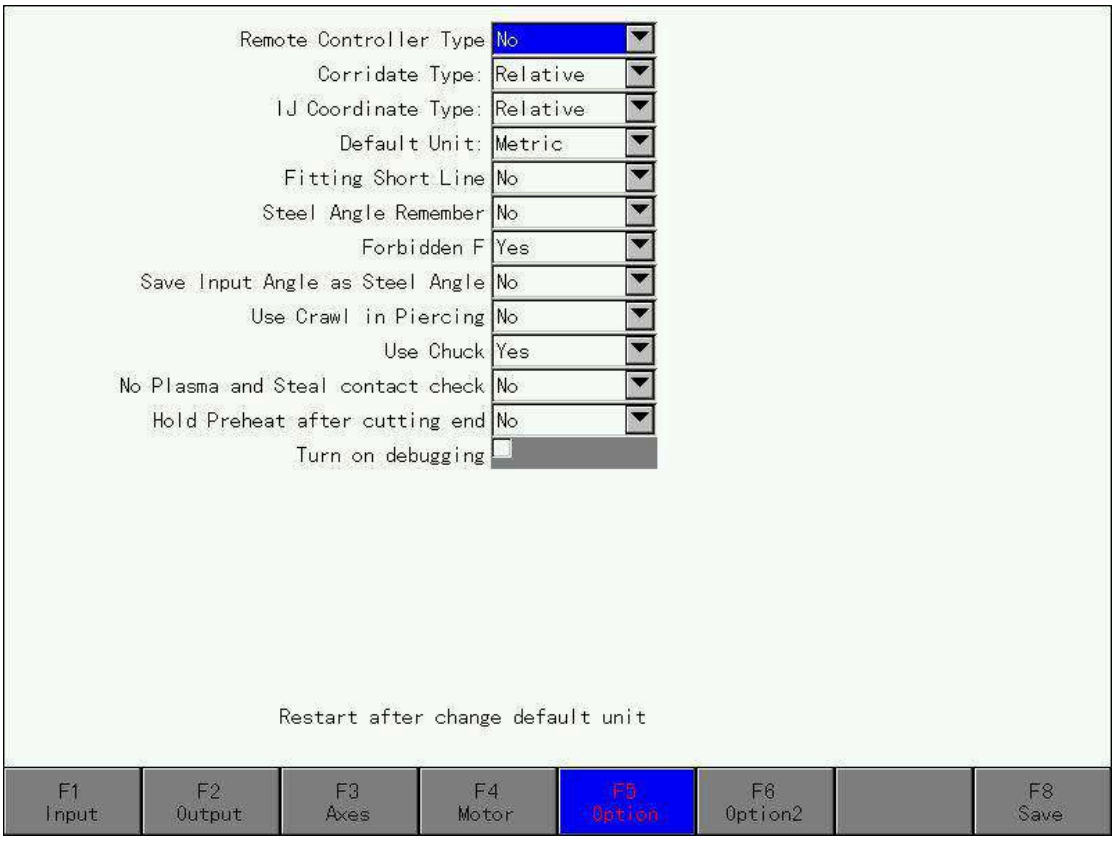


Fig 7.10 Options

7.6.6.1 Remote control

controller series default standard is to use a serial remote control, which can be used with power.

7.6.6.2 Default coordinates

In Figure 7.10, the default coordinates can be changed to relative or absolute coordinates.

7.6.6.3 Default IJ coordinates

In Figure 7.10, G02, G03 or G03, the following I or J parameters are relative or absolute coordinates by default. In general, the IJ coordinates of the arc are relative coordinates, and only the few G codes are absolute coordinates.

7.6.6.4 Metric system and English system conversion

As shown in Figure 7.10, the default units can be switched between the British system and the metric two units. After switching the metric British system, all the units related to the length can be switched.

7.6.6.5 Small line segment fitting

As shown in Figure 7.10, when there are too many small segments in G code and continuous jitter or vibration occurs during machine tool operation, set the parameter as "Yes", and generally use "No".

7.6.6.6 Steel plate Angle memory

By default, the plate-corrected angle is not remembered. When the parameter is set to "Yes", the plate angle memory is automatically remembered until another plate correction or angle reset.

7.6.6.7 The F instruction is disabled

When this parameter is Yes, the F instruction (i. e. the speed limit instruction) is ignored.

7.6.6.8 Steel plate correction from manual Angle

When this parameter is "Yes", the Angle manually input in section 4.3.3 is also used as the plate correction Angle. This Angle will be displayed in the main interface. If the plate Angle memory function is turned on, the Angle will be added into the plate correction Angle and be saved.

7.6.6.9, near the steel plate

When this parameter is checked on, the torch point is the longest end of the circular pipe cutting surface. When this parameter is not checked, when using the graphics library, the torch pivot intersection.

7.6.7 Option 2

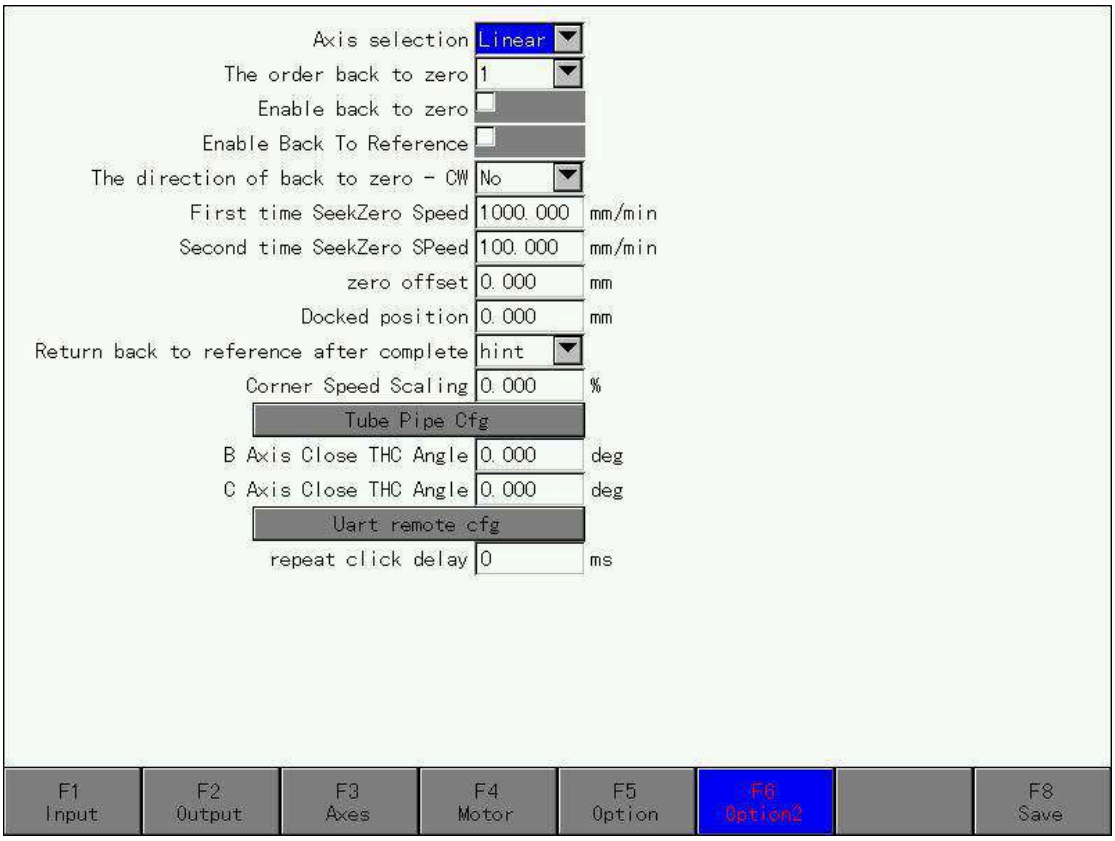


Fig 7.11, Option 2

7.6.7.1 Back to the zero-point parameter setting

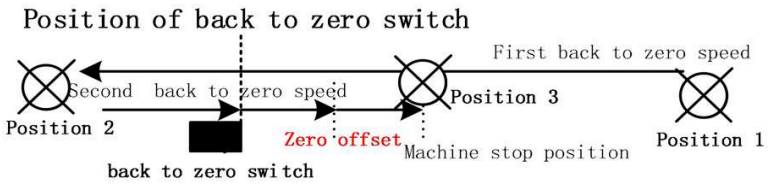


Fig 7.12 back to zero

As shown in Figure 7.12, the process of the machine back to zero is: before starting to zero, the torch head is at the position of the torch head on the right side of the zero switch. Press the F8 button and the torch head moves back to the zero arrow as shown in Figure 7.12 for the first time for the first time, just find the general range of the zero switch, so the speed can be larger. When the zero switch is detected, the system will pause immediately, and the head will stop on the left side of the zero switch, as shown in the torch position 2. Then the machine will move to the right in the direction of the second return zero arrow for the second time as shown in Figure 7.12, and find the position of the return zero switch for the second

time, when the range of the return zero switch has been determined, so the speed needs to be smaller in order to improve the accuracy of the return to zero. When the torch head moves back to the zero switch position in the figure, it then runs to the zero point of the current coordinate axis according to the zero point offset parameter, and finally runs to the docking position of the machine tool, namely the position of the torch head 3.

The return to zero parameter setting interface is shown in Figure 7.11, and each parameter is defined as follows

- Axis selection: Select the back-zero axis X, Y, B, C to be set, and the following parameters are set for this axis.
- Return Zero order: 1~4, the return zero order of the current axis.
- Zero enable: If the item is selected, the current axis will return to zero, otherwise the current axis will not return to zero.
- Forward to zero direction: If the item is selected, the current axis returns to zero in the positive direction, otherwise it will return to zero in the opposite direction.
- The first time, back zero speed: the current axis finds the speed of the first time to find the approximate range of the back zero switch, so the speed can be relatively large.
- Second return to zero speed: the speed of the current axis at the second time, when the range of the back to zero switch has been determined, so the speed needs to be smaller to improve the accuracy of back to zero.
- Zero point bias: the actual zero point of the machine tool, relative to the position of the return to zero switch. If the position of the return zero switch is not the zero position of the machine tool, this parameter is required to set the zero position of the machine tool.
- Machine docking position: the coordinate position where the current axis needs to dock after zero.
- All enabling axes return to zero simultaneously: if the item is selected, all enabling axes return to zero together, otherwise the zero order goes back to

zero.

- Default return to reference point after cutting: Select prompt to pop-up window after cutting, and the user can choose whether to return to the reference point according to the prompt. If yes, it will directly return to the reference point after the default cutting, without prompt. If no, the default cut will not return to the reference point, and will not be prompted.
- Angle speed scaling: in round tube mode, used to increase or reduce the speed at the angle between the line segment; in square tube mode, used to increase or reduce the speed to improve the overall processing speed. When the value is 0, the corner speed is planned by default, and the zoom is not effective. Note that this value is set too much, which will lead to excessive corner speed, which may cause abnormal sound of the machine tool.
- Tube gallery configuration: enable or close the elements in the gallery (enabled by default), or enable or close the gallery insert.

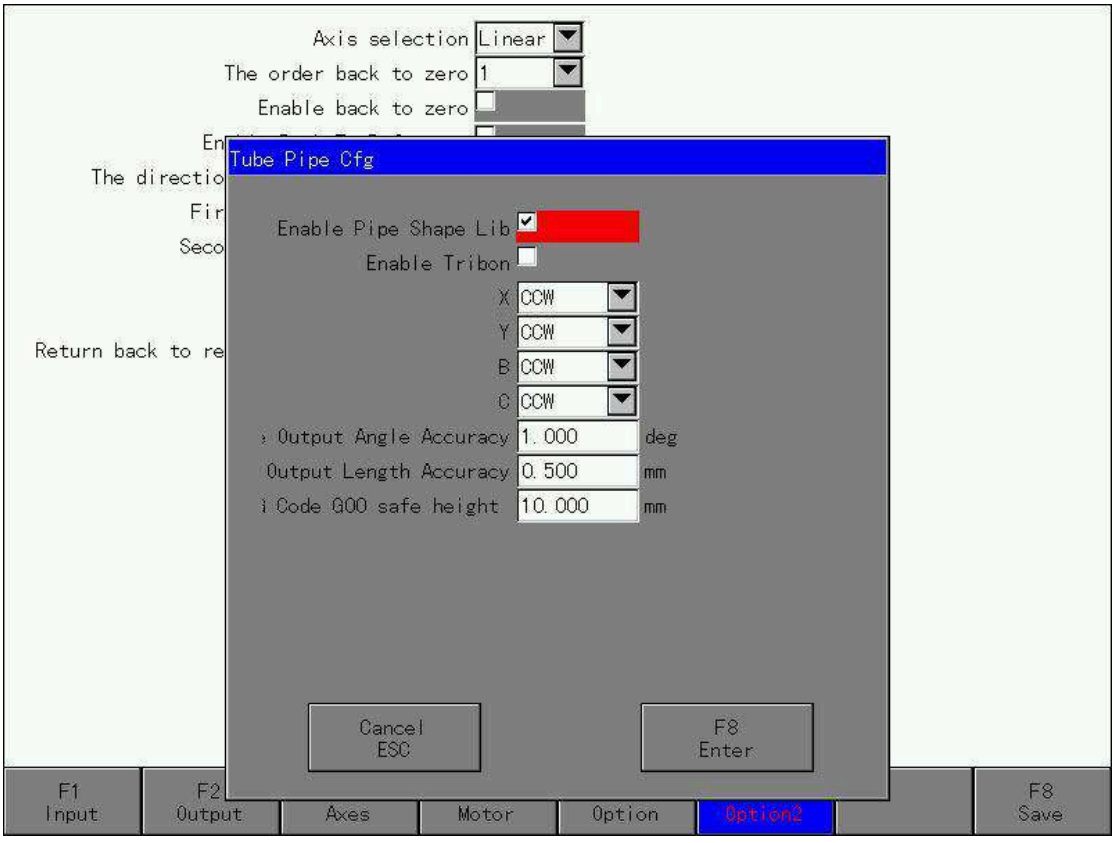


Fig 7.13 Tube gallery configuration

- X, Y, B, C: because X, Y, B, C axis has a fixed direction, when the mechanical structure and the default configuration, part of the axis reverse, so when using the figure in the gallery, can adjust the configuration, 4 axis is according to the cutting direction (normal configuration), which can normal cutting.

- G code output angle accuracy: control the accuracy of the chuck shaft in the generated G code file.
- G code output length accuracy: control the curve length accuracy in the generated G code file.
- Angle of B axis closing: during the cutting process, the angle affects the elevation, so after the movement of axis B exceeds the set angle.
- C-axis closing elevation Angle: during the cutting process, the Angle greatly affects the elevation, which closes the elevation when the C-axis movement exceeds the set angle.
- Serial port remote control configuration: select the F1520 serial port remote control.
- Double click delay: key response speed, the greater the value, the slower the response. Unit: mm

7.6.7.2 Z-axis positioning to enable

This option is only effective in the square tube mode. When the square tube is cut, because the square tube plane is not in an absolute horizontal position, the Z axis can be positioned once before each perforation, so as to reduce the height error between the Z axis and the square tube plane. When this option is selected, the Z-axis orientation function is enabled.

7.6.8 Language Switching

Press [F5 system diagnosis], [F8 system definition], press [F6 language]. You can switch between multilingual interfaces until you press the language interface you need.

7.6.9 Add a language file

After obtaining the language package file from the company, copy the language package file into the excellent disk, which is inserted into the USB port of the system. In this interface, move the cursor to the added language file, and press [ENTER]. Import success or failure will be prompted.

This system can support language files in most countries, and it can also customize language files. Please contact us if you need it.

7.6.10 Empty the file

Press [F5 system diagnosis], [F8 system definition], then press [] to move the cursor to the "empty file" button, and press [ENTER]. After emptying, all code is cleared under the hard-disk file.

7.6.11, and the system upgrade

Note: Round tube / square tube / plane can only be upgraded in tube mode, and the BIOS interface is only in tube mode. Do not upgrade tube mode in flat mode or use the BIOS interface in flat mode.

In the main interface, press [F5 system diagnosis], [F8 system definition], and then press [F8 system upgrade]. At this time, ensure that the USB interface of the system inserts the U disk, otherwise the prompt box will pop up to remind " no upgrade file found!".If the U disk has been inserted, a dialog box will pop up when [F8 System Upgrade] is pressed, as shown in Figure 7.14. Please click the OK button or press [ENTER] to confirm the upgrade prompt shown in Figure 7.15

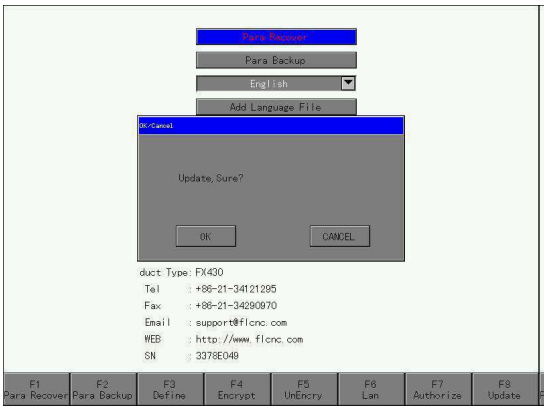


Fig 7.14 Confirm upgrade prompt

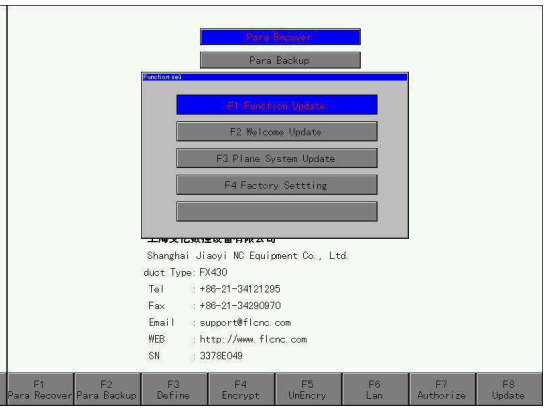


Fig 7.15 System upgrade prompt

F1-Round tube / square tube function upgrade: After pressing [F1], upgrade the function. The upgrade file corresponding to the function upgrade is F2000V5.upg, and it can be restarted after the upgrade.

F2-Interface upgrade: After pressing [F2], upgrade the interface to see the welcome interface for the first time after startup, as shown in Figure 2.3. Please contact us about how to make the welcome interface.

F3-plane system upgrade: it must be upgraded within the system definition in tube mode (every radius), and the upgrade file for the plane is F2000V5 _ PLANE.upg .

F4-Factory Settings: After pressing [F4], the system will be restored to the factory setting, and the restored system here will be completely restored to the state before the factory, that is, the parameters, IO port configuration, coordinate direction definition are all restored to the state before the factory. Generally used to upgrade the program, delete the previous data, to prevent data errors, after

restoring the factory need to reconfigure the mechanical parameter setting, please use with caution!

Chapter 8 Graphic management

8.1 Round tube mode

Under the main interface, press [F1] to enter the circular gallery interface, as shown in Figure 8.1

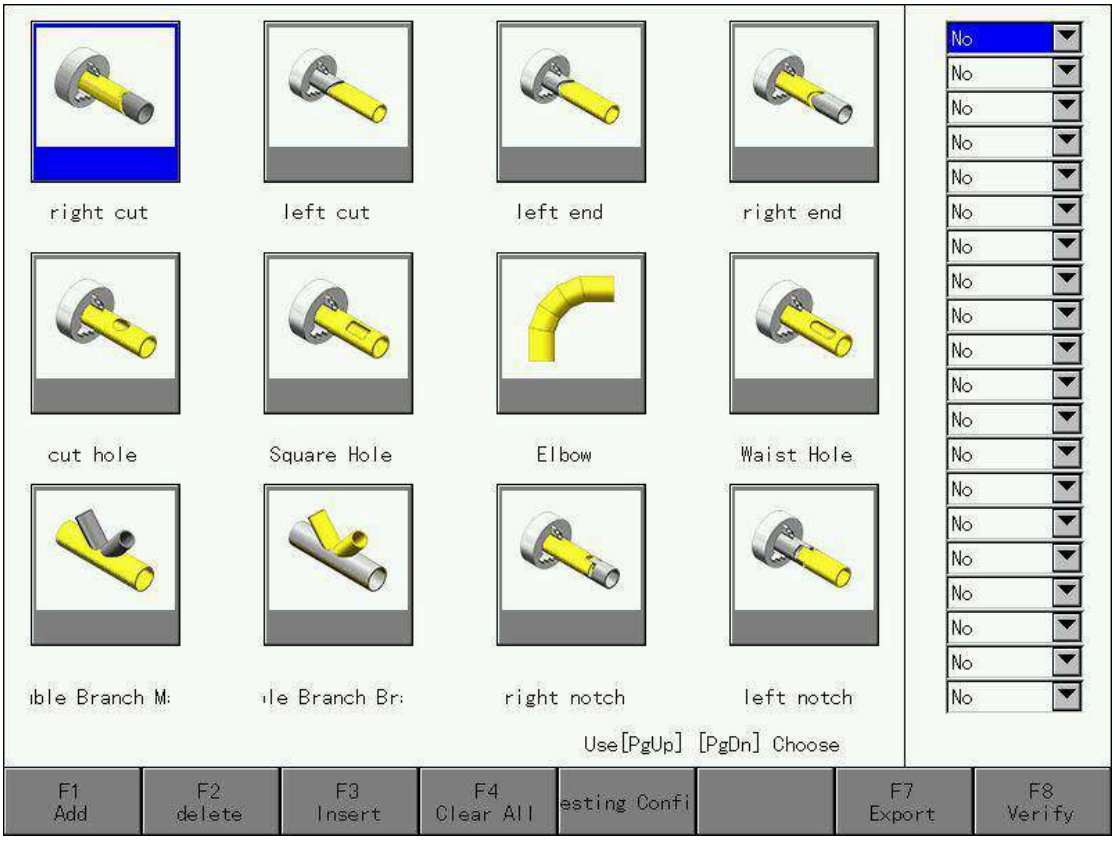


Fig 8.1 Main interface of circular gallery

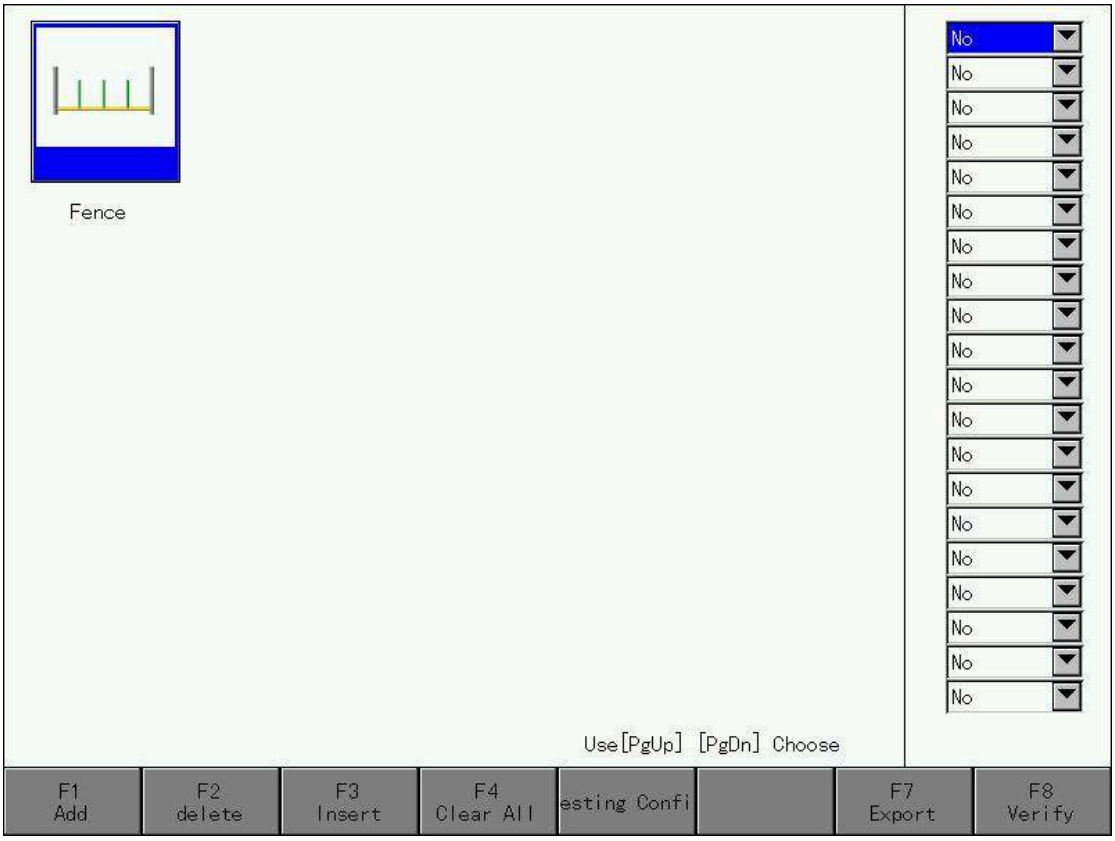


Fig 8.2 Turning page interface of circular tube gallery

1) [F1] Add: Add the selected figure on the left to the combined drop-down box list on the right. In multiple end combinations, the parameters for the tube diameter and tube wall thickness can only be set in the end type selected by the first drop-down box.
2) [F2] Delete: Delete the drawing in the drop-down box where the cursor is located.
3) [F3] Insert: Select the desired end type in the drop-down box.
4) [F4] All clear: Delete all the drawings selected by the right drop-down box.
5) [F5] Set material configuration: set material information option, effective effective:

① In the pipe gallery configuration, the sleeve material will be effective. The total length of the pipe can be set. When the sleeve material is not enabled, the sleeve material does not work, but only in the sleeve material.

② Arrangement: part length, number of parts, length is automatically generated by the set value of tube length, the number of parts is directly defined the number.

③ Choose whether to commoralateral, there is no gap between two adjacent workpieces, you can share a knife.

④ The part gap is the spacing between two adjacent parts.

⑤ Whether to allow reverse discharge, assuming that the truncation of a part is AB two cuts, the result of reverse discharge is ABBAABBAABBA.....

6) [F6] Turn the page: Use to switch the next page as shown in 8.1 and 8.2.

7) [F7] Drawing import: used to save the set cutting parameters for convenience.

8) [F8] Confirmation: After the confirmation parameters are set, enter the graphical preview interface.

8.1.1 Graphaph selection and combination

In the gallery interface shown in Figure 8.1, you can select the end type to cut and combine the graphics at will. Select the end type to cut in the left. Select the corresponding combined serial number through [PgUp] and [PgDn], then use the [] and [] drop-down boxes under the corresponding serial number, select the corresponding figure, and then click the [Enter] button to confirm, and then set its parameters. For each drawing you select, you must set the parameters.

8.1.2 Parameter editing

Under the interface of Figure 8.1, select the terminal to set the parameters through [↑] and [↓], and then press [F1], then the corresponding parameter editing interface will pop up.

8. 1.2.1 Truncation parameter interface

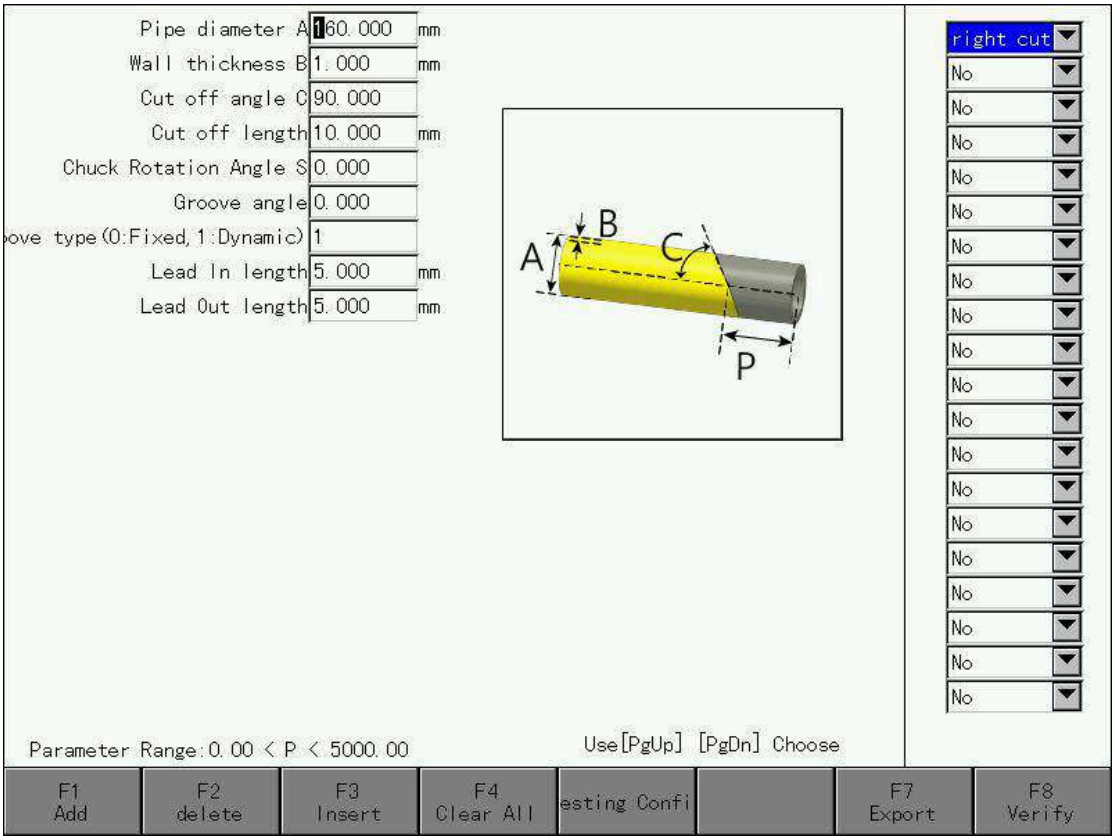


Fig 8.3 right cutting

In Figure 8.3, the corresponding parameters can be edited. The cut parameters are described as follows:

- Pipe diameter A: Outer diameter of the cut pipe, A on the diagram, this parameter can only be set in the end type selected by the first drop-down box in Figure 8.1. Range (0,5000) ,units:mm
- Wall thickness B: the wall thickness of the cut pipe, B on the diagram, this parameter can only be set in the end type selected by the first drop-down box in Figure 8.1. Range (0,500), units:mm
- Cut off angle C: the angle between the cut pipe and the cut surface, C on the diagram. Range (0,180), units: degree
- Cut off length P: the distance between the torch point and the intersection of the cut surface and the center line of the pipe, P in the diagram. Scope [0,20000) ,units:mm
- Chuck rotation Angle S: This is the position of the second part relative to the starting point of the first part, and the Angle of the chuck shaft rotation is set relative to the positioning point, which is generally used to confirm the position of the second blade. Invalid when the first part is set. From the direction of the head of the tube to the chuck, it is positive counterclockwise, with S in the schematic diagram, range [0,360], units: degree

- Grove angle: ramp angle of the cutting end.
- Grove type: 0 is fixed groove and 1 is dynamic groove.
- Lead in length: the default is 5mm, range [0,500], units: mm
- Lead out length: default is 5mm, range [0,500], units: mm

8.1.2.2 Terminal head parameter interface

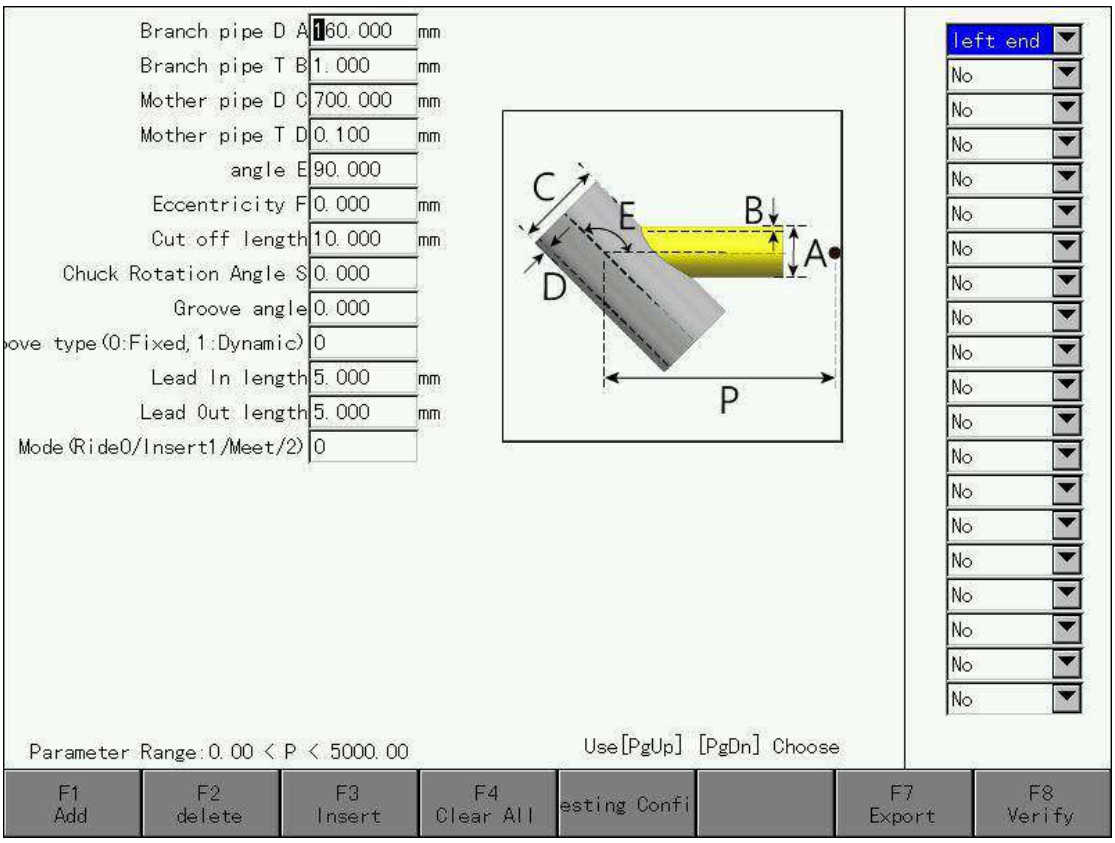


Fig 8.4 left end

The end head parameters are described as follows:

- Branch pipe (D)diameter A: the outer diameter of the cut pipe, A on the diagram. Range (0,5000),units: mm
- Branch pipe (T)thickness B: thickness of the cut pipe, B on the diagram. Range (0,500), units: mm
- Mother pipe (D)diameter C: the external diameter of the parent tube, C on the diagram. Range (0,5000),units: mm
- Mother pipe (T)thickness D: wall thickness of the parent tube, D on the diagram. Range (0,500), units: mm
- Angle E: Angle with the parent tube, E on the diagram. Range (0,180),units: degree
- Eccentricity F: the branch tube center line and the vertical line of the bus tube center line. Scope [0,5000), units: mm

- Mode: 0-ride, the mother pipe hole is slightly smaller than the inner diameter of the branch pipe; 1-insert, the inner edge of the mother pipe and the inner edge of the branch pipe; 2-meet, the opening size of the mother pipe is the same as the outer diameter of the branch pipe, the branch pipe can be inserted into the hole. Range (0 / 1 / 2)

8.1.2.3 Bus tube opening parameter interface

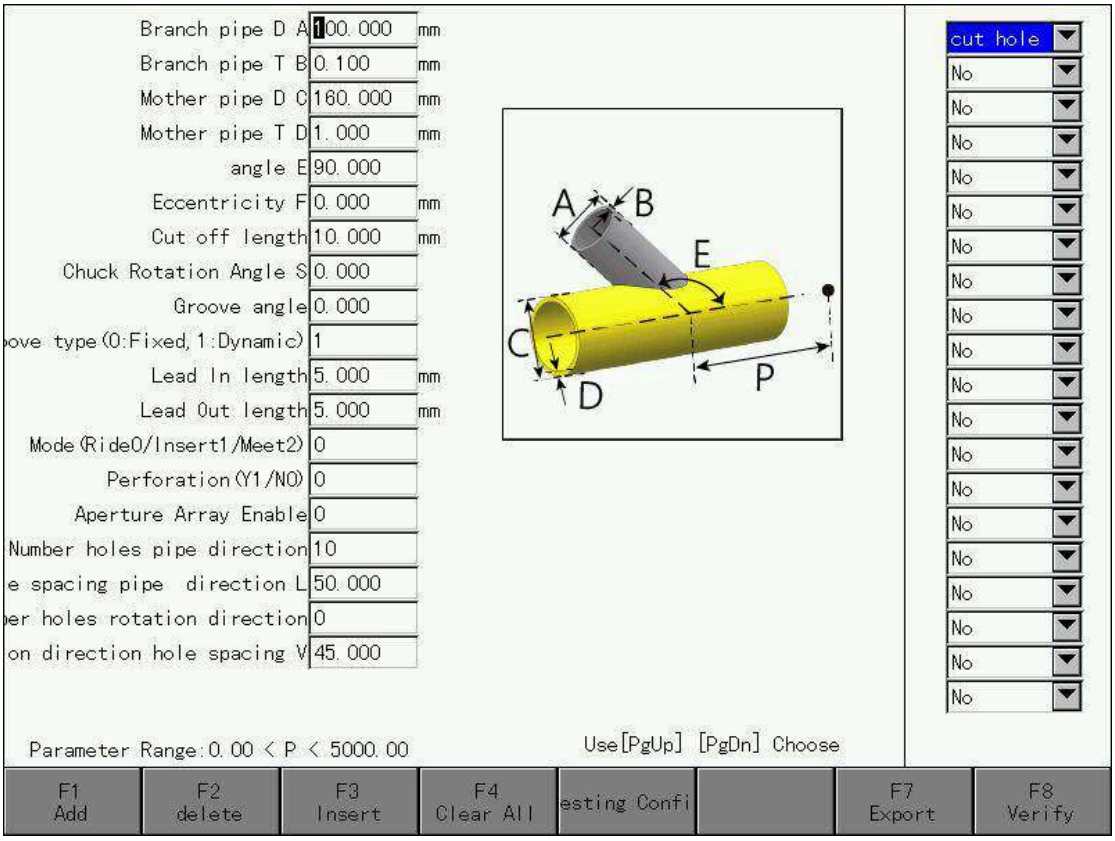


Fig 8.5 Interface of mother tube opening parameters

Most of the parameters have the same functions, but the different parameters of the mother tube opening are described as follows:

- Perforation (yes 1 / no 0): 1 enables perforation, 0 is no perforation. The oblique and vertical pair perforation are supported.
- Aperture array enable: yes 1 / no 0
- Number holes pipe direction: number of holes along the length, excluding the first hole. Scope [0,100), units: pcs
- Tube spacing pipe direction L: the hole spacing along the tube length direction, L of the schematic diagram. Range (0,20000),units:mm
- Number holes rotation direction: number of holes in the direction of rotation, without the first hole. When the tube length and rotation are array at the same time, preferentially rotate the array and then calculate the tube length array. Scope [0,100), units:pcs

- Rotation direction hole spacing V: spacing of holes in the rotation direction of the tube, range (0,360), units: degree

8.1.2.4 Interface of square hole parameters

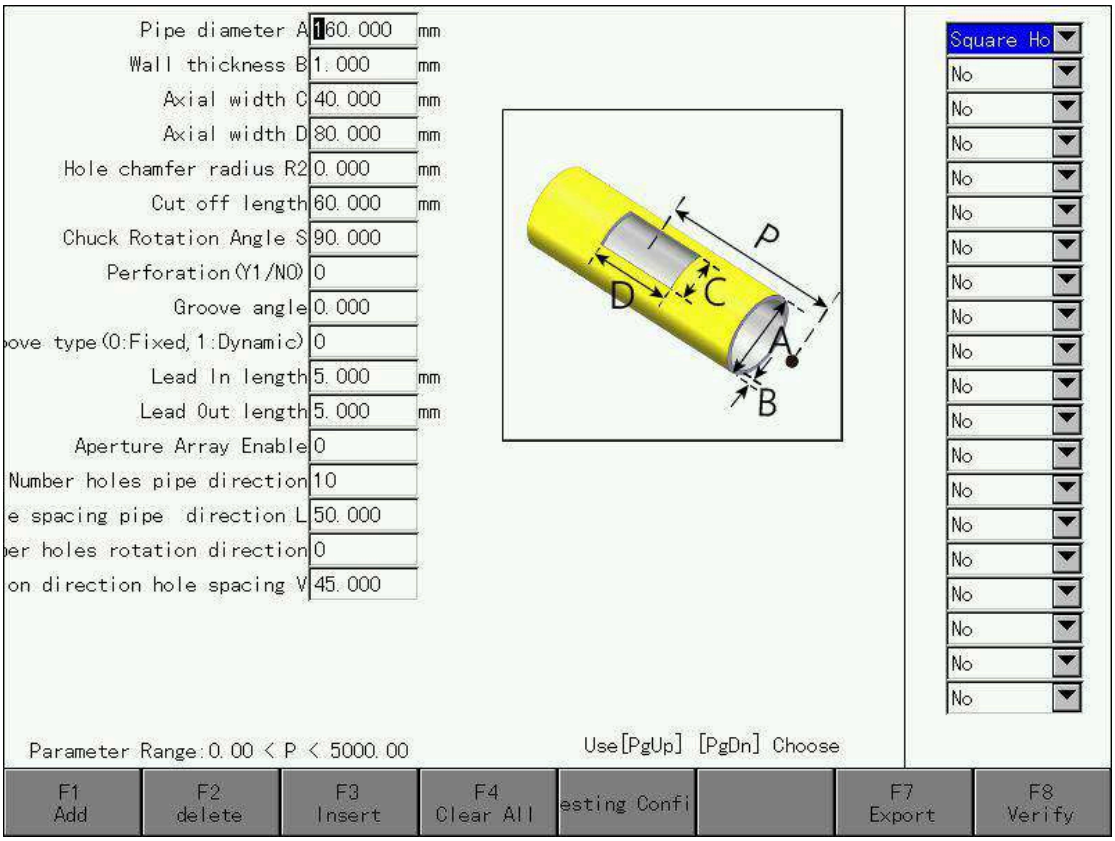


Fig 8.6 Parameter interface of the square hole

Most of the parameters of the graph have the same function, but the different parameters of the square hole are described as follows:

- Axial width C: the width of the square hole along the pipe diameter direction, C on the diagram. Range (0,5000) ,units:mm
- Axial width D: the width of the square hole along the pipe diameter direction, D on the diagram. Range (0,5000),units:mm
- Hole chamfer radius R2: the radius of the four chamfer of the square hole, R2 on the diagram. Scope [0,1000),units:mm
- Perforation: yes 1/ no 0. Only vertical pair perforation is supported.

8.1.2.5 Elbow

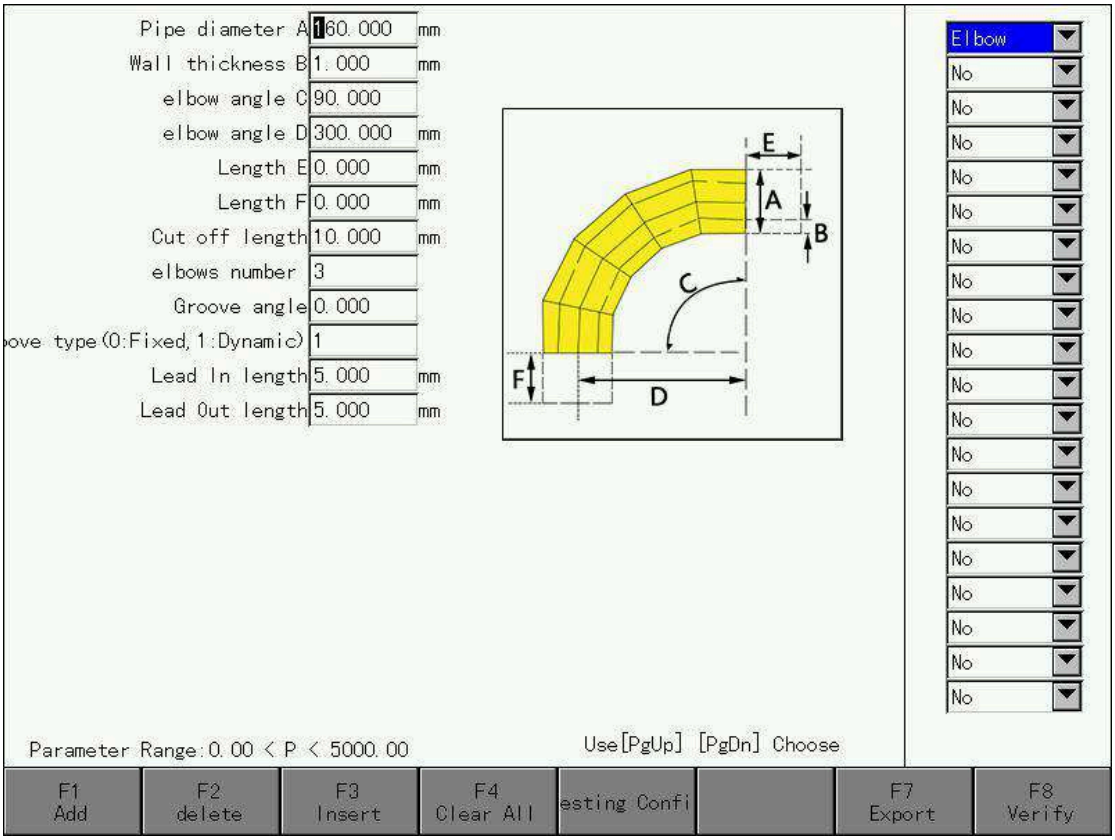


Fig 8.7 Bend parameters editing

Most of the parameters of the graph have the same function, but the different parameters of the bend are described as follows:

- Elbow angle C: the angle after the elbow combination, C on the diagram. Range (0,180), units: degree
- Elbow radius D: refers to the radius after the elbow combination, D on the diagram. Range (0,10000),units: mm
- Length E: extra extension distance at elbow end, E on the diagram. Range [0,5000],units: mm
- Length F: extra extension distance at the elbow end, D on the diagram. Range [0,5000],units: mm
- Elbow number: the cut elbow consists of several sections. Range [2,12], due to limited computing power, the maximum number of support is only 12.units:pcs

8.1.2.6 Parameter interface of waist hole

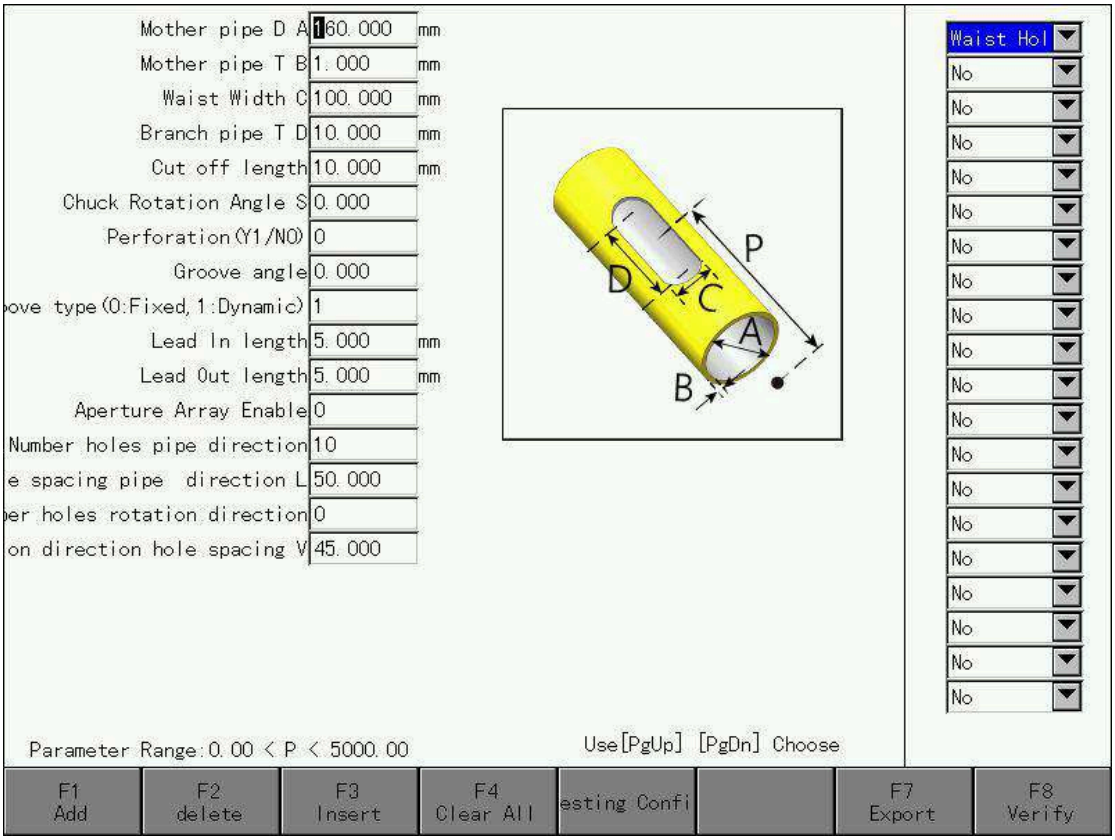


Fig 8.8 Edit of waist hole

Most of the parameters of the graph have the same function, without introduction, the different parameters of the waist round hole are described as follows:

- Waist width C: the waist width of the cut waist hole, C on the diagram.units:mm
- Branch pipe D: waist length of the cut waist, D on the diagram.units:mm
- Chuck rotation Angle S: This is the position of the second part relative to the starting point of the first part, and the set Angle of the chuck axis, which is generally used to confirm the position of the second blade. Invalid when the first part is set. From the direction of the head of the tube to the chuck, it is positive counterclockwise, with S in the schematic diagram, range [0,360], units: degree
- Perforation: yes 0/no 1. Only vertical pair perforation is supported.
- Aperture array enable : yes 1/no 0.
- Number holes pipe diercion: number of holes along the length, excluding the first hole. Scope [0,100), units: pcs
- Tube spacing pipe direction L: the hole spacing along the tube length direction, L of the schematic diagram. Range (0,20000) ,units:mm
- Number holes rotation direction: number of holes in the direction of rotation, without the first hole. When the tube length and rotation are array at the same time, preferentially

rotate the array and then calculate the tube length array. Scope [0,100), units:pcs

- Rotation direction hole spacing V: spacing of holes in the rotation direction of the tube, range (0,360), unit: degree

8.1.2.7 Branch tube-double branch tube parameter interface

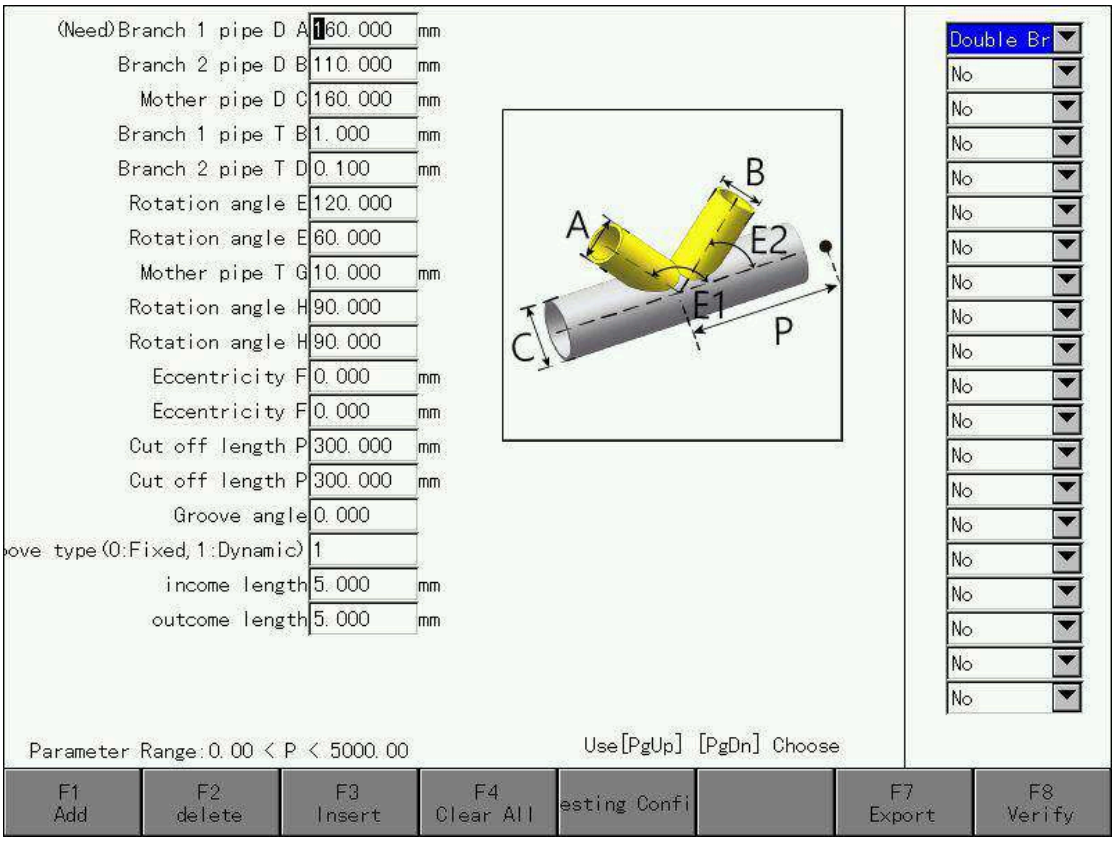


Fig 8.9 Branch tube-double branch tube parameter editing

Most of the parameters have the same functions, but the different parameters of branch-double branch are described as follows:

- (Need) Branch 1 pipe (D)diameter A: the external diameter of the cut pipe, A on the schematic diagram, range (0,5000), units: mm
- Branch 2 pipe (D)diameter B: wall thickness of the cut pipe, B on the diagram, range (0,5000), units: mm
- Mother pipe (D)diameter C: the diameter of the parent tube, C on the diagram. Range (0,5000),units: mm
- Branch 1 pipe (T)thickness D1: the wall thickness of branch pipe 1, D on the diagram. Range (0,500), units:mm
- Branch 2 pipe (T)thickness D2: wall thickness of branch 2, D on the diagram. Range (0,500), units:mm
- Rotation angle E: the angle between branch pipe 1 and the parent pipe, E1 in the diagram. Range (0,180), units: degree

- Rotation angle E: the angle between branch pipe 2 and parent pipe, E2 in the schematic diagram. Range (0,180),units: degree
- Mother pipe (T)thickness G: wall thickness of the parent tube, G on the diagram. Range (0,500), units:mm
- Branch 1 chuck rotation angle H: the rotation angle of the cutting start position of branch 1 relative to the origin. The difference between the rotation angle H of branch 1 and the rotation angle H of branch 2 is H 1 in Fig. Range [0,360], units: degree
- Branch 2 chuck rotation angle H: the rotation angle of the cutting start position of branch 2 relative to the origin. The difference between the rotation angle H of branch 1 and the rotation angle H of branch 2 is H 2 in Fig. Range [0,360], units: degree
- Branch tube 1 eccentric I: the vertical distance between the center line of branch tube 1 and the center line of the bus tube, I on the diagram. Scope [0,5000), units:mm
- Branch tube 2 eccentric I: the vertical distance between the center line of branch tube 2 and the center line of the bus tube, I on the diagram. Scope [0,5000), units:mm
- Branch pipe 1 and 2 axis distance P: the distance between the torch point and the intersection point of the center line of the pipe, P in the schematic diagram. Scope [0,20000) units:mm

8.1.2.8 Fence interface

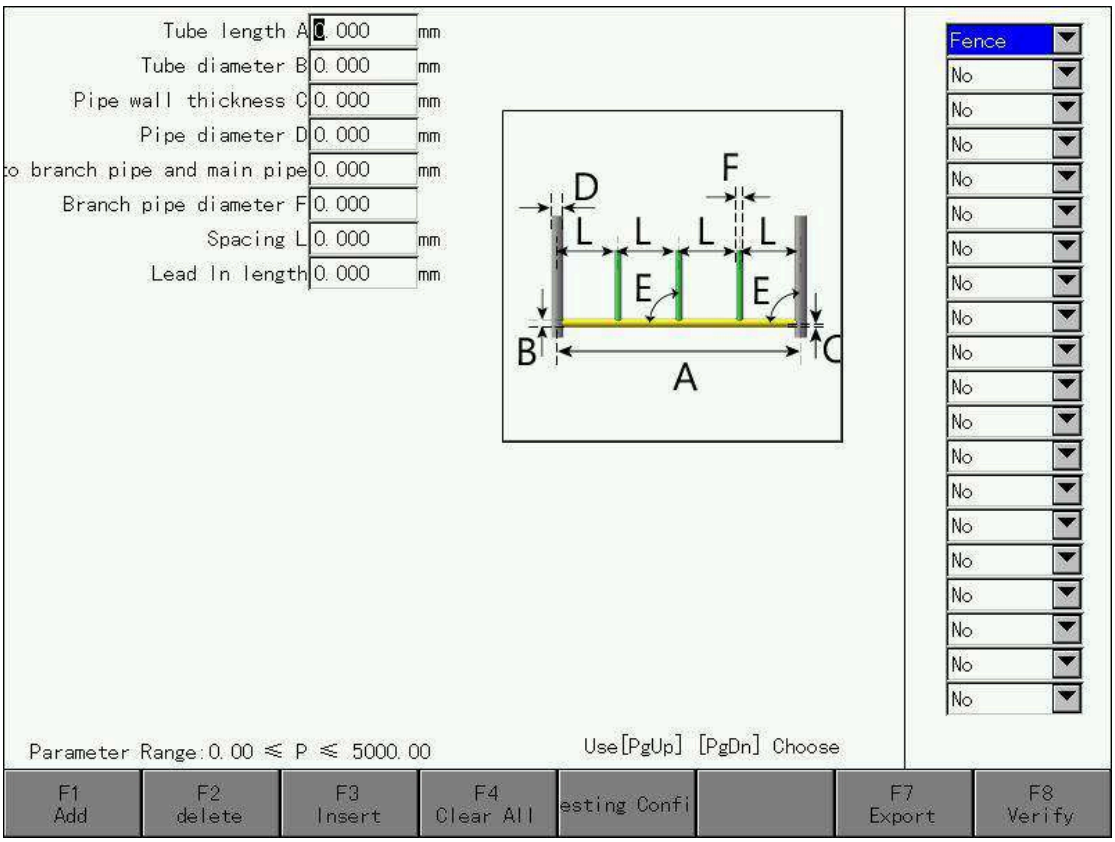


Fig 8.10 Fade parameter editing

New fence elements, only for a single use, do not support combined use. The parameters are described as follows:

- Tube length A: the length of the cut branch tube, A on the diagram. Range [0,5000],units:mm
- Tube diameter B: the diameter of the cut branch pipe, B on the diagram. Range [0,5000], units:mm
- Pipe wall thickness C: wall thickness of the cut branch pipe, C on the diagram. Range [0,500], units: mm
- Pipe diameter D: the diameter of the coherent mother tube, D on the diagram. Range [0,5000], units: mm
- Angle to branch pipe and main pipe E: Angle from the cut branch pipe to the parent pipe and the open branch pipe, E on the schematic diagram. Range [0,180], units: degree
- Branch diameter F: the diameter of the hole, the F on the diagram. Range [0,5000], in mm
- Spacing L: end to the opening, equal distance between the opening and the opening, L on the diagram. Range [0,5000], units: mm
- Lead in length: the default is the lead length of the right end, range [0,5000],units: mm

8.1.3 Drawing preview

After the parameters of the selected graph are set, click [F8] to confirm, and the graphics preview interface will be entered, as shown in Figure 8.11.

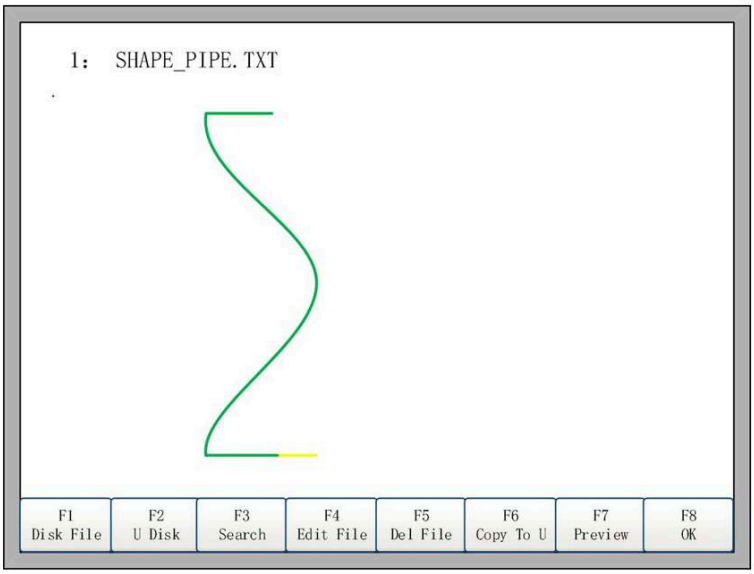


Fig 8.11 The graphical preview interface

In the graphical preview interface, the user can see the preview graph generated according to the previously selected end type and parameter. In the upper right corner, there will be an e-box, which is the G code file name generated according to this parameter, which can be modified by the user himself. Click [F8] to confirm, then the G code file is saved, click [F2] file management in the main interface to find the corresponding G code file, for users to call at any time in the future production process.

After the preview graphics is correct, click [F8] to enter the main interface and start cutting.

8.1.4 Graphic import

Add [F7] graphic import function to save the customer's cutting parameters. When combining or using a single drawing, in addition to generating a G code file name, users will also prompt whether to generate a DAT file with a parameter name, which is confirmed name and saved in the hard disk. Users can use the F7 drawing import to find the combined drawing just set again, and reset other sizes to facilitate cutting.

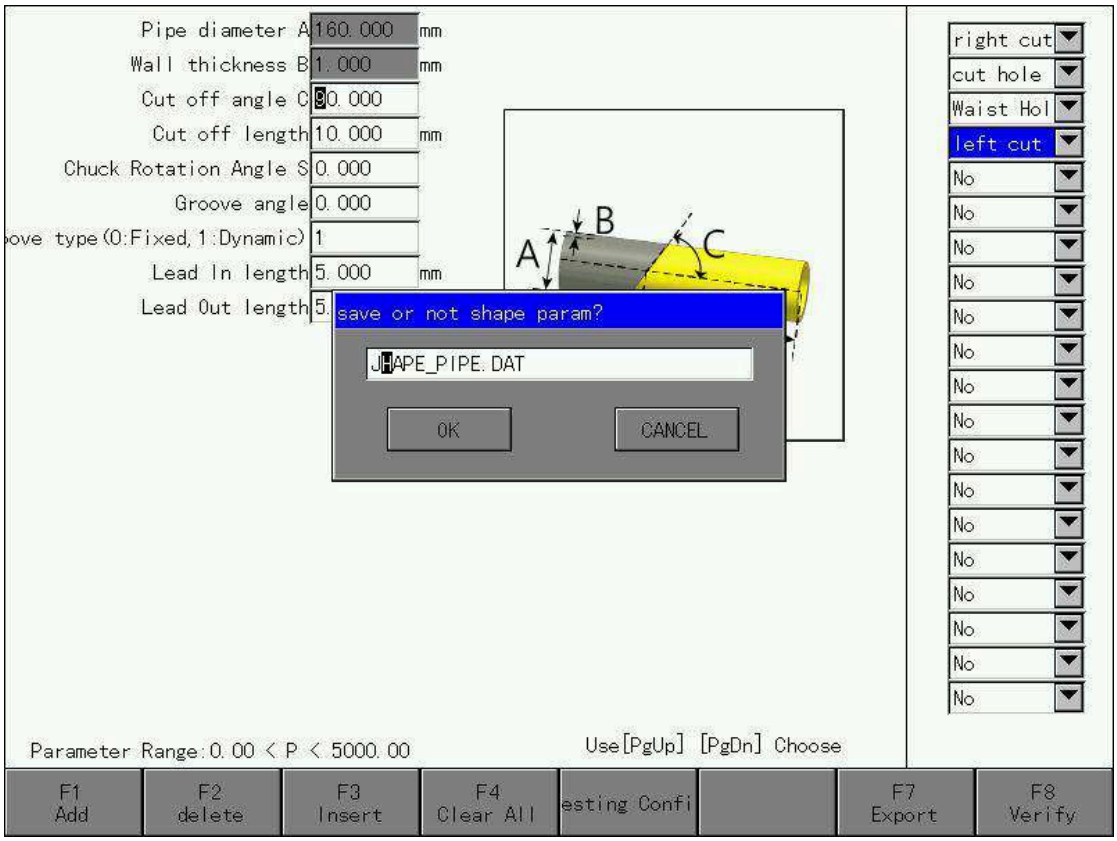


Fig 8.12 parameter saving confirmation interface

You can go to the hard disk file there is a number of DAT file, the user according to their own defined name to find the corresponding parameters to call, can also export to the U disk, use the computer to modify its name, and then import, such as process one, ten paragraphs and so on.

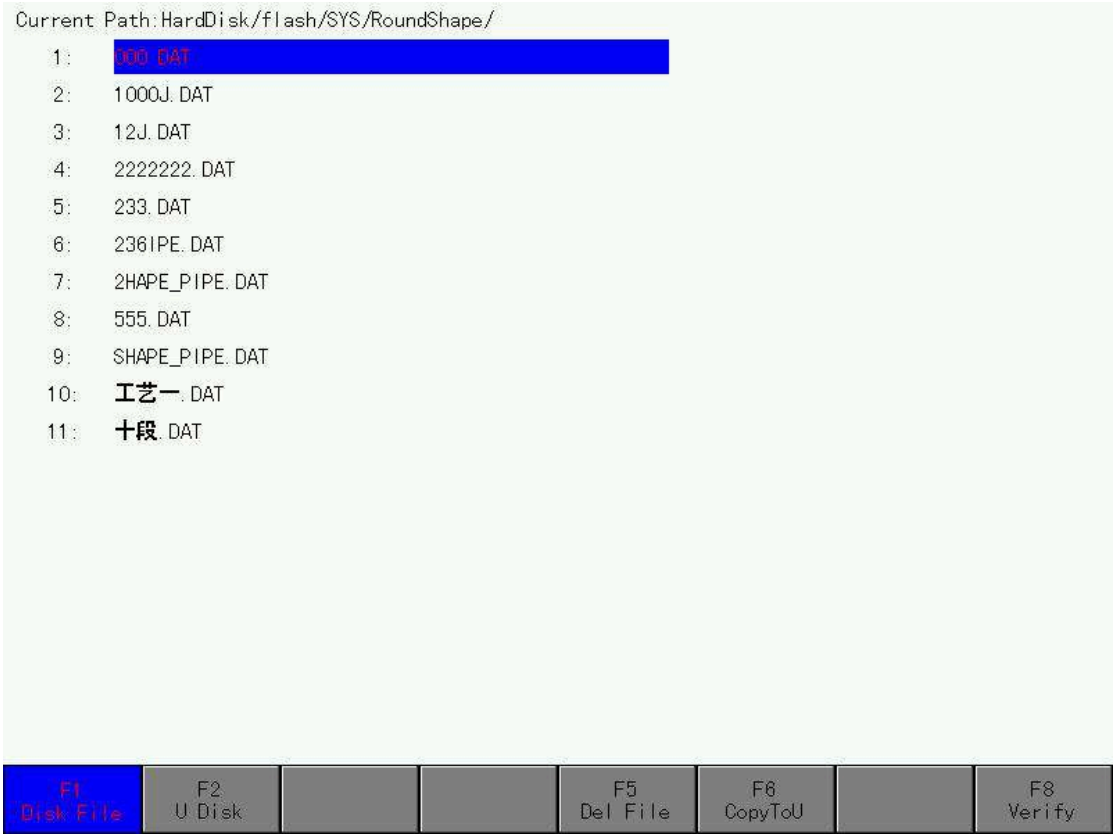


Fig 8.13 Parameter saving and selection interface

Users can copy a single file or folder to the U disk. Also, delete individual files or folders.

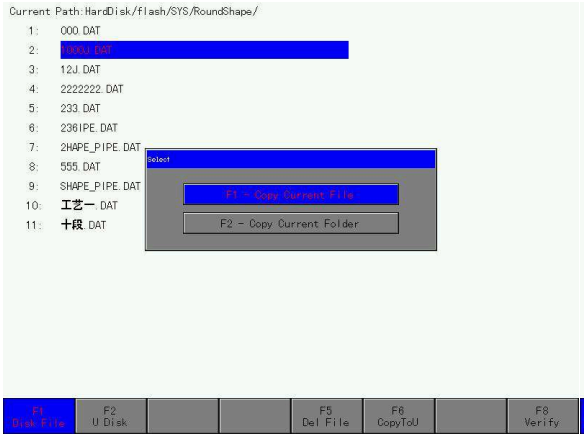


Fig 8.14 Parameter replication U disk selection interface

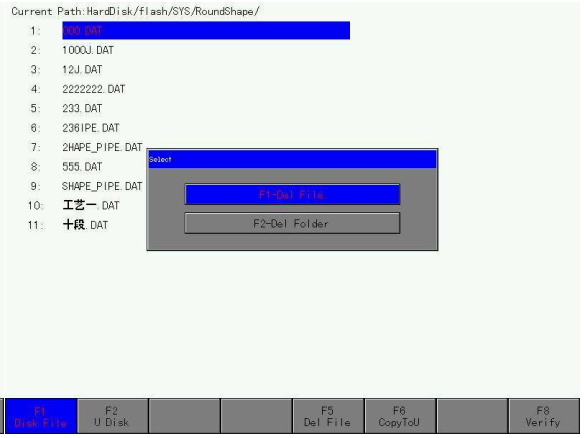


Fig 8.15 Parameter deletion selection interface

Chapter 9 Interface description

9.1 Input interface

- The input signal is a mechanical contact switch, supported by both open or closed types, valid when connected to 24 VG, and invalid when suspended or connected to 24V. The public end of the external switch is connected to 24 VG, and the other end of the external switch is connected to the corresponding IO port.
- A total of 16 input ports.
- Enter the signal definition.

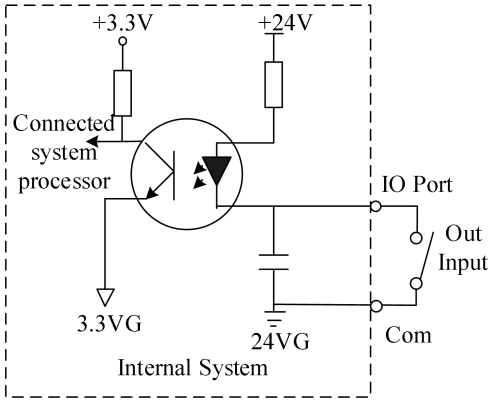


Fig 9.1 Input interface circuit

Table 9.1 Input port definitions

25-core interface pin number (male header)	Signal name	remarks	25-core interface pin number (male header)	Signal name	remarks
2	Hard limit alarm (Y +)		9	Hard limit alarm (B / Z +)	
15	Hard limit alarm (Y-)		10	Hard limit alarm (B / Z-)	
14	Hard limit alarm (X-)		7	Hard limit alarm (C +)	
1	Hard limit alarm (X +)		8	Hard limit alarm (C-)	
3	Emergency Stop		16	C back to zero input	

4	Arc Feedback		17	X back to zero input	
5	IHS Signal		18	Y back to zero input	
6	Plasma Collision		19	B/Z back to zero input	
11,20-23	reserve				
12,24	+24V	+ 24V / 3A power supply output	13,25	24VG	+ 24V, the ground of the power supply

9.1.1 Input the wiring instructions

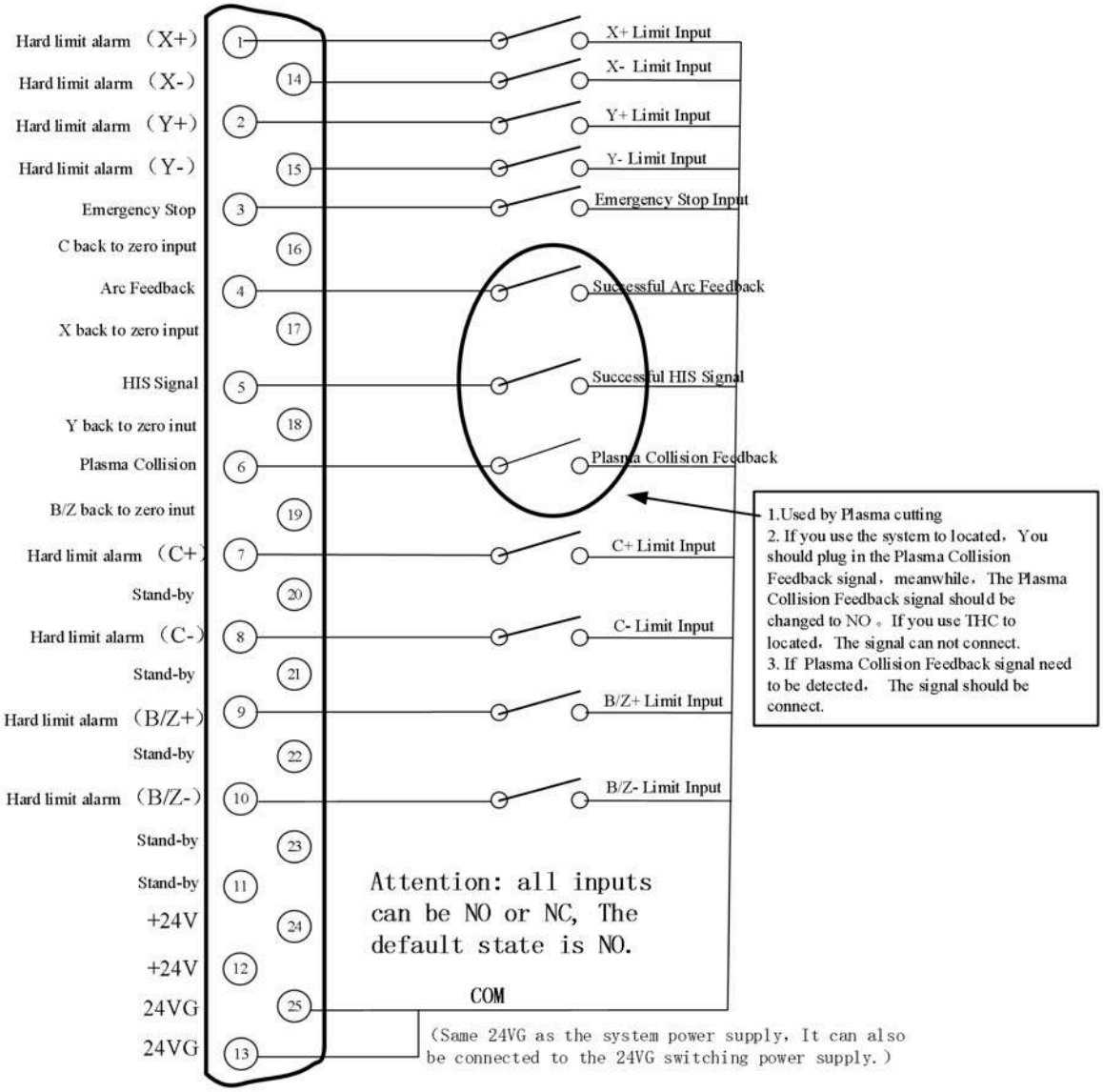


Fig 9.2 The external input wiring

9.2 Output interface

- The output voltage is 24V, the low level is effective; the common end of the external relay coil is 24V + (also connected to 24V + of the power supply of the system), and the other end of the relay coil is connected to the corresponding IO port.
- The output bears the maximum load current of 300 mA.
- A total of 16-channel output ports.
- Output signal definition.

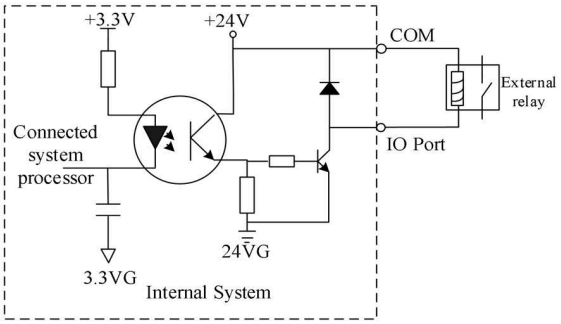


Fig 9.3 Schematic diagram of the output interface circuit

Table 9.2 Definition of the output ports

The 25-core interface pin number	Signal name	remarks	The 25-core interface pin number	Signal name	remarks
3	Ignition		6	Blow	
1	Low pressure preheating		8	THC Enable	
17	High pressure preheating		19	IHS Detect	
4	Low pressure cutting oxygen		16	Arc Starting	
5	Medium pressure cutting oxygen		18	Lock THC	
14	High pressure cutting oxygen		07	Maker Output	

2	Torch Up		20	Round or Rectangle tube mode output	
15	Torch Down		21	Marker preheat	
9, 10, 11	Unused		22, 23	Unused	
12,24	+24V	+ 24V / 3A power supply output	13,25	24VG	+ 24V, the ground of the power supply

9.2.1 Output wiring instructions

9.2.2.1 Typical wiring diagram for oxygen and gas cutting

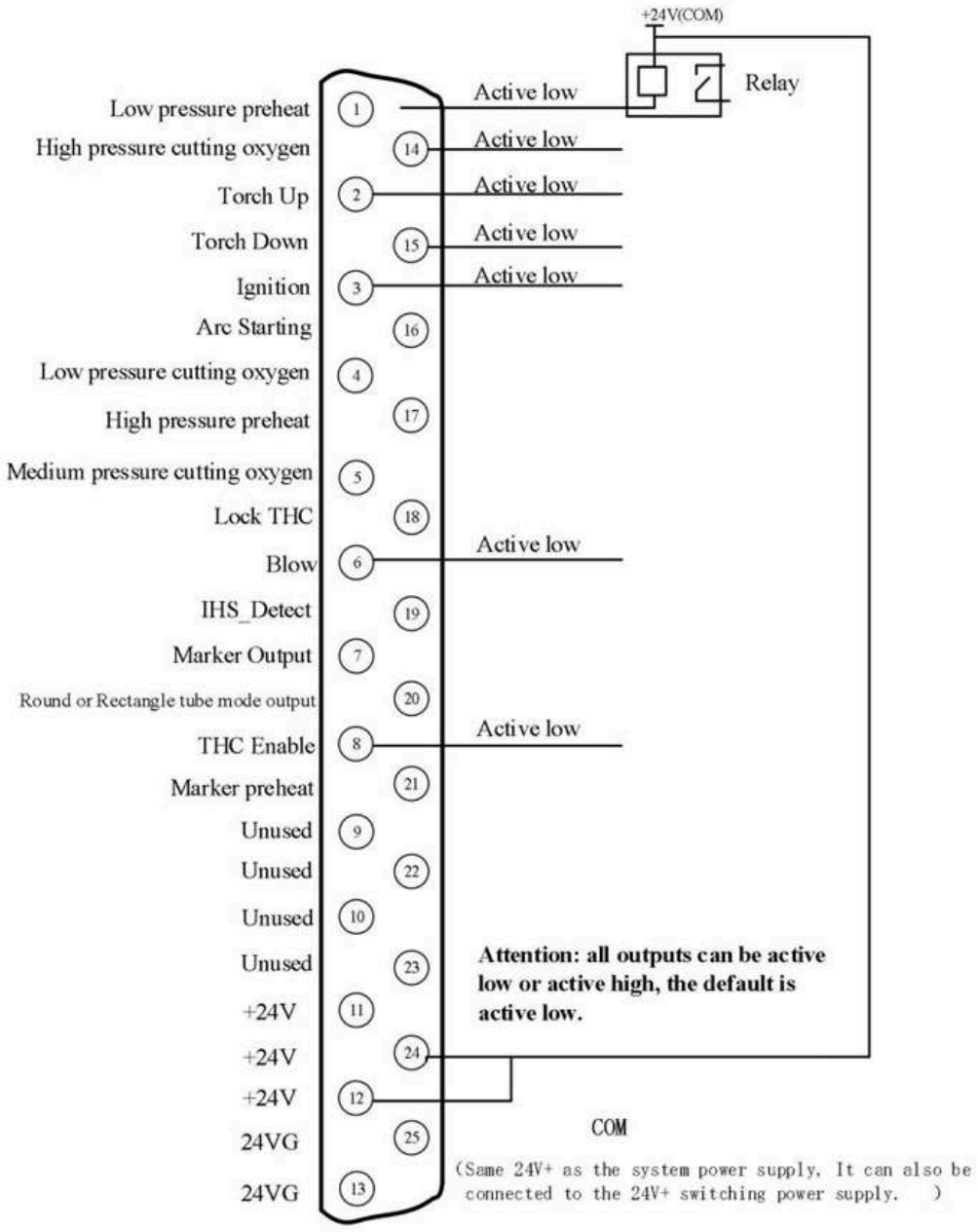


Fig 9.4 Typical wiring diagram of oxygen gas

9.2.2.2 Wiring diagram for level 3 perforation

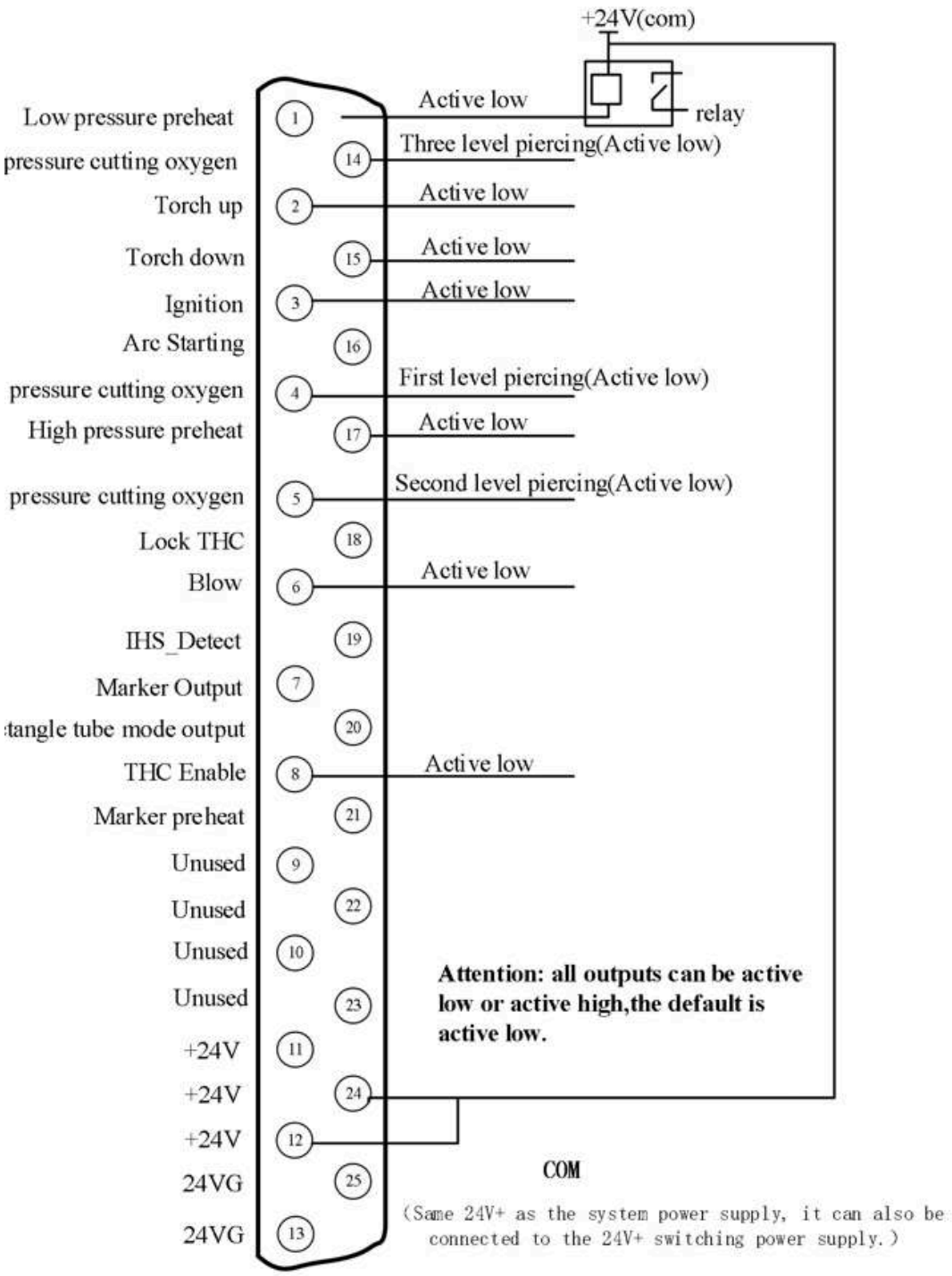


Fig 9.5 Typical wiring diagram of tertiary perforation

9.2.2.3 Typical wiring for powder spraying

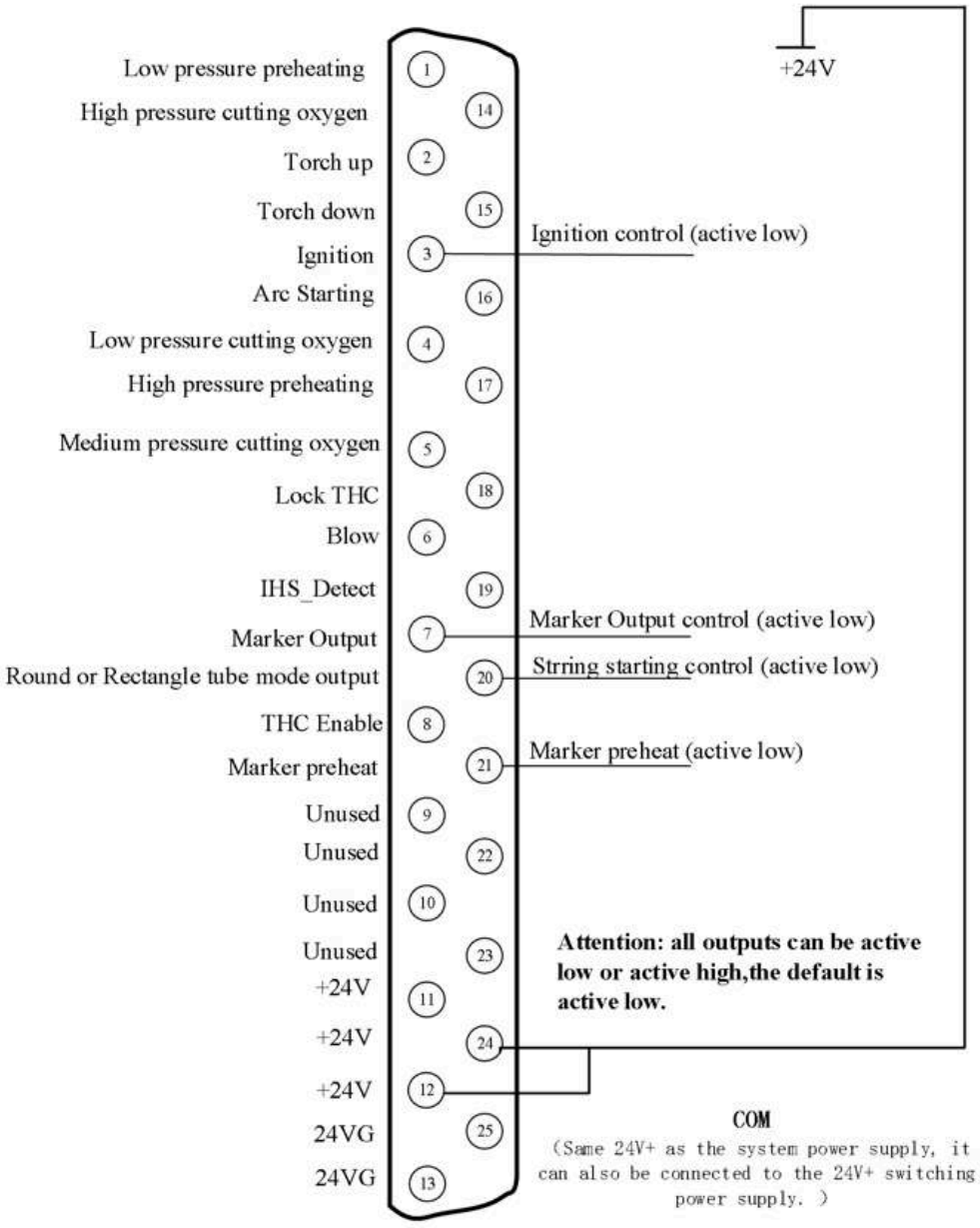


Fig 9.6 Typical powder wiring diagram

9.2.2.4 Typical wiring diagrams when using plasma cutting

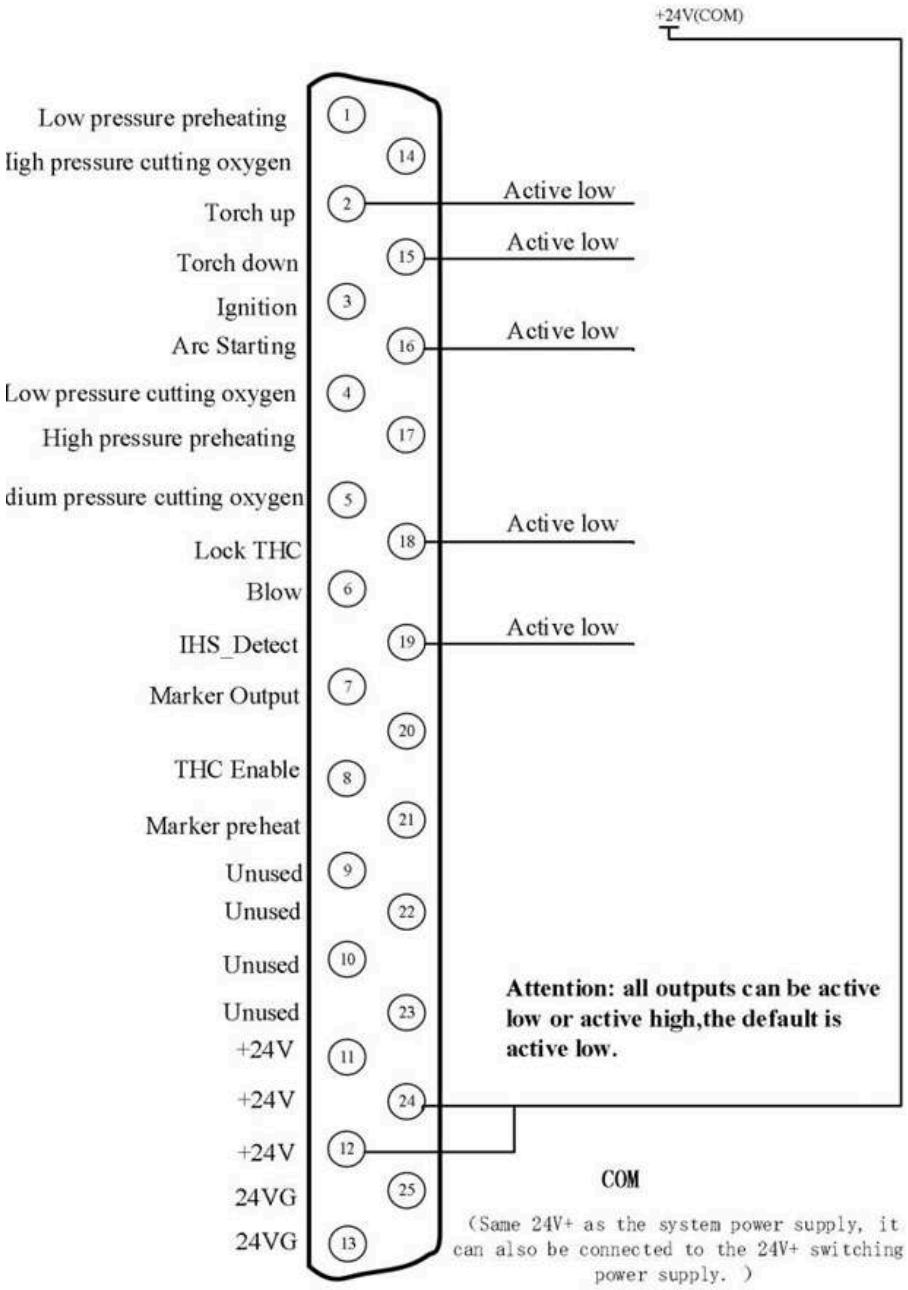


Fig 9.7 Typical plasma wiring diagram

explain:

- **Positioning using the NC system**

When using the positioning function of the CNC system, the first to enter the input configuration interface, the positioning of the successful input type from often closed to often open type, that is, from green "🟢" to red "🔴". At the same time, to the

positioning success signal feedback to the CNC positioning success input port. In the plasma parameter interface (reference section 6.3, plasma parameter), the positioning detection time and positioning rise time are set to the required value.

9.3 Motor interface

The controller supports a 4-axis motor interface.

Round tube mode: the default X-axis is a straight axis, along the tube length direction. The Y axis is the rotation axis of the chuck and is the rotation direction of the tube. Axis B is pendulum axis and tube length offset. The C axis is the pendulum axis and the pipe diameter deflection.

Square tube mode: the default X-axis is a straight axis, along the tube length direction. The Y-axis is a straight axis, along the pipe diameter direction. The C axis is the rotation axis of the chuck and is the rotation direction of the tube. The Z-axis is the lifting axis.

Note: The maximum output of each motor interface is 200 mA current. By default, each motor interface limits two servo drives. Beyond the loaded quantity will cause overload of the motor port and burn out the components!

9.3.1 Motor Interface (Motor)

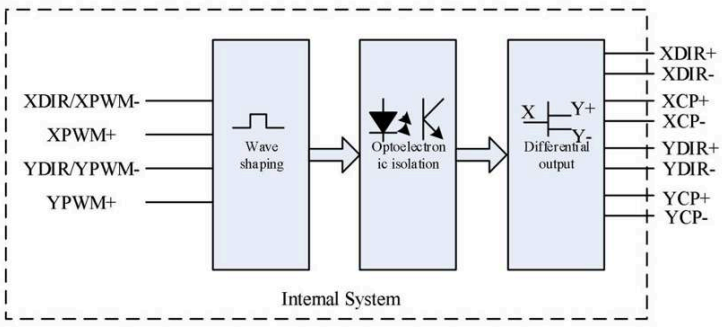


Fig 9.8 Schematic diagram of the motor interface

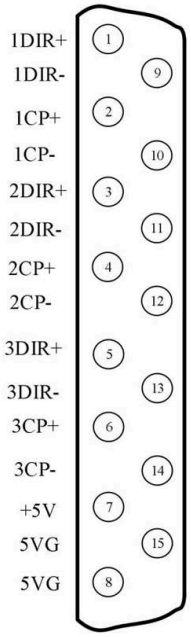


Fig 9.9 Motor interface diagram

- Signal definition table

Table 9.3, Definition table of the motor interface signal

The 15-core interface pin number	Signal name	remarks
1	1DIR+	1 axis direction is positive, default X axis
9	1DIR-	1 axis direction, default X axis
2	1CP+	1 axis pulse positive, default X axis
10	1CP-	1 axis pulse negative, default X axis
3	2DIR+	2 axis orientation, default Y axis
11	2DIR-	2 axis direction, default Y axis
4	2CP+	The 2-axis pulse is positive, with the default Y-axis
12	2CP-	The 2-axis pulse is negative, with the default Y-axis

5	3DIR+	3 axis is orientation with default B / Z axis
13	3DIR-	The 3-axis has a negative orientation, with the default B / Z axis
6	3CP+	3-axis pulse positive with default B / Z axis
14	3CP-	The 3-axis pulse is negative, with the default B / Z axis
7	+5V	+ 5V / 300 mA power supply output
15, 8	5VG	Ground of the 5V power supply

9.3.2 Motor 2 interface

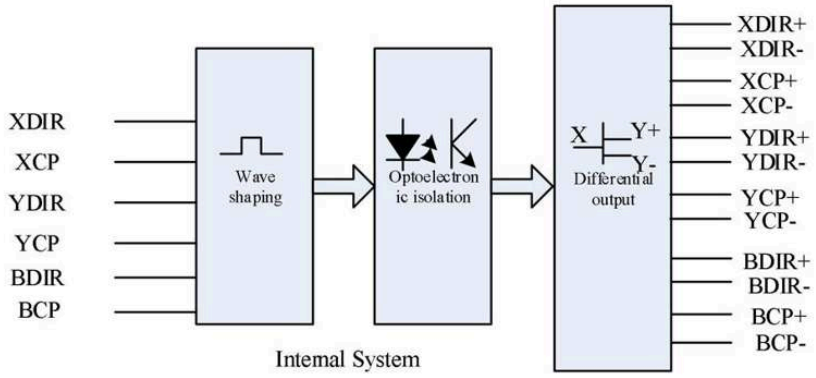


Fig 9.10 Schematic diagram of the motor interface

- Signal definition table

Table 9.4 Definition of Motor 2

The 15-core interface pin number	Signal name	remarks
1	1DIR+	4 axis is positive with default C axis
9	1DIR-	4 axis direction, default C axis
2	1CP+	The 4-axis pulse is positive, with the default C-axis
10	1CP-	The 4-axis pulse is negative, with the default C-axis

7	+5V	+ 5V / 300 mA power supply output
15, 8	5VG	Ground of the 5V power supply

9.3.3 Typical wiring diagram of the motor interface

9.3.3.1 Differential step drive connection

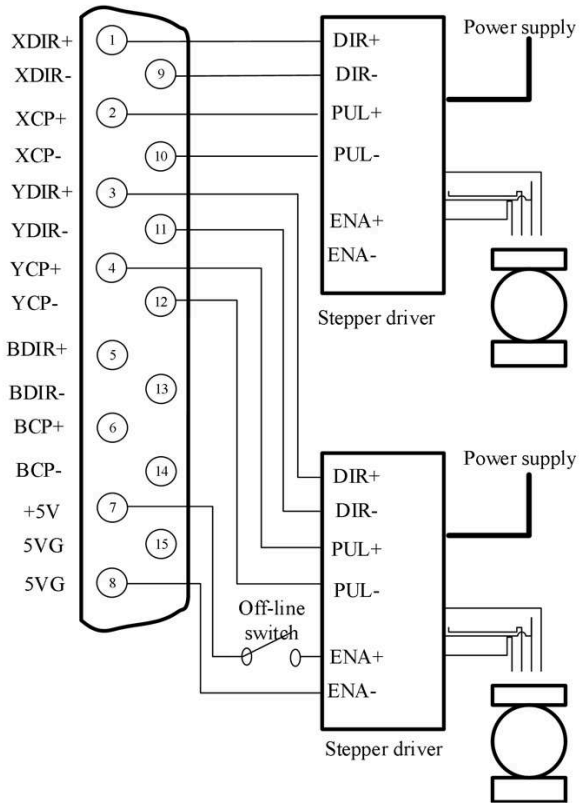


Fig 9.11 Differential step drive connection method (B and C axes are the same)

9.3.3.2 Common-anode step drive connection metho d

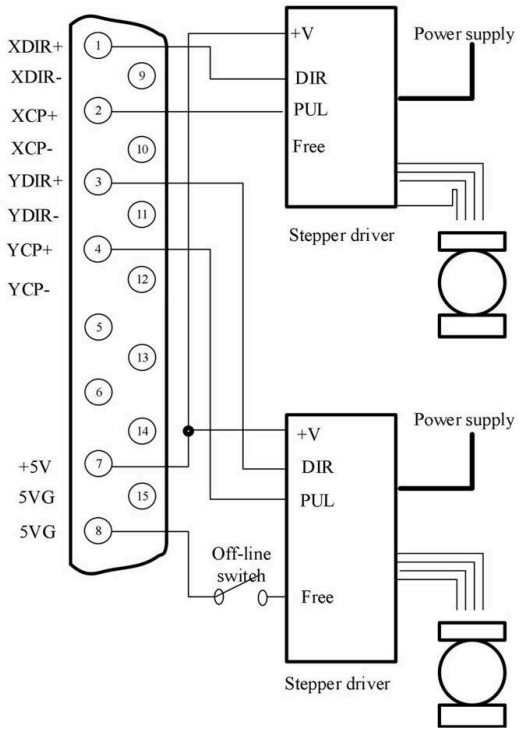


Fig 9.12 Common-anode step drive connection method (A and C axes are the same)

9.3.3.3 Servo drive connection

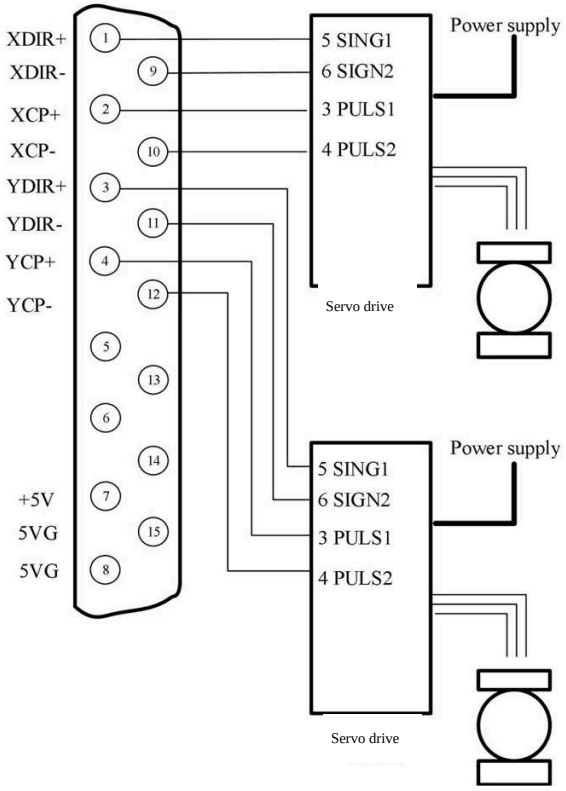


Fig 9.13 Servo drive connection method (A and C axial connection method is the same)

9.4 Description of power port (Power In)

Power supply port (Power In) input pin 24V-, 24V +, PE.

Table 9.5 Definition table of the power supply port signal

3-core interface pin	Signal name	remarks
1	24V-	24V, the power supply ground
2	24V+	The 24V power supply positive electrode
3	PE	landing

Chapter 10 BIOS use

For system upgrades and system restore, also refer to section 7.6.11 System Upgrade, which is similar to Section 7.6.11 When the system is just powered on, the system prompts in FIG 10.1



Fig 10.1 Power prompt

When the prompt of Figure 10 appears, before the countdown to 0, if the F2 key is pressed, the system enters the BIOS interface. If any other keys are pressed, the system ends the countdown and enters the system.



Fig 10.2 The BIOS interface

10.1 System upgrade

After entering BIOS, the system can be upgraded by [F1] and the following conditions shall be met before upgrading:

- The U disk is plugged into the system
- The upgrade file F2000V5.upg is located in the root directory of the U disk

If the above two conditions are met at the same time, the system can be upgraded after pressing F1. After the upgrade, the system can be restarted by pressing [F6].

10.2 and the system backup

After entering BIOS, the system can be backed up by [F4]. The system backup only backs up the operating system, not backup parameters, IO port configuration, coordinate configuration, etc.

10.3 and the system reduction

After entering BIOS, restore the previously backed up system according to [F5]. The restored system restored here does not affect the user's parameters, IO port configuration, coordinate system configuration, etc., so it is recommended to use the restore system function here.

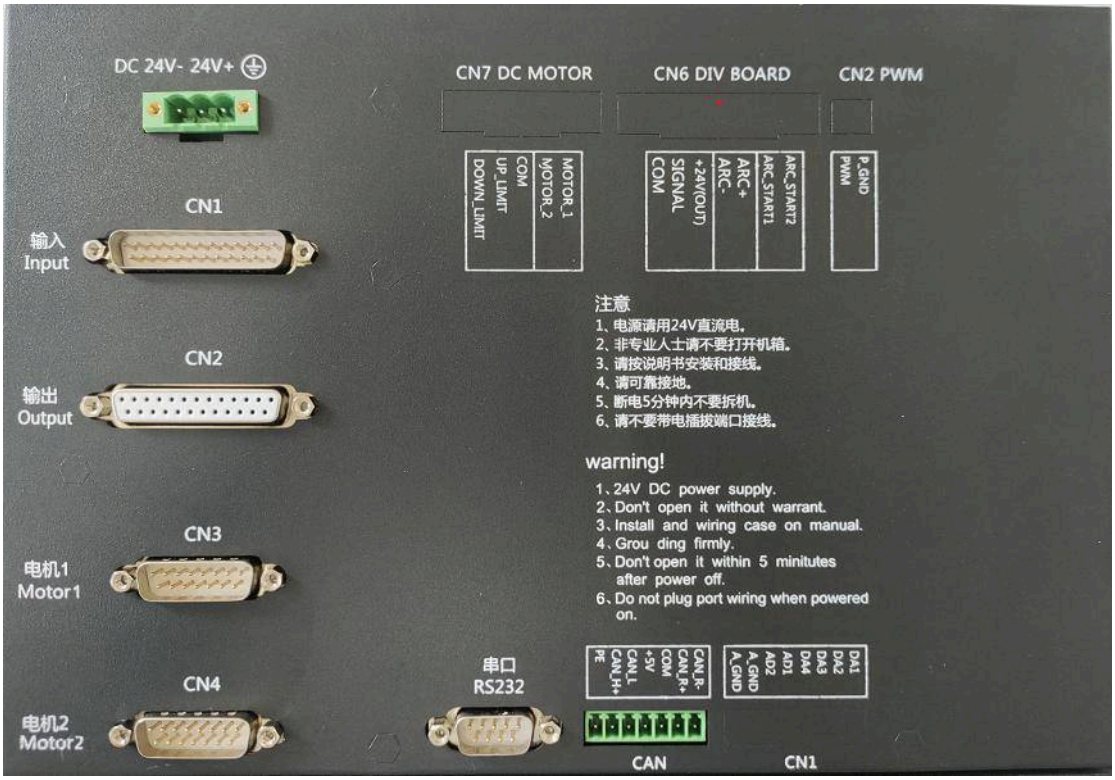


Fig 11.3, the back side interface diagram

The wiring is defined as shown in Figure 10.4.

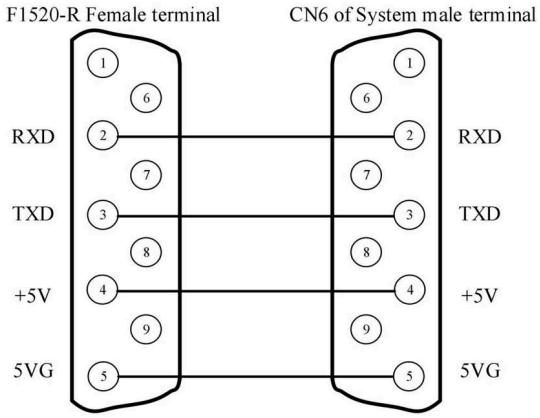


Fig 11.4 F1520-R wiring definition diagram

Appendix 1 G, M code for quick access

order number	instruct	function
1	G99	Rotation, scale, and mirror image
2	G92	reference coordinate
3	G91	relative coordinate
4	G90	absolute coordinate
5	G20	English unit
6	G21	metric unit
7	G26	The X-axis quickly returns to the reference point
8	G27	The Y-axis quickly returns to the reference point
9	G28	X, the Y-axis quickly returns to the reference point
10	G41	Left slit compensation
11	G42	Right slit compensation
12	G40	Cancel slit compensation
13	G00	quick travel
14	G01	Straight line processing
15	G02	Shun round processing
16	G03	Inverse round processing
17	G04	Program delay
18	M07	Ignition cycle
19	M08	Turn off the cutting cycle
20	M00	suspend
21	M02	end of program

Appendix 2 IO timing diagram of the CNC system

A2.1 Oxygen-gas cutting timing

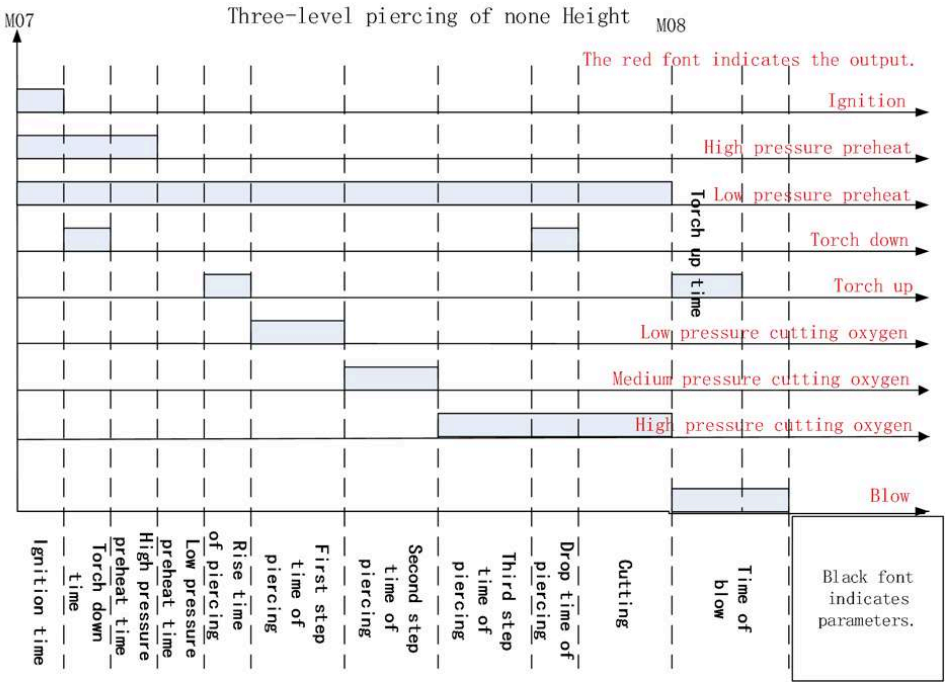


Fig. 2.1 Oxygen gas cutting timing diagram (without elevation regulator stage 3 perforation)

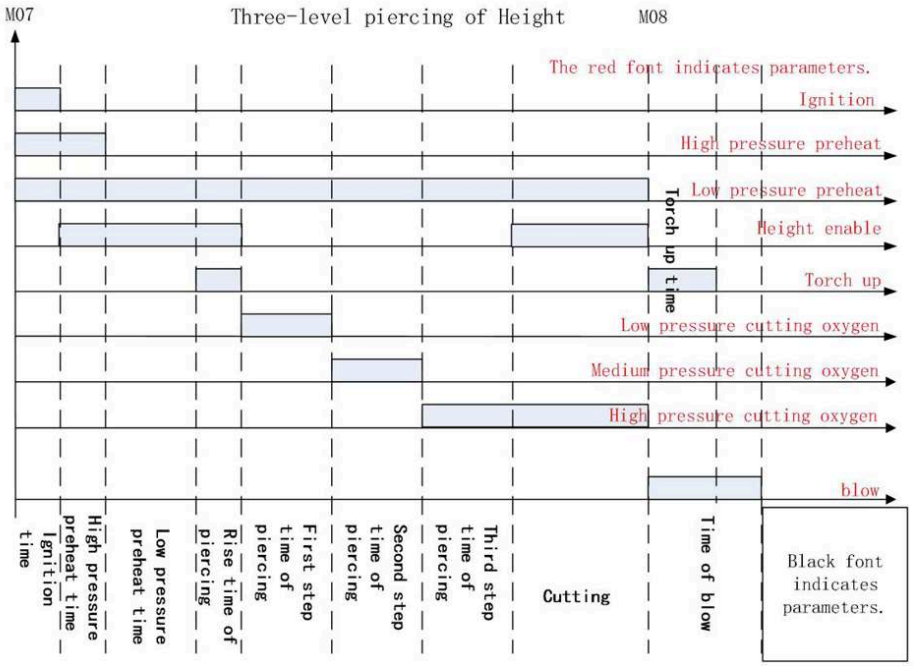


Fig. 2.2 Oxygen gas cutting timing diagram (with elevation regulator 3 perforation)

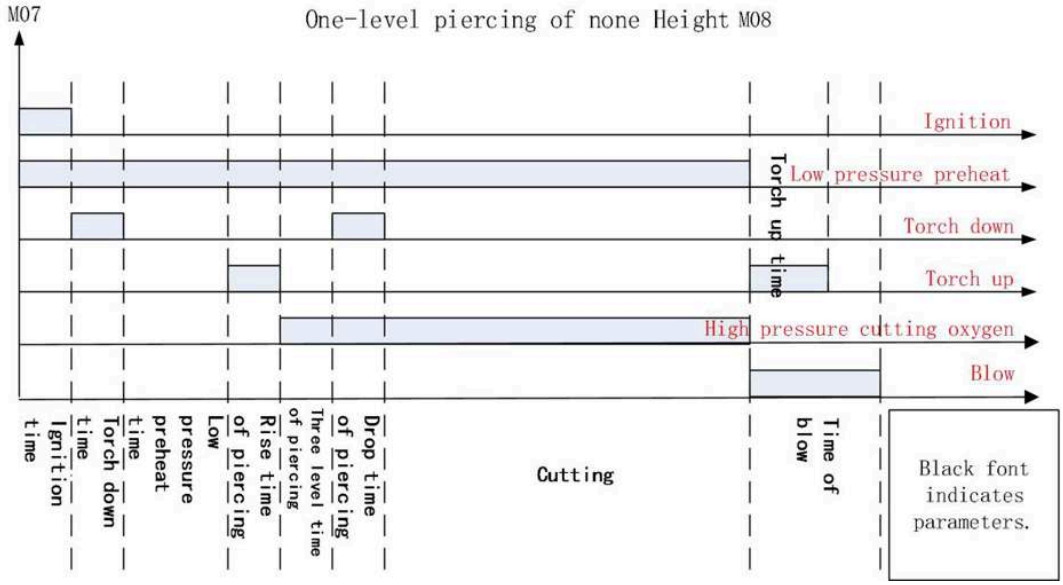


Fig. 2.3 Oxygen gas cutting timing diagram (no risper primary perforation)

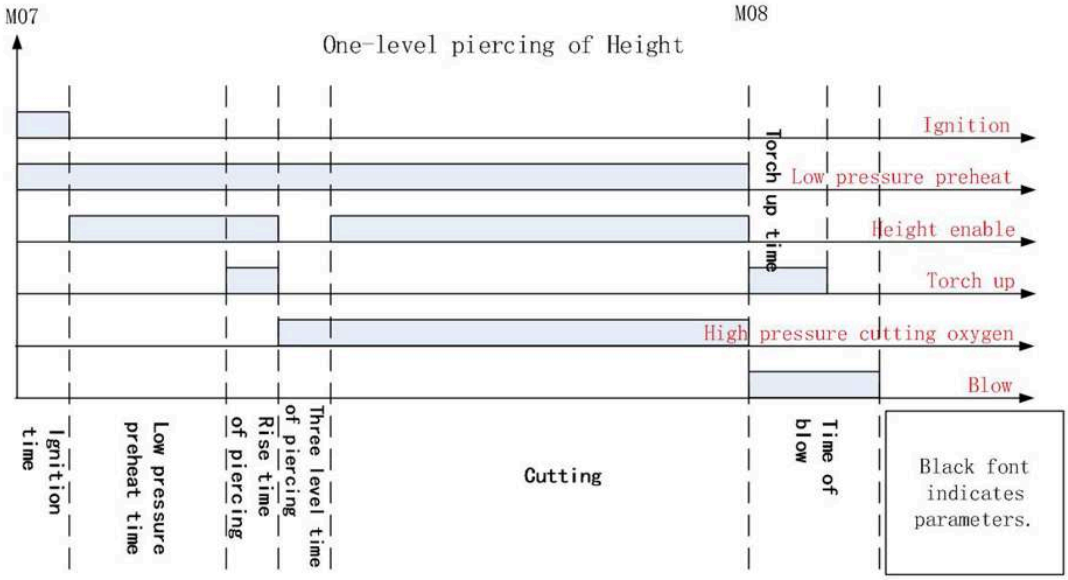
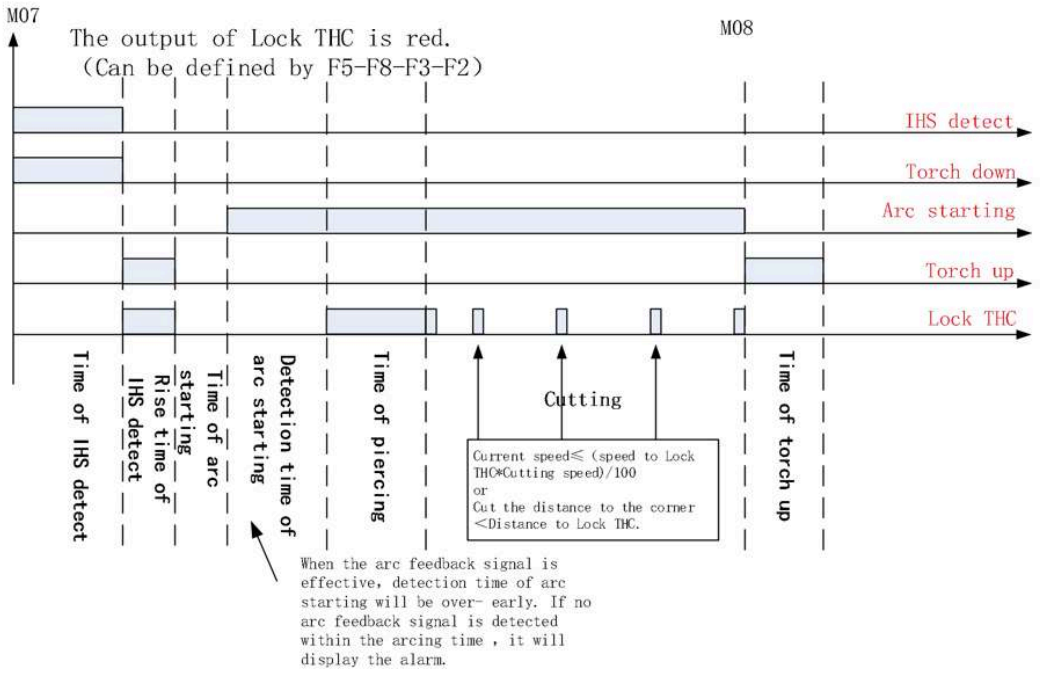
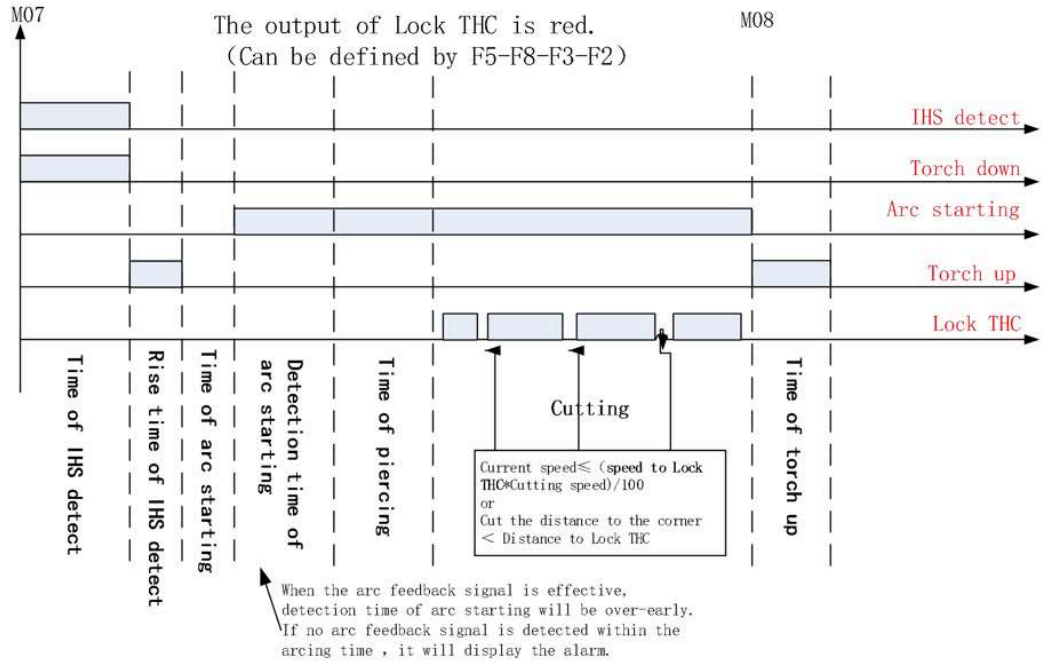


Fig. 2.4 Oxygen gas cutting timing diagram (with elevation regulator first stage perforation)

A2.2 Plasma IO timing sequence



Attached Fig 2.5 Plasma cutting IO timing diagram 1



Attached Fig 2.6 Plasma cutting IO timing diagram 2



Cruxweld NEXOR 1140 – CNC Plasma Pipe Cutting Machine

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