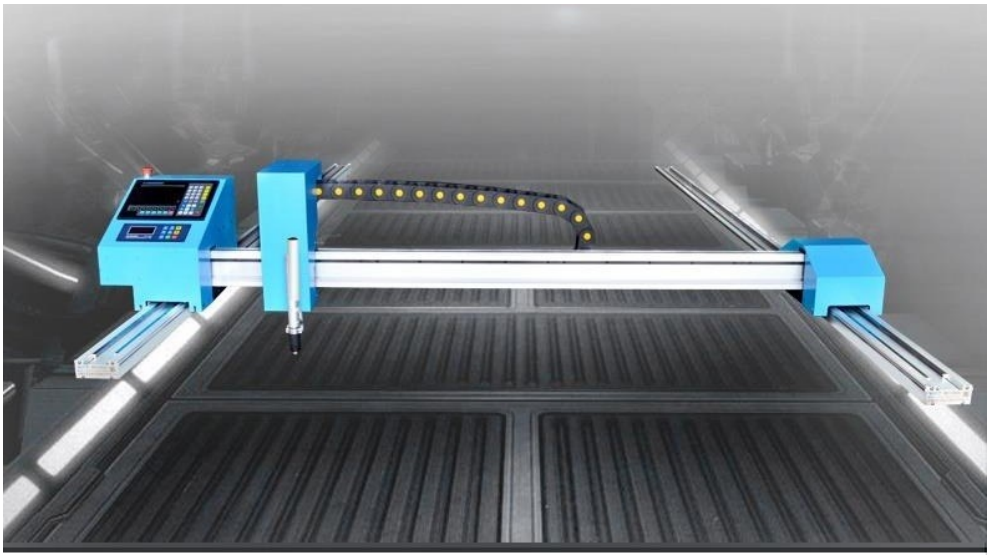
CRUXWELD®

INDUSTRIAL EQUIPMENTS PVT. LTD.

ProGantry 2560

Dual-Drive Gantry CNC Plasma & Flame Cutting Machine

Cutting area 2500 x 6300 mm | Plasma 0.5–30 mm | Flame 5–200 mm | Integrated arc-voltage THC



USER MANUAL

Part I – Machine: safety, installation, operation and maintenance • Part II – CNC controller: operation and installation

Read this manual completely before installing or operating the machine. Keep it for future reference.

Cruxweld Industrial Equipments Pvt. Ltd.
5, Sector 29, Faridabad – 121008 (Haryana), India
Phone: +91 8800 882 983 | +91 (129) 489 2868 Email: sales@cruxweld.com | Service: support@cruxweld.com
www.cruxweld.com

Contents

How the two parts work together

Part I covers the ProGantry 2560 as a machine: the gantry, rails, drives, torch station, gas and plasma connections, day-to-day operation, maintenance and troubleshooting. It is written for the owner, the installer and the operator.

Part II is the full operation and installation manual of the CNC shape-cutting controller fitted to the machine. It explains every screen, key, parameter, the shape library, G-code programming, input/output ports, the torch height controller (THC) and the remote controllers. Part II has its own contents list; page references inside Part II refer to Part II page numbers.

Before cutting for the first time, read Part I completely and at least the following of Part II: *User Guide*, *Chapter 2 Starting Up*, *Chapter 3 Cutting Function*, *Chapter 5 Manual Function* and *Chapter 7 Parameter Setting*.

Documents supplied with the machine

- This user manual (Part I and Part II).
- The operating manual of the plasma cutting power source supplied with the machine (if a plasma package was ordered).
- The manual of the nesting / CAD-CAM software and its USB installation media.
- Packing list and test / inspection certificate.

1 About this manual

Thank you for choosing the Cruxweld **ProGantry 2560** dual-drive gantry CNC cutting machine. This manual describes how to install, connect, operate and maintain the machine safely. Keep it near the machine and make sure every operator has read it.

1.1 Intended use

The ProGantry 2560 is designed for two-dimensional thermal cutting of flat metal plate by plasma arc or oxy-fuel flame, with the plate supported on a suitable cutting table. It is intended for industrial use by trained personnel. Any other use – for example cutting non-metallic materials, cutting containers that have held flammable substances, or use as a lifting or positioning device – is not permitted.

1.2 Symbols used in this manual

Symbol	Meaning
▲ DANGER	Indicates an immediate hazard which, if not avoided, will result in death or serious injury.
▲ WARNING	Indicates a hazard which, if not avoided, could result in death or serious injury.
▲ CAUTION	Indicates a hazard which, if not avoided, may result in minor injury or damage to the machine or workpiece.
NOTE	Useful information for correct and efficient use of the machine.

1.3 Qualification of personnel

- **Installation and electrical connection** must be carried out by a qualified electrician / service technician in accordance with local regulations.
- **Operation** is permitted only for persons who have been trained on this machine, have read Part I and the relevant chapters of Part II, and are familiar with the hazards of plasma and flame cutting.
- **Maintenance** beyond the daily and weekly tasks in Chapter 11 must be performed by trained service personnel.

1.4 Machine identification

The rating plate is fitted on the CNC drive unit. When contacting Cruxweld for service or spare parts please quote the model (ProGantry 2560), the serial number and the date of purchase. Record them here:

Model	ProGantry 2560
Serial number	
Date of purchase / commissioning	
Plasma power source (make / model / max. current)	
Supplied by	Cruxweld Industrial Equipments Pvt. Ltd., Faridabad

Continuous improvement: Cruxweld reserves the right to change the technical data, appearance and scope of supply of the ProGantry 2560 without notice. The illustrations in this manual may differ in detail from the machine delivered.

2 Safety

▲ Read all safety instructions before installing, connecting or operating the machine.
Plasma and flame cutting produce electric shock hazards, extremely bright arc radiation, hot metal, sparks, fumes, noise and fire risk. The gantry moves automatically under program control and can start without warning.

2.1 Electric shock can kill

- The plasma power source delivers dangerous open-circuit voltage to the torch. Never touch the torch tip, electrode or workpiece while the plasma source is switched on.
- Connect the machine, the plasma source and the cutting table to a proper protective earth. Never operate with a damaged earth conductor.
- Switch off and isolate the supply before opening the CNC drive unit, the plasma source or any junction box. Only a qualified electrician may work on the electrical system.
- Keep cables, hoses and the drag chain away from hot slag and from the cutting path. Replace damaged cables immediately.
- Do not operate the machine in rain or where water can collect on the floor or on the plate.

2.2 Arc rays, sparks and hot metal

- Plasma arc radiation burns eyes and skin. Wear a cutting face shield or goggles with the correct filter shade (typically shade 5–9 for plasma depending on current; shade 5–6 for flame cutting), flame-resistant clothing, gauntlets and safety boots.
- Screen the cutting area so that bystanders are not exposed to arc radiation.
- Cut parts, skeleton and slag remain hot for a long time. Handle only with tongs or gloves.

2.3 Fumes and gases

- Cutting produces metal fumes and gases that are harmful to health. Provide a downdraft or water cutting table with extraction, or adequate general ventilation.
- Do not cut galvanised, coated, painted or degreased plate without extraction. Never cut in a confined space.
- Do not use chlorinated solvents near the arc: ultraviolet radiation can form toxic phosgene gas.

2.4 Fire and explosion

- Sparks and slag travel several metres. Remove all flammable material (oil, rags, paper, gas cylinders, paint) from at least 10 m around the machine and keep a suitable fire extinguisher at hand.
- Never cut drums, tanks or pipes that have contained flammable or unknown substances.
- Acetylene, propane and LPG are highly flammable. Check all gas connections for leaks with soap solution – never with a flame. Fit flashback arrestors at the regulator outlets and at the torch inlet.
- Oxygen must never come into contact with oil or grease. Never use oxygen to blow off clothing or the machine.

2.5 Moving gantry – mechanical hazards

- The gantry travels at up to 5000 mm/min along the rails and the torch carriage traverses the cross beam. Both axes can start automatically when a program is running or when a key on the controller is pressed.
- Keep hands, tools, hoses and clothing clear of the rails, racks, drive wheels, the cross-beam guide and the drag chain while the machine is powered.
- Do not stand or lean on the rails or the cross beam. Do not place objects on the rails or in the travel range of the gantry.
- Only one person operates the machine. Before pressing **START**, make sure nobody is within the machine envelope.
- The **emergency stop** button on the CNC drive unit stops all motion immediately. Check its function every day (see Chapter 9.1). Reset it only after the cause has been removed.
- Pinch points exist between the drive carriage and the rail end stops; keep the rail ends free.

2.6 Gas cylinders and pressure

- Secure cylinders upright with chains. Keep them away from heat, sparks and the cutting area. Close the cylinder valves when the machine is not in use.
- Use only regulators, hoses and fittings designed for the gas concerned. Oxygen hose: blue/green, right-hand thread; fuel-gas hose: red/orange, left-hand thread.
- The maximum inlet pressure to the machine gas manifold and solenoid valves is **0.1 MPa (1 bar)**. Never exceed it.

2.7 Noise

Plasma cutting, especially at high current, generates noise levels above 85 dB(A). Wear hearing protection and provide it to persons working nearby.

2.8 Pacemakers and magnetic fields

The plasma arc and its cables create strong magnetic fields. Persons with pacemakers or other implanted medical devices must consult a physician before approaching the machine while cutting.

2.9 Personal protective equipment (PPE)

Task	Minimum PPE
Plasma / flame cutting, watching the cut	Face shield or goggles with correct filter shade, flame-resistant jacket, leather gloves, safety boots, hearing protection
Loading and unloading plate and parts	Safety helmet when using a crane, heat-resistant gloves, safety boots
Cleaning the cutting table, slag removal	Respirator (P2/P3), goggles, gloves
Maintenance	Isolate the machine; gloves; eye protection when using compressed air

2.10 Safety labels

Keep all warning labels on the machine clean and legible. Replace damaged labels; replacements are available from Cruxweld.

> **▲ WARNING – Emergency procedure**
> 1. Press the emergency stop. 2. Switch off the plasma source / close the gas cylinder valves. 3. In case of fire, use a CO_2 or dry-powder extinguisher; never water on live equipment. 4. Give first aid and call for medical help; electric-shock and burn victims must always be examined by a doctor.

3 Machine overview

The ProGantry 2560 is a portable-style gantry cutting machine: two parallel guide rails carry a longitudinal drive carriage on each side, connected by an aluminium cross beam. Both longitudinal carriages are motor-driven (**dual drive**) so the beam stays square at all speeds. The torch carriage runs along the cross beam and carries a motorised torch lifter with an integrated arc-voltage torch height controller (THC). The CNC controller, drive electronics and gas solenoid valves are housed in the drive unit on the master side.

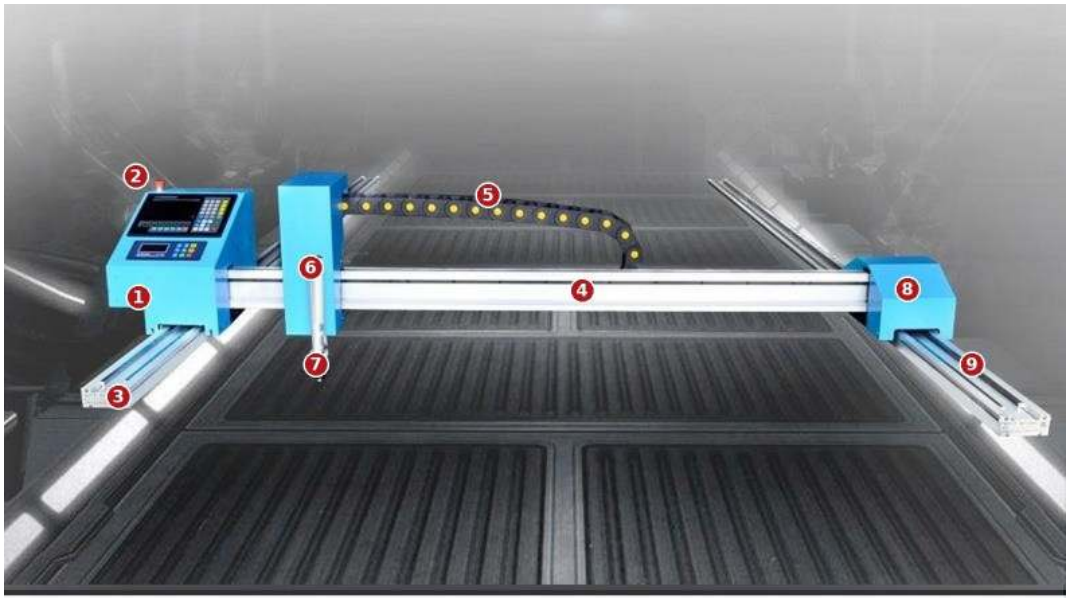


Fig. 3-1 Main assemblies of the ProGantry 2560

1. CNC drive unit (master side) with controller, keypad, display and USB port
2. Emergency-stop button and power switch
3. Guide rail, master side (3500 mm sections, rack drive)
4. Cross beam (transverse axis, 2500 mm effective travel)
5. Reinforced nylon drag chain carrying torch cables and gas hoses
6. Torch carriage with motorised torch lifter (150 mm stroke) and THC
7. Plasma torch / flame cutting torch with auto-ignition
8. Drive unit, slave side (second longitudinal motor)
9. Guide rail, slave side

3.1 Key features

- **Wide cutting range:** 2500 mm x 6300 mm effective cutting area for full-size plates.
- **Dual rail, dual drive:** two stepper-driven longitudinal carriages on two rails give stability and squareness for plasma and oxy-fuel cutting.
- **Advanced CNC control:** shape library of 95 parametric patterns, G-code input by USB or keypad, nesting software compatible with common CAD systems.
- **Integrated height control:** electric torch lifter plus arc-voltage THC keeps the torch at the correct height on uneven plate.
- **Two processes on one machine:** plasma 0.5–30 mm; flame 5–200 mm with automatic ignition.
- **Operating functions:** trial run, reverse along the path, plate alignment, mirror, array, breakpoint recovery, kerf compensation.
- **Protected cable routing:** reinforced nylon drag chain prevents hose wear and reduces overshoot in fast corners.
- **Space-efficient design:** light modular construction, quick to install and to relocate.

4 Technical specifications

Model	ProGantry 2560
Machine type	Dual-drive gantry CNC cutting machine (portable gantry type)
Effective cutting width	2500 mm
Effective cutting length	6300 mm (extendable with additional rail sections)
Drive mode	Double driver (one motor on each longitudinal carriage)
Cutting mode	Plasma and flame (oxy-fuel) cutting
Moving (rapid) speed	0 – 5000 mm/min
Cutting speed, flame	0 – 750 mm/min
Cutting speed, plasma	0 – 3000 mm/min
Torch lift distance	150 mm
Flame cutting thickness	5 – 200 mm
Plasma cutting thickness	0.5 – 30 mm (depending on plasma power source)
Plasma power options	Range from 63 A to 160 A
Power supply	220 V / 110 V, 50/60 Hz, single phase (machine control); plasma source per its own rating plate
Program input	Keypad or USB port
Gas pressure (inlet to machine)	Max. 0.1 MPa
Working precision	±0.2 mm/m
Shape library	95 patterns
Ignition device	Automatic (high-voltage ignition for flame cutting)
Height control	Integrated electric and arc-voltage (THC) height adjustment
Software	Advanced nesting software compatible with AutoCAD, SolidWorks, CAXA and more
Motor	Stepper motor
Operation functions	Trial run, reverse, plate alignment, mirror, array
Processing materials	Carbon steel, stainless steel, aluminium sheets, galvanised sheets
Working temperature	−10 °C to 60 °C
Guide rail size (L x W x T)	3500 x 273 x 60 mm per section
Overall dimensions (CNC drive unit)	610 x 458 x 418 mm
Total weight	260 kg

4.1 Environmental and supply requirements

Item	Requirement
Ambient temperature / humidity	−10 °C to 60 °C; relative humidity 5–95 %, non-condensing (controller: 0–50 °C recommended)
Mains supply for the machine	220 V (or 110 V) single phase, 50/60 Hz, with earth; fluctuation within ±10 %; separate protected circuit, min. 10 A
Plasma power source	Own three-phase supply as per the plasma source manual; earth resistance < 4 Ω
Floor	Level concrete floor able to carry the rails, table and plate; rails levelled to within 1 mm over the length
Compressed air (plasma)	Clean, dry, oil-free air as required by the plasma source (typically 0.5–0.7 MPa, 200–400 L/min)
Cutting gases (flame)	Oxygen and acetylene / propane / LPG, regulated to max. 0.1 MPa at the machine inlet
Space	Machine footprint plus at least 1 m free access on all sides; clear height 2 m above the beam

5 Cutting capability and materials

5.1 Plasma cutting

With a plasma power source of 63–160 A the ProGantry 2560 cuts carbon steel, stainless steel, aluminium and galvanised sheet from 0.5 mm up to 30 mm. The arc-voltage THC follows warped or uneven plate, and the high rapid speed (5000 mm/min) keeps cycle times short on nested sheets with many parts.

- Fine detail, small holes and thin sheet: 0.5–6 mm.
- General fabrication, brackets, flanges: 6–20 mm.
- Heavy plate and severance: 20–30 mm (upper range with 120–160 A sources).

Fig. 5-1 Plasma-cut parts, 0.5 – 30 mm

5.2 Flame (oxy-fuel) cutting

The flame cutting torch with automatic ignition cuts carbon steel plate from 5 mm to 200 mm. Preheat, pierce and cut oxygen are switched by the controller through solenoid valves; the pre-heat and pierce times are set in the flame parameters (Part II, Chapter 7.2).

- Use the nozzle size and gas pressures recommended for the plate thickness (Chapter 10).
- Flame cutting is for carbon and low-alloy steel only; stainless steel and aluminium must be plasma cut.
- Thick plate (>100 mm) requires a slow, steady speed and a clean, dry oxygen supply.

Fig. 5-2 Flame-cut plate up to 200 mm thick

5.3 Materials

Material	Plasma	Flame	Remarks
Carbon steel / mild steel	✔	✔	Plasma up to 30 mm, flame up to 200 mm
Stainless steel	✔	–	Plasma only; nitrogen or air plasma depending on source
Aluminium and alloys	✔	–	Plasma only; ensure good extraction
Galvanised / coated sheet	✔	–	Extraction essential (zinc fumes)
Copper, brass, titanium	●	–	Possible with suitable plasma source; test cut first

Fig. 5-3 Typical nested parts produced on the ProGantry 2560

6 Transport, unpacking and site preparation

6.1 Scope of supply

No.	Item	Qty	No.	Item	Qty
1	CNC drive unit (master) with controller and keypad	1	7	Drag chain with cable/hose bundle	1
2	Slave drive unit	1	8	Flame cutting torch with auto-ignition, gas manifold and solenoid valves	1 set
3	Cross beam, 2500 mm effective travel	1	9	Plasma torch holder and THC interface cable	1 set
4	Guide rail sections 3500 x 273 x 60 mm with racks and joints	2 x 2	10	Nesting software on USB, USB memory stick	1
5	Torch carriage with motorised lifter and THC	1	11	Tool kit, fasteners, rail end stops	1 set
6	Power cable and earth cable	1	12	User manual (this document)	1

Check the delivery against the packing list immediately. Report transport damage to the carrier and to Cruxweld within 3 days.

6.2 Handling

- Total weight approximately 260 kg. Lift the crated machine with a forklift or crane using the marked lifting points only. The cross beam and rails must be lifted horizontally, supported at two points, and never dropped or bent.
- Do not lift the assembled machine by the cross beam, the torch carriage or the drag chain.
- Store in a dry place. If the machine is stored below 0 °C, allow it to reach room temperature before powering up to avoid condensation in the controller.

6.3 Site preparation

- **Floor:** level, hard concrete floor. The two rails must be parallel and level with each other; a difference of more than 1 mm over the rail length causes binding and poor cut quality.
- **Cutting table:** provide a slat table (or water table) whose top is 100–200 mm below the underside of the cross beam and whose length and width match the cutting area. The table must be electrically bonded to the earth of the plasma source.
- **Space:** at least 1 m of free space around the machine for plate loading, maintenance and the operator; keep the operator side (master drive unit) free of obstacles.
- **Ventilation:** downdraft extraction through the table or a general extraction system. The cutting area must not be enclosed without ventilation.
- **Power:** a dedicated earthed socket for the machine controller (220 V / 110 V) and a separate three-phase supply for the plasma source, both with correctly rated protection and an isolating switch within reach of the operator.
- **Gas and air:** gas cylinders or manifold outlet with regulators and flashback arrestors; compressed-air supply with filter/dryer for plasma. Keep cylinders outside the spark zone.
- **Lighting:** good general lighting without glare on the controller display.

Placing the drive unit: the master drive unit (with the controller) is normally placed on the operator's side. Route the mains cable and the plasma interface cable so that they cannot be run over by the carriage or reached by sparks.

7 Mechanical installation

Installation takes two persons about half a day. Work in the sequence below and complete each step before moving on. Fasteners are supplied in the tool kit.

7.1 Laying and levelling the guide rails

1. Mark two parallel lines on the floor for the rails. The centre distance of the rails is fixed by the cross beam – measure it between the carriage centres before marking.
2. Lay the first rail section on the master side, then join the second section with the joint plates so that the rack teeth continue without a step. Check the joint with a straight edge: no gap, no step.
3. Repeat for the slave rail. Measure the diagonals between the rail ends: both diagonals must be equal within 2 mm to ensure the rails are square.
4. Level each rail with a precision spirit level or laser level; shim under the rail feet where required. Rails must be level along and across within 1 mm over the full length and level with each other.
5. Fix the rails to the floor with the anchor bolts / clamps supplied and fit the end stops at both ends of both rails.

7.2 Fitting the drive units and the cross beam

1. Place the master drive unit on the master rail and the slave drive unit on the slave rail. The guide wheels must sit on the rail track and the drive pinions must engage the racks over their full width.
2. Lift the cross beam horizontally and bolt its ends to the two drive units. Do not fully tighten yet.
3. Push the gantry by hand along the whole rail length. It must run freely without binding at any point. If it binds, re-check rail parallelism and levelling.
4. Square the beam to the rails: move the gantry against the end stops at one end and check that both drive units touch the stops simultaneously; adjust and tighten all beam bolts.

7.3 Torch carriage, lifter and torches

1. Slide the torch carriage onto the cross-beam guide and adjust the guide wheels so that it runs freely without play.
2. Fit the motorised torch lifter to the carriage and connect the lifter motor and THC cables.
3. Mount the flame torch (or the plasma torch in its insulated holder) in the lifter clamp, perpendicular to the plate in both directions. Check with a square.
4. Set the torch so that at the lowest lifter position the nozzle is approximately 5 mm above the plate; the 150 mm stroke gives room for THC correction and torch-up travel.

Fig. 7-1 Flame torch and gas manifold on the torch lifter

7.4 Drag chain and cable routing

1. Fix the drag chain support to the cross beam and the moving end to the torch carriage. The chain must lie flat and roll freely over the full traverse.
2. Lay the torch cables, THC cable, ignition cable and gas hoses inside the chain without twisting; leave a loop at the moving end so that nothing is stretched at the extreme positions.
3. Close the chain links and secure the cables with the clamps at both ends only – never inside the chain.
4. Route the longitudinal cable bundle (mains, plasma interface, slave-drive cable) alongside the master rail, protected from sparks and traffic.

Fig. 7-2 Reinforced nylon drag chain and solenoid valves on the drive unit

8 Electrical, plasma and gas connections

> **▲ WARNING**
> All connections must be made by a qualified technician with the mains supply switched off and locked out. Detailed pin-outs of the controller input/output ports, the plasma arc-start relay, the arc-voltage divider and the THC are given in Part II, Chapters 11, 13 and Appendix 3.

8.1 Mains and earth

1. Confirm that the supply voltage matches the setting of the drive unit (220 V or 110 V, 50/60 Hz).
2. Connect the mains cable to an earthed socket on a separately protected circuit. The earth conductor must be continuous from the socket to the drive unit.
3. Connect the separate earth cable from the earth terminal of the drive unit to the cutting table and to the earth bar of the workshop. Poor earthing causes controller resets, lost steps and THC errors.
4. Connect the slave drive-unit cable and the torch-carriage cable to the marked sockets on the master drive unit.

8.2 Plasma power source interface

1. Install the plasma power source according to its own manual (three-phase supply, air supply, work lead clamped to the cutting table or plate).
2. Connect the **arc-start** (torch start) contacts of the plasma source to the plasma start output of the controller.
3. Connect the **arc-transfer / OK-to-move** signal (if the source provides it) to the corresponding controller input so that motion starts only after the arc has transferred.
4. Connect the **arc-voltage divider** output of the plasma source to the THC input. Set the divider ratio in the THC parameters (Part II, Chapter 3.12).
5. Fit the plasma torch in the insulated holder on the lifter and route the torch lead through the drag chain. Keep the torch lead away from the controller signal cables.

8.3 Flame cutting gas connections

1. Fit regulators and flashback arrestors to the oxygen and fuel-gas cylinders (or manifold outlets).
2. Connect oxygen (blue/green hose, right-hand thread) and fuel gas (red hose, left-hand thread) to the marked inlets of the gas manifold on the machine.
3. Set the regulators so that the pressure at the machine inlet does not exceed **0.1 MPa**; the working pressures for each nozzle are given in Chapter 10.
4. Open the cylinder valves slowly and check every joint with leak-detection solution. Repair any leak before ignition.
5. Check that the controller operates the preheat oxygen, fuel gas, cut oxygen and ignition outputs in the manual mode (Part II, Chapter 5) before the first cut.

8.4 Compressed air (plasma)

- Supply clean, dry air through a filter/regulator with water separator; oil or moisture destroys plasma consumables.
- Pressure and flow according to the plasma source manual (typically 0.5–0.7 MPa).

8.5 Software and USB

- Install the nesting software on a workshop PC from the USB supplied. It converts DXF/DWG drawings into the G-code (.txt / .cnc) files read by the controller.
- Transfer programs to the machine on a FAT32-formatted USB stick through the USB port on the drive unit (Part II, Chapter 6).

8.6 Commissioning checks

- Emergency stop cuts all motion and the plasma start output.
- Jog direction on the keypad matches the machine direction (Part II, Chapter 7.5 for direction settings).
- Both longitudinal motors run; beam stays square.
- Torch lifter up/down and THC respond.

9 Operation

This chapter gives the daily working sequence. The keys, screens and parameters referred to are described in Part II.

9.1 Pre-start checklist (every shift)

☐	Rails and racks clean, free of slag, tools and cables; end stops in place	☐	Emergency stop released, then tested once after power-on
☐	Cross-beam guide and drag chain free; hoses and cables undamaged	☐	Plasma consumables (nozzle, electrode, swirl ring, shield) in good condition
☐	Earth cable connected to table; work lead of plasma source clamped	☐	Flame nozzle clean, gas hoses leak-free, regulators set, flashback arrestors fitted
☐	Air supply dry; water separator drained	☐	Fire extinguisher at hand; no flammable material within 10 m; PPE worn

9.2 Switching on and homing

1. Switch on the mains switch of the drive unit. The controller starts and shows the main screen (Part II, Chapter 2.1).
2. Switch on the plasma power source (plasma cutting) or open the gas cylinder valves (flame cutting).
3. Jog the gantry and the torch carriage with the direction keys to check free movement over the whole area (Part II, Chapter 5).
4. If the machine was moved by hand or after an emergency stop, return to the reference point (Part II, Chapter 3.6) or set a new working origin.

9.3 Loading the plate and aligning

1. Place the plate on the table with a crane; keep the plate edge roughly parallel to the rails and inside the 2500 x 6300 mm cutting area.
2. Jog the torch to the start corner of the plate and set it as the program origin.
3. Use the **plate alignment** function (Part II, Chapter 4.3): move the torch to a second point on the same plate edge; the controller calculates the skew angle and rotates the program to match the plate, so the plate need not be perfectly straight on the table.

9.4 Selecting or loading a program

- **Shape library:** choose one of the 95 built-in patterns, enter the dimensions and kerf, and the controller generates the part (Part II, Chapter 9).
- **USB:** load a G-code program created with the nesting software (Part II, Chapter 6).
- **Keypad:** short programs can be typed or edited directly on the controller (Part II, Chapter 6.4 and Chapter 10 for the G-code reference).
- Apply **mirror**, **array** (rows and columns of the same part), rotation or scaling as required (Part II, Chapter 4).

9.5 Trial run

Run the program with the **trial run** function first: the gantry follows the complete contour at cutting speed without igniting the torch. Check that the whole part lies on the plate, that the torch clears clamps and table edges, and that the speed is suitable. Correct the origin or the program if necessary (Part II, Chapter 3.11).

9.6 Plasma cutting sequence

1. Select **plasma** mode and set the plasma parameters: pierce time, torch-up time, arc-on delay, kerf width and cutting speed (Part II, Chapter 7.3). Typical values are given in Chapter 10.
2. Set the plasma source current and consumables for the plate thickness. Set the THC arc voltage set-point (Part II, Chapter 3.12) or use the automatic set-point function.
3. Check the initial height: the THC lowers the torch until it touches the plate (IHS), then lifts to the pierce height.
4. Press **START**. The controller starts the arc, waits for the arc-transfer signal, pierces, lowers to cutting height and begins the contour. The THC keeps the torch at constant arc voltage during the cut and is automatically locked in corners and at low speed.
5. Watch the first cut. If the arc is unstable or dross forms, adjust speed, current or height (see Chapter 12). The speed can be changed during cutting with the speed keys (Part II, Chapter 3.2).
6. On thin sheet use **edge start** instead of piercing to save consumables (Part II, Chapter 3.5).

9.7 Flame cutting sequence

1. Select **flame** mode and set the flame parameters: preheat time, pierce time, torch-up/down time and cutting speed (Part II, Chapter 7.2).
2. Fit the nozzle recommended for the thickness and set the oxygen and fuel-gas pressures (Chapter 10). Set the torch height to 8–12 mm above the plate.
3. Press **START**. The controller opens fuel gas and preheat oxygen and fires the automatic igniter; the plate is preheated for the set time (a bright red spot appears).
4. At the end of preheat the cut oxygen valve opens, the torch lifts for the pierce (thick plate) and then descends and the contour starts. The preheat time can be extended or skipped with the keys during preheating.
5. Adjust the neutral flame (equal-length inner cones, no acetylene feather) whenever the nozzle is changed. A dirty nozzle gives a ragged cut – clean it with the correct tip cleaner only.

9.8 Pausing, stopping and resuming

- **STOP / pause:** the torch is switched off and lifted; the program position is kept. Press **START** to continue.
- **Reverse:** after a pause the torch can be run backwards along the contour to repeat a section that did not cut through (Part II, Chapter 3.4).
- **Breakpoint recovery:** after a power failure the controller remembers the position; resume with the breakpoint recovery function (Part II, Chapter 5.4).
- **Emergency stop:** all motion and torch outputs are cut immediately. Rectify the cause, release the button, re-home if necessary and restart the program from the breakpoint or from the beginning.

9.9 After cutting

1. Lift the torch and move the gantry to the parking position at the end of the rails.
2. Switch off the plasma source; close the gas cylinder valves and bleed the hoses by operating the valves in manual mode.
3. Switch off the drive unit at the mains switch.
4. Let parts and skeleton cool before removing them. Remove slag from the table slats regularly so that the plate lies flat.
5. Clean the rails and the cross-beam guide; check the torch consumables and nozzle.

> **Kerf compensation:** enter the actual kerf width (Chapter 10) in the parameters so that the part is cut to the drawing size; measure a test part and correct if necessary.

10 Cutting parameter guide

The values below are starting points for mild steel with air plasma and with oxy-acetylene flame. Always start from the consumable and parameter tables of your plasma power source, then fine-tune on a test piece. Speeds are given in mm/min.

10.1 Plasma cutting – mild steel, air plasma

Plate thickness (mm)	Current (A)	Cutting speed (mm/min)	Pierce height (mm)	Cut height (mm)	Pierce time (s)	Approx. kerf (mm)
1 – 2	40 – 60	2500 – 3000	3	1.5	0.1	1.0 – 1.3
3	60	2000 – 2500	3.5	1.5	0.2	1.3
6	60 – 80	1200 – 1600	4	2	0.4	1.6
10	80 – 100	700 – 1000	5	2.5	0.6	2.0
12	100	600 – 800	5	3	0.8	2.2
16	100 – 120	450 – 600	6	3	1.0	2.5
20	120 – 160	350 – 500	7	3.5	1.2	2.8
25	160	250 – 350	8	4	1.5	3.2
30	160	150 – 250 (edge start recommended)	–	4.5	–	3.5

Stainless steel: reduce speed by about 15–20 %. Aluminium: increase speed by about 10–20 %. Maximum recommended pierce thickness is about 2/3 of the maximum cut thickness of the plasma source; use edge start above that.

10.2 Flame cutting – mild steel, oxy-acetylene

Plate thickness (mm)	Nozzle size	Cut oxygen pressure (MPa)	Acetylene pressure (MPa)	Cutting speed (mm/min)	Preheat time (s)	Approx. kerf (mm)
5 – 10	1 (small)	0.25 – 0.30*	0.02 – 0.03	550 – 750	5 – 8	1.5 – 2.0
10 – 20	1	0.30 – 0.35*	0.02 – 0.03	450 – 600	8 – 12	2.0 – 2.5
20 – 40	2	0.35 – 0.45*	0.03	350 – 450	12 – 18	2.5 – 3.5
40 – 60	2	0.45 – 0.55*	0.03 – 0.04	300 – 380	18 – 25	3.5 – 4.0
60 – 100	3	0.55 – 0.65*	0.04	200 – 300	25 – 40	4.0 – 5.0
100 – 150	4	0.65 – 0.75*	0.04 – 0.05	150 – 220	40 – 60	5.0 – 6.0
150 – 200	5 (large)	0.75 – 0.90*	0.05	100 – 150	60 – 90	6.0 – 7.0

* Cut-oxygen pressures above 0.1 MPa refer to a torch fed directly from a high-pressure oxygen regulator through a separate cut-oxygen line, as fitted on heavy-plate configurations. The preheat gases through the machine manifold and solenoid valves must not exceed 0.1 MPa. With propane / LPG use the corresponding propane nozzles, roughly 30 % more preheat time and fuel pressure 0.03–0.05 MPa. Nozzle sizes refer to the nozzle series supplied; follow the nozzle manufacturer's table when a different series is fitted.

10.3 Checking the cut

Observation	Meaning / correction
Fine, easily removed dross on the bottom edge; smooth face; drag lines slightly trailing	Speed and height correct
Heavy, hard-to-remove low-speed dross; wide kerf; excessive top rounding	Speed too low or current too high – increase speed
Rolled, sticky high-speed dross; arc trails strongly; cut not completed in corners	Speed too high – reduce speed or increase current
Bevel angle differs on the two sides of the kerf (plasma)	Torch not vertical, worn nozzle/electrode, or cutting height wrong
Flame: top edge melted, gouged face	Preheat flame too strong or torch too low; reduce preheat, raise torch

11 Maintenance

> **▲ WARNING**
> Before any maintenance switch off the drive unit and the plasma source, close the gas cylinder valves and secure the machine against restarting. Never use compressed air to clean the inside of the controller.

11.1 Maintenance schedule

Interval	Task	Notes
Every shift	Clean rails, racks and cross-beam guide of slag and dust; check plasma consumables and flame nozzle; drain the air water separator; test the emergency stop	Use a brush and dry cloth; never oil the racks heavily – a thin film only
Weekly	Inspect hoses, cables and drag chain for wear or burns; check gas connections for leaks; check the guide wheels for play; check that the torch is vertical	Replace damaged hoses immediately; adjust eccentric wheels if play is felt
Monthly	Lightly grease the racks and lifter lead screw; check rack/pinion backlash and the tightness of beam and drive-unit bolts; clean the controller fan filter; check the level of the rails	Lithium grease NLGI 2; re-level if the floor has settled
Every 6 months	Check the squareness of the beam to the rails and the accuracy with a test square (±0.2 mm/m); check motor couplings and pinion fixing screws; check the ignition electrode gap	Cut a 500 x 500 mm test square and measure the diagonals
Yearly	Full inspection by Cruxweld service or a trained technician: drives, wiring, earthing, THC calibration, backup of controller parameters	Parameter backup: Part II, Chapter 8.7.1

11.2 Rails, racks and guide wheels

- Slag beads on the rail track lift the guide wheels and spoil the cut. Clean the track every shift.
- The eccentric guide wheels of the drive units and torch carriage are adjusted so that the carriage runs without play but can still be pushed by hand with the motors de-energised.
- Check the rail joints for steps after any relocation of the machine.

11.3 Torch lifter and THC

- Keep the lifter guide clean; a small amount of grease on the lead screw is sufficient.
- Check that the initial-height-sensing (IHS) contact and the arc-voltage cable are clean and tight; oxidised contacts cause wrong pierce heights.
- Re-check the torch for verticality after every collision.

11.4 Plasma consumables

- Replace the electrode when the hafnium insert pit exceeds about 1 mm, and the nozzle when the orifice is no longer round. Change both together where recommended by the plasma source manufacturer.
- Dry, oil-free air is the single most important factor for consumable life.

11.5 Flame torch, valves and hoses

- Clean nozzle orifices with the correct size tip cleaner only; never with wire or drills.
- Check solenoid valves for tight closing: no gas may flow when the torch is off.
- Replace hoses showing cracks, burns or bulges. Renew flashback arrestors as prescribed by their manufacturer.

11.6 Controller

- Keep the drive unit closed and the display clean (soft dry cloth). Do not spray liquids.
- Back up the parameters to USB after commissioning and after every parameter change (Part II, Chapter 7.7).
- If the machine is not used for a long period, power it up once a month for one hour to keep the electronics dry.

12 Troubleshooting

Controller alarms and their meaning are listed in Part II (Chapter 8, Diagnosis function, and Chapter 13). The table below covers machine-level problems.

Problem	Possible cause	Remedy
Controller does not switch on	No mains; emergency stop pressed; fuse blown	Check socket and cable; release emergency stop; replace fuse with the same rating
Gantry does not move, or only one side moves	Slave-drive cable loose; motor driver alarm; pinion not engaging rack; obstacle	Check cable plugs; see driver LED / Part II Chapter 8; check pinion engagement; clear rails
Gantry moves in the wrong direction	Motor direction parameter or wiring reversed	Change the direction setting (Part II, Chapter 7.5) or swap the motor phase pair
Parts out of square or dimensions wrong	Rails not parallel / not square; beam not square; pulse equivalent wrong; kerf wrong; guide-wheel play	Re-check installation (Chapter 7); calibrate pulse equivalent (Part II, Chapter 7.5); measure and enter actual kerf; adjust wheels
Lost steps, position drifts during a program	Speed or acceleration too high; rails dirty; poor earthing causing interference; belt/pinion slipping	Reduce speed and acceleration (Part II, Chapter 7.5); clean rails; improve earthing, separate signal from power cables; tighten pinion
Plasma arc does not start	Plasma source not ready; start signal wiring; air pressure low; worn consumables; work lead not connected	Check source fault lamp; check start relay output in manual mode; check air; replace consumables; connect work lead
Arc starts but machine does not move	Arc-transfer (OK-to-move) signal missing; arc-on delay too long	Check the transfer signal input; if not available from the source, set the controller to time-based start (Part II, Chapter 7.3)
Torch dives into plate or rises too high	Arc voltage set-point wrong; divider ratio wrong; THC not locked in corners; arc voltage cable faulty	Adjust set-point; set divider ratio; enable corner/low-speed THC lock (Part II, Chapter 3.12); check cable
Excessive dross / bevel	Speed, current or height wrong; worn nozzle; torch not vertical; wet air	See Chapter 10.3; replace consumables; square the torch; drain and filter the air
Flame does not ignite	Gas valves closed; wrong pressure; igniter electrode dirty or gap wrong; ignition output not set	Open valves and set pressures; clean electrode and set gap 3–5 mm; check ignition output in manual mode
Flame cut does not pierce / cut stops in thick plate	Preheat time too short; cut oxygen pressure too low; nozzle too small or dirty; speed too high	Increase preheat; raise oxygen pressure; fit correct nozzle; reduce speed
Backfire or flashback in the torch	Nozzle overheated or blocked; torch too close to plate; leaking valve seat	Close oxygen then fuel valve immediately; cool and clean nozzle; check flashback arrestors; have torch serviced
USB program not recognised	Stick not FAT32; file name or extension wrong; file in sub-folder	Format stick FAT32; use short names with the extension expected by the controller (Part II, Chapter 6)
Controller restarts or display freezes while cutting	Interference from plasma HF start; poor earth; supply voltage dips	Improve earthing of table, source and machine; route torch lead away from signal cables; use a voltage stabiliser

If the fault cannot be cleared, note the alarm text shown on the controller, the program being run and the parameter settings, and contact Cruxweld service (Chapter 13).

13 Warranty, spare parts and service

13.1 Warranty

Cruxweld warrants the ProGantry 2560 against defects in material and workmanship for the period stated in the sales contract, from the date of delivery. Within this period defective parts will be repaired or replaced free of charge at Cruxweld's discretion. The warranty does not cover:

- consumable parts such as plasma electrodes, nozzles, swirl rings, shields, flame nozzles, hoses, guide wheels, drag-chain links and fuses;
- damage caused by incorrect installation, incorrect supply voltage, poor earthing, moisture, contaminated air or gas, lack of maintenance, collision or operation outside the specification;
- modifications or repairs carried out by persons not authorised by Cruxweld;
- damage in transport or storage after delivery.

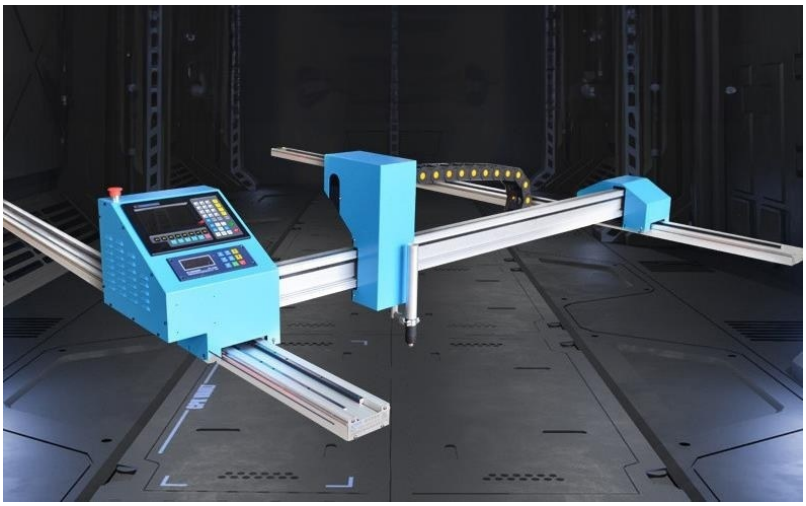
13.2 Spare parts

Use only genuine Cruxweld spare parts. When ordering, quote the model, serial number and a description or photograph of the part. Commonly stocked items:

Group	Items
Drive	Stepper motor, motor driver, pinion, rack section, guide wheel set, rail joint plate, end stop
Torch station	Torch lifter motor, lead screw, torch clamp, THC board, arc-voltage divider cable, IHS sensor
Flame	Flame cutting torch, nozzles (sizes 1–5), solenoid valve, igniter and electrode, hose set, flashback arrestor
Control	Controller unit, keypad membrane, power supply 24 V, relay board, emergency stop switch, cable set
Other	Drag chain, cross beam, rail section 3500 mm, cover set

13.3 Service

Cruxweld provides installation, commissioning, operator training, annual inspection and repair service. Please have the following at hand when you call: model and serial number, date of purchase, plasma power source model, a description of the problem and the alarm message shown on the controller.



Cruxweld ProGantry 2560 – built for stability, mobility and precision

Cruxweld Industrial Equipments Pvt. Ltd.
5, Sector 29, Faridabad – 121008 (Haryana), India
Phone: +91 8800 882 983 | +91 (129) 489 2868
Email: sales@cruxweld.com | Service: support@cruxweld.com | www.cruxweld.com

PART II

CNC Shape Cutting Controller
Operation and Installation Manual

ProGantry 2560 – keypad, display, parameters, shape library, G-code, input/output ports, torch height control, remote controllers and wiring.

Part II has its own contents list (Catalog) and page numbering.
Page references given in Part I of this manual refer to the page numbers printed in Part II.

CRUXWELD®

User Guide

Read this Manual

This manual is used to the numerical control cutting controller (ProGantry 2560 series) produced by Cruxweld Industrial Equipments Pvt. Ltd.. Read and understand this instructional manual, the cutting machine manuals and local security regulation before using it carefully.

Note: Due to the continuous improvement of this product, the technical parameters and hardware parameters mentioned in this manual are subject to change without notice. If you have any questions or comments on this product and the contents of this manual is not detailed, please contact us promptly,and we will be happy to answer your questions ,suggestions and criticisms. Thanks again for your choice and your trust.

Note: This product is not designed to be field serviceable. Please return back to the after-sales (service) center for any required service.

Work Condition

- Working Temperature, 0℃~50℃. Relative Humidity, 5~95%.
- Operation Voltage: DC +24V.
- The controller should be installed in a cab which can provide protection from powder.
- The controller would be better used in the situation without high voltage radiation.

Maintenance

- KEEP HANDS CLEAR of dangerous moving machinery. All control action, including manual action, can be executed using the front panel keys or remote interface.
- Loose fitting clothing or ties may become entangled in the machinery. These items should not be worn while operating the machine.
- This controller should only be operated by trained service person.
- Do not open the controller unless obtaining the authorization.
- Do not let any acid, alkaline, corrosive and other items to corrode the controller.

High Voltages

- Electric shock can kill. Be sure this equipment is safely installed in accordance with enclosed procedures and specifications.
- Avoid contact with electrical wires and cabling while power is on.
- Only trained person can operate this controller.

Catalog

Chapter 1 ProGantry 2560 CNC Controller Introduction

1.1 Brief Introduction

ProGantry 2560 series CNC controller is a new product, absorbing the advantages of many CNC controller, combined with our own PG2560-A, PG2560-B, PG2560-C and PG2560-D, PG3100, PG5100 series CNC controller, which is more user-friendly, more convenient and more cost-effective. The controller can control the motion of two axes, which is apt to the application of flame, plasma or laser cutting. This series is suitable for all two axis CNC machines which support position control mode.

This controller is very light and handy and it is very easy to operate. The controller provides menu or illustration for all the operations for the convenience of users. All key switches are human oriented designed, and they are very convenient and comfortable.

The controller high performance ARM chip and ultra large scale programmable device FPGA, runs multi task real-time operating system and adopts the method of combining software interpolation with hardware interpolation, making high-speed operation more stable and reliable. Reflect speed is very fast. Based on Cruxweld's research of CNC system for many years, the machines control is more stable and the protection mechanism is quite good.

The numerical control controller of ProGantry 2560 series consists of PG2560-A， PG2560-AT, PG2560-B A/B， PG2560-BT A/B， PG2560-C A/B， PG2560-CT A/B and PG2560-D/DT controller.

1.1.1 PG2560-A， PG2560-AT controller

Fig 1.1 PG2560-A

Fig 1.2 PG2560-AT

1.1.2 PG2560-B A/B, PG2560-BT A/B controller

Fig 1.3 PG2560-B A

Fig 1.4 PG2560-BT A

Fig 1.5 PG2560-B B

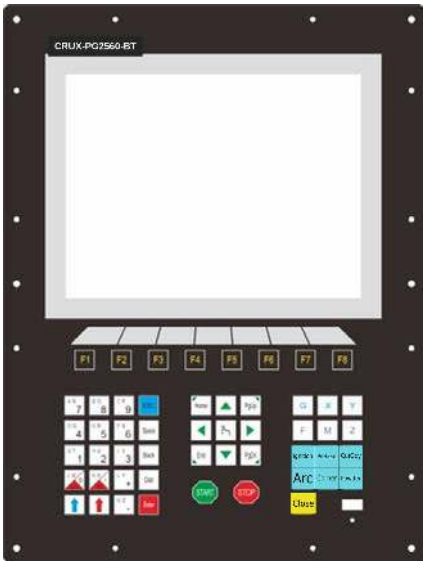


Fig 1.6 PG2560-BT B

1.1.3 PG2560-C A/B, PG2560-CT A/B controller

Fig 1.7 PG2560-C /ET A

Fig 1.8 PG2560-C /ET B

1.1.4 PG2560-D/DT controller

Fig 1.9 PG2560-D/DT

1.2 Characteristics

1) Chinese/English/French/Portuguese/Russian/Denmark/Korean language are supported, the language can be switched easily. In addition to Chinese and English, it need customer to provide language translation documents. In addition to Arabic, other languages are all available.
2) 49 categories different graphics (including grid pattern), chip part and hole part are alternative.
3) Support the EIA code (G code) and various CAM software , such as FastCAM, FreeNest , SmartNest , IBE. Support G code with suffix such as TXT,CNC,NC,MPG,B3.
4) Compact keyboard design and easy to input files.
5) Shape have some operations such as Proportion, Rotate, and Mirror.
6) Shape can be arrayed in matrix, interaction, stacked modes.
7) Steel plate can be adjusted according to any steel side.
8) Coordinate system can be customized to support the two dimensional coordinates of all eight kinds.
9) All input and output port type and the number can be customized (normally open or normally closed).
10) Self-diagnostic function, to diagnose the key status and all the IO status, facilitate inspection and debug.
11) Provide a front USB interface for copying files.
12) System can be upgraded by USB interface easily, and we provide lifetime

upgrade service.

13) All functions and techniques can upgrade online and don't worry about the after sale service.
14) Import and export files by single or all files.
15) Display time, week and clock.
16) Parameters backup and parameter restore.
17) Support the Flame, Plasma, Marker and Demonstration four kinds of mode.
18) Including various types of processing parameters to meet the needs of different processes.
19) Flame and Plasma are separated in the control IO ports.
20) Support THC(Torch Height Control), two-level preheat, three-level pierce in flame mode.
21) Plasma arc feedback, positioning feedback, automatically shut down the arc at the corner.
22) Built-in plasma arc auto/manual turn high function: display actual arc pressure and set arc pressure, set THC parameter, check for collision/position successful signal, control arcing signal, check for location.
23) Plasma arc controlling supports two close arc THC ways of speed and distance to make the machine more stable and safer.
24) Support edge cutting. It can save the preheat time for the thick steel plate.
25) Movement speed can be real-time acceleration, deceleration.
26) According to plate thickness, the cutting speed is automatically restricted by a speed limit in the corner, effectively preventing over burn.
27) Select row and column manually.
28) Dynamic/static illustration of the process, graphics zoom in / out, dynamically tracking cut-off point under zooming state.
29) DSP as core can control the machine move in high speed accurately, stability and in low noise.
29) Starting speed and acceleration can be set by your convenience.
30) Automatically memorize the working situation and the last cutting point when power off.
31) "Cutting offset" function can avoid waste the steel plate when the nesting of the plate is calculated wrong.
32) Set up different administration authority and the corresponding password to safeguard the interests of equipment manufacturers.

33) Support P2P mode ,BCD (8421) mode remote controller and serial RS232 remote control.
34) The original size of the workpiece and size with kerf can simultaneously display, intuitive and convenient
35) Support system backup and system restore function, system restore can be restored not only to operating system but also to factory condition.
36) Support ESSI code commonly used instructions
37) Controller models with suffix "T" have integrated THC module
38) Support laser point function
39) Support plasma dynamic perforation function
40) Information statistics such as processing piece, operation time, perforation number and so on.

1.3 Technical Indicator

1) Control Axis: 2 axis linkage(3 axis customizable)
2) Control accuracy: +/-0.001mm
3) Coordinate range: +/- 99999.99mm
4) Max pulses: 200 kHz. Max speed: 15,000 mm/m
5) Max lines of code: 80,000lines
6) Max size of single code file: 4M
7) Time resolution: 10ms
8) Working Voltage: DC +24V direct-current power input, power > 80W.
9) Working Temperature: -10℃~+60℃. Relative Humidity, 0~95%.
10) Max power of drive arc THC motor: 45W (suitable for models with "T"). if need more power, can select maximum value: 200W.

1.4 Controller Interface

a) DB15 pins SMA Male interface of 2 axes of motor drive.
b) DB25 pins SMA Female interface of 16 channels optoelectronic isolation output ports max back flow current 300mA.
c) DB25 pins SMA Male interface of 16 channels optoelectronic isolation input ports, max output current 300mA.
d) USB interface on the front panel, for the convenience of transmitting cutting code.
e) Extend IO input/output ports, PWM input ports, analog input ports.
f) Optional standard DB9 core male serial port RS232 interface.

The following three interfaces are only suitable for controller models with "T":

g) Selection of partial pressure proportion of arc input: 1:50 or 1:100

h) 5 pins connector for THC motor output and limit input ports.

i) 7 pins connector for arc voltage and IHS port, arcing start output port.

1.5 Hardware Configuration

1.5.1 PG2560-A, PG2560-AT Hardware Configuration

1. Monitor:7 inch, 800*480, high definition 16 million colors and high brightness LCD
2. Memory: 64M SDRAM
3. Program space available for user: 256M electronic hard disk
4. CPU frequency: 400MHz
5. USB: USB 1.1 front interface, at least 16GB U disk supportable
6. Keyboard: PCB keyboard
7. Chassis: full-steel structure completely shielded which defends electromagnetic radiation, interference and static electricity

1.5.2 PG2560-B A/B, PG2560-BT A/B Hardware Configuration

1. Monitor: 10.4 inch 800*600, high definition 16 million colors and high brightness LCD
2. Memory: 64M SDRAM
3. Program space available for user: 256M electronic hard disk
4. CPU frequency: 400MHz
5. USB: USB 1.1 front interface, at least 16GB U disk supportable
6. Keyboard: PCB keyboard
7. Chassis: full-steel structure completely shielded which defends electromagnetic radiation, interference and static electricity

1.5.3 PG2560-C A/B, PG2560-CT A/B Hardware Configuration

1. Monitor : 15 or 17 inch high brightness LCD with industrial VGA interface
2. Memory: 64M SDRAM
3. Program space available for user: 256M
4. CPU frequency: 400MHz
5. USB: USB 1.1 front interface, at least 16GB U disk supportable
6. Keyboard: PCB keyboard

7. Chassis: full-steel structure completely shielded which defends electromagnetic radiation, interference and static electricity

1.5.4 PG2560-D/DT Hardware Configuration

1. Monitor : No, but standard monitor with VGA interface supportable
2. Memory: 64M SDRAM
3. Program space available for user: 256M
4. CPU frequency: 400MHz
5. USB: USB 1.1 front interface, at least 16GB U disk supportable
6. Keyboard: no, but standard keyboard with PS2 interface supportable
7. Chassis: full-steel structure completely shielded which defends electromagnetic radiation, interference and static electricity

Chapter 2 Starting up

2.1 Operation Panel

Fig 2.1 PG2560-A

Fig 2.2 PG2560-AT

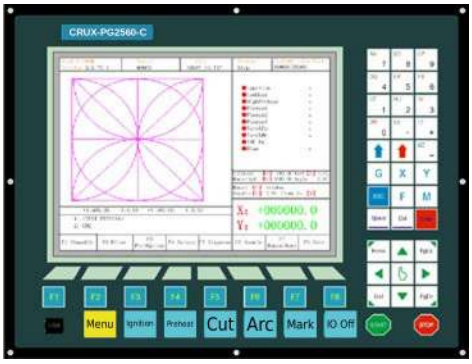


Fig 2.3 PG2560-B/ET A

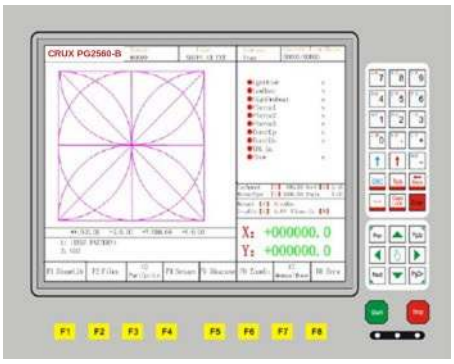


Fig 2.4 PG2560-C/ET A

[F1] -[F8] Function key in different interface

[S↑/PgUp] page-up key of edit interface or Torch up in other interface

[S↓/PgDn] page-down key of edit interface or Torch down in other interface

[F+/HOME] Accelerate or skip to the head of code line

[F-/END] Decelerate or skip to the tail of code line

[1] -[9] During the cutting process, change the cutting speed to ratio of the speed limit you have set, for example press[1] , change the cutting speed to 10% of the speed limit you have set, press[2] , change the cutting speed to 20% of the speed limit you have set

Only [1] , [4] , [7] can only adjust the speed with the T controller.

The following shortcuts only support the ProGantry 2560 series of CNC controller with 'T':

[2/3] :Adjust piercing time quickly.

[5/6] :Adjust the HIS time quickly.

[0] : Disable or Enable THC.

[8/9]: Set the arc voltage quickly.

[.] : IHS test.

2.2 Power on Processing and Main Interface

When just power on, the controller will first go into BIOS starting up interface:

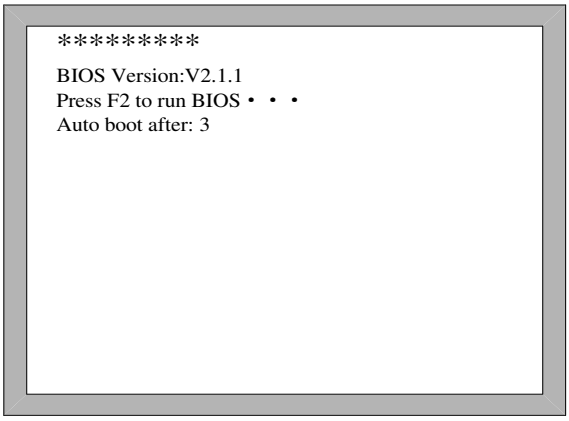


Fig 2.5 Controller self-check interface

In the starting process, there is 3 seconds to countdown, before the countdown is over, if pressing [F2] , it will enter the BIOS (please take the reference of the chapter 12 to run bios). If pressing any other key, it will jump over the countdown and directly enter the welcome interface. If pressing no key, it will countdown to 0 and then enter the welcome interface shown as Fig 2.6. In the welcome interface, press any key to enter the main interface automatically shown as Fig2.7.

Fig 2.6 welcome interface

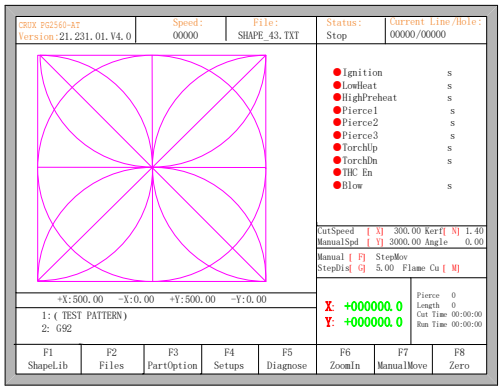


Fig 2.7 the main interface

Note: the controller model "PG2560-AT" shown in "CRUX PG2560-AT" at the left and up corner of above figure shows different contexts, the following is the same, it will not be interpreted repeatedly. For example, it will show "CRUX PG2560-BT" in the controller of PG2560-BT.

In the main interface, press [F1] -[F8] for the following functions:

- [F1] **ShapeLib:** Pressing F1 to enter the Shape Library including 48 common shape, and most of them have plate size and hole size.
- [F2] **Files:** You can load local files, U disk files or edit, import, export and delete codes.
- [F3] **PartOption:** Make actions of mirroring, rotation, plate adjusting, plate arraying, selecting row and hole or code edition etc.
- [F4] **Setups:** Setting all parameters.
- [F5] **Diagnose:** Including input ports diagnosis, output ports diagnosis, keyboard diagnosis, controller self check, date setting and ports definition.
- [F6] **ZoomIn:** Zoom in the shape in full screen.
- [F7] **ManualMove:** Manually move the machine.
- [F8] **Zero:** Clear the coordinate of X and Y before starting cut or after cutting over.
- [X] **CutSpeed:** Setting the cutting speed.
- [Y] **ManualSpeed:** Setting the manual moving speed.
- [F] **Manual:** Setting the mode of manual movement including keepMov(keep movement), StepMov(step movement), ContiMov(continue movement).
- [G] **StepDis:** Setting the distance of the StepMov .
- [N/Z] Before the cut running starts, set kerf compensation value.
- [M] Selecting the cutting mode including Flame Cut(flame cutting), Plasma Cu(plasma cutting), Demo run.
- [START] Begin to cut.
- [SPACE] Enter cutting interface.

2.3 Function Index

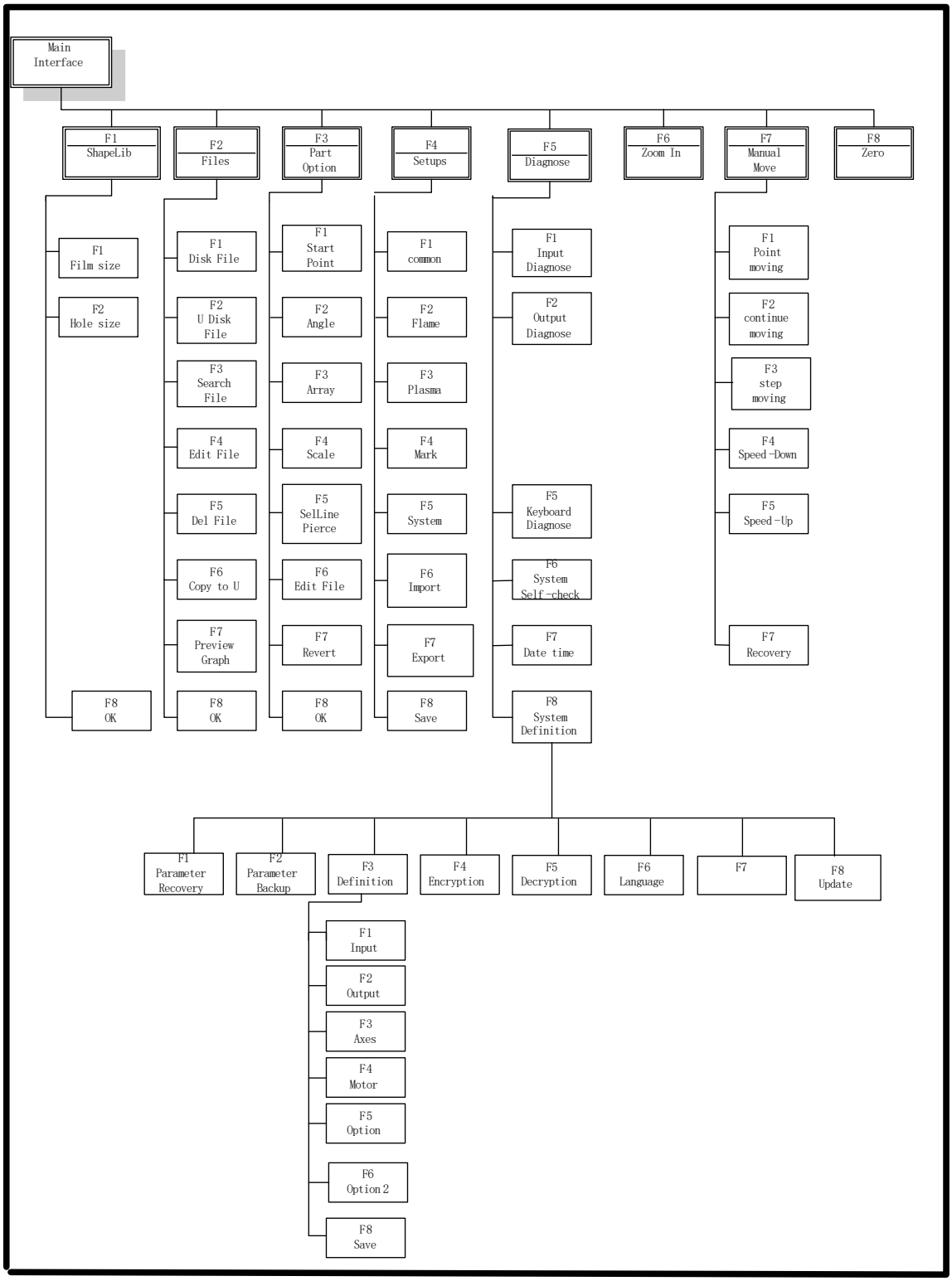


Fig 2.8 Function index of main interface

Chapter 3 Cutting Function

In the main interface, press the [SPACE] to enter the cutting interface, shown as follows:

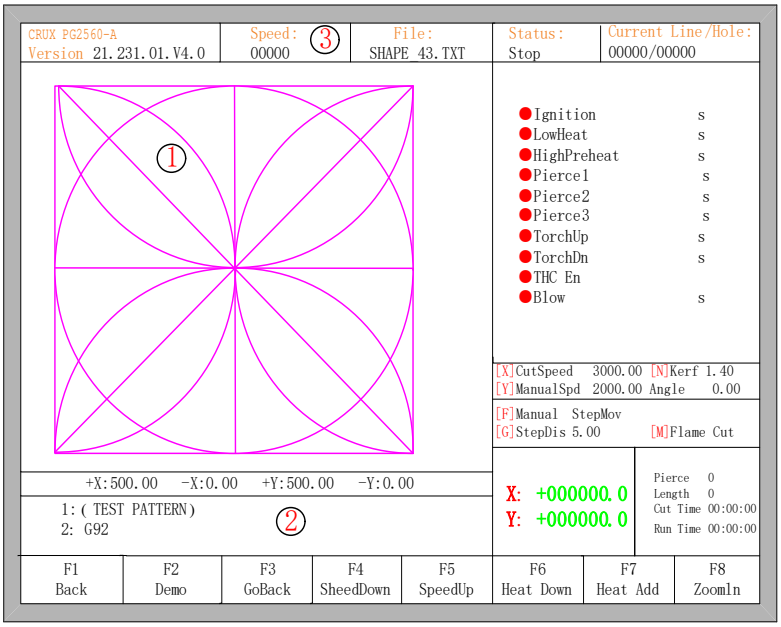


Fig 3.1 cutting interface

①Shows the current workpiece's cutting path.

②Shows the G-file being processed, shows the current and next line.

③Shows the current cutting speed. during cutting or paused, you can press the keyboard's number keys [1] - [9] to achieve quick speed regulation. For example, press the number[3] , the speed is automatically adjusted to 30%; press the number [8] the speed is automatically adjusted to 80%.

Only Key [1], [4], [7] can achieve rapid speed control with T controller.

X shows the absolute coordinate of the torch in X direction.

Y shows the absolute coordinate of the torch in Y direction.

In the cutting interface:

- Press [X] : Modify the cutting speed.
- Press [Y] : Modify the manual move speed.
- Press [F] : Change the current manual move mode.
- Press [G] : Modify the distance of step move in manual move
- [START] (or[F9]): Start cutting.
- [STOP] (or [F10]): Pause, the controller can suspend all ongoing actions.
- [F1] :Move back along the cutting path(I / O closed)
- [F2] : Move forward along the path (I / O closed).
- [F3] : Return to the starting point, i.e. the starting point of the current work piece.
- [F4] : It is same to key End. Decrease the cutting speed, each decrease of 3% click rate. Decrease the rate of manual moving machine in manual mode.
- [F5] : It is same to key Home. Increase the cutting speed, each 3% increase in click rate. Increase the rate of manual moving machine in manual mode.

- [F6] : Reduce the preheat time, skip the remaining preheat time, and the controller automatically records preheat time and the time is used until the workpiece is over.
- [F7] : Increase the preheat time once 15 seconds.
- [F8] : When the controller move is suspended, for selecting piercing point; when in moving, the trace display is zoom in over the full screen.
- Four direction keys (Up, down, left and right): manually move.

3.1 Cutting Index

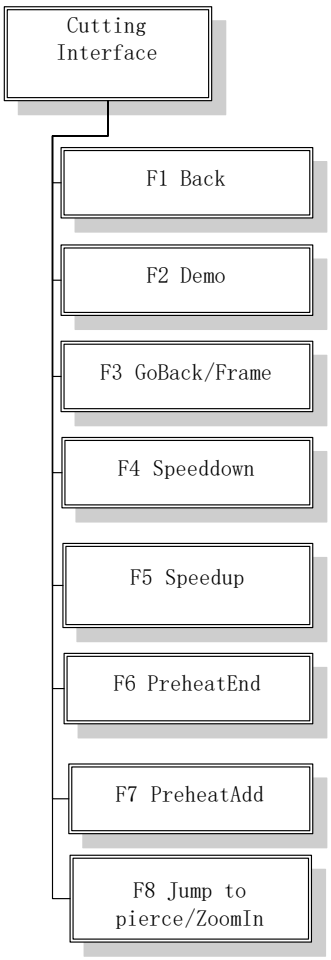


Fig 3.2 Cutting operation index

3.2 Speed Regulation

3.2.1 Normal Speed Regulation

In the operation panel, press [F5] , [PRE] or[HOME] , increasing 3% of current rate with per click. Hold the [F5] , [PRE] or[HOME] , then the rate will continuously increase to the maximal cutting rate.

In the operation panel, press [F4] , [NEXT] or[END] , decreasing 3% of current rate with per click. Hold the [F4] ,[NEXT] or[END] , then the rate will be continuously reduced to 0.5% of

maximal cutting rate.

3.2.2 Quick Speed Regulation

In automatic operation, or when the system is suspended, in the cutting interface the system can carry out quick speed regulation.

In the cutting interface, on the operation panel, press the number keys [1] - [9] , the speed will quickly adjust to the corresponding percentage figures 10 times, for example press [3] , adjust to 30% of the speed limit you have set, press [8] , adjust to 80% of the speed limit you have set.

3.3 Forward

In the automatic function interface, press key [F2], the machine start to move without cutting. The process does not excute any ignition, piercing and any other I/O working. The machine just moves along with the shape trace. Press [F2] again, stop running.

The function can be used to check the trace or code before you start the cutting process, or can also be used when the process needs shift piercing. Press the red "STOP" key to stop the forward process as you want.

Forward speed and cutting speed are provided separately. Forward speed is defined by the "Demo/Back speed" in the common parameters.

3.4 Backward

During the running process, if you want to go backward along with the shape trace (maybe the iron board was not cut through), you can follow the following direction:

- First, press "STOP" key to set the machine at pause status.
- In the automatic function interface, press key [F1] (Back) to make the machine go backward along with the shape trace. When the torch reaches the position you need, press "STOP" key to stop it. You may press key [F2] to go forward if the machine just went back too much.

Notice: Go backward or forward function can be used repeatedly to make the machine reach an ideal position.

- In the backward process, press [F1] again, the system stops running.
- When the torch reaches the position you need, press "START" key again, if the current cutting code is G01, G02 or G03, system will automatically piercing before performing these procedures, and then continue the current program, if the current row is not G01, G02 or G03, the system will directly continue the current line program.

Same as the forward speed, backward speed and cutting speed are also provided separately. Backward speed is also defined by the "empty / backward speed" in the common parameters.

3.5 Edge Cutting / Offset Cutting / Return

When the torch is not on the trace of the current work piece, it will prompt as follows:

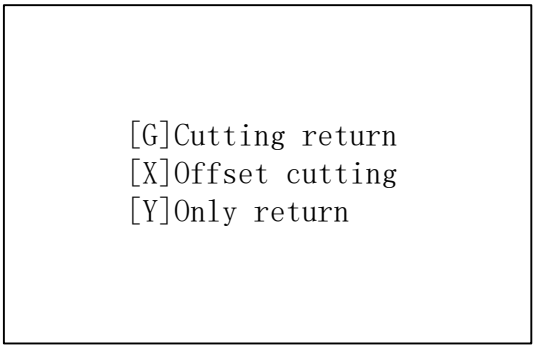


Fig. 3.3 edge perforation

There are two reasons led to this situation:

1) When the common parameter "Edge Cutting Enable" is checked and if G-file of the next processing line is M07, the system will be automatically suspended. At this time, the torch can be manually moved to any edge of the plate, press the "start" button, the system will prompt as above
2) When the processing is paused, due to some reasons, it needs to move the torch out of the actual path of the work piece, the above prompt will appear.

- If press[G] , the system cutting returns back to the paused point, continue to cut. This feature is particularly useful for thick steel plate, it can reduce the preheat time and increase cutting efficiency.
- If press [X] , the controller offset current point to paused point, it will continue cutting. That is, the controller offsets the cutting point. When the cutting machine paused or a power outage or any other reason, if the torch is not on the right trace of shape, the function can be used to offset the torch to the shape trace.
- If press[Y] , The controller moves to the paused point quickly, and then pause. During the cutting process, if discovering cutting torch malfunction or other issues, system needs to move the cutting tip out of cutting region to overhaul. When return to breakpoint after the maintenance, this key can be pressed. Then return to the paused point, press the[start] button, the system automatically continues to cutting.

3.6 Back to Reference Function

Pause in the processing, if press the [F3] , then the system will prompt:

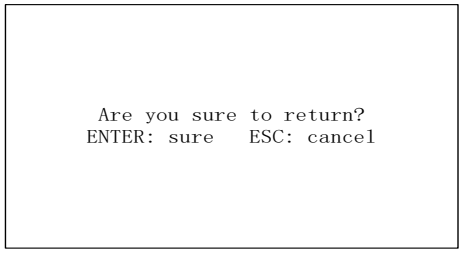


Fig. 3.4 Return reference prompt

Press the Enter key, the system will automatically return to the starting point of the work piece, and then the system automatically switches to processing the main interface, and waits for further user action.

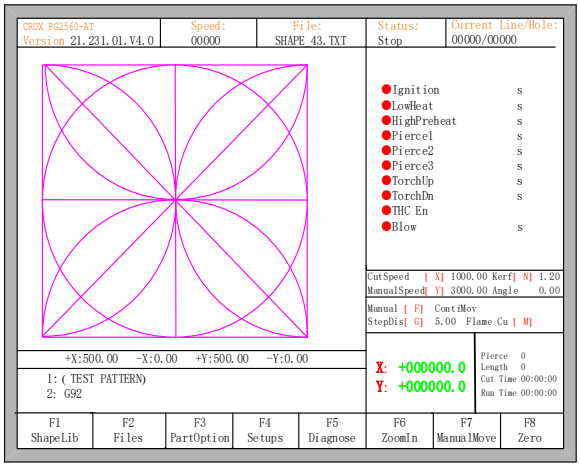


Fig. 3.5 main process interface

During the return process, the user can press the "Stop" button to stop the operation, and can continue to return operation after pressing of [F3] . Number of back to reference and stop has no limit.

3.7 Preheat Time Regulation

- In the preheat process, press the START (F9) key to skip the process of preheat or piercing delay.
- In the preheat process, press the STOP (F10) key to prolong preheat until START(F9) key is pressed again.
- In the preheat process, press the [F6] key then the preheat time will be reduced to the current preheat time spent, and skip the process of preheat. The total preheat time is remembered until M02 or M30.

For example: the preset preheat time is 60 seconds. In preheat process, the preheat time will count down, under normal circumstances, till 0, the system begins the next step of cutting, but if the system has the remaining 10 seconds of countdown time, press [F6] , then the system immediately stops preheat to begin the next step of cutting, and records the preheat time of 50 seconds, the system automatically thinks that users need preheat time of 50 seconds, the next preheat after the null cutting when the preheat time becomes 50 seconds.

- In the preheat process, each press the F7 key, preheat time increases by 15 seconds and the preheat time maintains the increased value till incision ending of this time.

For example: The original system sets the preheat time of 60 seconds after the null cutting, during the system countdown, each press[F7] , on the interface the countdown increases by 15 seconds, and the next time you need to preheat, the initial preheat time be 75 seconds.

3.8 Jump to pierce

Before you start cutting or cutting is paused, the function key prompt F8 is "Jump to Pierce ", now press F8, the system will prompt:

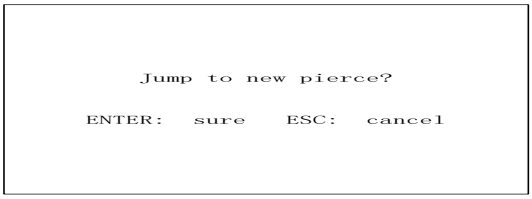


Fig. 3.6 select new pierce

Pressing ESC, the controller will return back to the cutting interface. Pressing ENTER, the controller will prompt again:

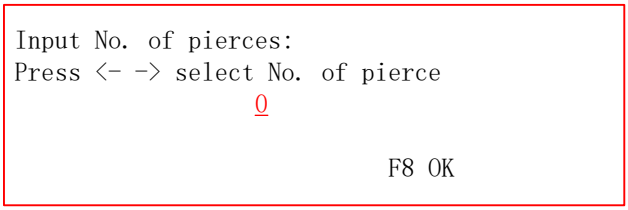


Fig. 3.7 pierce prompt

Pierce point can be input manually here. You can also press ESC to exit without manual input pierce point, and then press the left and right arrow keys to select the pierce point.

3.9 Dynamic Amplification

After the start of cutting, the F8 in the cutting interface will become "ZoomIn ", then press the F8 key, full-screen amplify the processing graphic , and dynamically tracking.

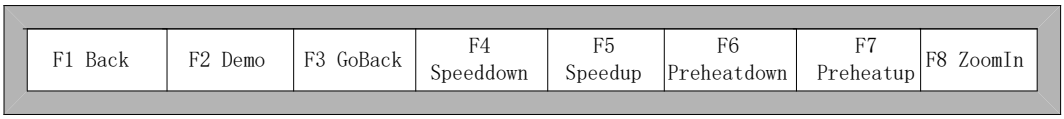


Fig 3.8 Function key of cutting interface

- Press the F8 key continuously, the system will progressively amplify graphic.
- Press ESC to exit the amplified display, back to the cutting interface.

3.10 Cutting Exit

When the cutting process does not get finished, and the cutting machine also being in the pause condition, if press [Esc] , the controller will query whether quit the cutting process. If pressing [Enter] , the process will be canceled, and if pressing [Esc] the process will be saved, and the controller will start cutting from the paused poing.

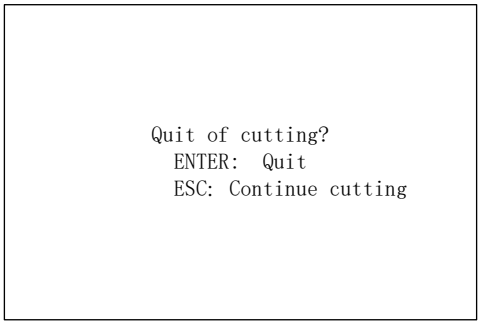


Fig. 3.9 Quit of cutting

3.11 Frame

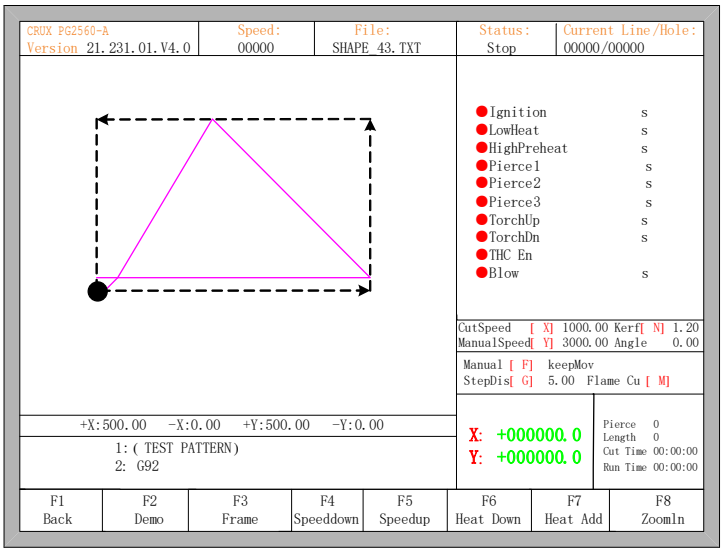
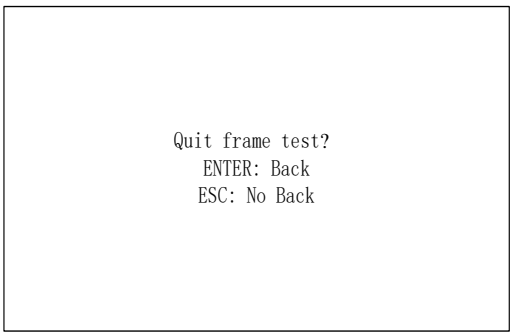


Fig. 3.10 Walk along frame

Before the beginning of the process, Pressing will enter into the interface of auto processing, [F3] is the function of walking along frame as figure 3.10 shows at CCW direction, the beginning point is the lower left corner. In the end of the walking, the controller will prompt:



At this time, pres$ Enter] , the controlelr will automatically go back to start point of parts. If press [ESC] , the controller will stop at current point.

In the process of walking along frame, pressing STOP suspends operation, and press START, the controller resumes running. Press [F3] again, the controller returns to the starting point.

3.12 THC Instruction (only "T" models of ProGantry 2560 series CNC controller)

3.12.1 Wiring Instruction

PG2560-AT controller links with location proximity switch, arc start of plasma power and arc voltage dividor by 7 pins socket, links with lifting motor by 5 pins socket.

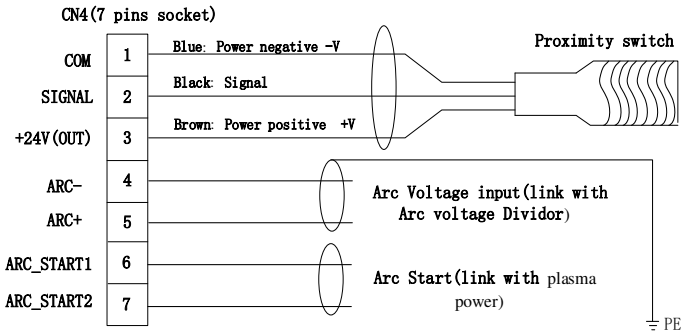


Fig.3.11 Arc and location signal wiring schematic

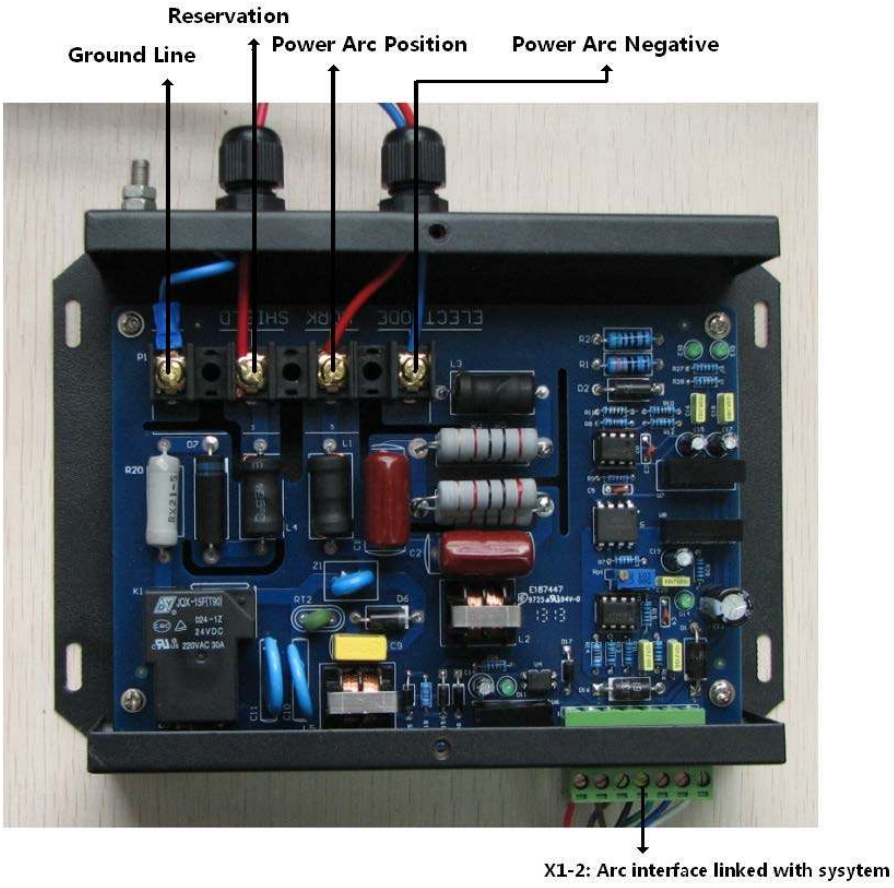


Fig.3.12 Arc Voltage Dividor

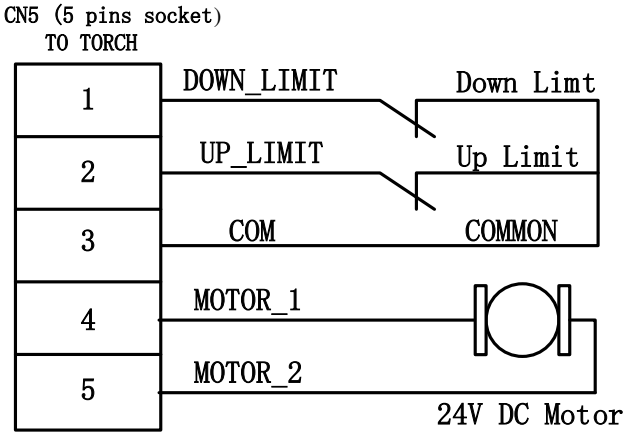


Fig.3.13 Lifting body monitor and limit switch wiring

Note: please refer to the section of 11.4.5 to get detail of wiring interpretation with THC module.

3.12.2 Arc Setting and Actual Arc Displaying

In the main interface or auto interface, display the arc voltage setting and actual arc voltage.

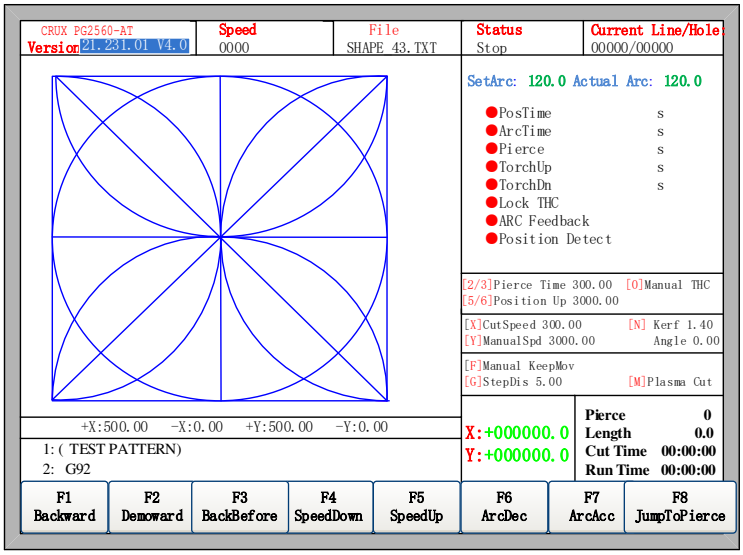


Fig.3.14 Auto interface with arc THC setting

3.12.3 IHS(Initial Height Sensor)

Several settings needed to be done before using IHS.

Proximity switch should be connected CN4 (Fig 3.11). (CN4_SIGNAL)

When torch has not touched with steel panel, in the system diagnosis (Chapter 8 Fig 8.1) , Position detect should be NO. When torch has touched with the steel panel, Position detect signal display NC.

In the figure.7.4, Position Check Time must be more than the time of which torch drops down

from the highest point to the steel panel.

In the figure.7.4,Position Up Time is the time of which torch ascends from steel panel touch point to arc ignition height.

When controller is at stop or pause status, press[.] to test IHS.

- Torch descend (the longest time of which is Position Check Time)
- Torch stop then ascend to ignition height (Position Up TIme) when torch tip reach the plate and proximity switch is active.
- A warning window will prompt if Torch cannot reach plate and proximity switch is not active after torch descend the whole Position Check Time.

1.12.4 Set Arc Voltage

The arc voltage is set in the plasma parameter setting interface, please refer to Section 7.3 for the parameter setting.

3.12.5 Increase/Decrease Arc Voltage

In the auto interface with Plasma cutting mode, press [F6] to reduce arc voltage, press [F7] to increase arc voltage.

In the auto interface and main interface in Plasma cutting mode, press[8] to reduce arc voltage, press[9] to increase are voltage.

The step of decreasing or increasing is the manual adjusting stride of setting arc, it can be set in the plasma parameter setting.

3.12.6 Disable/Enable THC

In the plasma cutting mode, press [0] to alternate Disable and Enable THC.

press[PgUp] to ascend the torch (full speed) and press [PgDn] to descend the torch (full speed).

Whent THC is working, press[PgUp / PgDn] also to ascend or descend the torch, but it will enter into the THC working status after [PgUp / PgDn] is released.

3.12.7 Torch Collision / IHS Signal Check

- In the non plasma cutting mode, If the Torch touch plate, Plasma Collision (Pin06 of CN1) or Position Detect(Pin05 of CN1) signal is active torch automatically ascending time is Position Up Time. Refer to Positon Up Time in the figure 7.4.
- In the plasma cutting mode, If the Torch touch plate, Plasma Collision (Pin06 of CN1) or Position Detect(Pin05 of CN1) signal is active, it will automatically stop and the torch will automatically ascend, the time of which is the Torch Up Time. Refer to Torch Up Time in the figure 7.4.

3.13 Statistical Information

The function of statistical information is used to record the number of piercing, the number of the

finished workpiece, the total cutting distance, the cutting time and the running time of the plasma and flame cutting. Plasma and flame are calculated separately.

3.13.1 Related Parameters

Pierce Count: Record the number of pierce during cutting process.
Workpiece Count: Record the number of finished workpiece.
Cut Length: Record total cutting length. Unit: metric - meter, Inch - feet.
Cut Time: Record the whole cutting time.
Run Time: Record thewhole running time, empty state time and M07 state time.

3.13.2 Statistical Information Display

In flame cutting interface, the lower right corner will display Pierce Count, cut length(Unit: metric - meter, Inch - feet), the cut time and the run time of flame cutting. As shown in figure 3.15.

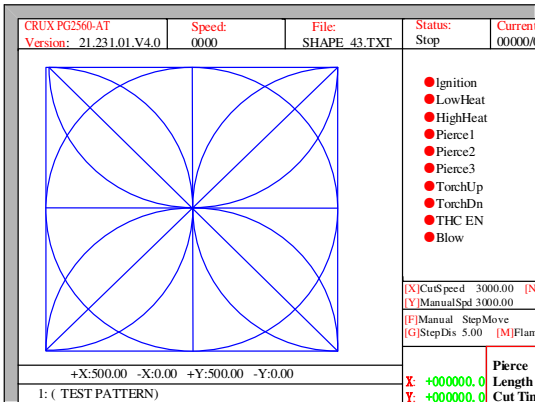


Fig.3.15 Oxygen gas cutting interface

In plasma cutting interface, the lower right corner will displaypierce count, workepiece count, cutting length(Unit: metric - meter, Inch - feet), the cut time and the run time of plasma cutting. As shown in figure 3.16.

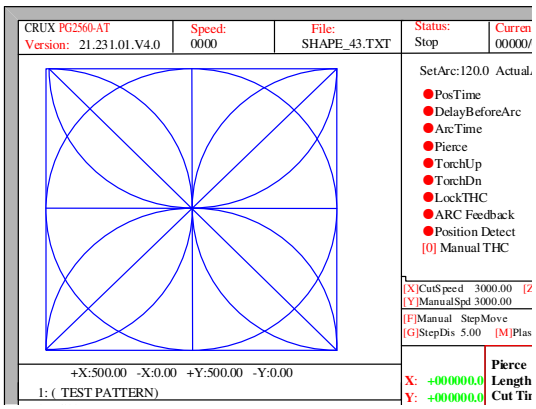


Fig.3.16 Plasma cutting interface

In the non plasma and flame cutting mode, it does not show any statistical parameters. As shown in figure 3.17.

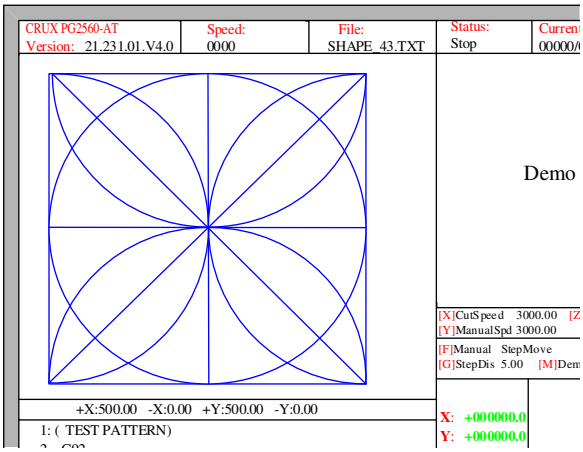


Fig.3.17 Non plasma and oxygen gas cutting interface

Chapter 4 Part Option

Before starting cutting, you can use "F3 Part Option" in the main interface.

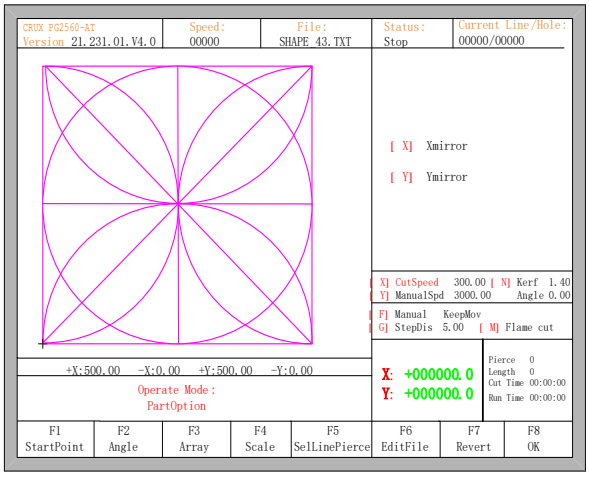
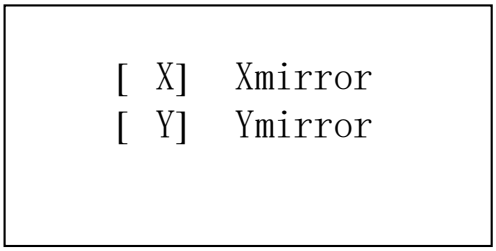


Fig 4.1 Part options

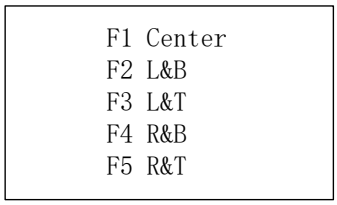
4.1 Mirror Function



- Press X to mirror the image of the part along the horizontal axis(X axis)
- Press Y to mirror the image of the part along the vertical axis(Y axis)

4.2 Start Point Selection

After press [F1] , System will prompt to select start point:



At this time, press [F1] -[F5] , the starting point of cutting part automatically jump to relevant location. For example, press [F4] , the start point will automatically jump to lower right corner. As the following figures 4.2 and 4.3 show:

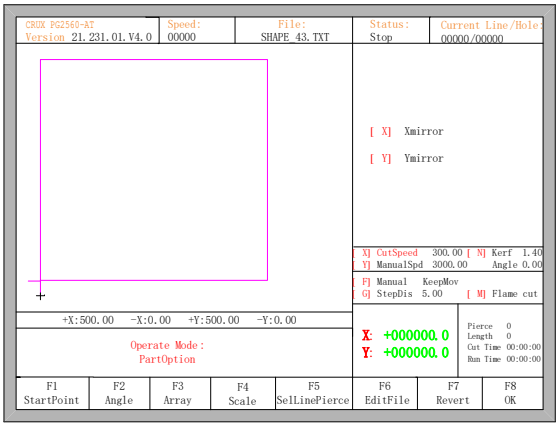


Fig 4.2 before press F4, start point is at original point

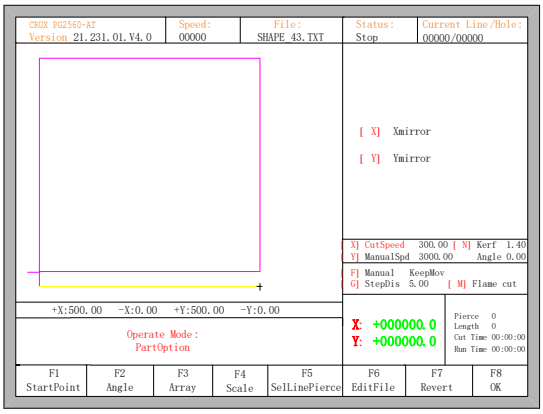


Fig 4.3 after press F4, start point is at lower right corner

4.3 Angle Adjustment

Press F2, the system will prompt:

```
F1- steel plate adjust
F2- enter angle
```

- Press F1 to align the part according to steel plate
- Press F2 to input align angle directly
- Press ESC to exit angle adjusting

4.3.1 Steel Plate Adjustment

After entering steel plate adjustment menu, the system will prompt:

```
X-start Y-OK  ESC-exit
Adjust X:  +00000.00
Adjust Y:  +00000.00
Angle      +00000.00
```

Here, you can manually move the cutting torch to any edge of the steel plate or a corner of the plate. Pressing [X] to set the current point as the starting point of correction. And then manually move the torch far enough away from the starting point along to the second point at the same edge of the steel plate, Pressing [Y] to finish the angle adjust. The controller will automatically calculate the current align angle of plate, and then automatically rotate part image.

Illustration: if use the laser gun to make adjustment, the laser point can be aligned to the edge of the plate correction, the specific use of the method can refer to section 5.5 laser offset function.

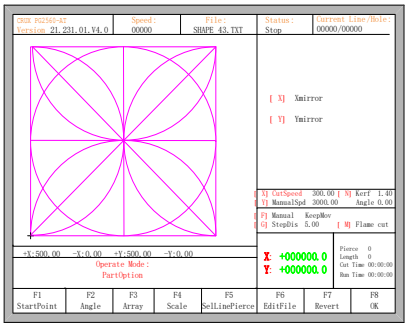


Fig 4.4 before adjusting

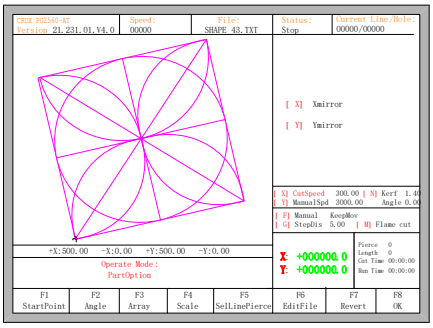


Fig 4.5 after adjusting

After adjusting, the controller will ask whether to return to the start point, if press [ENTER] , the controller will run back to the start point of the operation, if press [ESC] , the controller will do nothing but go back to the auto interface.

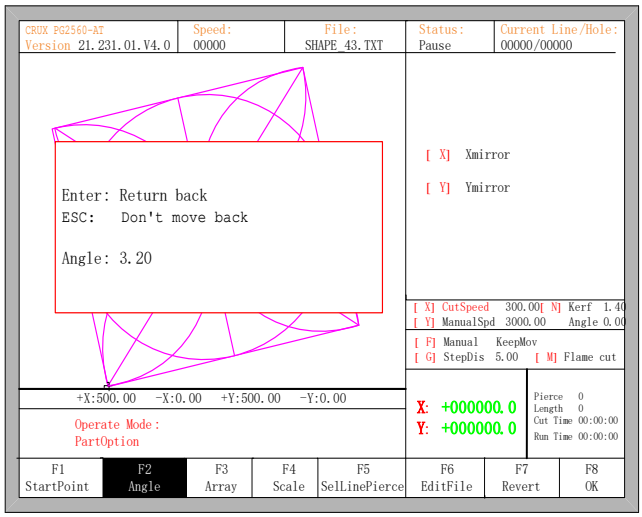


Fig 4.6 Return to the start point after adjusting

4.3.2 Steel Plate Adjust Angle Memory Function

About steel plate adjust angle memory, please refer to the section of 8.7.6.6.

4.3.3 Enter Angle

When the angle of the current work piece is known, you can input the angle:

```
Please enter angle
min: -360 max: 360
Angle:          0.00
Note:
>0 Rotate CCW on the base of current
<0 Rotate CW on the base of current
=0 Reset the current part to 0 degree
```

After manually input the angle, press [ENTER] to make sure, the part image will be rotate with the corresponding angle. Positive angle means rotate in counterclockwise, while negative means clockwise. Press [ESC] to exit angle adjusting.

Illustration: when enter angle 0, the part image will restore to the angel of 0° , at this time, the controller will clear the angle of steel plate adjustment and manual input angle. Generally, the angle entered is not as the angle of steel plate adjusting. If the angle entered here needs to be as the angle of steel plate adjusting, please refer to section 8.7.6.8.

4.4 Array

In the part options menu, press [F3] , the system will prompt as Fig 4.7. There are three build-in array types: arrange in straight, arrange in stagger, arrange in nest.

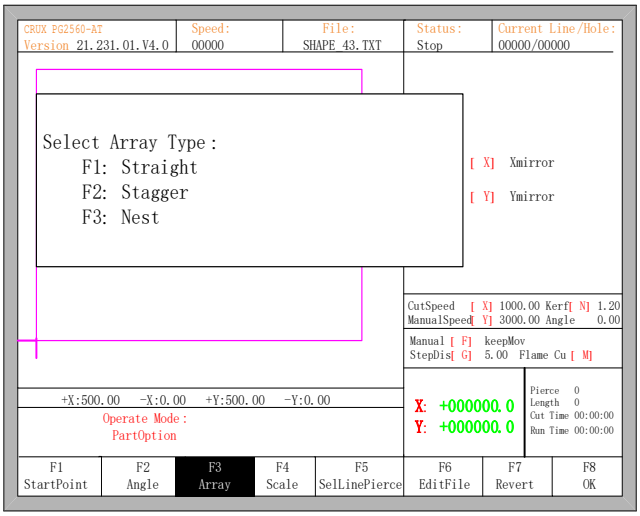


Fig 4.7 Select arrange type

Press[F1] to arrange in matrix.

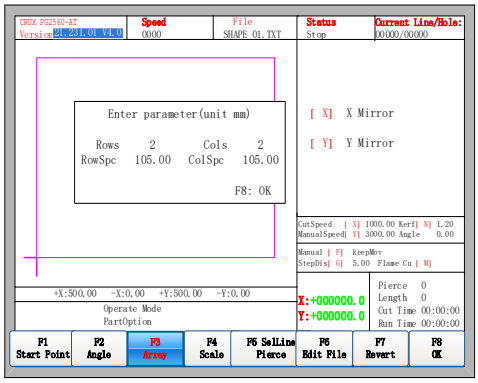


Fig 4.8 Arrange in straight

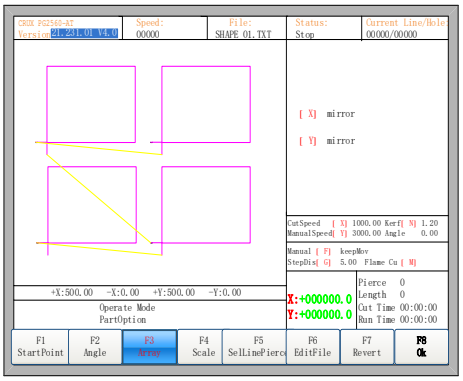


Fig 4.9 Result of arranging in matrix

Press [F2] to enter staggered arrangement.

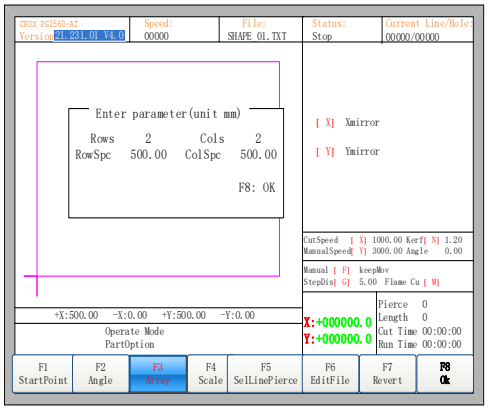


Fig 4.10 Staggered arrange

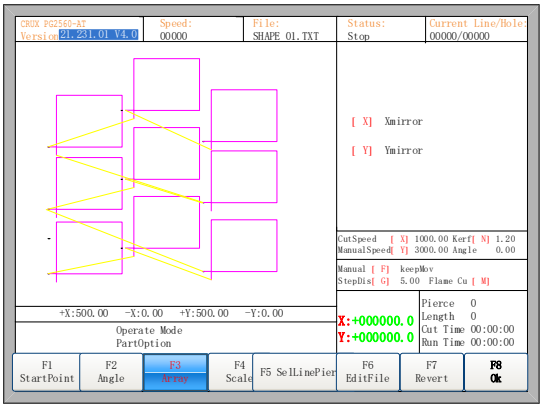


Fig 4.11 Result of staggered arrangement

Press [F3] to enter arrangement in stack.

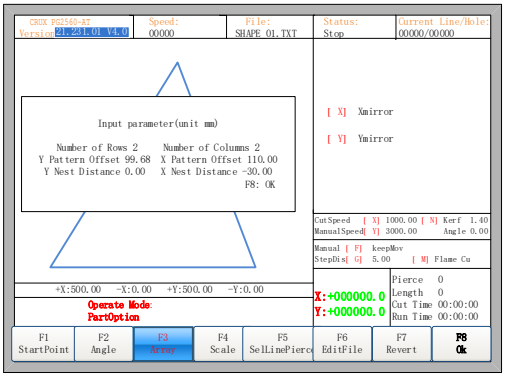


Fig 4.12 Arrange in Nest

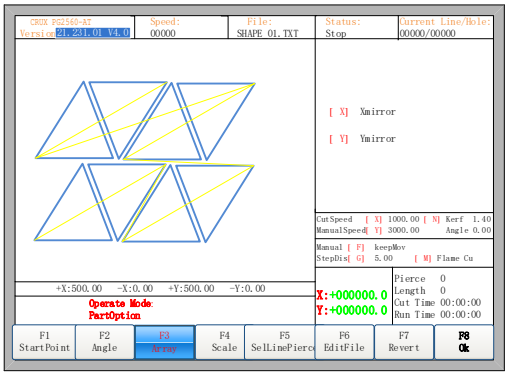


Fig 4.13 Result of arrangement in nest

Note:

The Arrange in Nest is mainly applied to graphics that are suitable for insertion, such as triangles, trapezoids and so on. First, the current graphic is rotated 180 degrees in the center. The original graphics and the rotated graphics are inserted into a new pattern. Then the combination of the new graphics start Staggered arrange. The description of parameters:

Y Nest Distance: When two graphs are inserted in centrosymmetric way, the distance between the two graphics center in the Y direction. This parameter can be negative.

X Nest Distance: When two graphs are inserted in centrosymmetric way, the distance between the two graphics center in the X direction. This parameter can be negative.

Number of Rows: Two graphics in centrosymmetric way combined into a graphic, and the number of rows that the combination of graphics arrange.

Number of Columns: Two graphics in centrosymmetric way combined into a graphic, and the number of columns that the combination of graphics arrange.

Y Pattern Offset: Two graphics in centrosymmetric way combined into a graphic, and the Y pattern offset that the combination of graphics arrange.

X Pattern Offset: Two graphics in centrosymmetric way combined into a graphic, and the X pattern offset that the combination of graphics arrange.

4.5 Proportion

In the part options menu, press [F4] (scale), the controller prompt as figure 4.14:

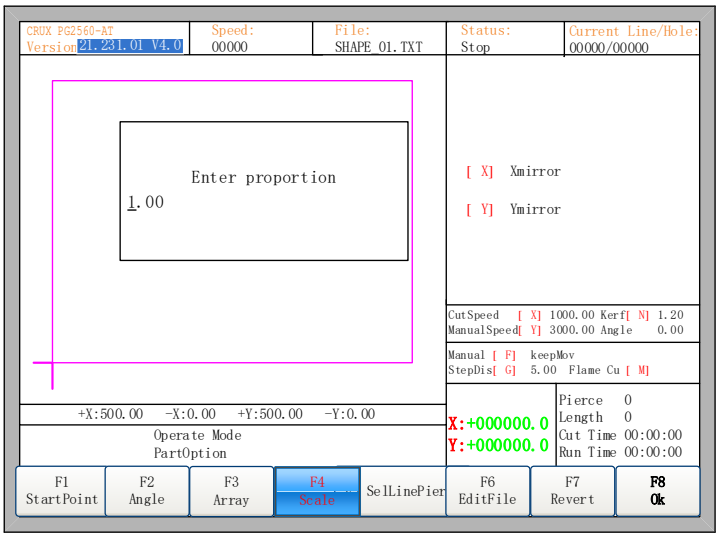


Fig 4.14 Set scales

After entering the scale, press [Enter] , then the shape will automatically be scalced if the parameter is legal.

Note: Proportion is also applied to lead in and lead out.

4.6 Select Line/Pierce

In part options menu, press[F5] to enter selecting line/pierce, the controller will prompt:

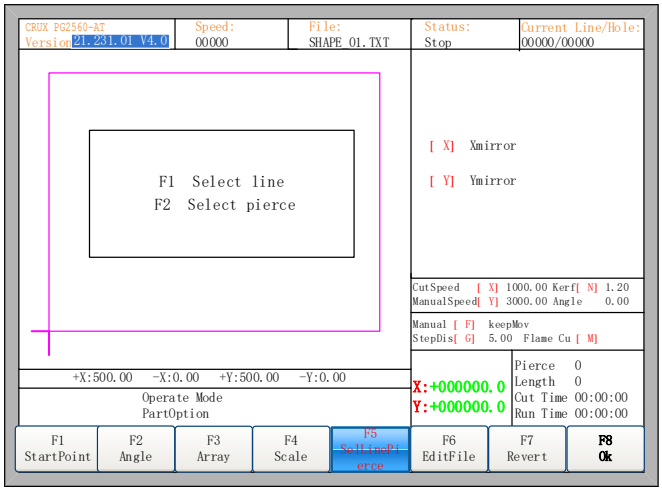


Fig 4.15 Select Line/Pierce

4.6.1 Select Line

Press[F1] to select the number of G code line to start cutting, the controller prompts:

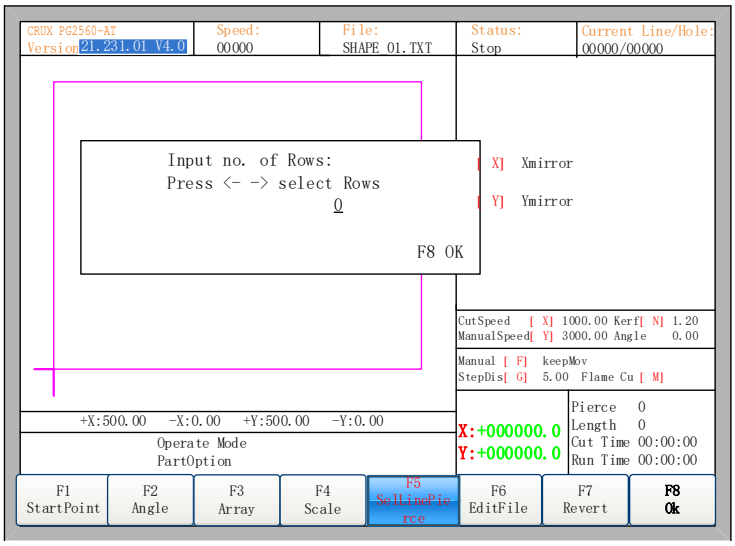


Fig 4.16 Prompt to select row

Here, you can directly enter the row number or press [ENTER] to press [←] of [→] to select row.

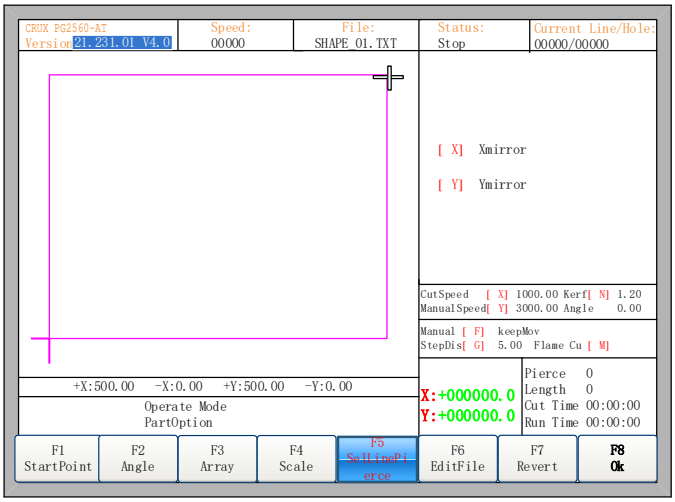


Fig 4.17 Select row

After selecting row, press[F8] to confirm.

4.6.2 Select Pierce

The operation is similar to 4.6.1.

4.6.3 Operation after Select Line/Pierce

After selecting row or pierce, press [F8] to exit to the main interface. Press SPACE to enter the auto interface, there are two kind of operation:

1. Move from current position to the selected position and then cutting

- Press[F1] in the auto interface, the controller will directly run to the position of the selected line or pierce without cutting, then pause and wait for the next operation.

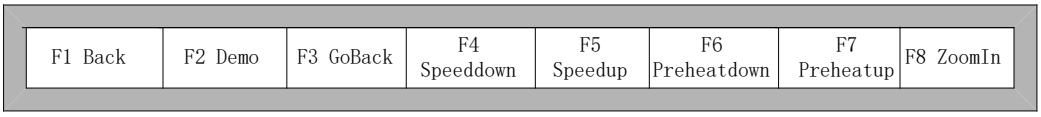


Fig 4.18 Function key of cutting interface

- Press [START] in the cutting interface, the controller will prompt:

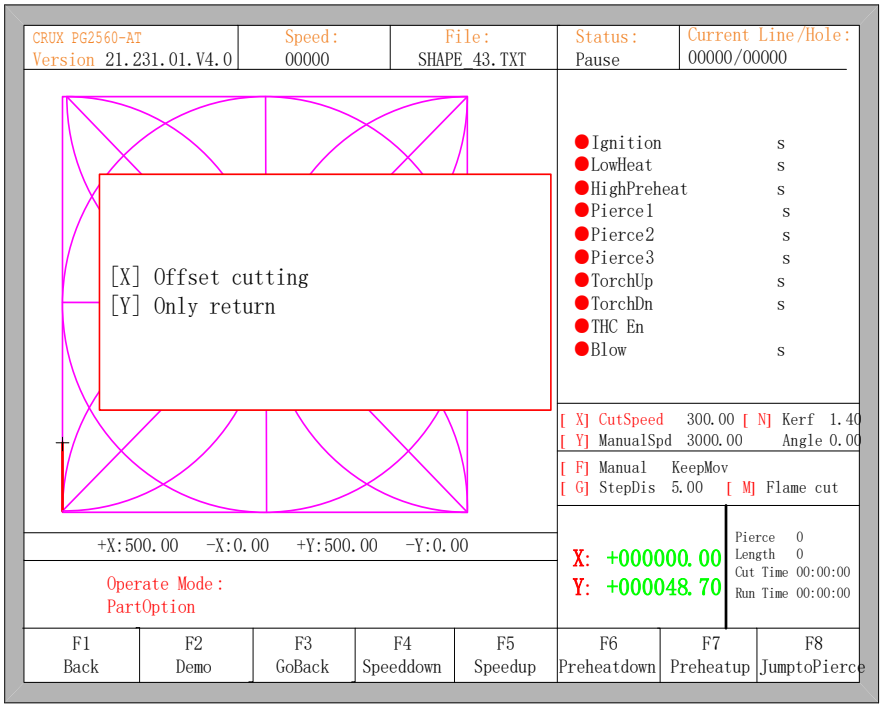


Fig 4.19 Operation after selecting row/number

Press [Y] , the controller will also directly move to the selected line or pierce, then pause and wait for the next operation.

2. Cutting from the current position

After the prompt of Fig 4.19, press [X] , then the controller will start cutting from current position.

4.7 Restore

If you want to cancel all of operations with part option including mirror, angel adjust, scale or/and array, press [F7] in the part options menu, the controller automatically revert to original state of the part.

Chapter 5 Manual Function

In the automatic interface, press [F7] (Manual) to enter manual function interface, shown as Fig 5.1:

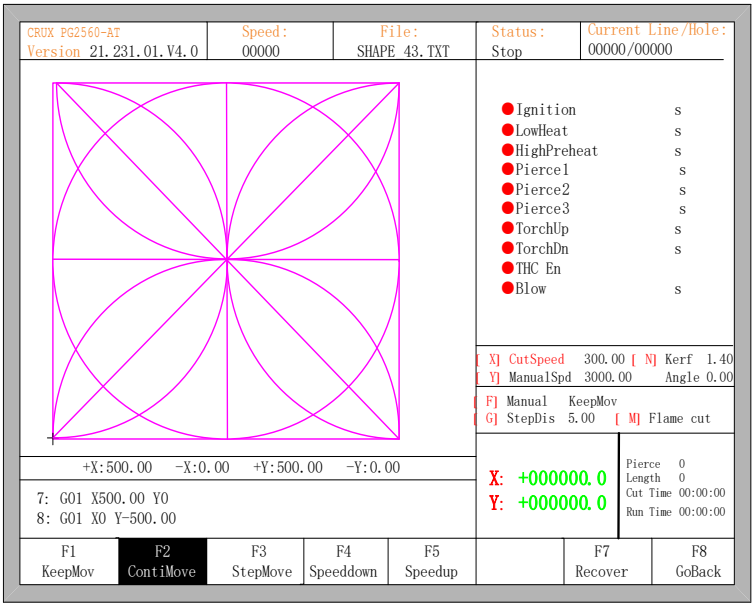


Fig 5.1 Manual function interface

Manual move speed can be increased by pressing [HOME] or be decreased by pressing[END] Also, press numeric key, the manual move speed changes to ratio which is 10 times of the corresponding figure of the speed limit you have set, for example press [3] , change the cutting speed to 30% of the speed limit you have set, press [8] , change the cutting speed to 80% of the speed limit you have set.

5.1 Keep Moving Function

When you enter into the manual interface, the default option is continuous moving function. Press key [F1] to go for the keep moving function. At this moment, the controller will move toward the specified direction if any directory key is pressed, and when the directory key is released, the system will stop.

5.2 Continuous Moving Function

When in the manual interface, press [F2] to enter the continuous-moving function interface. At this moment, the controller will move toward the specified direction if any directory key is pressed and then released, and when any directory key or stop key is pressed the controller will stop moving.

5.3 Step Moving Function

In the manual interface, press [F3] to enter the interface of step moving,. The controller prompts to input the step distance:

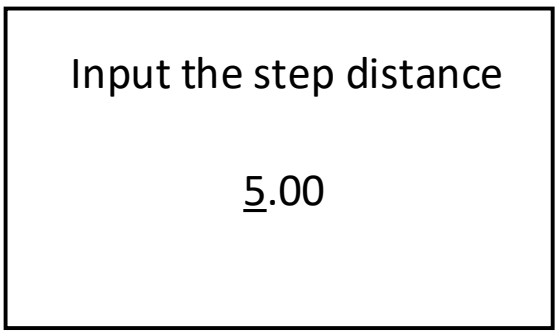


Fig 5.2 Input the fixed length

After inputting the step distance. Press any direction key and then release, the system will move the step distance toward the direction, in the process of moving, when any direction key or stop key is pressed, the controller will stop moving.

5.4 Breakpoint Recovery

To guarantee that the breakpoint could work correctly, you need to meet with the following conditions:

1) When the controller is paused. the controller will automatically remember the paused point as the breakpoint.
2) In the process of cutting, when power is off, the controller will remember the current position as the breakpoint and remember it.

When you need to recover from the breakpoint from the breakpoint. After the controller powers on, don't move the torch, press [F7] in the main interface to enter the manual interface, then press[F7] to recover from the breakpoint. After recovering, if the torch hadn't been moved and is on the position when the power is off, press [START] , the controller will go on from the breakpoint.

After the breakpoint is recovered, if the position is not on the exact position, you need move the torch to the exact point manually, check the exact point by Forward or Backward and Offset cutting operation.

Also you can move the torch to the start point of the part, then select Line or Pierce (refer to chapter 4.6 Select Line/Pierce), Press [START] and select only return function. the controller will show in Fig 5.3:

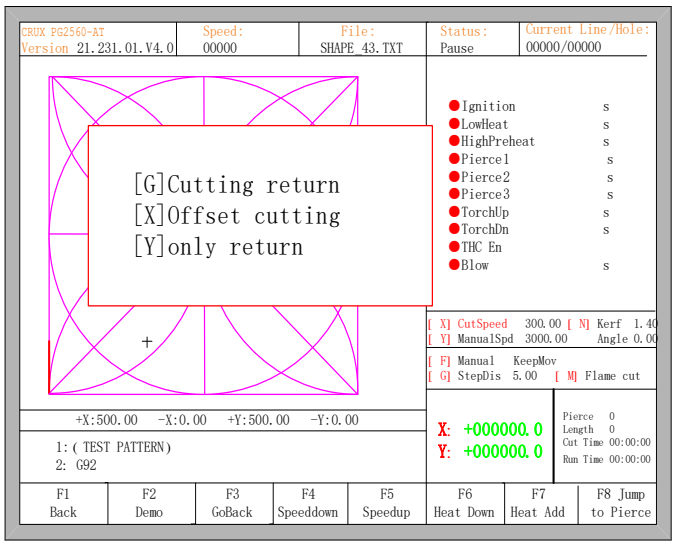


Fig 5.3 Restore breakpoint

- Press [G] , the controller will start cutting from current point to the start point of the select Line or Pierce.
- Press [X] , the controller will offset current point to the start point of the select Line or Pierce.
- Press [Y] , only move from the current point to the start point of the select Line or Pierce.

5.5 Laser Offset Function

Laser offset function refers to the user's installation of a laser cross location next to cutting torch. Distance between the cross and the cutting torch is fixed. After setting this offset distance(refers to section 7.4 powder parameters), user can use in [F7] Manual Move interface:

- [F4] Laser offset: can make the cross cursor move to the original position of the torch
- [F5] Laser bias: can make the torch move to the position of the cross cursor

Using this function, the user can conveniently use positioning characteristics of the cross laser cursor. After the completion of the positioning, make the torch move back to the position point of the cross cursor. This function can be mainly used in steel plate correction, steel plate start point search, etc.

If user has customized the laser offset function, the previous acceleration and deceleration buttons in manual move interface will be replaced by buttons [F4] laser offset and [F5] laser bias, shown as fig 5.4:

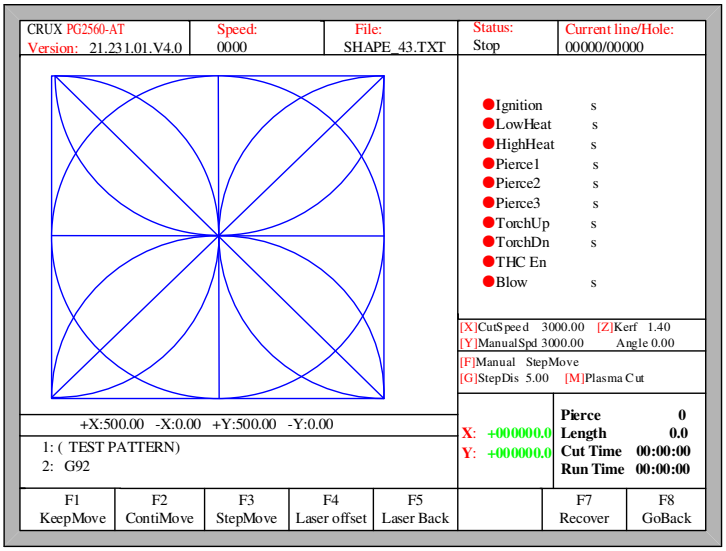


Fig 5.4 Laser offset and laser back function

Chapter 6 File Operation

The controller supports cutting file which has txt, cnc, nc, B3, MPG postfixes. The maximum file size is 4M and the largest lines is 150000. You can edit, compile, delete, export or import.

Note:

1. The total files in the controller is less than 5000. And only less than 1000 files in a folder.

2. The total length of the file path in the USB disk can not exceed 133 bytes. A Chinese Character is counted by two bytes, and the letters and characters are counted by one byte.

3. The hard disk folder name is 13 bytes.

4. The file name is less than 64 bytes.

In the main interface, press key[F2] (edit) to enter file management interface, shown as follows:

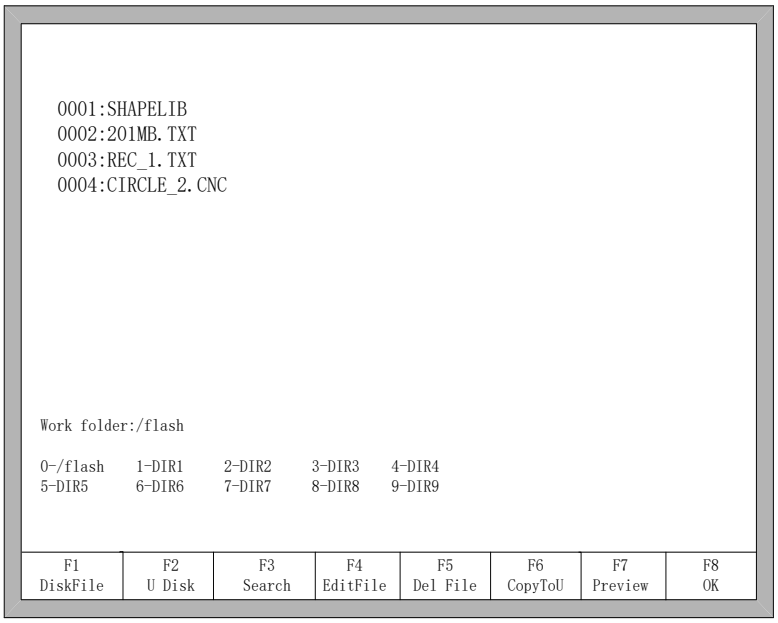


Fig 6.1 file manage interface

6.1 Disk Files

In the file management interface, press F1 to enter the Disk File management, as shown in Fig 6.1 . All supported files are listed.

- Press F4, if the file is G file, you could edit them. Please refer to chapter 6.4 on how to edit files.
- Press F5, you could choose to delete the current file or the current folder, as well as all the files.
- Press F6, if the file to USB.
- Press F7, preview the part image if the file is G file.
- Press F8, load the G file to the controller.

6.2 U Disk Files

In the file management interface, press key[F2] to go for U Disk interface.

In the U Disk interface, choose the corresponding G file stored in USB, press [F6] , the controller will save the file into the disk.

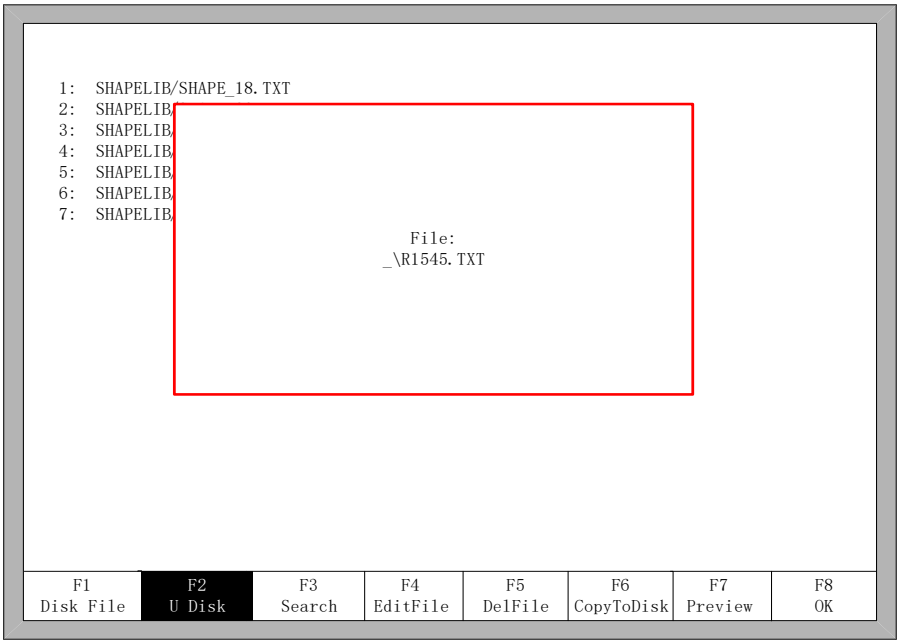


Fig 6.2 save U disk files

Note: The file in U disk can be loaded into the controller directly without be copied into the disk. At this time , the file will be saved automatically by name ufile.txt. shown as Fig 6.2:

When input file name, if you do not want to change the file name, you can be directly press [Enter] to preserved; or modify the file name and then press[Enter] to save. If the same named file has already exited, the system prompts:

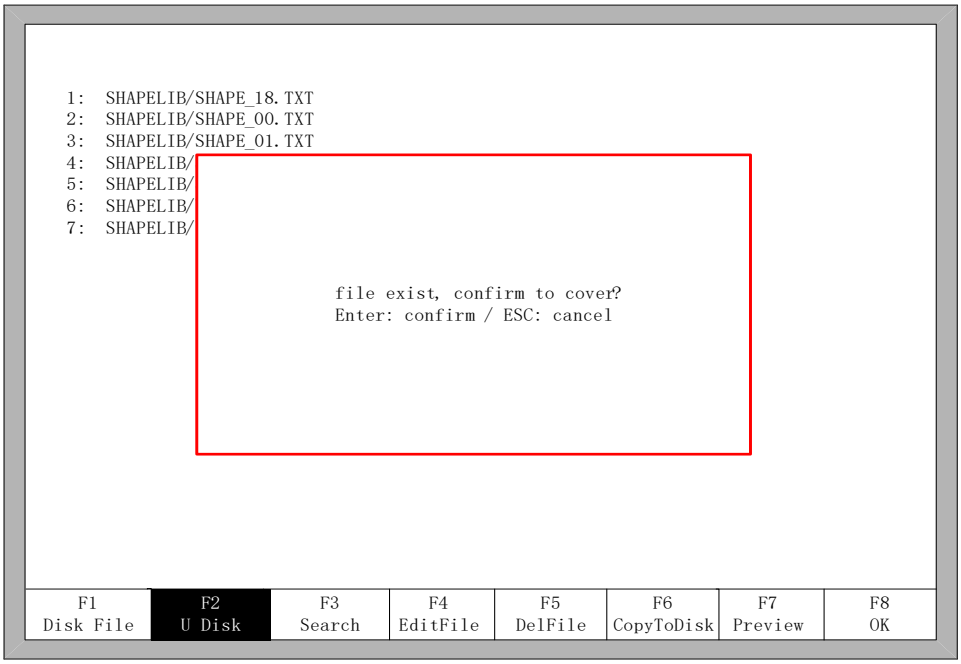


Fig 6.3 Replacement documents

6.3 Search File

In the file manage interface, press key[F3] to search a file. You can input all or part of the file name, then press [Enter] , and the controller will list all the files which name include the input word.

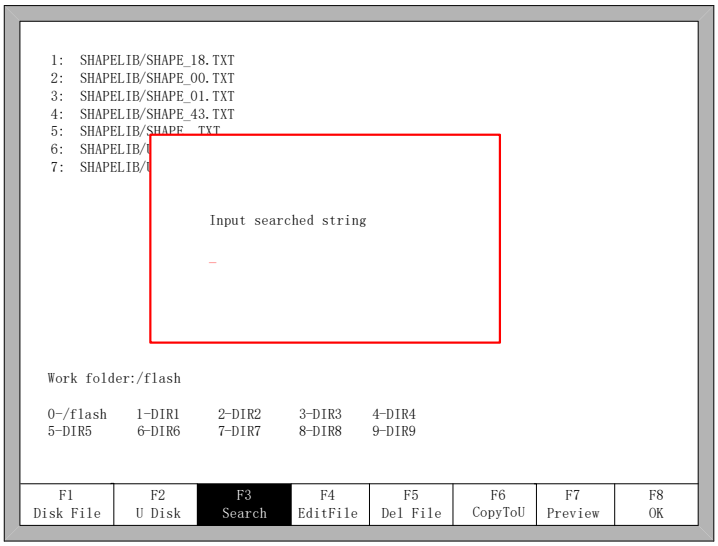


Fig 6.4 search file

6.4 Edit File

In the disk file interface, move the cursor to the file that you want to edit, then press [F4] to enter the edit interface.

When enter the characters, some keys are multiplexing button. Press these keys directly, enter the characters under the button. If first press [Shift] key, release the [Shift] key and then press the multiplexing button, then enter characters upper the button. Or press both[Shift] and reuse keys, then enter characters upper the button.

When editing the file, press [F2] can insert a new line after the current line, and press [F3] to delete the current line. Press [F+/Home] key, the cursor automatically moves to the first character of the current line, press[F-/End] , the cursor automatically moves to last character of the current line.

Each edit line supports 128 characters maximum.

When you open a file on U disk or new a G file, you must save it before using it. Otherwise, you cannot make use of the breakpoint recovery function.

Press [F8] to save the file.

6.5 Delete File

In the file management interface, press[F5] to delete the file, it will pop up the dialog box as shown in Fig 6.5, select the cursor to delete the file or the current selected folder all the files, or empty all the files.

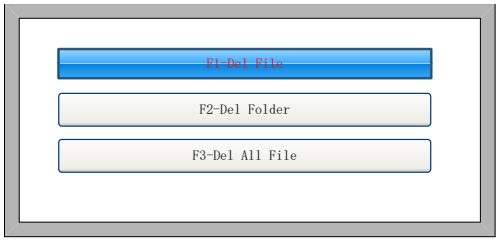


Fig 6.5 Del File

[F1] Delete file: The G file where the current cursor is located is deleted.

[F2] Delete folder: all G files in the current folder will be deleted.

[F3] Empty all files: all G files in the machine will be deleted.

6.6 New File

In the editing file interface (refer to 6.4 edit code), you can press key[F4] to create an new file.

6.7 Compile Code

After create a new G file or edit G file, if you want to check if file is legal or not , in the edit interface, press [F1] ,you can compile the file to check it.

6.8 Folder Managerment

6.8.1 Select Work Folder

The controller supports 10 folders, as the figure 6.1 shows.

- Work folder: current work folder path.
  - 0-/flash 1-DIR1 2-DIR2 3-DIR3 4-DIR4 5-DIR5 6-DIR6 7-DIR7 8-DIR8 9-DIR9 . These 10 symbols interpret 10 folder path. The number before '-' is the short key, press the corresponding number, switch current work folder into corresponding folder. For example, press[1] , it will show as the figure 6.6.

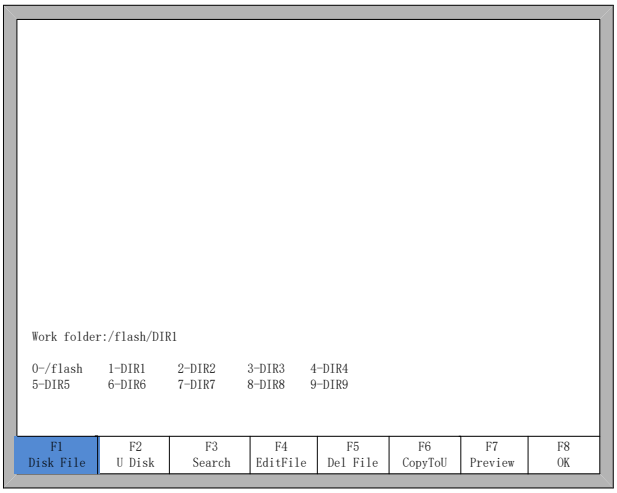


Fig 6.6 Folder 1

6.8.2 Create New Folder

As 6.4 edit file. First go to the edit file interface and edit a G file. As the figure 6.7 shows.

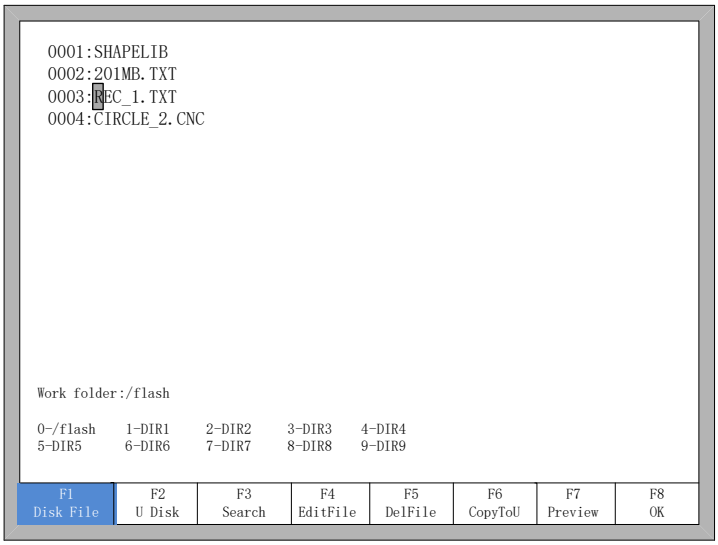


Fig 6.7 cursor moves to G code file name

Then press[F4] -- edit file, the function keys under the edit file show as figure 6.8.

F1 Compile	F2 AddRow	F3 Del Row	F4 New File	F5 NewFolder			F8 Save

Fig 6.8 Edit file interface

At this time, press[F5] , input the folder's name in the prompting diaglog window and then press [Enter] .

Illustration: the controller supports only 10 folders. If there already are 10 folder , then the new added folder will replace the second folder, successively the third folder, the forth file and so on. The first folder /flash is reserve folder, this folder can neither be replaced nor be modified.

Chapter 7 Parameter Setting

In the main interface, you can get the parameter interface by pressing key[F4] (Setups). Showed as Fig 7.1

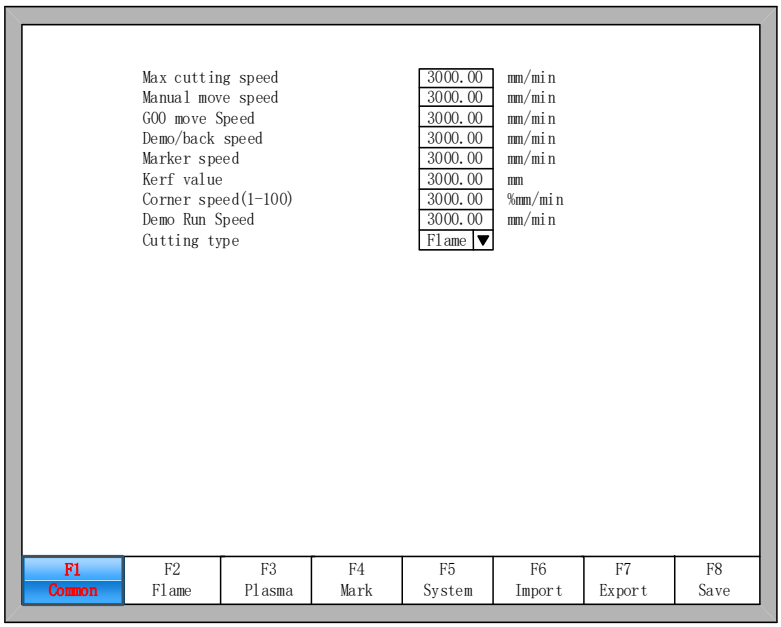


Fig7.1 Parameter Interface

You can set five kinds of parameter in the parameter interface:

1) Common parameters: cutting speed, manual move speed, G00 move speed, the size of kerf compensation, corner speed, cutting type.
2) Flame parameters: all the parameters used in oxygen gas cutting, edge cut enable.
3) Plasma parameters: all the parameters used in plasma cutting
4) Marker parameters: ignition, perforation cycle parameters, marker gun offset
5) System parameters: you can set system pulses, maximum speed limit, motor parameters and soft limit parameters.

7.1 Common Parameters

- **Cutting Speed:** the current cutting speed.
- **Manual Move Speed:** manual move speed.
- **G00 Move Speed:** the move speed at G00. That is the rapid move in cutting.
- **Demo/ back speed**: the speed of forward or backward along the part path.
- **Dust speed**: the speed when executing powder.
- **Kerf:** Specifies the amount of kerf that is applied to the current part progam.
- **Corner speed:** Corner speed is speed limited at corner. When the α is between 10-35 degree, the speed is limited automatically by controller. If the corner is less than 10 degree,

the speed is not limited , if it is more than 35, the speed is limited to start speed.

$$V_x = \begin{cases} V & \alpha < 10 \\ \left(1 - \frac{\alpha}{25\pi} * h\right) * V, & 10 \le \alpha \le 35 \\ \text{start speed} & \alpha > 35 \end{cases}$$

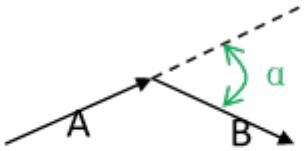


Fig 7.2Corner Illustion

- **Demo run speed**: the speed under demonstration.
- **Cutting Type:** There are three cutting types: flame(Oxygen gas), Plasma and demonstration type.

7.2 Flame Parameters

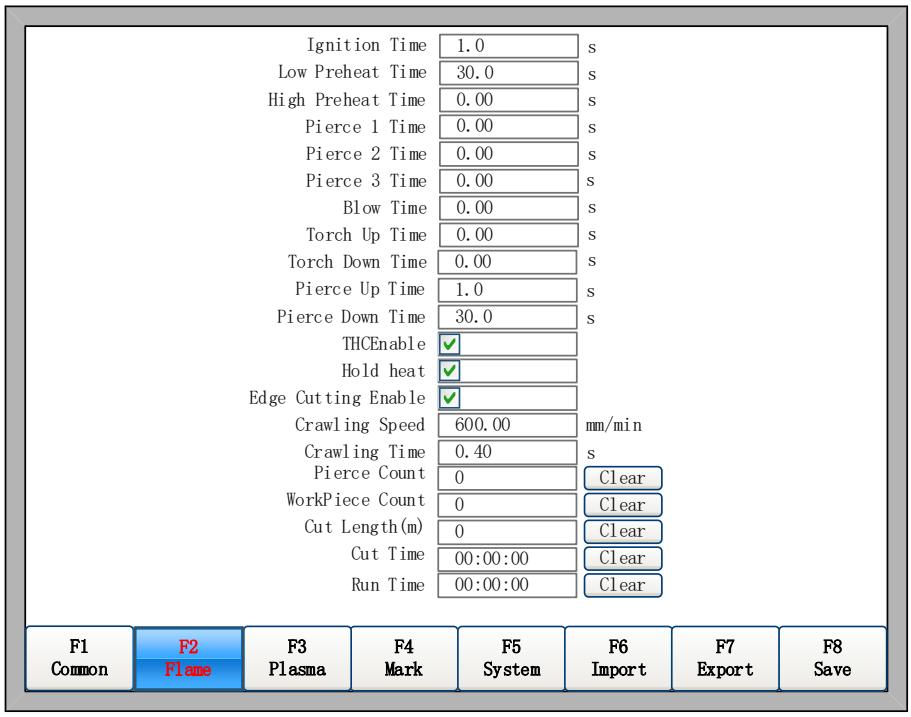


Fig 7.3 Flame Parameters

- **Ignition Time**: the time delay after opening ignition output.
- **Low Preheat Time**: The preheating time before piercing the steel plate. During the low pressure preheating process, you can prolong the preheating time by pressing "stop" key or [F7] key. If Key[stop] is pressed, the preheating time will delay until [Start] is pressed . If[F7] is pressed, the preheating time will automatically be increased 15 seconds, and this time will be preserved by controller.
- **High Preheat Time:** Like **Low Preheat Time. But** open different IO, high preheat time is before low preheat time.
- **Pierce 1 Time:** Piercing time with low pressure oxygen open.
- **Pierce 2 Time:** Piercing time with middle pressure oxygen open.

- **Pierce 3 Time:** Piercing time with high pressure oxygen open.
- **Blow Time:** The open time of output blow after oxygen output is closed.
- **Torch Up Time**: Specifies the amount of time used for torch lift after completing each cut. This is normally used to provide torch head clearance and return the torch to its predefined rest position.
- **Torch Down Time**: Specifies the amount of time used to lower the torch at the beginning of each new cut. This is usually longer than the Pierce Torch Down Time as it involves lowering the torch from its predefined rest position.
- **Pierce Up Time**: Specifies the amount of time used for torch lift during piercing. This parameter is used to provide distance between the torch tip and metal surface for cutting.
- **Pierce Down Time**: Specifies the amount of time used for torch lowering during piercing.
- **THC Enable:** Torch Height Control is enable or disable. The output of THC enable is active or inactive in flame cutting .
- **Hold Preheat**: If it is checked, Low Heat IO port is on the open status even after completing each cut. It will be closed when all cuts are finished, that is the file is finished. Also, it can be kept open status even all cuts are finished if Hold Preheat after cutting end is YES, refer 8.7.6 option.
- **Edge Cutting Enable**: When it is checked, the controller will automatically stop whenever each pierce point has occurred. When it stops, user can move the torch to the edge of steel panel, then press start button, the controller will prompt:

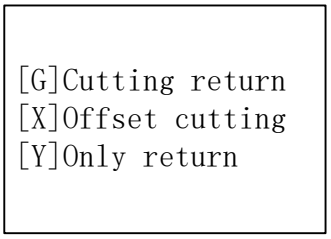


Fig.7.4 Edge cutting

When press[G] , after the controller will pierce at the current position and cutting to the part path. The current position should be at edge of metal.

This function will be especially useful when cut the thick metal plate. Thick steel plate is hard to be punched holes and the punched hole will be also larger. If directly punch hole in the cutting path, it will maybe affect the final production quality. Using edge cutting can may accelerate the efficiency of punch holes, save cutting time and improve production quality.

Of course, don't use edge cutting, punch hole with lead-in is also a more effective method.

- **Crawling speed:** creep speed when opening the crawling function. See8.7.6.9 for crawling function.

- **Crawling time**: Specifies the amount of time after piercing the part that the torch travels at crawling speed. After the Crawling Time is completed, the control accelerates to full cut speed. This parameter is helpful in allowing the operator to bring the cutting surface up to temperature and completely pierce the metal before cutting at full speed.

Note: Depending on the performance of the plasma system, a crawling time may be required to allow for ramp up of the cut voltage after a pierce.

- **Pierce count**: record the number of pierce during flame cutting.
- **Workpiece count**: record the number of workpieces completed by flame cutting.
- **Cut length**: record the total flame cutting distance. Unit: metric-meters, Inch-feet
- **Cut time**: record the time of flame cutting process.
- **Run time**: record the flame cutting time + G00 move time + the time of piercing time.

7.3 Plasma Parameters

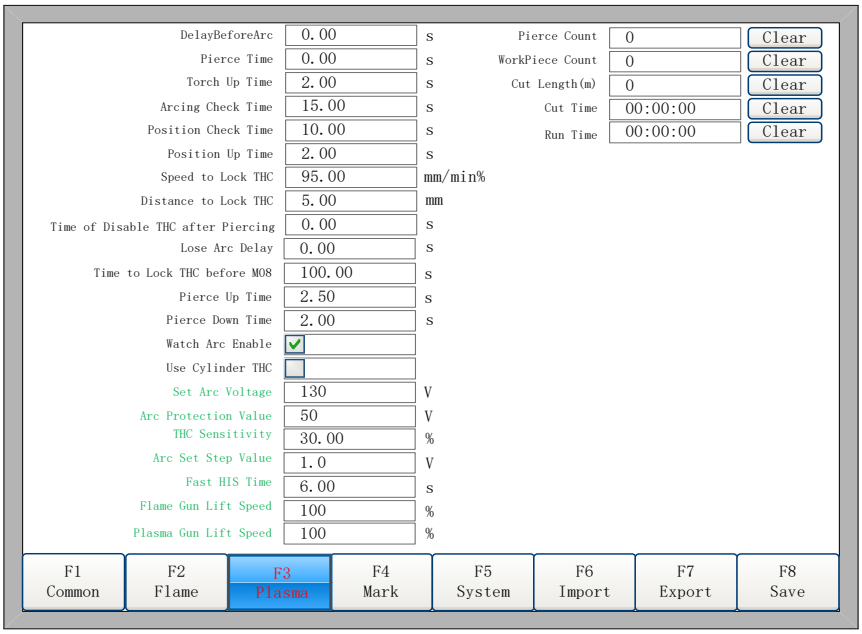


Fig 7.5 plasma parameters

- **DelayBeforeArc**: Specifies the delay time before starting piercing. That is a wait time before controller starts to cut. All outputs are off.
- **Pierce time**: Specifies the time delay from when the torch completes lowering until motion is initiated at Creep Speed. Used to allow the plasma torch to completely pierce the material before moving.
- **Torch Up Time:** Specifies the length of time to raise the torch at the beginning and end of each cut to provide clearance over the cut pieces. If you are using an automatic height control system,

set Torch Up Time to zero.

- **Arcing Check Time:** The time between the control system start arc on and Arc On Feedback is on. The controller will go on to move and cut if arc on feedback is on with this time. Or it will prompt a warning message and stop running if arc on feedback is off after this time.
- **Position check Time:** The max time of controller start to lower the lifter and Position Detection is on.
- **Position up Time:** In Position Check Time, if the Position Detection is on, then the torch is raised for this time. It is the ignition height of plasma arc.
- **Speed to Lock THC:** The percentage speed of full cut speed. If the speed is less than this, the output of LockTHC is on.
- **Distance to Lock THC:** Within the distance of each cut segment, the output of LockTHC is on.
- **Time of Disable THC after Piercing**: The delay time to enable torch height control after arc on feedback is on.
- **Lose arc delay:** The filter time of lose arc detection.
- **Time to Lock THC before M08:** Plasma is off before the end of part cut.
- **Pierce up time:** When the crawling function is opened, the dynamic pierce parameters are described in detail. 8.7.6.9 Reptile function description.
- **Pierce Down time:** When the crawling function is opened, the dynamic pierce parameters are described in detail. 8.7.6.9 Reptile function description.
- **Watch arc enable:** whether real-time detection of arc on signal in cutting process or not.

If setting "yes", in the cutting process, the system detects the real-time arc on feedback signal. If arc on is lost, the controller will stop the cutting and prompt alarm message.

If setting "No", then in the cutting process does not detect arc on feedback signal

- **Use CyIinder THC:** When this parameter is selected, it keeps Torch Down output in cutting.

(The following is typical for the "T" models in ProGantry 2560 series CNC controller)

- **Set Arc Voltage**: reference arc voltage, the range of value is 50.00-300.00. Unit: V
- **Arc Protection Value:** When actual arc value ≥ (Set Arc Voltage + Arc Protection Value), the controller will prompt an alarm of breaking arc and stop cutting, the range of the value is 5.00-100.00. Unit: V. Default 30V.

Notice: if arc value is less than 30 V, the controller will also prompt the alarm of breaking arc. This 30 V is fixed value and not permitted to be modified.

- **THC Sensitivity:** This is sensitive reflected by THC motor. The more fast of the lifter motor, the more larger of THC Sensitivity. It is advised to set 30-50, the range of which is 1.00-100.00.
- **Arc Set Step Value:** In cutting interface, Increase or decrease the **Set Arc Voltage** value every time by pressing F7 or F6, the range of value is 0.10-10.00. Unit: V.

- **Fast IHS Time**: The lifter motor runs time in full speed when IHS(initial height sensing). Then the lifter motor runs the half speed until the torch contact the steel plate.

  Notice: **Fast IHS Time** cannot be more than **Position Check Time**.
- **Flame gun lift speed:** Flame torch can reach the maximum percentage of lift speed.
- **Plasma gun lift speed**: Plasma gun torch can reach the maximum percentage of lift speed.
- **Pierce Count**: record the number of perforations during the plasma cutting process.
- **WorkPieceCount**: record the number of workpieces completed by plasma cutting.
- **Cut Length (m)**: record the total plasma cutting distance. Unit: metric-meters, Inch-feet.
- **Cut time**: record the time of plasma cutting process.
- **Run time**: record the plasma cutting time + empty time + the time of M07 state.

7.4 Marker Parameters

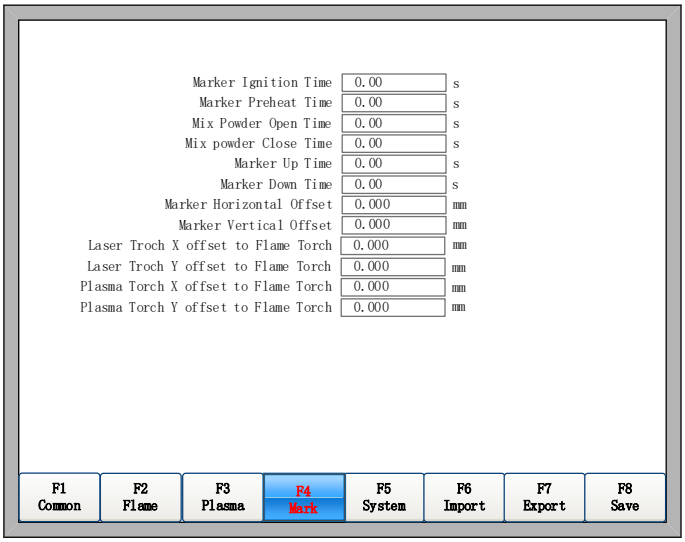


Fig 7.6 marker parameters

- **Marker Ignition Time**: Ignition time of marker. Note: the output is same to flame ignition output.
- **Marker Preheat Time**: The preheat time of marker from ignition complete to open mix power Open.
- **Mix powder Open/Close Time**: Delay time of scatter powder mouth relative to spurt powder mouth open/close, input ≥0 arbitrary value, unit: s.
- **Marker Up Time**: The time of marker torch going up. Unit: s.
- **Marker Down Time**: The time of marker torch going down. Unit: s.
- **Marker Horizontal Offset**: Horizontal offset of powder torch gun relative to flame

cutting torch gun. Unit: mm.

- **Marker Vertical Offset**: Vertical offset of powder gun relative to cutting torch. Unit: mm.
- **Laser Troch X offset to Flame Torch**: the horizontal distance of the laser gun relative to the flame torch gun.
- **Laser Troch Y offset to Flame Torch:** the Vertical distance of the laser gun relative to the flame torch.
- **Plasma Torch X offset to Flame Torch:** the horizontal distance of the plasma torch gun relative to the flame torch gun.
- **Plasma Torch Y offset to Flame Torch:** the Vertical distance of the plasma torch relative to the flame torch.

7.5 System Parameters

The system parameters, as shown in Fig 7.7, are related with the precision of driver shaft of the cutting machine, coordinate axis, increase/decrease of rate and little arc processing limited parameter.

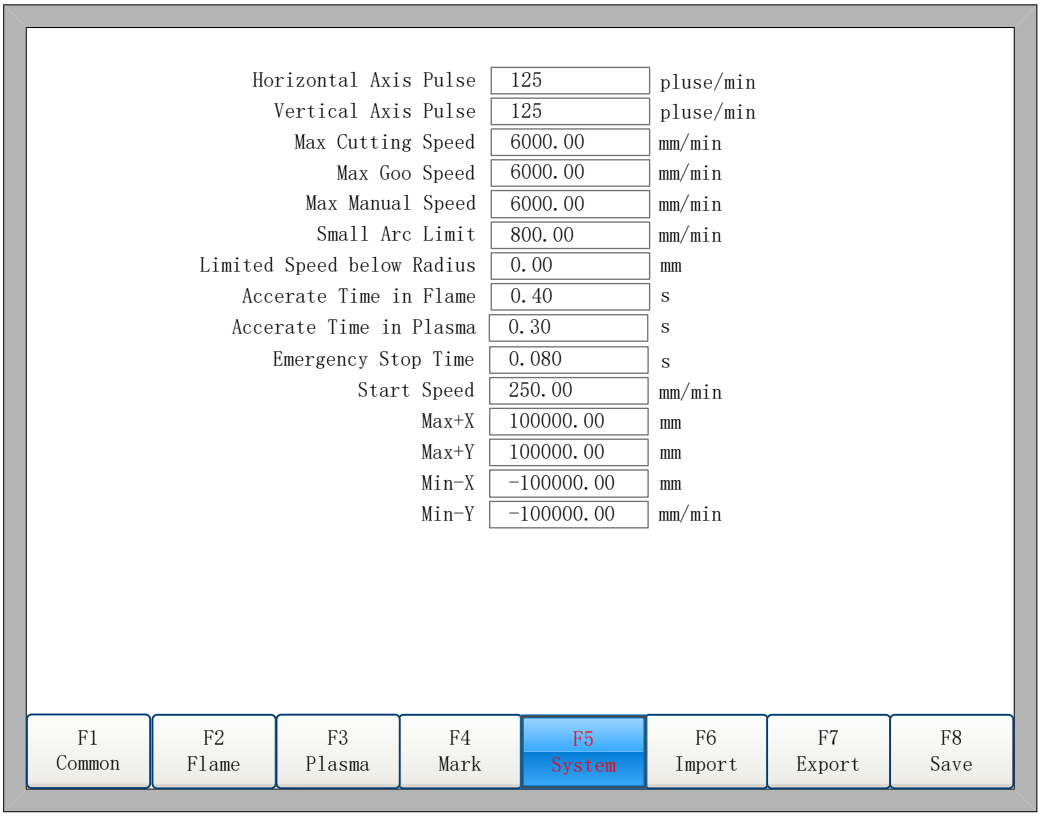


Fig 7.7 System Parameters

- **Horizontal Axis Pulse:** The number of pulse that controller needs to generate when the machine move1mm towards X axis, maintaining 3 digits at most after decimal point.

- **Vertical Axis Pulse:** The number of pulse that system needs to generate when the machine move 1mm towards Y axis , maintaining 3 digits at most after decimal point.
- **Max Cutting Speed:** the maximum cutting speed.
- **Max G00 speed:** the allowable maximum rapid move speed.
- **Max Manual Speed**: the maximum speed of manual move.
- **Small Arc Limit:** Maximum speed at cutting a small arc. Refer to note 1.
- **Small Arc Radius Limit**: If the radius is less than or equal to the value of the circular arc, the running speed should be limited. Refer to note 1.
- **Flame adjusts time:** the accelerate time from start speed to the full speed in flame cutting.
- **Plasma adjust time:** the accelerate time from start speed to the full speed in plasma cutting.
- **Emergency STOP Time**: the deaccelerate time from current speed to stop in emergency.
- **Start Speed**: the system's speed when it began to start.
- **Max Coordinate**: The maximum positive coordinate which the machine can reach horizontally.
- **Min Coordinate**: The minimum negative coordinate which the machine can reach horizontally.

Note 1:

Table 7.1 Small Arc Definition

Cutting Speed(mm/min)	Small 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 cut speed and arc radius:

Small Arc Limit	Small Arc Radius	Cutting Speed
=0	=0	No limit
>0	=0	Follow table 7.1, for arc less than small arc radius, the running speed should be limited.
>0	>0	Cutting speed = small arc speed limit * sin [90 * (arc radius / small arc speed limit radius)]. When the result is less than the starting speed, the value is starting speed. When starting speed is less than cutting speed, the value is cutting speed.

Note: the modified small arc limit or radius of small arc limit will become effective only after reloading cutting files.

7.6 Parameter Import

In the parameter configuration interface, press F6 to import the parameters from the U disk or the hard disk. As shown in Fig 7.8.The import from the U disk, first of all , insert the U disk into the system USB interface, and the corresponding parameter file in the U disk, which can only be from the same system with the system model derived from the parameters of the file. Then select the parameter file that need to import from the U disk, click Enter.

The import from the hard disk, first of all, determine that the local hard disk has a saved parameter file. Click Enter to select the parameter file saved in the local hard disk, then click enter.

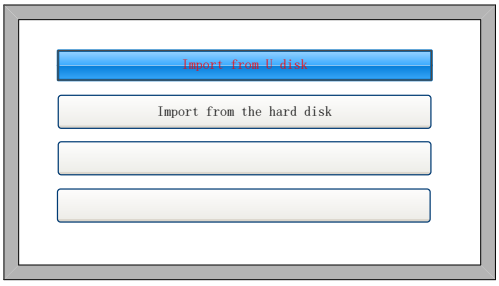


Fig.7.8 Parameter import

7.7 Parameter Export

After the parameter configuration is over, press F7 in the parameter configuration interface to export the parameters, you could choose to export to the U disk or hard disk.

The export to the U disk. First of all, Insert the U disk into the USB port of the unit, named the name of the parameter file. Click Enter to complete the parameters saved to the U disk.

Export to the hard disk, and the parameters stored in the hard disk. When needed, restore at any time.

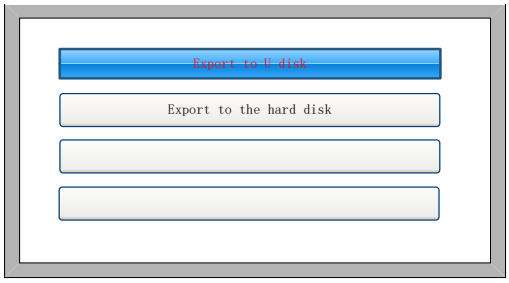


Fig.7.9 Parameter export

This function combines the input parameter function to enable rapid adjustment of the cutting parameters required for different thickness plates. Use the export parameters function to let the cutting parameters of thickness of the plate required to store in the hard disk or the U disk. When cutting the corresponding thickness of the plate, use the import parameters function from the U disk or hard disk to import the corresponding parameters can be.

7.8 Save Parameters

After parameter modification, press [F8] to save.

Note: when any parameter has been modified, you must take preservation operation to keep modification valid, or the system will take the original parameters.

Chapter 8 Diagnosis Function

Fig 8.1 Diagnostic interface

In the main interface, you can press[F5] to enter the system diagnosis interface, as shown in Fig 8.1.

You can be diagnosing the I/O and keyboard in this interface. System self-check can be made by this.

8.1 Diagnosis Interface Index

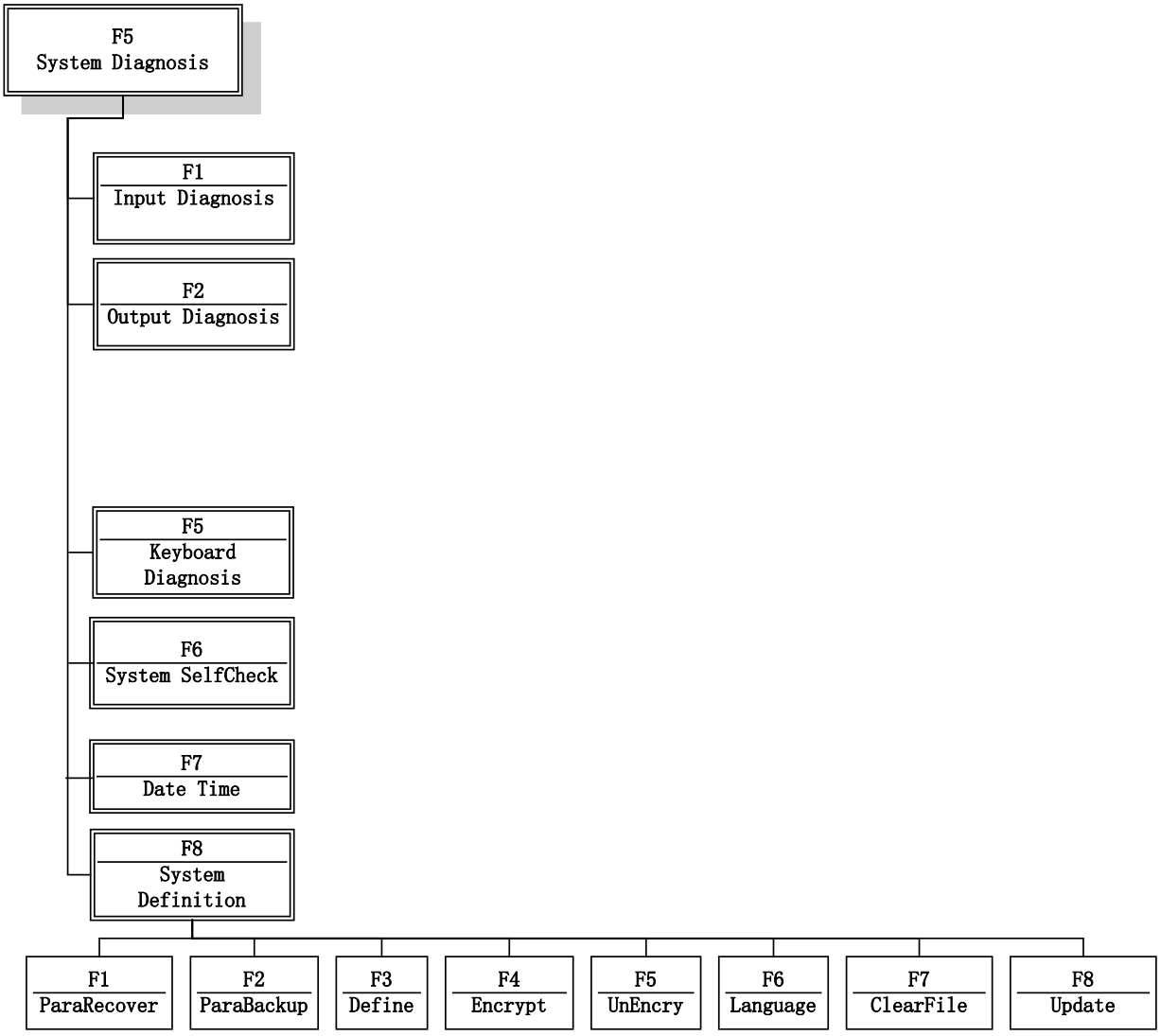


Fig 8.2 Diagnosis interface index

8.2 Input Diagnosis

The system will read current IO information when press [F1] to refresh the interface, and display all IO's status. The green NC means the input is effective, and the red NO means the input is ineffective.

8.3 Output Diagnosis

In diagnosis interface ,press [F2] to enter output diagnosis interface, shown as Fig 8.3

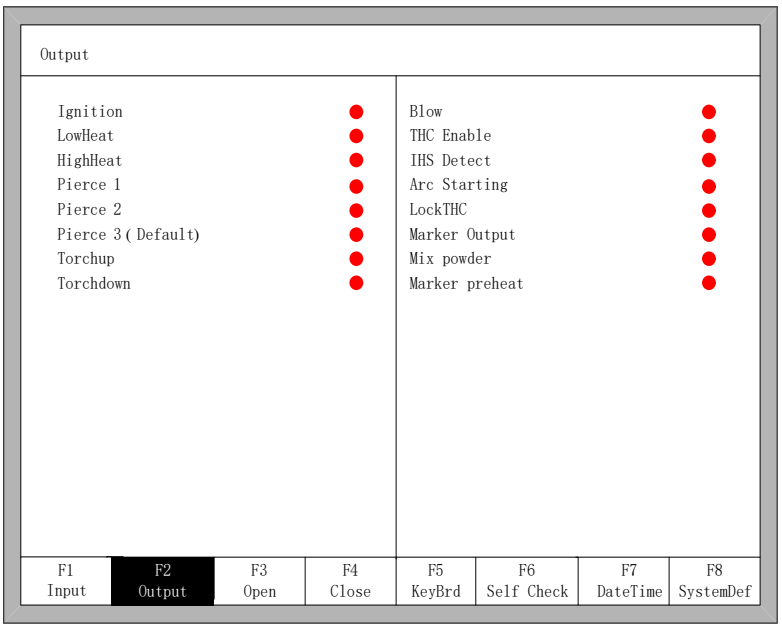


Fig 8.3 Output diagnosis

Press[↑] [↓] [←] [→] , you can move the cursor to the corresponding output port, press[F3] to open the corresponding output port, press[F4] to close the corresponding output. ● represents the output is active, ●represents the output is inactive.

8.4 Keyboard Diagnosis

In diagnosis interface ,press [F5] to enter okeyboard diagnosis interface, shown as Fig 8.4.

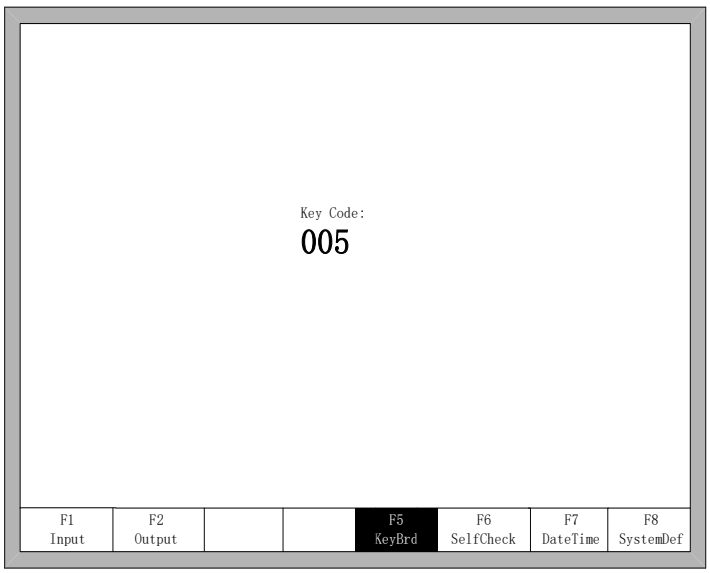


Fig 8.4 Keyboard Diagnosis

In this interface, press any key of the keyboard, there will be a corresponding keyboard encoding shown here. if there is no encoding shown, then this key is out of fault.

8.5 System Self-check

In the system diagnosis interface, press[F6] to enter the system self-check interface.

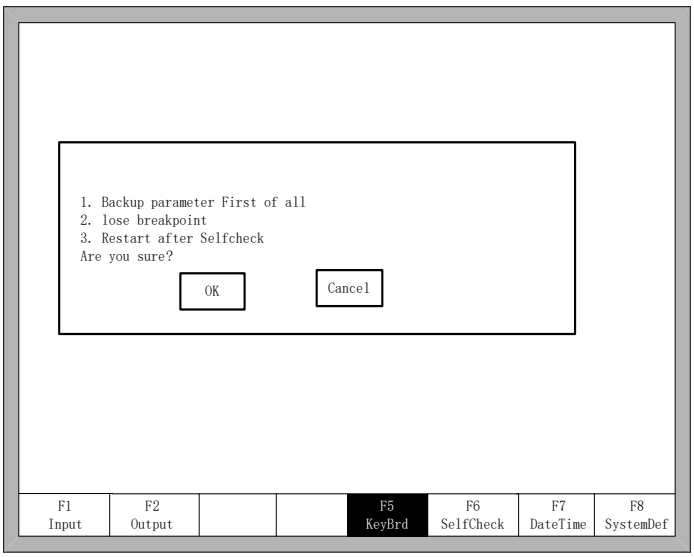


Fig 8.5 System self-check

If the self-check is OK, the system will show:

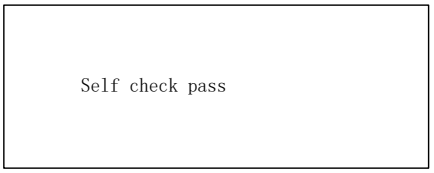


Fig 8.6 Self-check pass

8.6 Date and Time

Press F7 in the system diagnosis interface to set the date and time

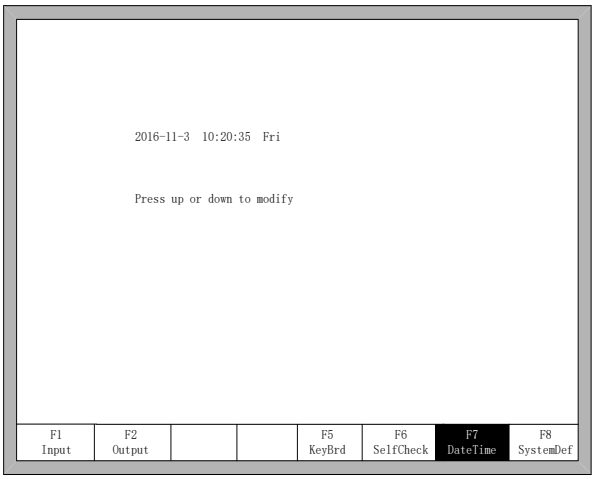


Fig 8.7 System time

Move the cursor to the corresponding date, time or week, press [·] or[·] to adjust the time.

8.7 System Definition

In the system diagnosis interface, press F8 to enter the system custom definition interface, in the interface, you could set the input IO, output IO or system coordinate, set back to zero, and also reset or backup the parameters and one key switch between English or Chinese.

8.7.1 Parameter Backup and Restore

Parameter Backup: The process of parameter backup is, in the main interface press[F5] (System Diagnosis), [F8] (System Definition), [F2] (Parameter Backup). The system will need code, after inputting the code "1396", press [Enter] , the system will import the default parameters. In the following process, if the parameters are modified or some of them arebroken, reset the parameters.

Notice: after installing and debugging the complete equipment, equipment manufacturer please backup the parameters.

Parameter Reset: The process of reset the parameters is, press [F5] (System Diagnosis) in the main interface, [F8] (System Definition), [F1] (Parameter Reset).

Notice: After resetting successfully, please restart the system.

8.7.2 Input Definition

The controller could change the IO definition, including changing the order of IO number, the type of IO(normally open or closed) according to the user's need. In the system custom definition interface, press [F3] to enter the definition interface, press[F1] to enter the input definition interface. As shown in fig 8.8.

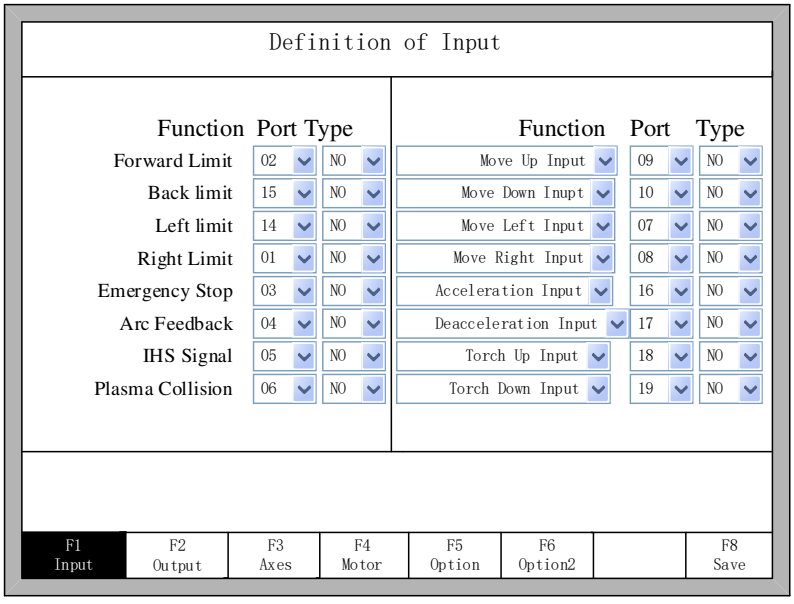


Fig 8.8 input definition

In the interface press[·], [·], [·], [·] , move the cursor to the position that needs changing, press [Enter] to open the tab of the drop - down box at the location of the cursor, move the cursor by [·], [·] , press [Enter] to change the number of the Input, press [Enter] to set the selected parameters.

Serial number: 01~10, 14~22.

Type: NO (normally open), NC (normally closed)

Function: Move forward, move back, move left and move right, ignition input, oxygen cutting input, start input, stop input, gun rising input, gun down input, acceleration input, deceleration input, z axis upper limit position, z axis lower limit position, open drilling rig, drive no alarm situation, forward and backward.

8.7.3 Output Definition

The controller could change the IO definition, including changing the order of IO number, the type of IO(normally open or closed) according to the user's need. In the system custom definition interface, press [F2] to enter the definition interface,, as shown in fig 8.9.

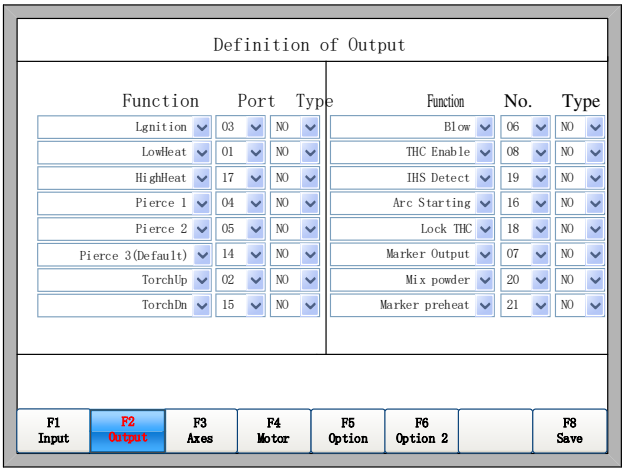


Fig 8.9 output definition

In the interface press[·], [·], [·], [·] , move the cursor to the position that needs changing, press Press the[Enter] key to open the tab of the drop-down box where the cursor is located. Press [·], [·] to move the cursor and press [Enter] again to set the selected parameter. The output type is open drain transistor output type.

Type NO means that the output signal is normally open. Type NC means that the output signal is normally closed.

8.7.4 Coordinate Definition

The system could provide IO definition for the user. As shown in Fig 8.10

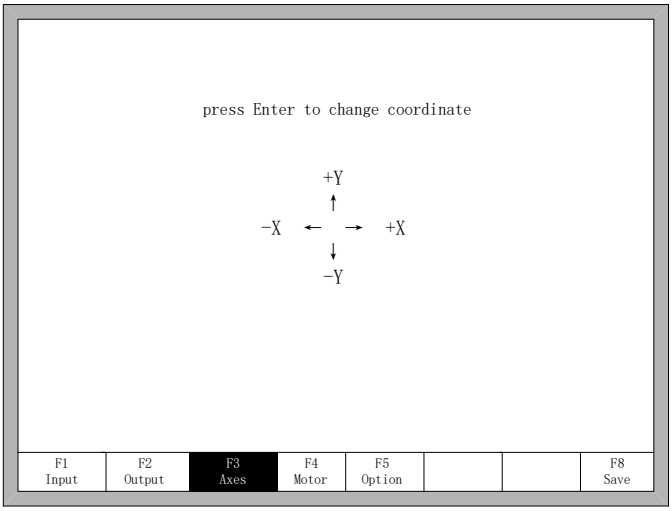


Fig 8.10 Coordinate Definition

In the interface, press Enter repeatedly to change among 8 type of coordinates. Press [F8] to save.

8.7.5 Motor

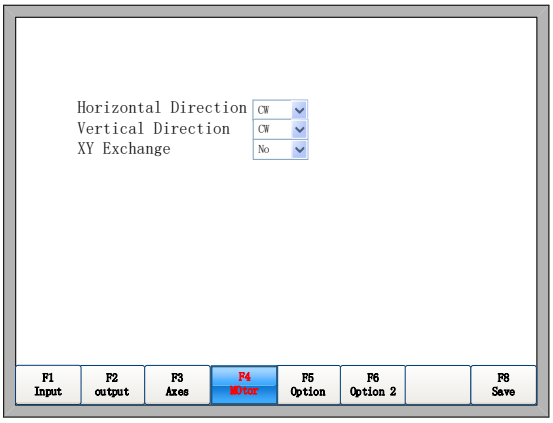


Fig.8.11 Motor Direction

Fig 8.11 Motor directionPress up or down key, move the cursor ▌ to the axes of which needs to change motor rotation direction, then press [Enter] , the motor direction can switch between positive and reversal.

XY exchange: if this function is "YES", output pulse of X axis and Y axis exchange each other, in other words, horizontal axis and vertical axis exchange each other.

8.7.6 Option

8.7.6.1 Remote Controller

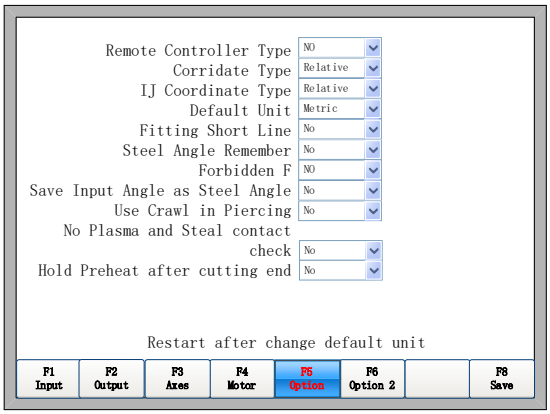


Fig 8.12 Option

Press left or right arrow in this interface, remote controller's type can be set arbitrarily one of the three types which are NO, P2P, 8421.

- NO type: no input of remote controller.
- P2P type: reference the section 11.1.2 Remote input.
- 8421 type: reference the section 11.1.2 Remote input.

8.7.6.2 Default Coordinate

As the figure 8.12 shows, the default coordinate can be set default relative coordinate or default absolute coordinate.

8.7.6.3 Default IJ Coordinate

As the figure 8.12 shows, in the G code of G02 or G03, I or J parameter after the code is relative coordinate or absolute coordinate. Under the general circumstance, the arc's IJ coordinate is relative coordinate, only minority several G code of arc's IJ coordinate is absolute coordinate.

8.7.6.4 Switch between Metric and Inch

As the figure 8.12 shows, default unit can be switched to either the metric or the inches, after switching, the data's units about length are all switched.

8.7.6.5 Short Line Fitting

As the figure 8.12 shows, when short line segments in the G code are too many and continuous shake or shock occurs in the process of machine tool runs, set this parameter " Yes ", in the general condition this parameter is set "No".

8.7.6.6 Steel Plate Angle Memory

In the default condition, the angle after steel plate is adjusted has no memory. After this parameter is set "Yes", steel plate angle memory will be automatically stored, until the steel plate is adjust again or the angle is cleared.

8.7.6.7 F Instruction Forbidden

When this parameter is "Yes", F instruction after G code which is used for limited rate is ignored.

8.7.6.8 Manual Angle Input to Adjust Steel Plate

When this parameter is "Yes", the manual input angle in the section of 4.3.3 is also steel plate adjusting angle. This angle will be shown in the main interface, if open the function of steel plate angle memory, this angle is also add to the steel plate adjust angle and accordingly saved.

8.7.6.9 Use the crawl function

When this parameter is yes, dynamic pierceand crawl are enable. The timing diagram of the dynamic pierce is shown in Fig 8.13.

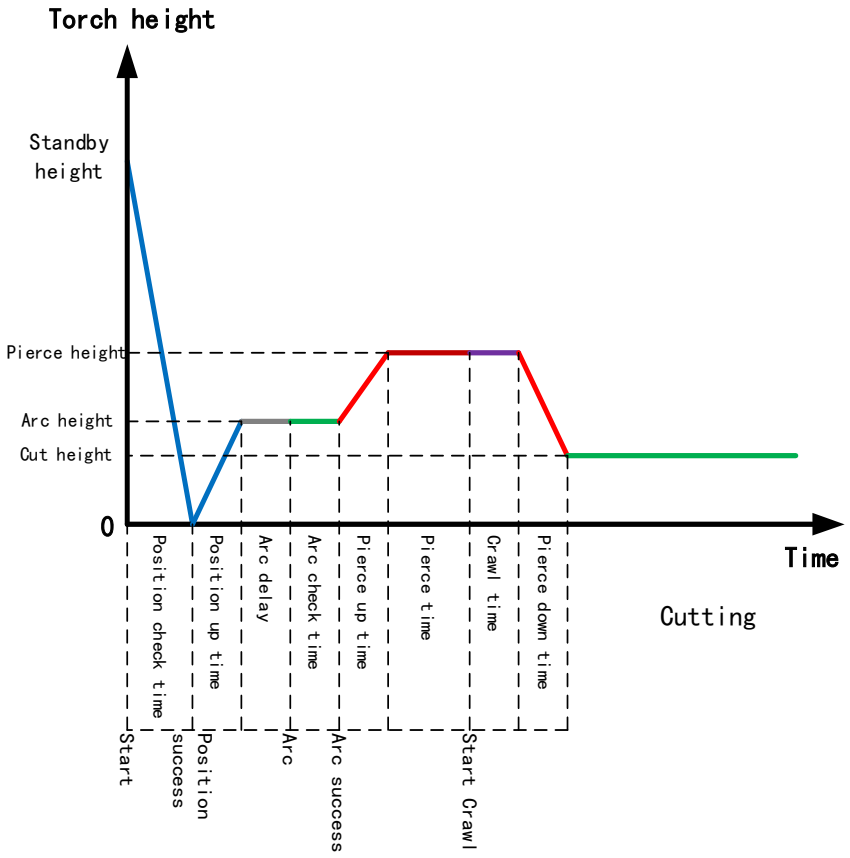


Fig 8.13 Dynamic perforation timing diagram

Time parameter description: (For details, see 7.3 Plasma Parameter Settings.)

- Position check time: After the cutting is started, the torch descends, and when the system detects the positioning success signal, the positioning detection time ends in

advance. If the system has not received the positioning success signal after the positioning detection time has ended, the system will alarm. When this parameter is 0, the system will skip the detection of the positioning success signal and the torch will not fall and go directly to the positioning up phase.

- Position up time: After detecting the positioning success signal, the torch is lifted and the ascending time is the positioning rise time. When the parameter is 0, the torch does not lift, the system goes directly into the arc delay phase.
- Arc delay: After the positioning up time is over, the system will delay the arc for a period of time, which is defined as the arc delay. When the parameter is 0, the system goes directly to the arc, instead of delaying.
- Arc check time: After the Arc delay time is over, the system starts to open the Arcing port and detect the successful starting feedback signal. When detecting the successful signal, the arc detection time ends in advance. If the system has not received the successful starting feedback signal after the arc detection time has ended, the system will prompt the error and terminate the cutting of the current workpiece, and exit the program according to the breakpoint memory. When the parameter is 0, the system will directly detect the starting feedback signal. If the signal is not detected, it will report an error. After detecting the signal, the system will enter the next stage.
- Pierce up time: After arc success, the torch at the same time to enhance. This upgrade time is the pierce up time. When the parameter is 0, the torch does not lift and the system goes directly to the next stage.
- Piercing time: After the system detects the successful feedback signal from the arc, the system starts to static perforation, which is called piercing time. When this parameter is 0, the system will skip the time and enter the crawl phase.
- Crawl time: At the end of the static perforation, if there is more perforation at the perforation point, higher slag build-up, the arc will be unstable when cutting in this area. So it is necessary to move forward for a period of time under the condition of no height adjust, the time is the crawl time. When this parameter is 0, the system will skip the time and enter the perforation fall phase.
- Pierce Down time: When the crawl time ends and the torch descends to the normal cutting height, start cutting. And this fall time is the perforation fall time. When the parameter is 0, the torch does not drop, and directly start normal cutting.

8.7.6.10 No Plasma and Steal contact check

Whether the collision signal is detected during the plasma cutting process. If the election is no, when the collision between the plasma gun and the steel plate is detected during cutting process, cutting will be stopped and the alarm prompt will be given. If it is selected yes, the collision information is not processedduring cutting.

8.7.6.11 Hold Preheat after cutting end.

In oxygen gas cutting, when cutting is completed, choose whether to turn off the preheated oxygen automatically..

8.7.7 Option 2

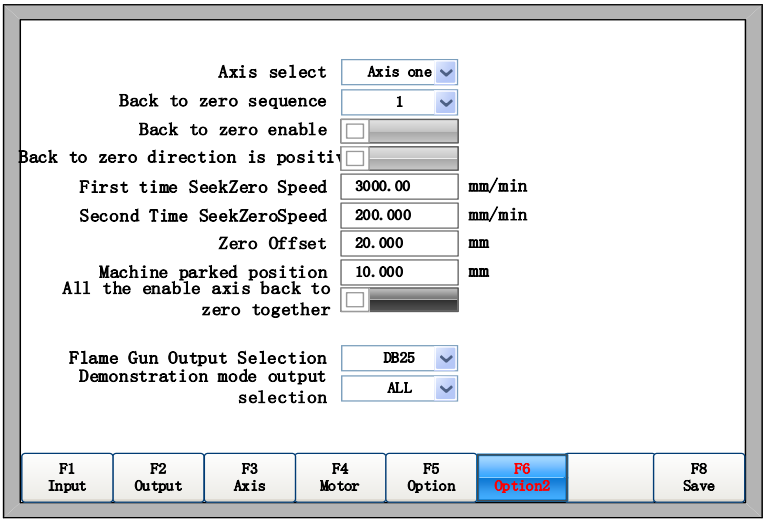


Fig 8.14 Option 2

8.7.7.1 The function of backing to zero.

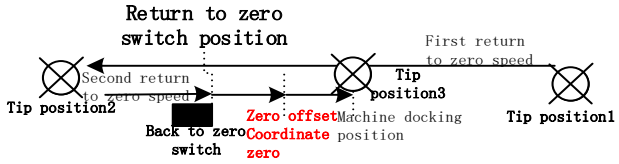


Fig 8.15 Return to zero process diagram

As shown in Fig8.15, backing to zero process is: Before starting to return to zero, the tip is in the right side of the tip position 1, then press the F8 button on the main interface, the machine starts to return to zero, The tip moves to the left in the direction of the first zero return arrow shown in Figure 8.15 at the first zero return. The location of the first time to find the zero switch is just to find the approximate range of zero switch, so the speed can be relativelyfast. When the return switch is detected, the system will immediately pause, then the gun will stop at the left side of the zero switch, as shown in the figure Tip position 2. The machine will then move to the right in the direction of the second return arrow as shown in Figure 8.15 at the second return to zero, and the position of the second time to find the zero switch is found, and the range of the zero switch has been determined. Now speed needs to be smaller in order to improve the accuracy of zero. When the tip moves to the zero switch position in the figure, it runs to the zero point of the current axis according to the zero offset parameter, and finally runs to the machine tool position, that is the tip position 3.

The parameter setting interface is shown in Fig 8.14. The parameters are defined as follows

- Axis select: select the need to set the zero axis X, Y, the following parameters are set on the axis.
- Backto zero sequence: 1 ~ 2, the current axis of the return order.
- Back to zero enable: If selected, the current axis will be back to zero, otherwise the current axis will not return to zero.
- Backto zero directionpositive: If selected, the current axis will return to the positive direction,

otherwise it will return to the opposite direction.

- First time seek zero speed: the first time the current axis to find the speed of zero switch, this time just to find the approximate range of zero switch, so the speed can be relatively large.
- Second time seek zero speed: the current axis of the second time to find the speed of zero switch, then return to zero the scope of the switch has been determined, nowspeed needs to be smaller in order to improve the accuracy of zero.
- Zero Offset: The location of the actual machine zero relative to the zero return switch. If the position of the return switch is not the zero position of the machine, this parameter is required to set as the zero position of the machine.
- Machine parked position: After the completion of back to zero, the coordinate position which current axis required to dock.
- All the enabled axis back to zerotogether: If this is selected, all enabled axis will back to zero, otherwise they will back to zero in order

Description: ProGantry 2560 series CNC system with "T"models are unique.

Flame gun output selection: flame gun output selection, you can choose to use CN5 or DB25 (CN2) interface to make heightcontrol of the flame gun.

Demonstration mode Output selection: In the demonstration mode, you can choose whether making lifter control to CN5 or DB25 (CN2) interface

Note: This option only suffix with T models only, CN5 interface only suffix with T only.

8.7.8 Language Switch

In the main interface, press [F5 Diagnose] ,then press [F8 System definition] ,then press [F6 Language] , it will select needed language interface.

8.7.9 Add the Language File

From the company get the language pack file and copy it into the USB. Insert the USB into the system USB port. In the main interface, move the cursor to add language file, press [Enter] . There will be an introduction appearing to show the result.

This system can support most of the national language files, can also be customized language file. Please contact the company demand.

8.7.10 Clear Files

In the main interface, press [F5 Diagnose] ,then press [F8 System definition] ,then press [↓] to make cursor above [Clear File] button and press [ENTER] , the system will clear all G code files of system.

8.7.11 System Update

In the main interface, press [F5 Diagnose] ,then press [F8 System definition] ,then press [F8 System update] , please ensure that you have inseted the U disk into system's USB interface, otherwise it will pop up a prompt box "please insert U disk". If U disk is okay, after press [F8 System update] , it will pop up a dialog box as Fig 8.16. Press [Enter] and confirm, it will prompt to update as the figure

8.17 shows.

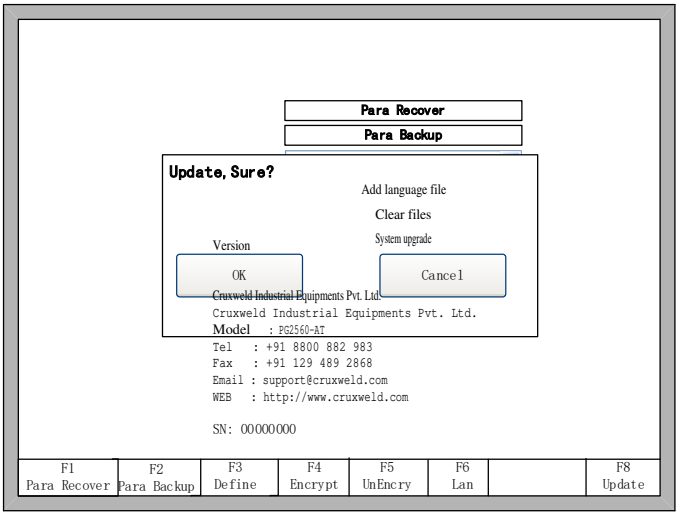


Fig 8.16 the prompt of update confirm

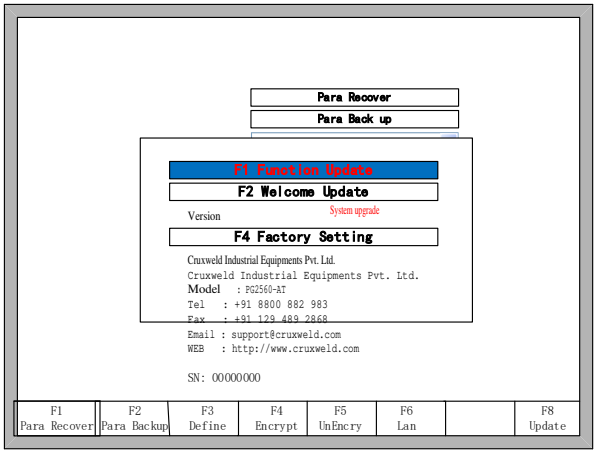


Fig 8.17 the prompt of system update

Function Update: after press [F1] , it will update function. The function update file is PG2560.exe or corresponding model upgrade file PG2560A.exe, PG2560B.exe, PG2560C.exe.

Welcome Update: after press [F2] , it will update the welcome interface. The interface upgrade file is named WELCOME.bmp, which should be put directly into the U disk but not in any folders. This welcome interface is the first shown interface after power on. If you want to find the method of make new welcome interface, please contact with our after-sale service department.

System recovery: after press [F4] , it will recover the system. At this time, the system is exhaustively recovered back to the status before leaving factory, in other words, the parameters, IO ports configuration, coordinate direction definition and so on are all recovered back to the status before leaving factory. In the general condition, please don't use this function to recover system.

Chapter 9 Graph Management

In the main interface, press[F1] (Shape Lib) to enter graph interface, shown as follows:

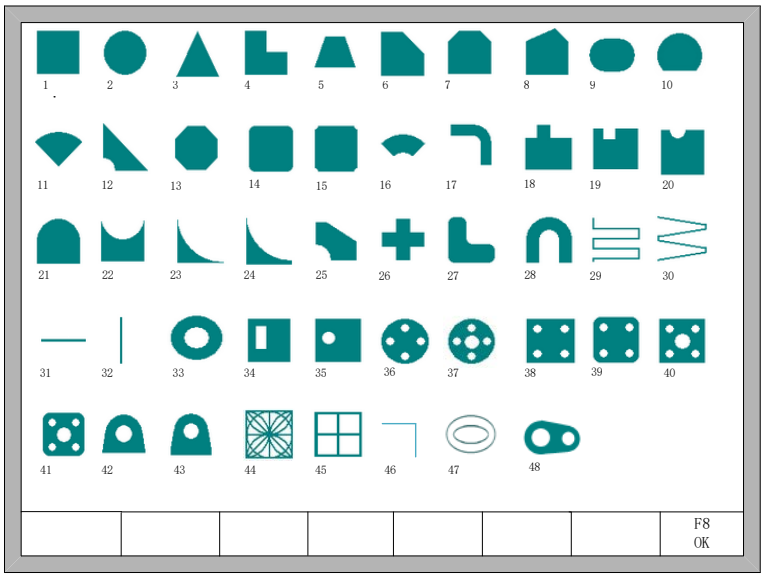


Fig 9.1 Page of graph Library

You can press [↑], [↓], [←], [→] to choose different graph.

9.1 Choose Graph

In home interface of graph, move the cursor to the required graph, press [F8] to confirm, shown as Fig 9.2:

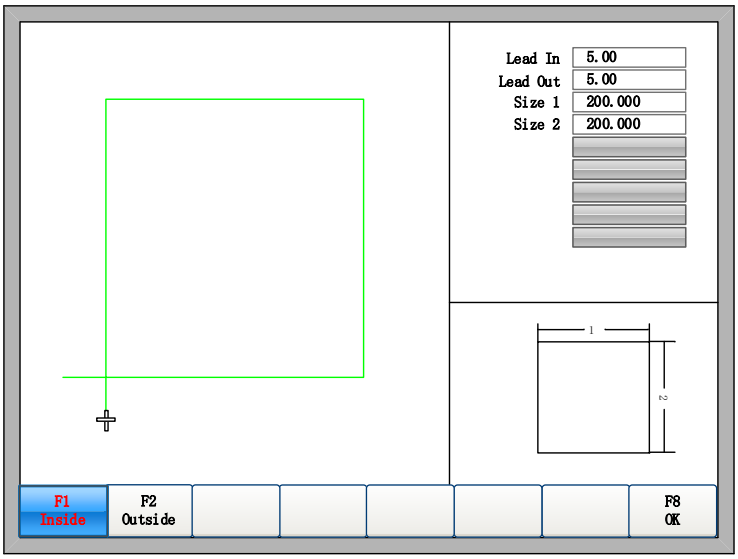


Fig 9.2 Chip size interface

You can press[↑], [↓], [←], [→] to modify sizes, after modification , press [F8] to confirmed.

Press any key to return to graphics processing interface as shown in Fig3.1.

9.2 Chip/Hole Size

In Fig 9.2 in chip size interface, you can press[F2] to choose hole size, shown as Fig 9.3:

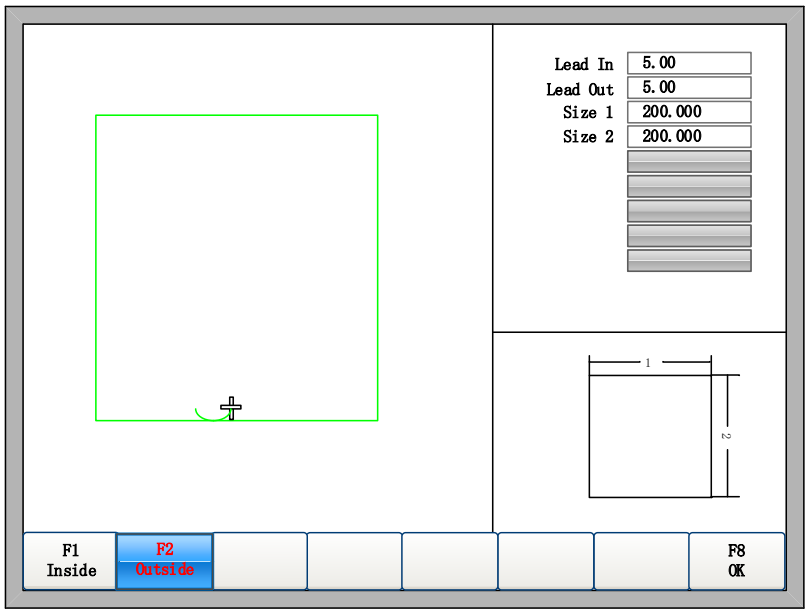


Fig 9.3 Hole size

Modify hole sizes is the same as chip sizes.

After modification , press [F8] to confirmed, then enter into the interface of cutting as shown in Fig 3.1.

Note: The graphic after No.29 don't have hole size.

Chapter 10 Code Explanation

10.1 Code Symbol and Interpretation

- In the cutting machine programming, the following programming symbols are generally available, with corresponding parameter following it.

Table 10.1 Programming symbols interpretation

programming symbols	Function Interpretation
N	Programming segment number
G	Code for ready
M	Auxiliary function
X	Relative coordinate or absolute coordinate of X axle
Y	Relative coordinate or absolute coordinate of Y axle
U	Relative coordinate of X axle
V	Relative coordinate of Y axle
I	Coordinate d-value of X axle between circle center and arc's start
J	Coordinate d-value of Y axle between circle center and arc's start
R	Arc's radius, when it's positive value, the arc <180°; when it's negative value, the arc >180°
F	Cutting rate, used for G01, G02, G03

- In the following context, all the symbol "/" is the relationship of OR. For example, X/U represents that the result is either X or U, both of which cannot simultaneously appear. N represents parameter value, for example, Xn expresses that n is the following parameter. [] means optional context, which can be selected or not.

10.2 Coordinate System

This system uses right-hand Descartes coordinate system acquiescently, as the figure 10.1 shows.

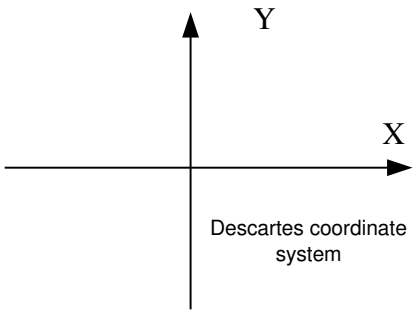


Fig 10.1 Descartes coordinate system

Of course, the system also can be defined coordinate system by user, referencing "8.7.4 Coordinate definition".

10.3 G Code Explanation

The G code which this system supports for is shown as the table 10.2.

Table 10.2 Common G code table

G99	Parameter: X/U Y/V I J	Part option parameter
G92	Parameter: X Y	Reference point setting
G91 / G90	No parameter	Relative/Absolute coordinate
G20 / G21	No parameter	Inches/metric
G41 / G42	No parameter	Left/right Kerf compensation
G40	No parameter	Cancel Kerf compensation
G00	Parameter: X/U Y/V	straight line rapid moving tool
G01	Parameter: X/U Y/V	Straight line cutting
G02	Parameter: X/U Y/V I J	Clockwise arc cutting
G03	Parameter: X/U Y/V I J	Anticlockwise arc cuting
G04	Parameter: P	Time delay

1. G92 Reference point setting

Format:

G92 [Xn] [Yn]

Parameters meaning:

[Xn][Yn] express absolute coordinate of reference point to be set and is also absolute coordinate of which machine tool goes back to. If no parameter after G92, the default reference point coordinate is (0, 0). Generally, while machine tool is taking (0,0) as reference point, this code can be ignored.

Note:

After inputting this code, coordinate of reference point to be set by G92 can be saved automatically. Before new cutting code hasn't been inputted, the coordinate of this reference point is always available, whether system is power off or not. After input a new cutting code, if new code has G92 instruction, the coordinate of this reference point is the context after G92, if no G92, the reference point is default (0, 0). In one code file, G92 only appears once.

Example:

a. G92 X0 Y0

Take (0,0) as reference coordinate, when press "go back" function key, the machine tool goes back to coordinate point (0, 0).

b. G92 X20 Y0

Take (20,0) as reference coordinate, when press "go back" function key, the machine tool goes back to coordinate point (20,0).

2. G90/G91

Format:

G90/G91

G90: absolute coordinate. X/Y in the code means absolute coordinate value; U and V mean relative coordinate value.

G91: relative coordinate. X/Y in the code means relative coordinate value; U and V also mean relative coordinate value.

Example:

a. G90 usage

```
G92  X0 Y0        // Reference point (0,0)
G90               // Absolute coordinate
G00 X20 Y0   // Rapidly moving tool to (20,0)
M07              // Cutting device on
G01 X120 Y100   //Cutting to (120,100)
M08               //Cutting device off
M02               // End of program
```

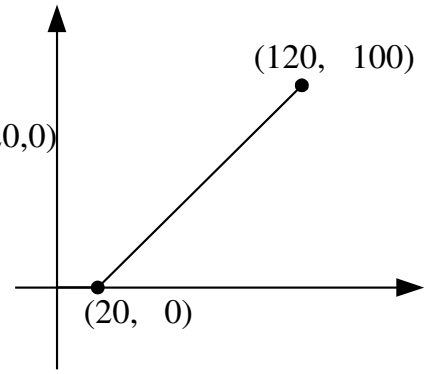


Fig 10.2 G90 usage

b. G91 usage

```
G92  X0 Y0        // Reference point (0,0)
G91               // Relative coordinate
G00 X20 Y0    //Rapidly moving gun to (20,0)
M07               //Cutting device on
G01 X120 Y100 //Cutting to(140,100)
M08               //Cutting device off
M02              // End of program
```

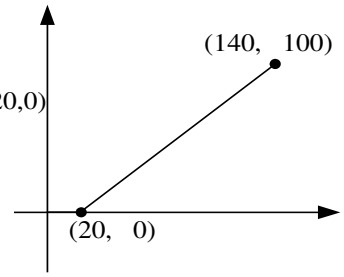


Fig 10.3 G91 usage

3. G20/G21

Format:

G20/G21

G20: inches unit. All of X, Y, I, J, R, U, V after G20 are inches unit.

G21: metric unit. All of X, Y, I, J, R, U, V after G21 are metric unit.

Note:

If no G20/G21 in the code, take the metric as data's unit.

The conversion formula of inches and metric: 1 inches ≈ 25.4mm.

4. G00 Traverse rapidly

This instruction expresses that rapidly traverse to specific location, which the system will rapidly move to at the rate of "G00 move speed* time ratio" from start point.

Format:

G00 X/Un Y/Vn [Fn]

Parameters meaning:

- Fn – rapidly moving to specific location at the limited rate;
- Un · displacement of endpoint's X coordinate relative to start point of current segment, unit(mm);
- Vn · displacement of endpoint's Y coordinate relative to start point of current segment, unit(mm);

(In the relative coordinate system):

- Xn · displacement of endpoint's X coordinate relative to start point of current segment, unit(mm);
- Yn · displacement of endpoint's Y coordinate relative to start point of current segment, unit(mm);

(In the absolute coordinate system):

- Xn · displacement of endpoint's X coordinate relative to working start point, unit(mm);
- Yn · displacement of endpoint's Y coordinate relative to working start point, unit(mm);

Example:

```
G92  X0 Y0       // Reference point (0,0)
G91              // Relative coordinate
G00 X100 Y100 //rapidly moving tool to (100,100)
M02
```

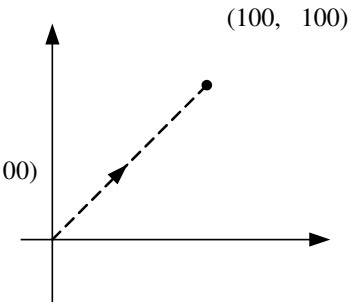


Fig 10.4 G00 usage

5. G01 Linear Interpolation(at cut speed)

This instruction expresses that linearly incise to specific location, which the system will cut to at the rate of "incise speed* time ratio" from start point of current segment.

Format:

G01 X/Un Y/Vn [Fn]

Parameters meaning:

The same to the meaning of G00 code, the difference of them is only that G00 expresses linearly walking(meaning: output ports are all closed), but G01 expresses linearly incising.

6. G02 Clockwise Circular Interpolation

This instruction expresses that incise clockwise arc (clockwise interpolation) to specific location, which the system will cut to at the rate of "incise speed* time ratio" from start point of current segment.

Format:

G02 X/Un Y/Vn In Jn [Fn] or G02 X/Un Y/Vn R[-]n [Fn]

Parameters meaning:

- Fn – incise at limited rate;
- Un · displacement of endpoint's X coordinate relative to start point of current segment, unit(mm);
- Vn · displacement of endpoint's Y coordinate relative to start point of current segment, unit(mm);
- In · displacement of circle centre's X coordinate relative to start point of current segment, unit(mm);
- Jn · displacement of circle centre's Y coordinate relative to start point of current segment, unit(mm);
- R[-]n · the radius of arc, when the angle of arc <=180°, R is positive. Otherwise, it's negative, unit(mm);

(In the relative coordinate system):

- Xn · displacement of endpoint's X coordinate relative to start point of current segment, unit(mm);
- Yn · displacement of endpoint's Y coordinate relative to start point of current segment, unit(mm);

(In the absolute coordinate system):

- Xn · displacement of endpoint's X coordinate relative to working start point, unit(mm);
- Yn · displacement of endpoint's Y coordinate relative to working start point, unit(mm);

Example:

```
Example 1:  B->A
G92  X0 Y0       // Reference point (0,0)
G91              // Relative coordinate
G00 X60 Y100     //Rapidly move tool to B
G02 X-40 Y-40 I0 J-40 //The arc 1
/(G02 X-40 Y-40 R-40)
M02
Example 2:  A->B
G92  X0 Y0       //  Reference point (0,0)
G91              // Relative coordinate
G00 X20 Y60      //Rapidly move tool to A
G02 X40 Y40 I40 J0 //The arc 2
/(G02 X40 Y40 R40)
M02
```

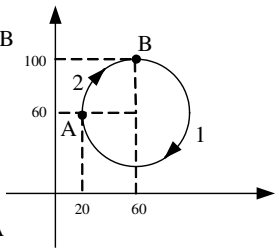


Fig 10.5 G02 usage

7. G03 Counterclockwise Circular Interpolation

The same as G02. The difference is that G02 is clockwise circular(clockwise arc), but G03 is counterclockwise circular(counterclockwise arc).

8. G40/G41/G42 Kerf Compensation

These functions are used for kerf compensation. Because flame incision and plasma incision both finally have the existence of kerf when incise route expressed by code is only actual size of work piece, the actual incision work piece without regard to the effect

of kerf isn't needed size. After set the kerf compensation, the system will automatically work out the effect of kerf and incise work piece with actual size.

G41/G42 must match with G40 to be used. If G41/G42 is ignored, the default kerf compensation is zero; if G40 is ignored, kerf compensation is available.

Format:

G41 //Enable Left Kerf Compensation
…… // incision code
G40 //Disable Left Kerf Compensation
G42 // Enable Right Kerf Compensation
…… // incision code
G40 // Disable Right Kerf Compensation

Example:

```
( Convex Roof Trapezoid w/Hole )
G21                                    /* metric unit */
G91                                    /* relative coordinate */
G99 X1 Y0 I0 J0      /*proportion factor is 1, rotate angle is 0, no mirror image*/
G00 X44.45 Y41.275                  /* Rapidly moving to (44.45, 41.275)*/
G41                                    /* Left Kerf Compensation */
M07                                    /* Incision beginning*/
G03 X0 Y0 I19.05 J0                /*Counterclockwise Circular Interpolation */
M08                                    /* Incision ending */
G40                                    /* Disable Left Kerf Compensation */
G00 X-44.45 Y-41.275               /* Rapidly moving to (-44.45, -41.275) */
G41                                    /* Right Kerf Compensation */
M07                                    /* Incision beginning */
G01 X25.779438 Y58.031634             /*Linear Interpolation */
G02 X75.441125 Y0 I37.720562 J-16.756634  /* Clockwise Circular Incision*/
G01 X25.779438 Y-58.031634            /* Linear Interpolation */
G01 X-127 Y0                           /* Linear Interpolation */
M08                                    /* Incision ending */
G40                                 /* Disable Right Kerf Compensation */
M02                                    /* End of program */
```

Note:

The value of Kerf Compensation should be half of actual kerf width.

9. G99 proportion, rotate, mirror (image)

Format:

G99 Xn Yn In Jn

Parameters meaning:

- X – proportion factor, can be set from 0.001 to 1000.
- Y – rotate angle, can be set from -360° to 360°.
- I – image of X axis, make image along X axis, 1 expresses that there is image, 0 expresses that there is no image.
- J –image of Y axis, make image along Y axis, 1 expresses that there is image, 0 expresses that there is no image.

Note:

A code can have G99, also cannot. If there is G99, the parameter X, Y, I, J after code should not be ignored.

Mirror image and rotation will take the origin (0, 0) of Descartes coordinate as reference point.

10. G04 Time delay

Format:

G04 Pn

Parameters meaning:

P- delay time, the following parameters are using 0.01 second as the unit, such as P100 means delay of 1 second.

11. Program notice items

- The program must contain the instruction of G92 (reference point setting) and M02(end of program).
- G41/G42 must match with G40 to be used. If G41/G42 is ignored, the default kerf compensation is zero; if G40 is ignored, kerf compensation is available.
- If G20 / G21 is ignored, the system will execute G21 (metric unit).
- If G90 / G91 is ignored, the system will execute G91 (relative coordinate).
- M07 and M08 can't be neglected.
- When there is one parameter in the code of G00, G01, G02, G03 is ignored, if this parameter is absolute coordinate, the system will set it G code coordinate value of last row; If it's relative coordinate, the system will set it 0.
- G00, G01, G02, G03 can be simplified: G0, G1, G2, G3.
- If there is contiguous G00 (or G01, G02, G03) around, the following G00 (or G01, G02, G03) can be ignored.

10.4 M Code Explanation

Table 10.3 Common M code

M07	No parameter	Cutting device on
M08	No parameter	Cutting device off
M11	No parameter	Marker offset on
M12	No parameter	Marker offset off
M09	No parameter	Open the Powder
M10	No parameter	End of Powder
M00	No parameter	Stop of instruction
M02/M30	No parameter	End of program

- M07 Cutting device on

Please refer to Appendix 2 I/O Timing Sequence Figure of ProGantry 2560 Series Numerical Control System.

- M08 Cutting device off

Please refer to Appendix 2 I/O Timing Sequence Figure of ProGantry 2560 Series Numerical Control System.

- M00 End of instruction

In the processing of incision, the system will stop the machine tool with the M00 instruction, waiting for the next operation.

- M02/M30 End of program

Chapter 11 Port Explanation

As shown in Fig 11.1, the back interface of the system. The red box section is unique to the T series. CN1 is the input port, which is the standard DB25 male, CN2 is the output pin, which is the standard DB25 female, CN3 is the motor interface, which is the standard DB15 male.CN4 and CN5 are unique to T-series. Refer to Section 11.4 for details on wiring with T series. The bottom 3-pin green terminal interface is the 24V power interface.

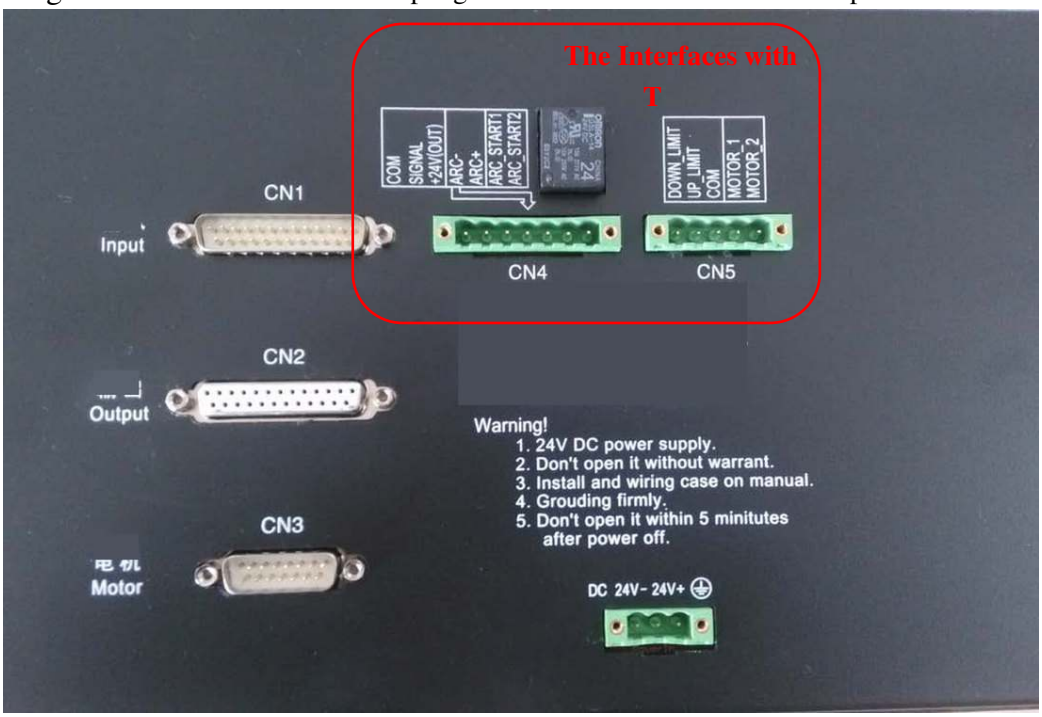


Fig 11.1 Back Interface

11.1 Input Port

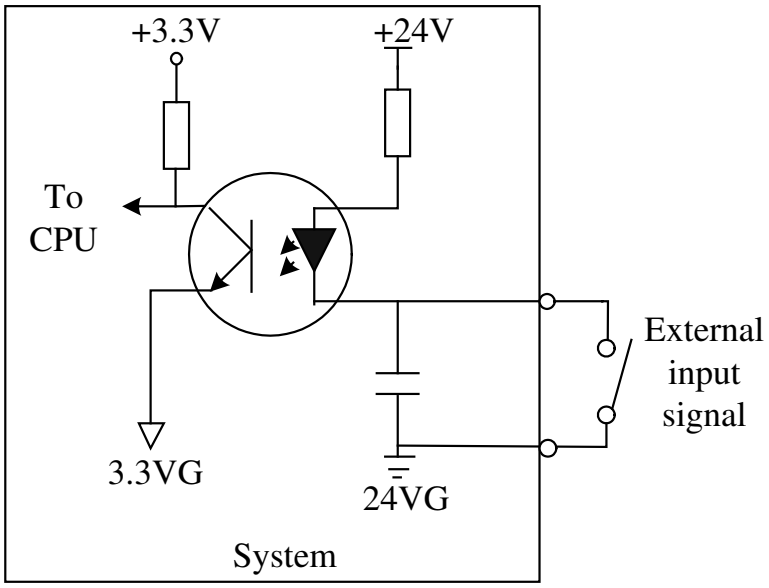


Fig11.2 input port circuit

- Input signal is a mechanical contact switch, normally open type and closed type are all supported, it is effective when it is connected to 24VG, and it is ineffective when it is float or connected to 24V. Com-port of switch outside is connected 24VG. The other port is connected to corresponding IO port.
- 16 channel input ports totally
- Input signal definition

Table 11.1 Input port definition

Pin number	Signal name	remark
2	X+ limit	X+ stop input, float it if not use, this is horizontal
15	X- limit	X- stop input, float it if not use, this is horizontal
14	Y+ limit	Y+ stop input, float it if not use, this is vertical
1	Y- limit	Y- stop input, float it if not use, this is vertical
3	Emergency stop	Emergency stop input, float if not use
4	Arcing successfully	
5	Positioning successfully	
6	Plasma collision	
11,20-23	Spare	
12,24	+24V	+24V/3A Power output
7	Move left/C	Remote control input
8	Move right/D	Remote control input
9	Move forward/A	Remote control input
10	Move backward/B	Remote control input
16	Firing	Remote control input
17	Oxygen cutting	Remote control input
18	Cutting torch up	Remote control input
19	Cutting torch down	Remote control input
13,25	24VG	+24V Ground

11.1.1 Input Wiring Instructions

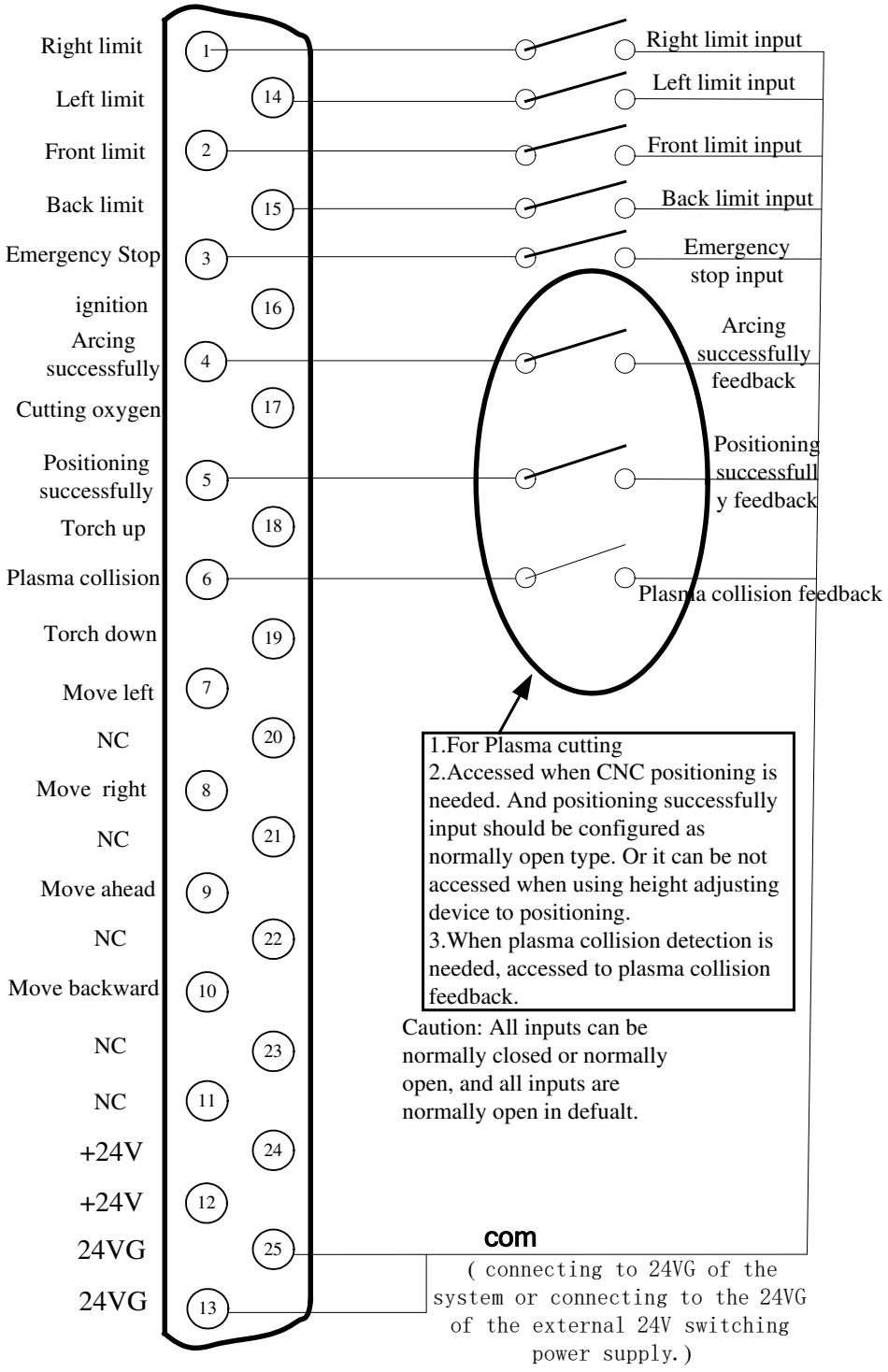


Fig 11.3 External input wiring

11.1.2 Remote Controller Input

The system supports three external remote control input, one for line input (P2P) type, one for 8421 (BCD) encoded input type, Another for serial RS232 interface input type.

➢ Line Input(P2P) Type

The pin 7, 8,9,10 of input port represents left, right, forward, backward, when inputting valid signal , the machine can move toward the corresponding direction, when the input signal is invalid, the machine stop moving.

When the input signal of pin 16 is valid, the system will ignite the torch , the ignition time is the setting value in system parameters, please take the reference of part of "ignition time " in "7.2 oxygen gas parameters " .

When the input signal of pin 17 is valid, the system will turn on or off the cutting oxygen. When the cutting oxygen is on, the system cut off the oxygen, when the cutting oxygen is off, open the cutting oxygen system.

When the input signal of pin 18 is valid, the system will raise the cutting torch, when the signal invalid, the torch stops.

When the input signal of pin 19 is valid, the torch goes down, when the signal invalid, the cutting torch stops.

Note: The external switches of line input are designed by the user.

➢ 8421(BCD) code input

Input pin 9, 10, 7, 8 is the A, B, C, D bits of the 8421 code. Functions are shown in Table 11.2

Table 11.2 Function of 8421 code input

Decimal	8421 code(DCBA)	Function
0	0000	No Input
1	0001	Turn on or off the cutting oxygen
2	0010	Go back according to the original track
3	0011	Move forward according to the original track
4	0100	Left lateral movement
5	0101	Ignite Input
6	0110	Start
7	0111	Slow down
8	1000	Accelerate
9	1001	Move for the negative direction vertically
10	1010	Move forward vertically
11	1011	Pause
12	1100	cutting torch
13	1101	raise the cutting torch
14	1110	Move toward right horizontally
15	1111	Start

8421-type remote control input is designed by the user

➢ Serial RS232 remote control

See Chapter 15, Cruxweld serial transmitter remote controller instructions for details.

11.2 Output Port

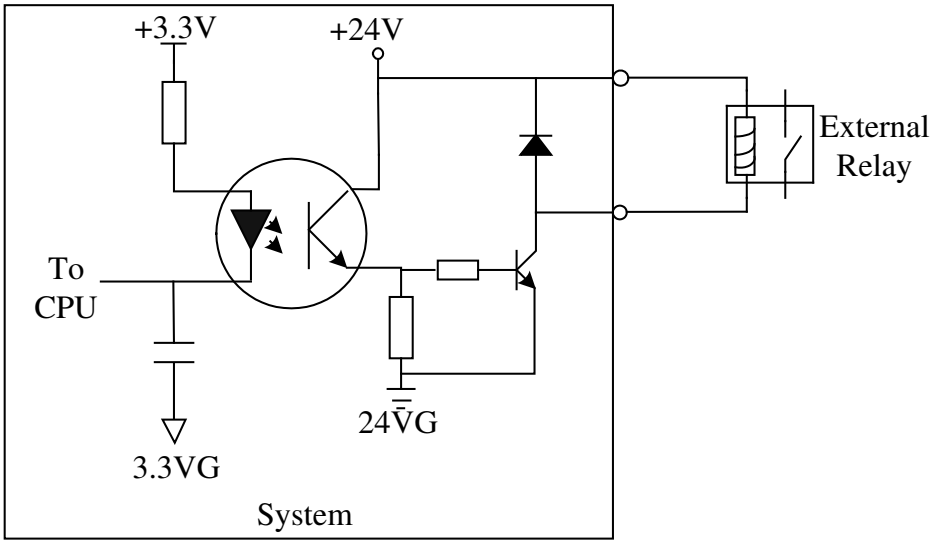


Fig11.4 output port circuit

- Output voltage is 24VDC, low level is effective; The common end of the external relay coil is connected with the 24V +, and the other end of the relay coil is connected with the corresponding IO port.
- Maximum output current $I_{\max} = 300mA$;
- 16 output ports in total
- Output signal definition

Table 11.3 Output port definition

25 interface Pins No.(Main connector)	Signal	Remark
3	Ignite	
1	Low pressure preheat	
17	High pressure preheat	
4	Low pressure cutting oxygen	
5	Medium pressure cutting oxygen	
14	High pressure cutting oxygen	
2	Torch up	
15	Torch down	
6	Exhaust	

8	Enable high adjusting box	
19	Plasma locating	
16	Plasma arc starting	
18	Corner low-speed output Or automatic / manual	
7	Spray powder	
20	Raise powder	
21	Marker Preheat	
9,10,11,22,23	Not used	
12,24	+24V	+24V/3Aoutput
13,25	24VG	+24Vground

Note: the power supply of external relay, please take 24V power supply output from the DB25(CN2) 12/24 feet ,and take 24V power ground from 13/25 feet.

11.2.1 Output Wiring Instructions

11.2.1.1 Oxygen Gas Typical Connection

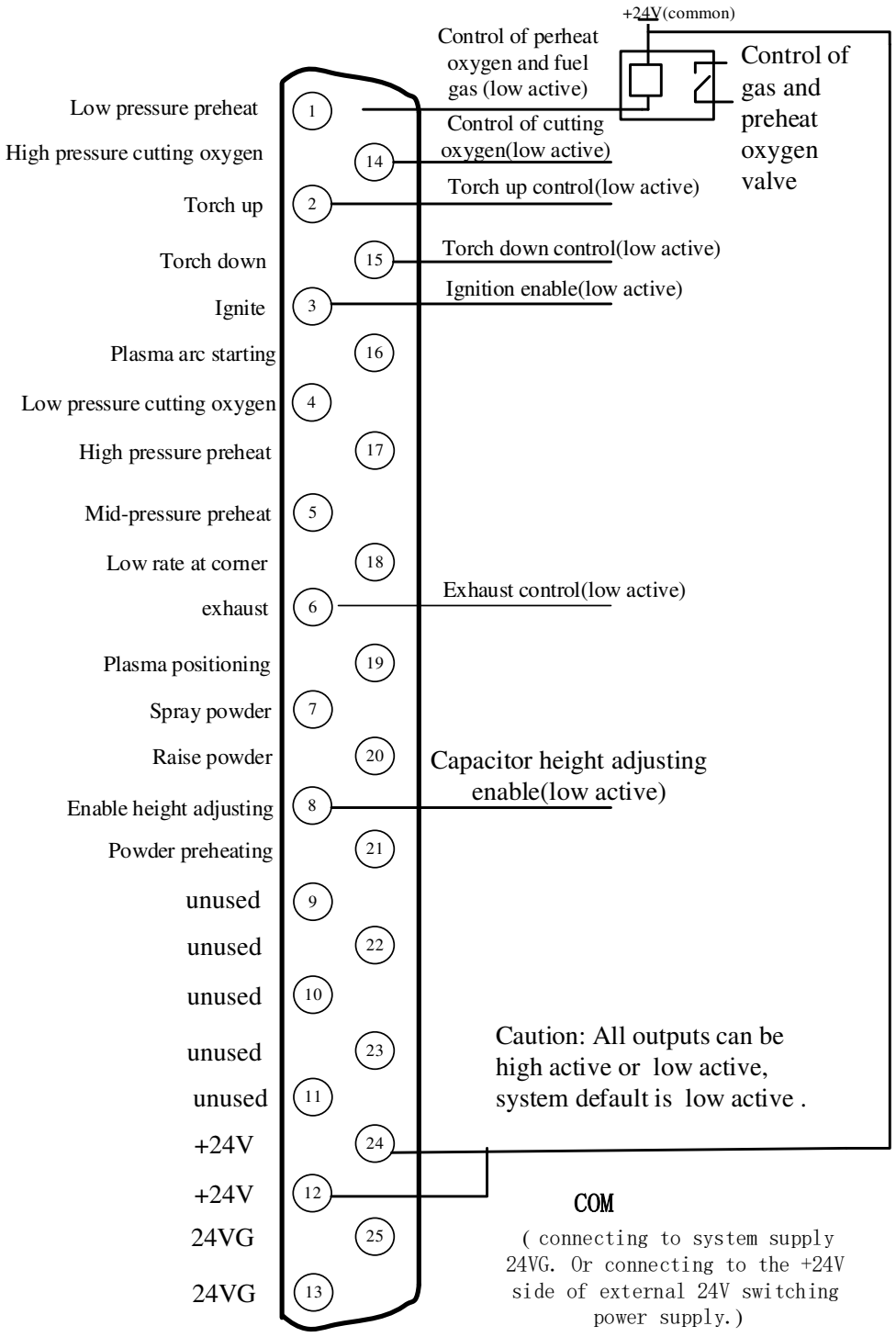


Fig 11.5 Oxygen gas typical connection

11.2.1.2 Three Level Perforation Circuit

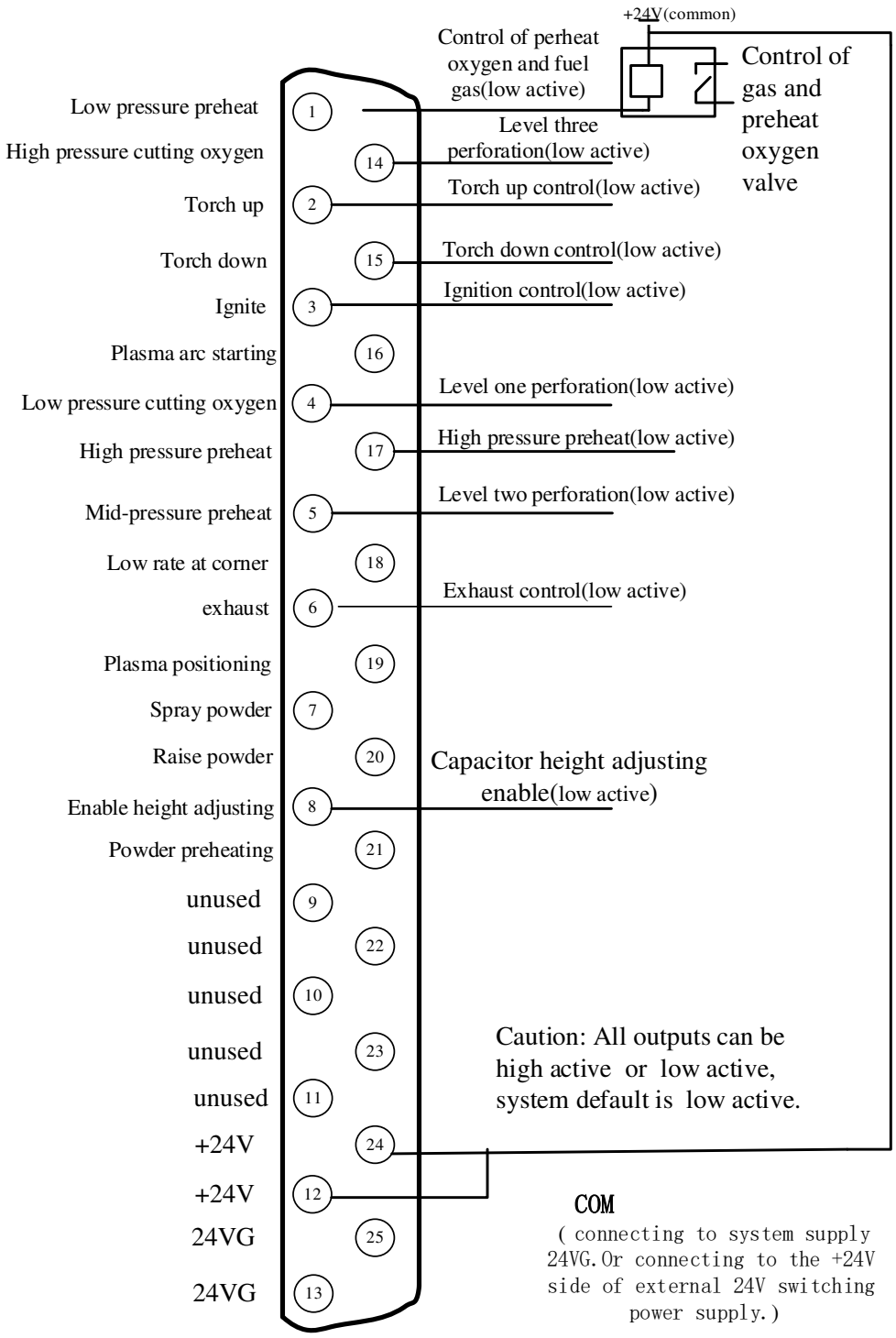


Fig 11.6 Three level perforation circuit

11.2.1.3 Typical Circuit of Using Powder

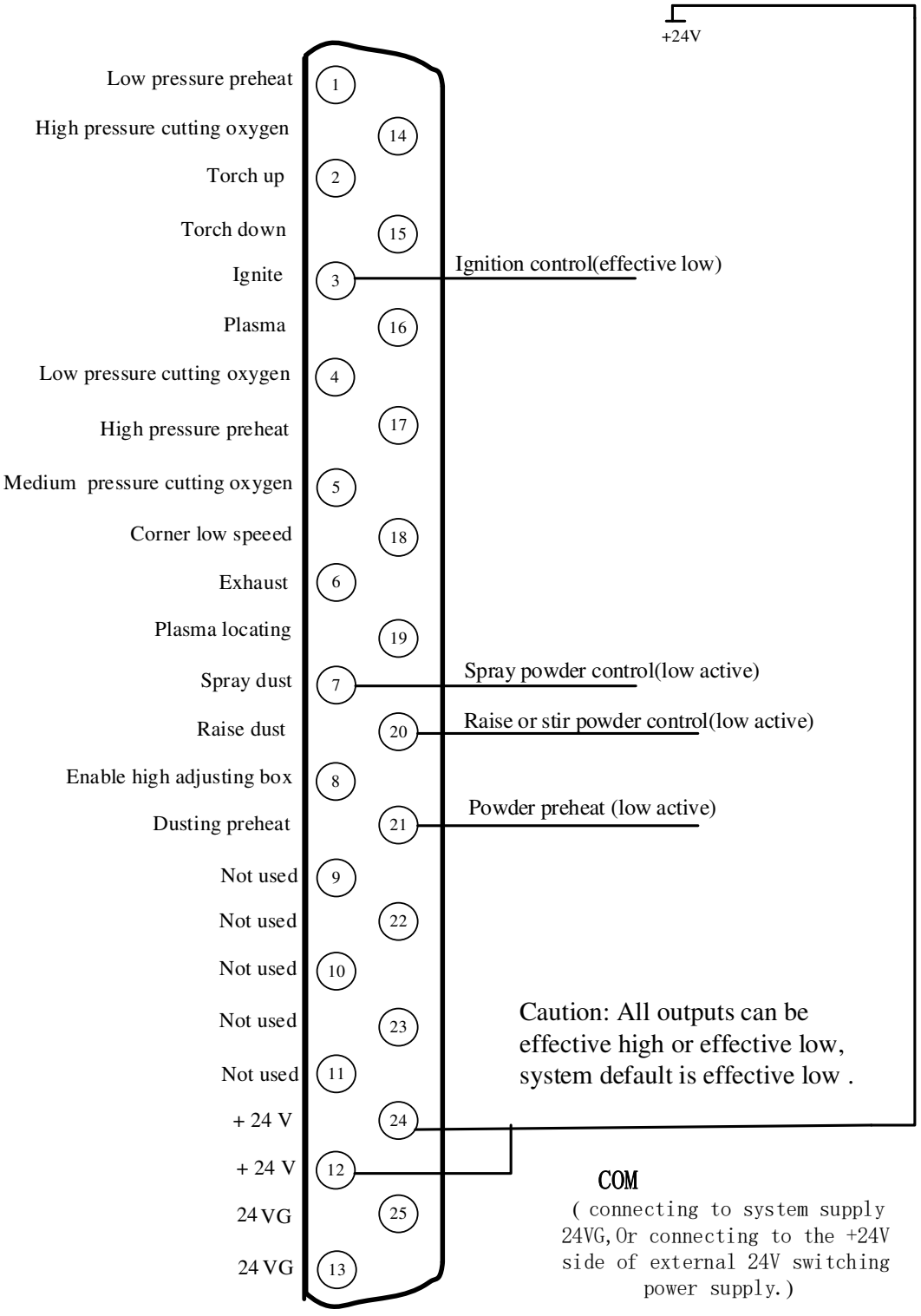


Fig 11.7 powder typical connection

11.2.1.4 Typical Circuit of Using Plasma Cutting

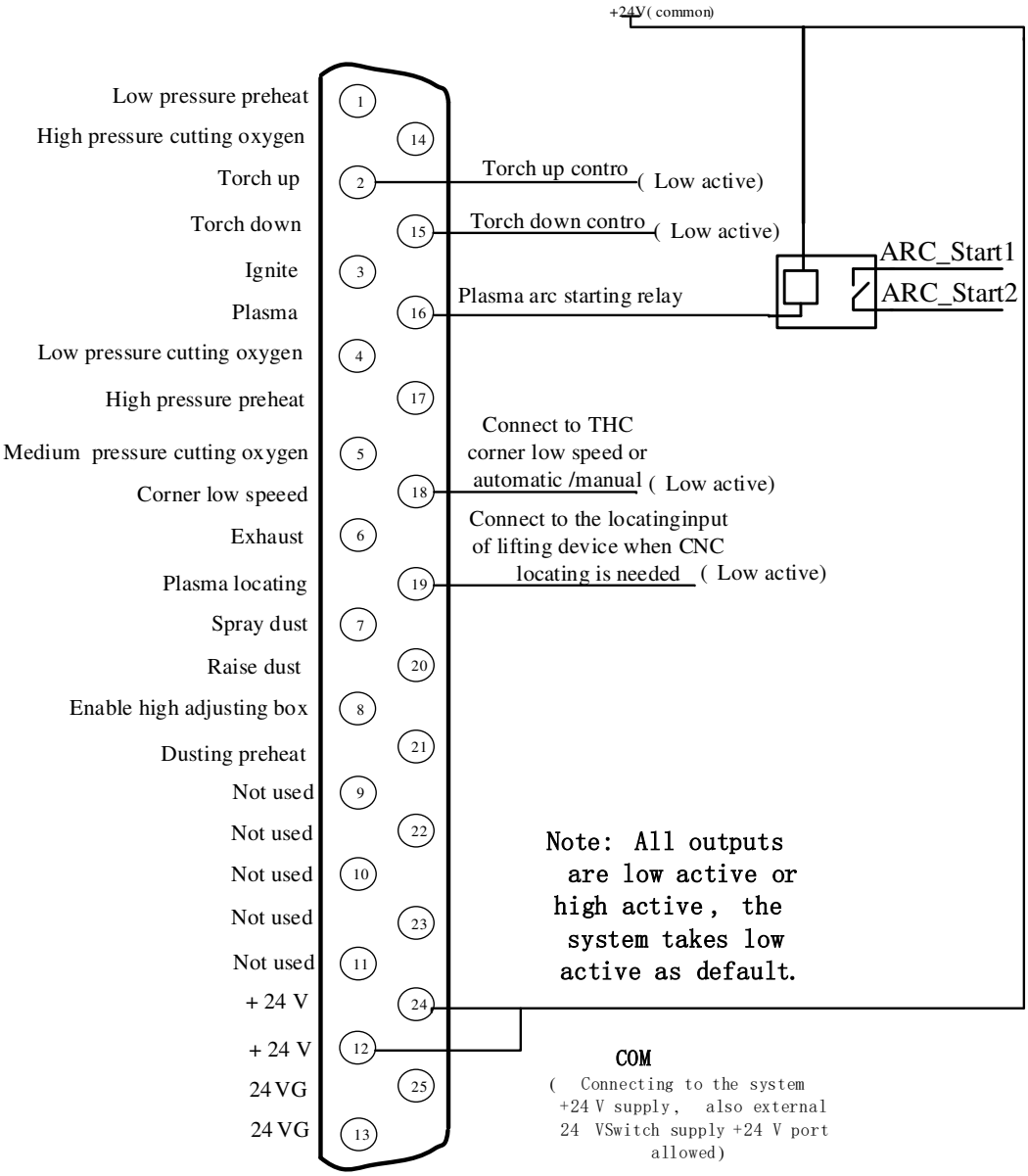


Fig 11.8 Typical wiring diagram of the plasma

Instruction:

- **Height-adjusting device wiring with corner low-speed**

When the height-adjusting device takes corner low-speed input control signal, the system's "corner low speed" output signal is used to control the height-adjusting device's corner low-speed input. The system takes an open-collector transistor output, with the default active low signal. Reference section 8.7.3, set the output port type of close THC (corner signal) "NO". CNC system needs to output low electrical lever signal with this THC during decreasing rate and this signal should be broken off at normal cutting time.

- **Height-adjusting device wiring with automatic / manual**

When the height-adjusting device takes automatic / manual control function instead of corner low-speed input, the system needs to use the "corner low-speed" output to control the height-adjusting device's automatic / manual signal. The system takes an open-collector transistor output, with the default active low signal. Meanwhile, it needs to change the type of corner low speed from normally-open to normally-closed in the output port configuration interface (Section 8.7.3), i.e. from "NO" to "NC". CNC system needs to break off this signal with this THC during decreasing rate and this signal should output low electrical lever at normal cutting time.

- **Using height-adjusting device locating**

When using the locating function of the height-adjusting device, the locating function of numerical control should be closed. The approach is to change the input type of successful locating from normally-open to normally-closed in the input port configuration interface (Section 8.7.2), i.e. from "NO" to "NC". There are two types of locating:

The first: locating controlled by the plasma arc starting. CNC emits the plasma arc starting, the height-adjusting device starts arc after locating, and sends signal of arc starting successful feedback to CNC after starting arc successfully. After CNC system has received signal of arc starting successful feedback, it will begin to incise immediately. Such devices available in the market include Type 5, devices of the types listed in Appendix 3. Such devices can connect the "plasma arc starting" output of CNC system to the " starting arc with locating" input of the height-adjusting devices, and at the same time in the plasma parameters (refer to section 7.3 plasma parameters) set the arc detecting time to the value that allows for completing the testing and starting arc.

The second: finish position from the decline of the cutting torch . Before issuing the command of starting arc, first issue the command of declining the height adjust device, then issue the command of starting arc. Height adjusting devices of several makes are used in this way. When using these kind of height adjusting device, transfer to the interface of plasma parameters (refer to section 7.3 plasma parameters), set the location detecting time as the time of location of touch.

- **Using CNC system locating**

When using the location function of digital control system, firstly enter into the input configuration interface, set the input type of successful location from normally closed to normally open type, i.e. from "NC" to "No". At the same time, return the signal of successful location to the input port of the successful location of the digital controller. In the plasma parameter interface (refer to section 7.3 plasma parameters), set the location detecting time and locating up time to needed values.

11.3 Motor Port

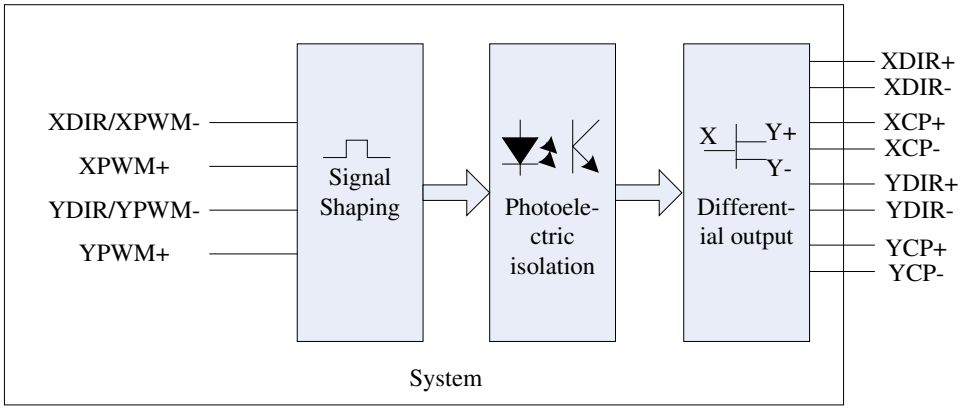


Fig11.9 motor port schematic diagram

- Signal definition table

Number of the 15 pin interface	signal	Remarks
1	XDIR+	Positive at the horizontal axis
9	XDIR-	Negative at the horizontal axis
2	XCP+	Positive pulse at the horizontal axis
10	XCP-	Negative pulse at the horizontal axis
3	YDIR+	Positive at the vertical axis
11	YDIR-	Negative at the vertical axis
4	YCP+	Positive pulse at the vertical axis
12	YCP-	Negative pulse at the vertical axis
5,13,6,14	Not used	
7	+5V	+5V/500mA Power output
15,8	5VG	5V Power Ground

11.3.1 Typical Wiring Diagram of the Motor Interfaces

11.3.1.1 Connection Methods for Differential Stepper Driver

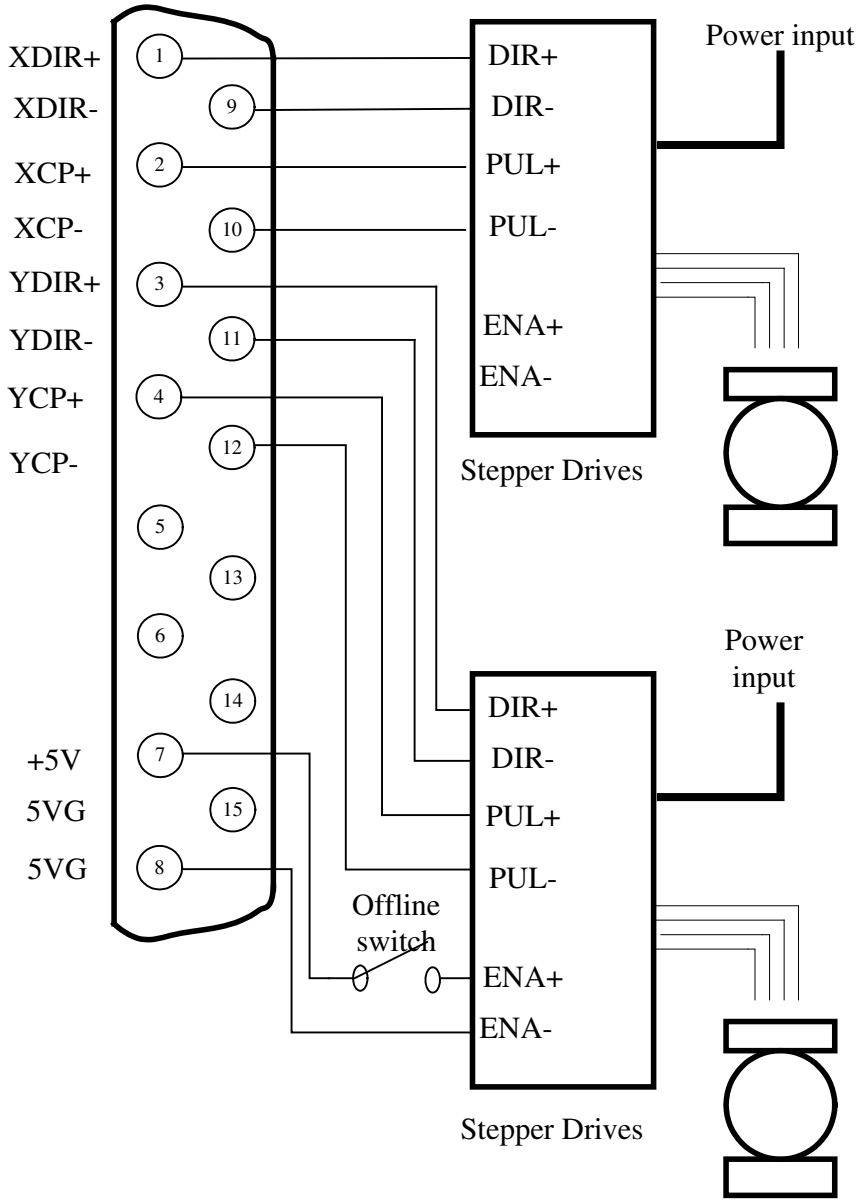


Fig 11.10 connection methods for differential stepper driver

11.3.1.2 Com-anode Connection Methods for Stepper Driver

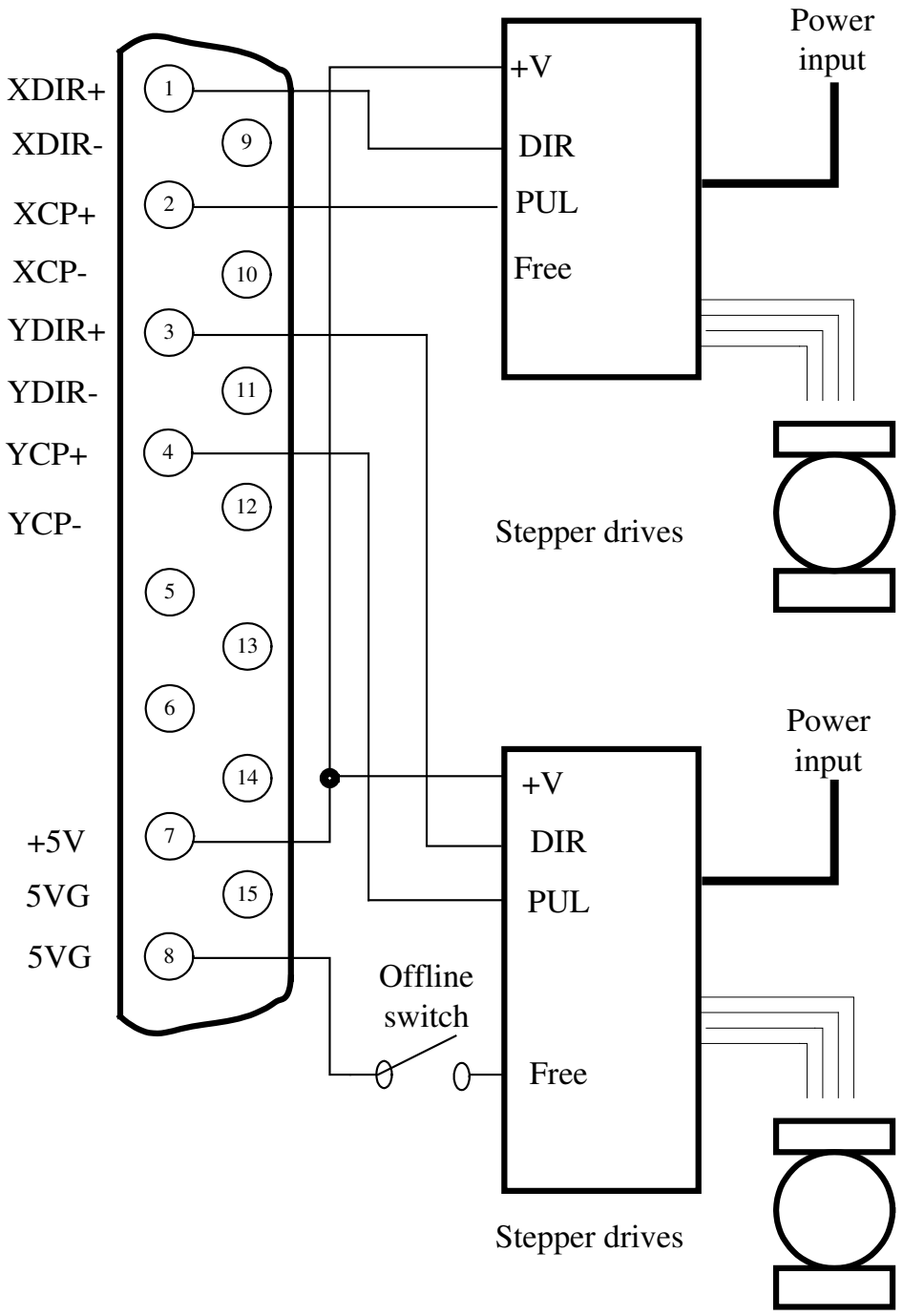


Figure 11.11 com-anode connection methods for stepper driver

11.3.1.3 Connection Methods of Servo Driver, Typical Connection

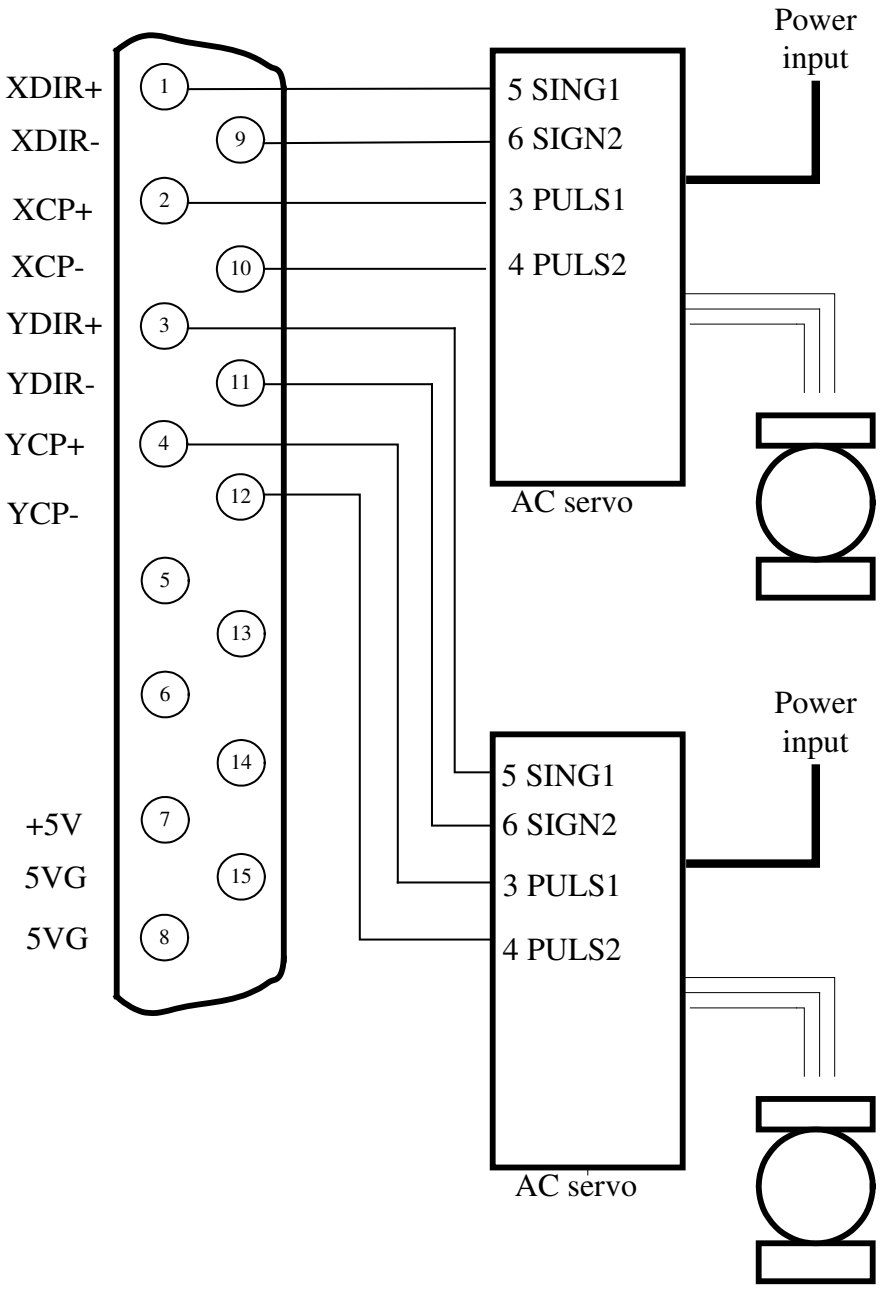


Figure 11.12 Connection methods of Servo driver, typical connection

11.4 Arc THC Module Interface (THC) (suffixed with "T")

Compared to ProGantry 2560 series CNC system, ProGantry 2560-T CNC system adds the ports of arc THC as the red frame area in following figure based on the original system.

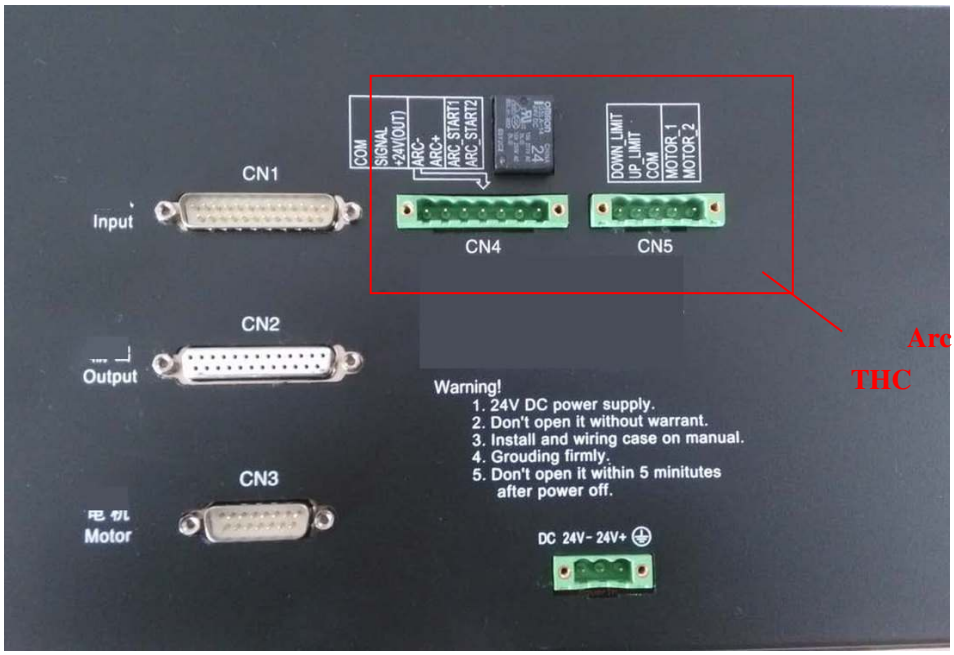


Fig.11.13 PG2560-AT system interface schematic diagram

11.4.1 Torch Height DC MOTOR Port (CN5)

Motor port CN5 (DC MOTOR) output pin MOTOR_1, MOTOR_2, input pin UP_LIMIT, DOWN_LIMIT, common ground COM. connect MOTOR_1, MOTOR_2 to height adjustment motor, connect UP_LIMIT, DOWN_LIMIT to upper limit switch and lower limit switch.

Table 11.4 Torch Height Motor Port

CN5	Signal Name	Comment
1	DOWN_LMT	Lower limit switch input
2	UP_LMT	Upper limit switch input
3	COM	+24V Power Ground
4	MOTOR_1	Height Adjustment Motor
5	MOTOR_2	Height Adjustment Motor

Note:

1. **Maximum power of DC motor: 45W.**
2. **Short the DOWN_LMT and COM by an electrical wire, and short UP_LMT and COM,When don't use limit switches.**

11.4.2 Arc Input (ARCIn)

Arc input pins are ARC+ and ARC- in port CN4. ARC+ link with positive pole of arc output of arc divider board. ARC- link with negative pole of arc output of arc divider board.

Table 11.5 Arc Input Signal

CN4	Signal Name	Comment
4	ARC-	negative pole of arc output of arc divider board
5	ARC+	positive pole of arc output of arc divider board

Note: By default, the controller use arc divider 100: 1. That is, the original arc voltage is divided 100 by divider board.

If use 50: 1 divider board, open the system box, find the switches showing as the figure 11.13. When this switch is on, divider board is 50: 1, otherwise 100: 1. Default position is OFF, 100:1.

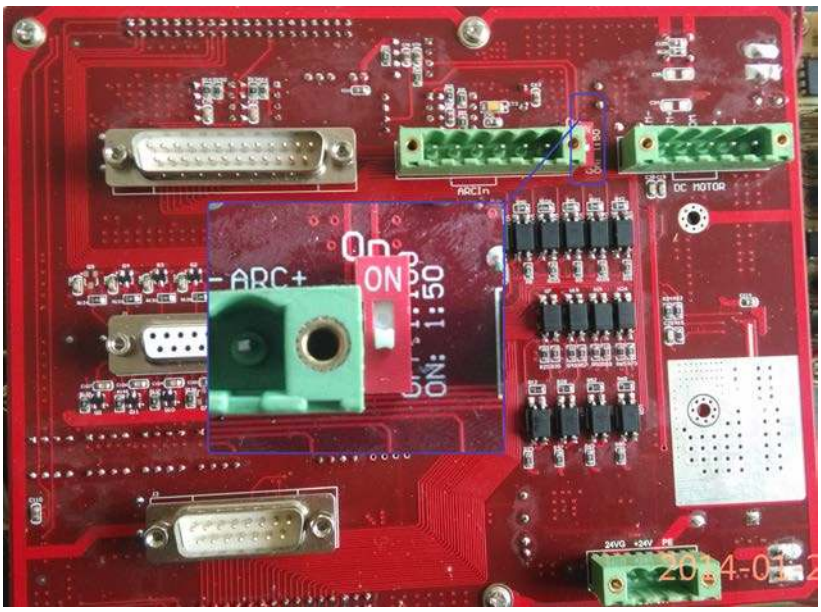


Fig.11.14 Arc input partial pressure proportion

11.4.3 IHS Sensing Port

The positioning port (PS) and the arc pressing port are in the same seven pin interface (CN4), the pins are +24V (OUT), SIGNAL, COM. The +24V (OUT) is connected with the positive electrode of the switch, and the SIGNAL is connected with the signal of the proximity switch, and the COM is connected with the negative electrode of the switch.

Note: Approach switch is NPN type with DC24V.

Table 11.6 Position Interface Signal Definition of Arc THC Module

CN4	Signal Name	Comment
1	COM	Negative pole of approach switch
2	SIGNAL	NPN approach switch signal
3	+24V(OUT)	Positive pole of approach switch

11.4.4 Arc Start (ARC_START)

The starting arc port (ARC_START) and the arc input port are in the same seven pin interface (CN4), the output pin is ARC_START1, ARC_START2, and connect to the arc port of the plasma power supply.

Table 11.7 Arcing port Signal Definition of Arc THC Module

CN4	Signal Name	Comment
6	ARC_START1	plasma power arcing port+
7	ARC_START2	plasma power arcing port-

Note: It is strongly recommended that the customer use a relay for isolation to avoid interference from the system with the plasma power supply.

11.4.5 Wiring Diagram of ProGantry 2560-T CNC System with Arc THC Module

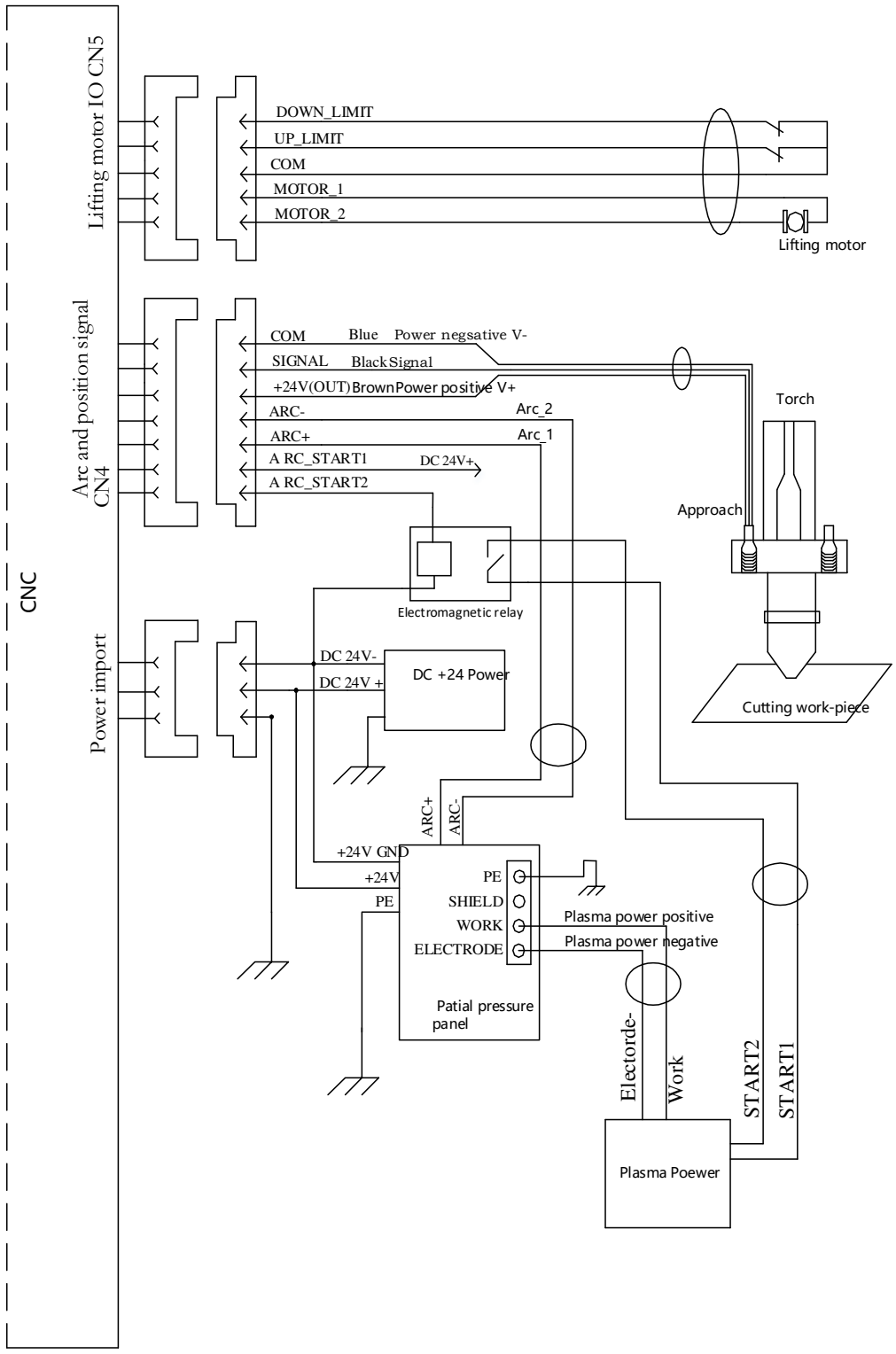


Fig.11.15 Wiring Diagram of PG2560-AT system with Arc THC Module

11.4.6 Wiring Diagram of double approach switch

Two NPN-style approach switches are used for location, which can either be linked

with the parallel mode or be linked with series mode. To make the location more accurate and stable, we recommend using series mode to link the two switches. The specific wiring mode is shown as the figure 11.16. With this link-mode, any one action of approach switch can emit the collision signal.

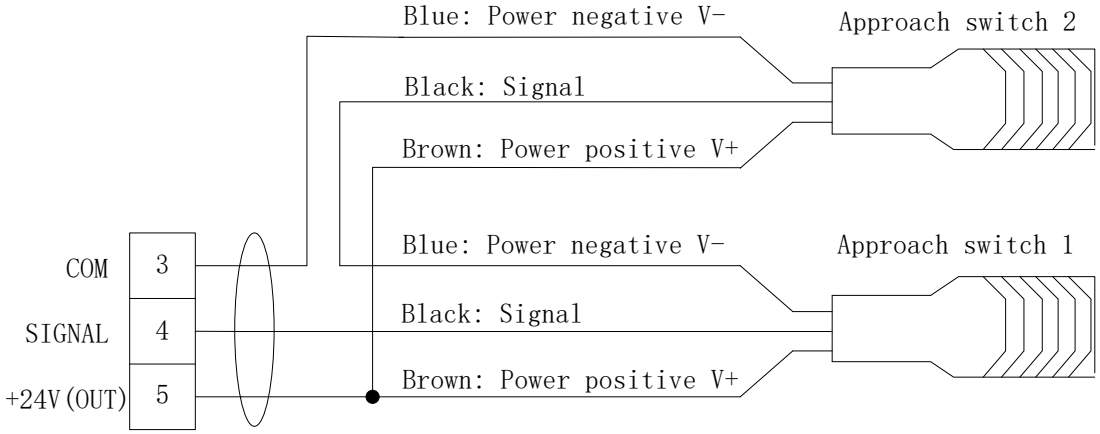


Fig.11.16 Wiring Diagram of double approach switch

11.4.7 Separate Control of Flame Cutting Torch and Plasma Cutting Torch

This function can achieve the separate control of flame cutting torch and plasma cutting torch. Plasma cutting torch can only be connected to CN5 motor interface, while flame cutting torch can select to be controlled by CN5 interface or DB25(CN2) interface by setting parameter "output port of the flame gun" (Please refer to section 8.7.7).

The connection method of the plasma gun is referenced to 11.4.1 Motor CN5 (MOTOR DC).

The connection method of the flame gun, if controlled by CN5 interface, is also referenced to 11.4.1 Motor CN5 (MOTOR DC). If controlled by DB25 interface, then please refer to section 11.2 output wiring instructions.

11.5 Power Input（ Power In)

Power input: 24V-, 24V+, PE.

Table 11.8 Power Interface Signal Definition

3 Pins Interface Pin Number	Signal Name	Comment
1	24V-	24V Power -
2	24V+	24V Power +
3	PE	Ground

Chapter 12 Use of BIOS

About system upgrade and system recovery function, the users can also refer to section 8.7.10, the function here is similar to that section. When the system powers on, it will display as shown in Fig 12.1.

Fig 12.1 Power on

Before the screen number counts down to 0, if you press F2, the system will enter the BIOS interface. If you press other keys, the system will stop counting down and enters the main interface..

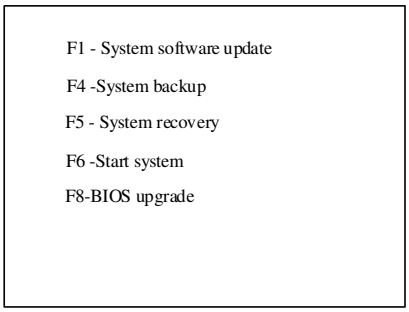


Fig 12.2 BIOS interface

12.1 System Upgrade

After entering BIOS, press[F1] to upgrade the system, it should satisfy the following conditions:

- U disk has been inserted into USB interface of CNC
- There should be the upgrade file PG2560.exe in the root folder of the U disk..

Under the circumstance of above two conditions satisfied, Press [F1] to upgrade system, when completing the upgrading, press[F6] to reboot.

12.2 System Backup

After entering BIOS, press [F4] to backup system. It only backup OP (operation system), but not backup parameter, IO ports configuration, coordinate configuration and so on.

12.3 System Recovery

After entering BIOS, press [F5] to return to the original system that has been backup. System recovery here does not affect the user's parameters, IO port configuration, coordinate configuration, etc., Recommend to use system recovery function here.

Chapter 13 Installation and Debugging

13.1 Horizontal / Vertical Pulses Number Setting

- Horizontal / vertical pulses number setting

Here, horizontal / vertical pulses number is also introduced in the section of 7.5 system parameter. It's easy to set the number of horizontal (vertical) pulses. Before drawing a line, assume one value of horizontal pulses XPls and one value of vertical pulses YPls, set these two parameters and then save the settings. Enter the manual interface, choose fixed moving function. Assume the fixed distance is Amm. Move A mm horizontally, and the actual length of the line is B mm (which is generally not equal to A), then we can calculate the horizontal pulses number. The equation is $XPls \bullet \frac{A}{B}$. After calculating, replace the outcome with the assumptive XPLs(take three decimal places at most). Similarly, move C mm vertically, the actual length is D mm, then the vertical pulses number is. $YPls \bullet \frac{C}{D}$

- Requirement of pulses number:

The maximum frequency of output pulses from the system is 160 KHz. It is not possible to work properly according to the order if the pulse frequency is higher than 160KHz. Assume the pulse number is x, the highest speed is M_v (mm/min), then (M_v*x/60) should be less than 160000.

For example, the pulse number is x=2000, the highest speed is M_v=12000(mm/min).Because of M_v*x/60=12000*2000/60=400000>160000, the speed of 12000(mm/min) is not reachable. If we set x to be 500, then M_v*x/60 = 12000*500/60 = 100000<160000, at this time it can operate at the maximum rate of 12000mm/m.

While in principle the number of pulse can be set to a large value, in fact it should be set between 150 and 1200. Because the frequency is too high, some drives can't work very well, the motor sometimes will be out of synchronism. On the other hand, the performance of anti-jamming is of foreign interference is poor and the external interference is strong.

Note: The most reasonable number of pulse is between 150 and 1200. The number of pulse exceeds this range, please refer to the interpretation of driver and modify subdivision number of stepper driver and denominator of Servo driver.

Chapter 14 Cruxweld Handheld Remote Controller

14.1 Wireless Remote Control Module Performance and Characteristic

- 433MHz free ISM frequency channel, free license on trial
- Remote controlling distance > 30m, at least not below 0.5m
- Hardware test error code, software optimizing algorithm, bi-direction communication, insure the communication stable and reliable
- Sending module matches address with receiving module, the address can be set manually, support at most 128 supportable addresses
- Wireless remote controlling send module is supplied power by dry battery, at least working more than 6 months service time
- Receiver module is set into 8421 port mode or IO mode, at most 16 output ports

14.2 The Layout of Remote Controller

Fig.14.1 layout of remote controller

14.2.1 Transmitter Description

Keys: the control keys are "Start, Stop, four directions(· ···), 1 manual key (Manual) , T·, T·, S+, S-, Ignition, Preheat, CutOxy, Plasma, Forward, Back, Close, ManualRate". 19 keys in total.

Indicator: three manual modulation rate (5%, 50%, 100%) and 3 manual mode lamp (electric, interlock, fixed length). 1 sending signal indicator, 1 electric quantity indicator(or multiplexes

with signal indicator)

Description: boot default rate is 50% manual lights, manual rate for the second state, manual rate in continuous is pressed, the manual speed change state machine manual rate twice (50% light) -> Manual rate three times (100% light) -> Manual rate once (5% light) -> Manual rate twice (50% light). When turned on, the default is inching bright Manual as a state, to move light, Manual changes state machine Manual once (Jog lights) -> Manual secondary (interlock lights) -> Manual three times (fixed length lights) - > Manual once (jog lights).

When all keys are pressed, it will issue OUT1-OUT8 signal as the following table, when the key is released, all outlets closed (OFF).

Transmitter Keys	P2P Output (description: 0 means to determine the high level of output, the 1 means the low level output)	Encoding output OUT1,2,3,4,5,6,7,8 (description: 0 means to determine the high level of output, the 1 means the low level output)	Remarks
S+/Speed	00001000	00001000	Speed up
S-/Speed	00000100	00000111	Speed down
↑	00100000	00001010	Up arrow
↓	00010000	00001001	Down arrow
←	01000000	00000100	Left arrow
→	10000000	00001110	Right arrow
Manual once (Boot default)		00001111	Manual cycles between once, twich and three times
Manual twice		00011111	
Manual three times		00101111	
T ↑		000001101	Torch up
T ↓		00001100	Torch down
Start	00000010	00000110	Start
Stop	00000001	00001011	Stop
Back		00000010	Back
Foward		00000011	Forward
Ignition		00000101	Ignition
CutOxy		00000001	Cutting oxygen
Preheat		00110000	Preheat oxygen
Plasma		01000000	Plasma arc
Manual rate once		01010000	Cycles between three types
Manual rate twice (Boot default)		01100000	
Manual rate three times		01110000	
Clsoe		11110000	

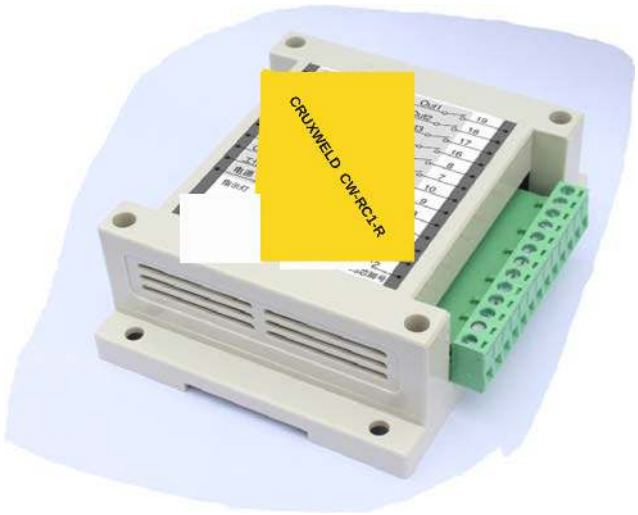
14.3 The Output Port of Receiver

Model: handheld receiver

Output ports: 8

Power supply mode: 24VDC.

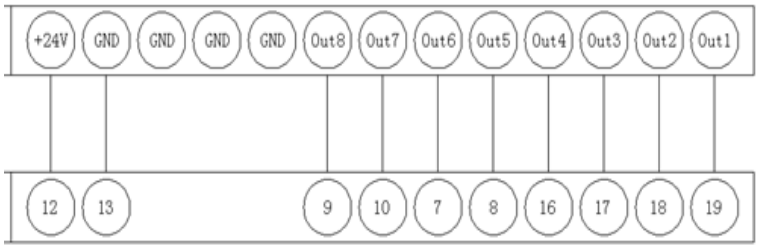
Each output port corresponds to a LED lamp to display IO port state, when it is ON, lamp lights, when it is OFF, lamp is off.



Wiring instructions for remote controller and ProGantry 2560 series:

Receiver output

System input



Description: all the buttons on the panel can be used. Press F5 diagnose, F8 system definition, F3 definition, F5 option, then set the remote controller type to 8421.

Chapter 15 Cruxweld Serial Remote Controller

Note: serial remote remote controller needs special instructions when placing orders. If you need to add it after some time, you need to send the system back to our Cruxweld after-sales maintenance department. It can be used normally after we add the appropriate hardware circuit to system.

15.1 Performance and Characteristics of Wireless Remote Control Module.

1.433MHz free ISM band free license trial;

2. Remote control distance> 30m, at least not less than 0.5m;

3.Hardware detection error, software optimization algorithm, two-way communication ensure stable and reliable communications;

4.Send and receive modules by address match, the address can be set manually, the maximum support 128 addresses;

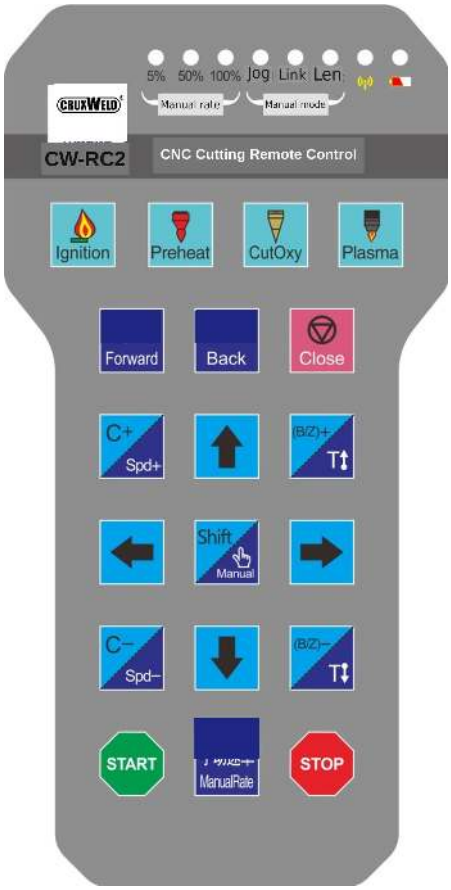
5.Wireless remote controller usesdry battery power supply, use of time can last more than 6 months.

6.serial remote remote control is divided into hand-held transmitter serial receiver and receiver serial transmitter;

7.Receiver module serial receiver uses RS232 connection, user-friendly wiring.

15.2 Layout of Remote controlle

15.2.1 Transmitter serial transmitter Description



Buttons: Start, Stop, Four direction(↑↓→←), Manual, T↑, T↓, S+, S-, Ignition, Preheat, CutOxy, Plasma, Forward, Back, Close and ManualRat. There is 19 keys.

Indicator: three manual speed lights (5%, 50%, 100%), three manual mode lights (electric, interlock, fixed length) .one send signal indicator, a power indicator (or signal Indicator light multiplexed)

Description: When the manual speed is 50% by default, the manual rate is quadratic. When the manual rate is pressed continuously, the manual rate changes the manual speed twice (50% light) -> Manual rate three times 100% light) -> manual rate once (5% light) -> manual rate twice (50% light). When the power is on, the default is the point of the manual for the state, the jog light is on, the manual changes

the state machine for the manual once (the jog light is on) -> Manual twice (with lights) -> Manual three times (fixed light) >Manual One time (jog light).

15.2.2 Receiver serial receiver wiring instructions

Remote controller receiver serial receiver, using the standard serial port connection, directly connects to the system's RS232 serial port nine-pin DB terminal block head, There is serial remote control receiver in Figure 15.2. The standard ProGantry 2560 series has no such ports, so customer needs special instructions when placing orders.

Fig15.2 Receiver serial receiver

As shown in Fig15.3, it is serial transmitter remote control interface that can be connected to the serial port RS232 interface diagram, motor 2 and serial port CN6. You can plug the receiver head directly, or use a male and femalDB9 extension lineto connect.

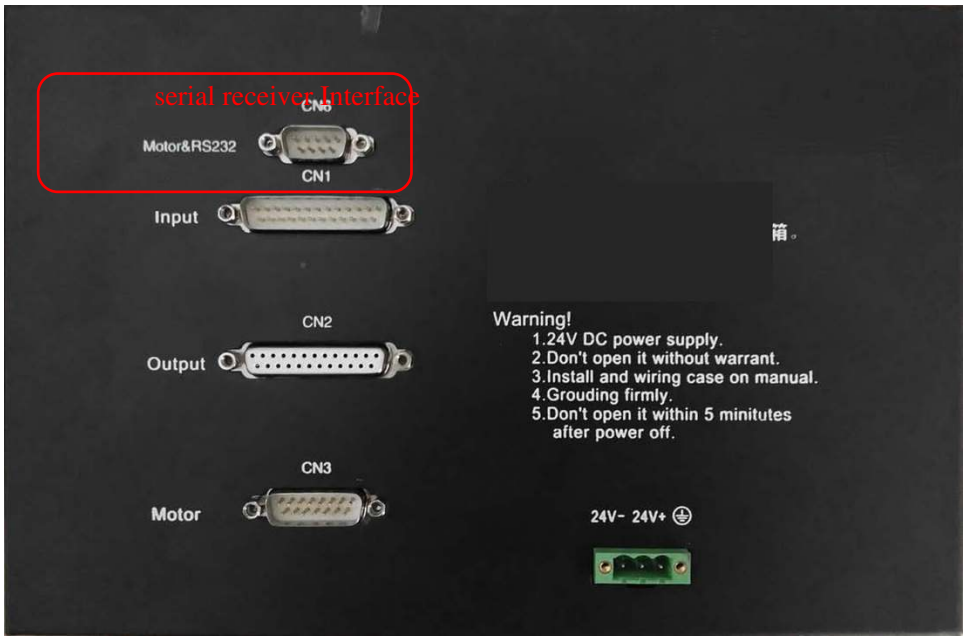


Fig15.3 Back interface

The wiring definition is shown in Fig 15.4.

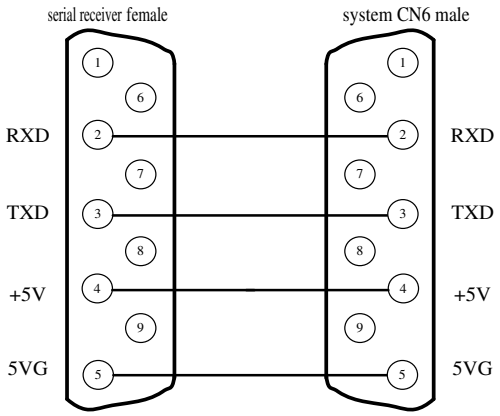


Fig 15.4 serial receiver wiring definition

Chapter 16 Tube/plate All-in-one module

16.1 Summarize

16.1.1 Module Brief Introduction

ProGantry 2560-X module is the pipeline cutting software function module based on the ProGantry 2560 model digital control system produced by our company. Digital control system with ProGantry 2560-X module function can process various pipe parts. This function is based on the mature ProGantry 2560 system, so this system is stable and reliable, easy to operate. The user can rapidly cut pipeline based on the initial operation.

This module can be applied to all ProGantry 2560 series controller from our company, facing to different machine tool, various mating controller selection available.

16.1.2 Module Function

- Supporting 2 axes cutting tube machine with chuck mode
- Supporting 2 axes cutting tube machine with friction disk mode
- Supporting tube and plate all-in-one (chuck mode) cutting machine
- Supporting tube and plate all-in-one (friction disk mode) cutting machine
- Tube /Plate function auto switch
- Any pipe diameter processing By using of Fang Ling pipe nesting software, it support a variety of workpiece cutting such as truncated, saddle head, eccentric saddle head, shrimp tube, bent pipe, etc.
- System comes with graphics library, containing five graphics, support left and right truncation, left and right branch and the mother tube opening, can be free combination.

16.2 operation instructions

16.2.1 Main interface

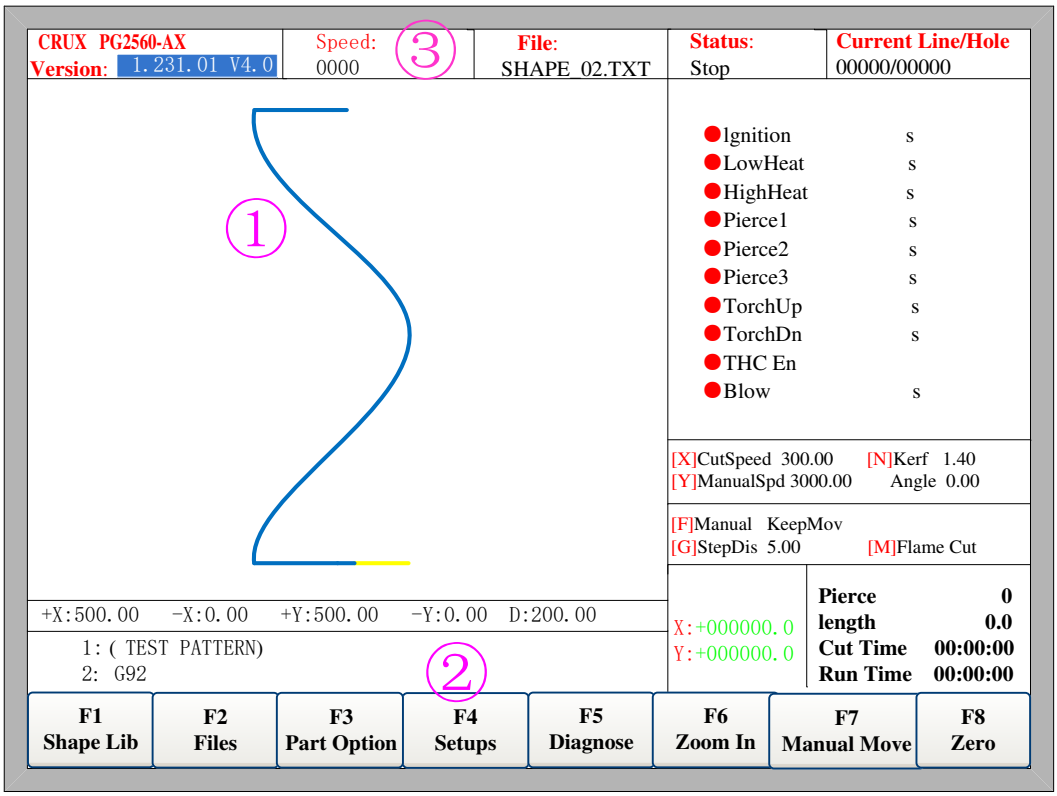


Fig 16.1 Tube/plate cutting main Interface

The Tube/plate All-in-one system shows one more X on the upper corner of main interface than ordinary ProGantry 2560 series. For example PG2560-A, it will be PG2560-AX.

In the middle section of the display graphics area 1 and area 2, there's one more parameter tube diameter D. for example: "D:200.00". It interprets that current tube diameter is 200 mm.

16.2.2 Tube/Plate Cutting Switch

The tube/plate All-in-one system has onemore parameter in common parameter interface, tas shown in Fig16.2

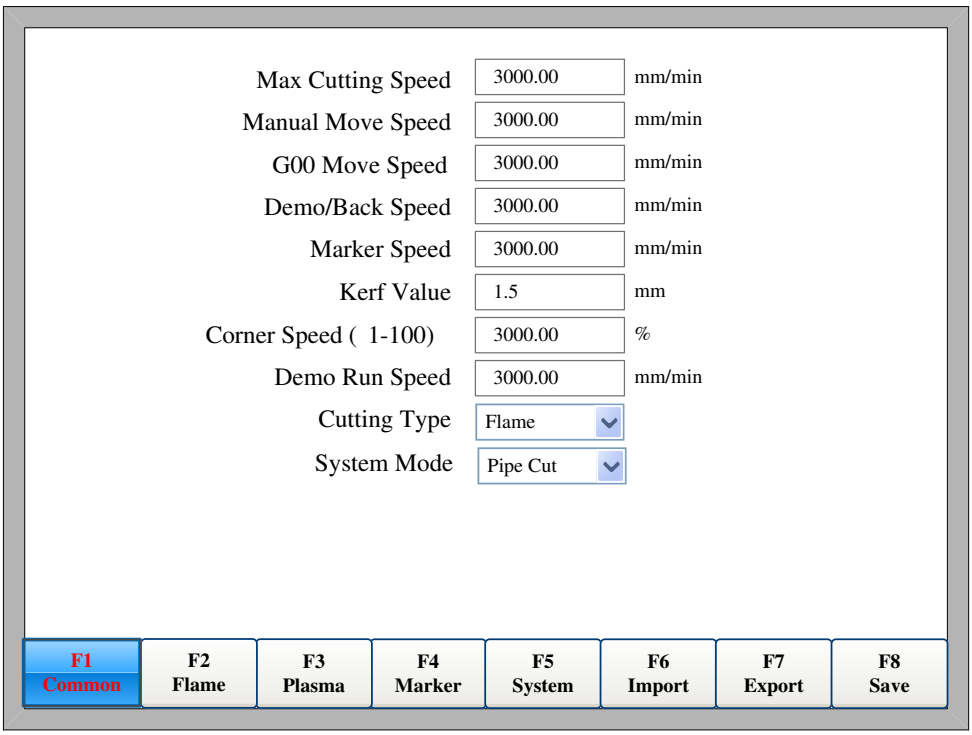


Fig16.2 Tube/Plate Cutting Switch

In the main interface, press [F4] to enter into Setups interface. It will show [F1 Common] parameter function interface as figure 16.2.

Press down [↑] or [↓] to select paramete[System mode] , press down [←] or[→] to switch between two modes:[Tube cutting] and[Plate cutting] .

Note: after switch system mode, the user needs to save parameters and power off to restart system, then cutting modeswitches between tube cutting and plate cutting.

16.3 Tube graphics library

Under the main interface, press [F1] to enter the tube graphics libraryinterface, as shown in Figure 16.3.

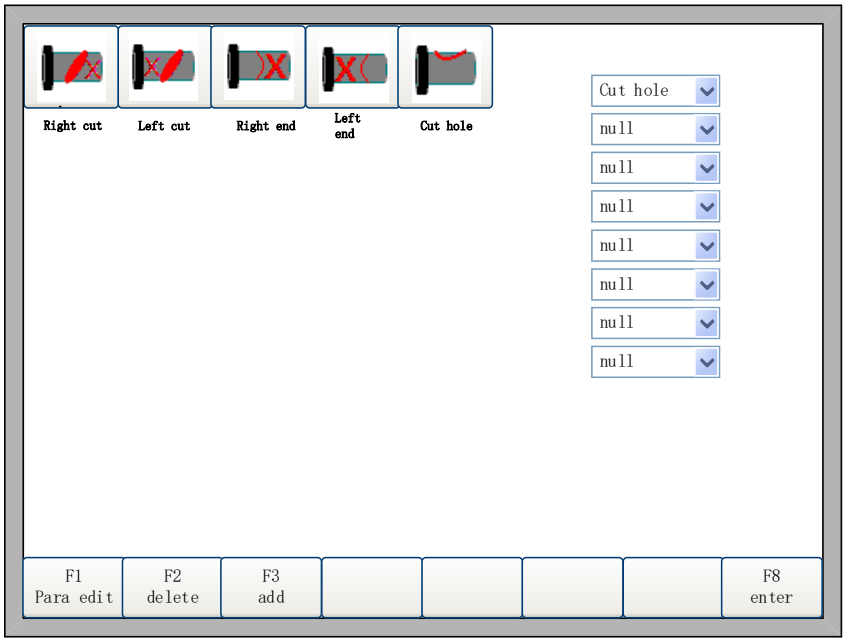


Fig16.3 Graphics library interface

Note: This chapter is only available in the tube cutting system.

1) [F1] Parameter editing: the cursor where the drop-down box type of the relevant parameters set. When multiple end combinations are combined, the pipe diameter and pipe wall thickness parameters can only be set in the end type selected in the first drop-down box.

2) [F2] Delete: delete the cursor where the drop-down box in the end, the first one can not be deleted.

3) [F3] Add: Select the desired end type in the drop down box where the cursor is located.

4) [F8] Confirm: confirm the parameters setting is completed, enter the graphical preview interface.

16.3.1 Graphic selection and combination

In the Gallery interface shown in Figure 8.1, you can select the type of end to be cut and you can combine the graphics at will. In the drop-down box on the left, select the type of end to be cut in order. Press[↑], [↓] to select the corresponding drop-down box, and then click [Enter] or [F2] to open the drop-down box and select the desired terminal type. To select each end, you must set the parameters. The end of the parameter that is not set is red

16.3.2 Parameter editing

In Figure 16.3, undergraphics library interface, press [↑], [↓] toselect the end of the parameter to be set, and then press [F1] to display the corresponding parameter editing interface.

16.3.2.1 Truncate the parameter interface

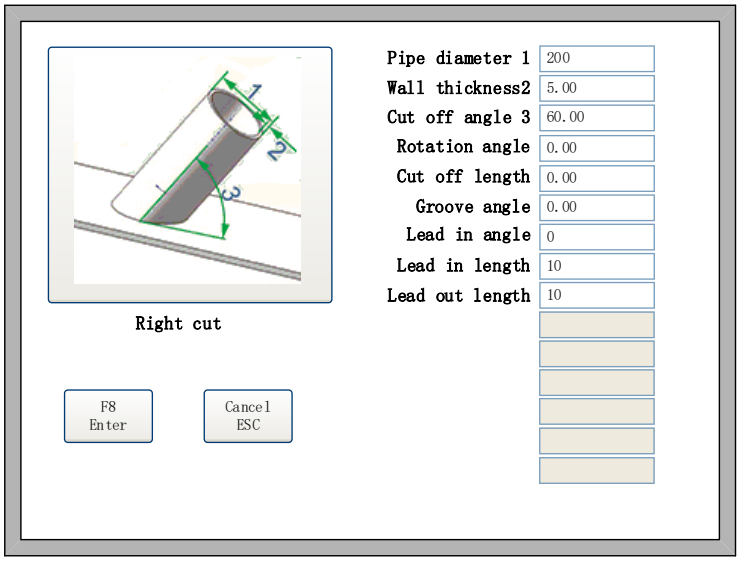


Fig16.4 **Truncate the parameter interface**

In Fig 16.4 cut off the parameters interface, you can edit the corresponding parameters. The cutoff parameters are described below:

- Pipe Diameter 1: The outer diameter of the cut pipe, 1 on the schematic, which can only be set in the type of terminal selected in the first drop-down box in Figure 16.3. Unit: mm
- Pipe wall thickness 2: The wall thickness of the cut pipe, 2 on the diagram. This parameter can only be set in the type of terminal selected in the first drop-down box in Figure 16.3. Unit: mm
- Cut off angle: the angle between the cut tube and the cut surface, 3 on the schematic. Unit: degrees
- Rotation angle: This is the relative position, relative to the positioning point, chuck shaft rotation set the angle, from the tube head to the chuck direction, counterclockwise positive. Unit: degrees
- Cut off length: the first end of the graphics combination, the parameter refers to the point of contact with the tube to the center line of the intersection of the

distance. The lower end, which refers to the distance between the intersection of the front end of the front end and the intersection of the axis of the current tip. Unit: mm

- Lead inangle: unit: degree
- □ Lead in length: Unit: mm
- □ Lead out length: Unit: mm

16.3.2.2 Branching parameter interface

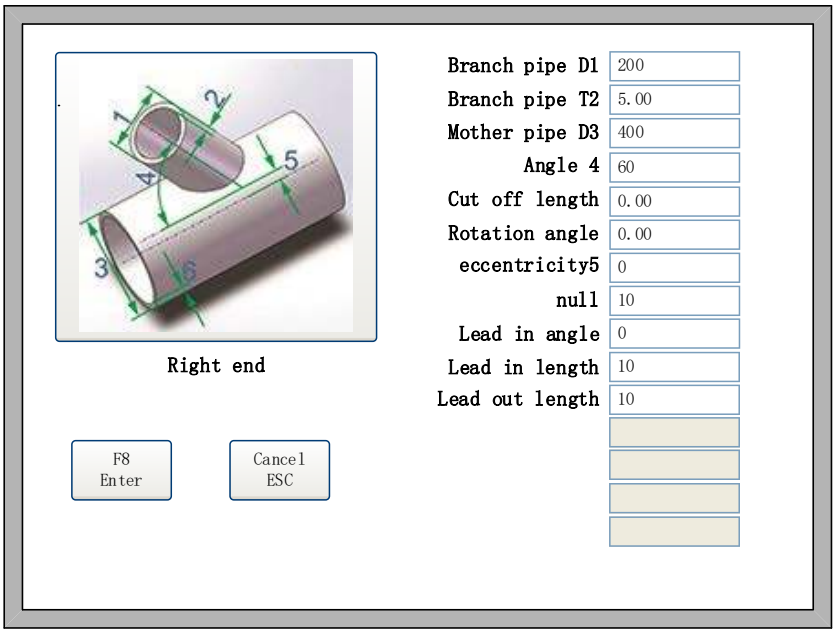


Fig 16.5 Branching parameter interface

The branching parameters are described below:

- Branch pipe1: The outer diameter of the cut pipe, 1 on the diagram. This parameter can only be set in the terminal type selected in the first drop-down box in Figure 16.3. Unit: mm
- Branch pipe2: The wall thickness of the cut pipe, 2 on the diagram, which can only be set in the type of terminal selected in the first drop-down box in Figure 16.3. Unit: mm
- Mother pipepipe 3: Diameter of the coherent tube of the cut tube, 3 on the schematic.Unit: mm
- Angle 4: branch pipe and the angle of the tube, the figure on the 4, unit: degree
- Cut off lengthdistance: the first end of the pattern combination, this parameter refers to the gun point to the branch pipe and the center line of the intersection of the distance. The lower end of the pipe is the distance between the

branch of the front end and the intersection of the pipe axis and the intersection of the branch of the current end and the axis of the parent pipe. Unit: mm

- Rotation angle: This is the relative position, relative to the positioning point, chuck shaft rotation set the angle, from the tube head to the chuck direction, counterclockwise positive. Unit: degrees
- Eccentricity 5: the vertical distance between the centerline of the branch pipe and the center line of the tube, 5 on the schematic. Unit: mm

16.3.2.3 Mother hole opening interface

The manifold opening is divided into a riding-type mother tube and a plug-in pipe, and is set by a drop-down box below the schematic. The interface of the bus opening is shown in Fig 16.6.

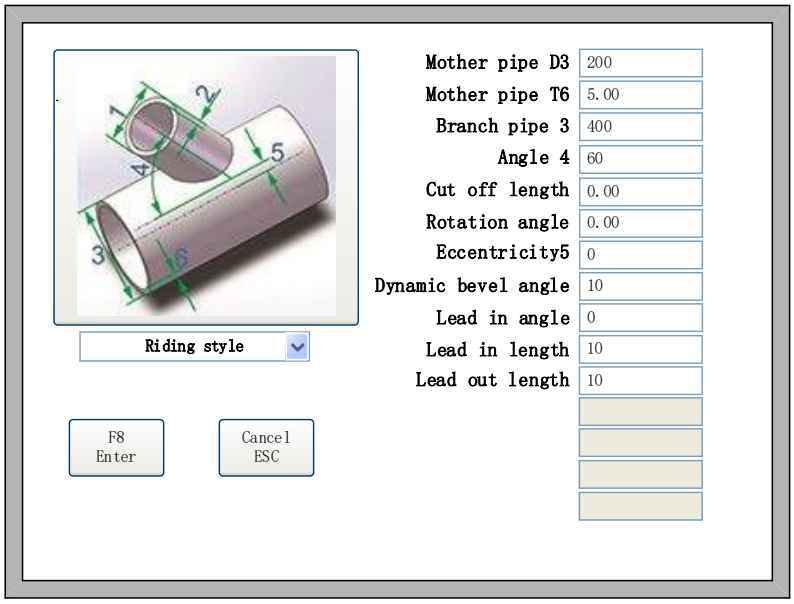


Fig 16.6 Mother hole opening interface

When the combination of graphics, then the branch inside the branch on the parameters of the value, in the main tube inside the hole will become the parameters of the mother tube. The parameters of the parent opening are as follows:

- Mother pipe D3: The outer diameter of the cut pipe, 3 on the schematic. This parameter can only be set in the type of terminal selected in the first drop-down box in Figure 16.3. Unit: mm
- Mother pipeT 6: The wall thickness of the cut pipe, 6 on the diagram. This parameter can only be set in the type of terminal selected in the first drop-down box in Figure 16.3. Unit: mm

- Branch pipe 1: The diameter of the branch pipe to be inserted by the cutting pipe, 1 on the diagram: Unit: mm
- Angle 4: branch pipe and the angle of the tube, the figure on the 4, unit: degrees
- Cut off length: the first end of the pattern combination, this parameter refers to the gun point to the branch pipe and the center line of the intersection of the distance. The lower end of the pipe is the distance between the branch of the front end and the intersection of the pipe axis and the intersection of the branch of the current end and the axis of the parent pipe. Unit: mm
- Rotation angle: This is the relative position, relative to the positioning point, chuck shaft rotation set the angle, from the tube head to the chuck direction, counterclockwise positive. Unit: degrees
- Eccentricity 5: the vertical distance between the centerline of the branch pipe and the center line of the tube, 5 on the schematic. Unit: mm
- Dynamic bevel angle: the dynamic bevel angle of the parent pipe opening. Unit: mm

16.3.2.4 Graphic preview

After the parameters of the selected graphic are set, click [F8] to confirm, then enter the graphical preview interface, as shown in Figure 16.7

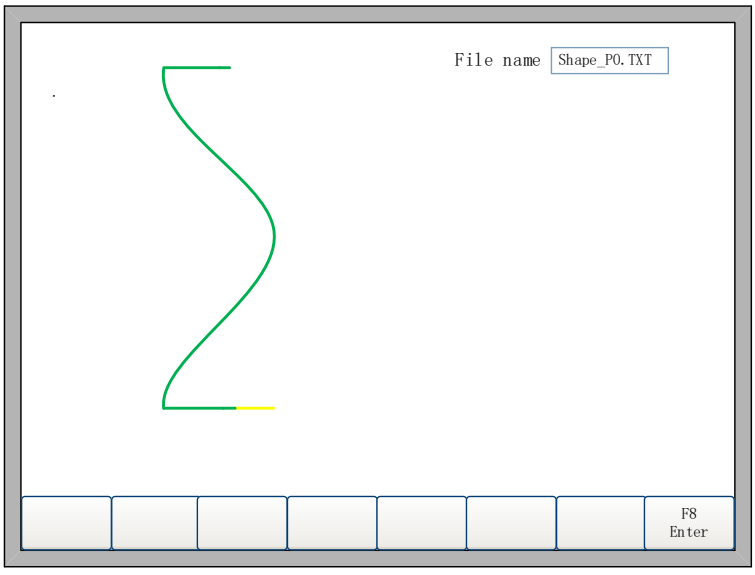


Fig 16.7 Graphic preview

In the graphical preview interface, the user can see the preview code generated according to the type of the selected terminal and the parameter. In the upper right corner there will be an edit box, which is the name of the G code file generated by the parameter, which can be modified by the user. Click[F8] to confirm, then this the G

code file can be saved. In the main interface click [F2] file management the corresponding G code file can be found ,thus users can find and select in the future production process at any time .

After confirming the graphic preview, click [F8] , then enter the main interface, you can start cutting.

16.3.3 Tube cutting related parameter settings

16.3.3.1 Number of pulses set

As shown in Figure 16.8, in the [F4] parameter interface under the [F5] system parameters, there shows the number of chuck pulse related settings.

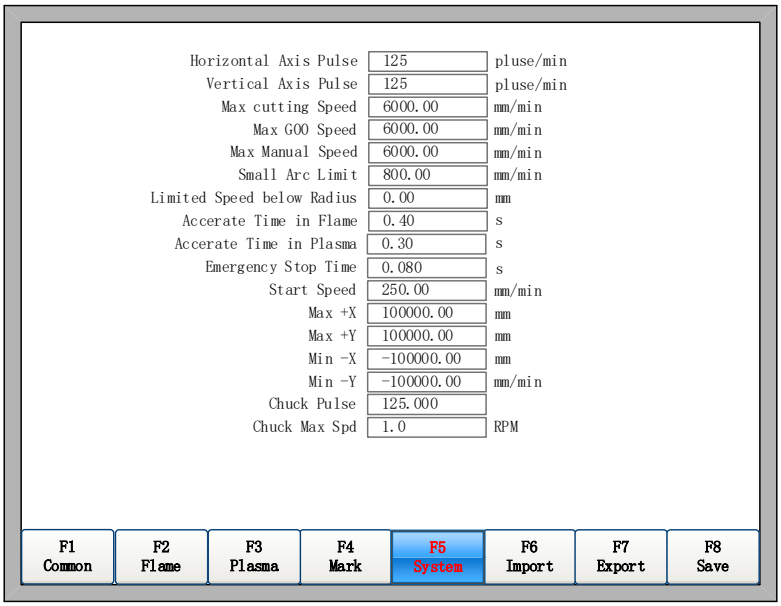


Fig 16.8 Chuck pulse

- Chuck pulse : This parameter sets how many pulses to rotate one degree. In the pipe cutting mode, use the number of chuck pulses to calculate the chuck position.
- Chuck Max Speed: the maximum speed of the chuck.

16.3.3.2 Chuck selection

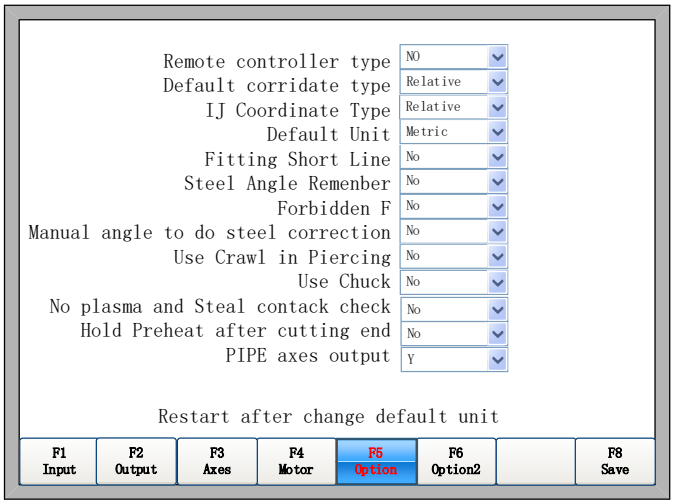


Fig 16.9 Chuck selection

In[F5] System Diagnostics -[F8] System Definition -[F3] Definition - [F5] Option Parameter interface is shown in Figure 16.9.

- [Use chuck] When the rotating axis uses a chuck, it is set as yes. When rotating axis uses a friction disk, set as no.
- [PIPE axes output] set the chuck axis is X or Y.

16.4 Tube/plate All-in-one System controller Topology Schematic

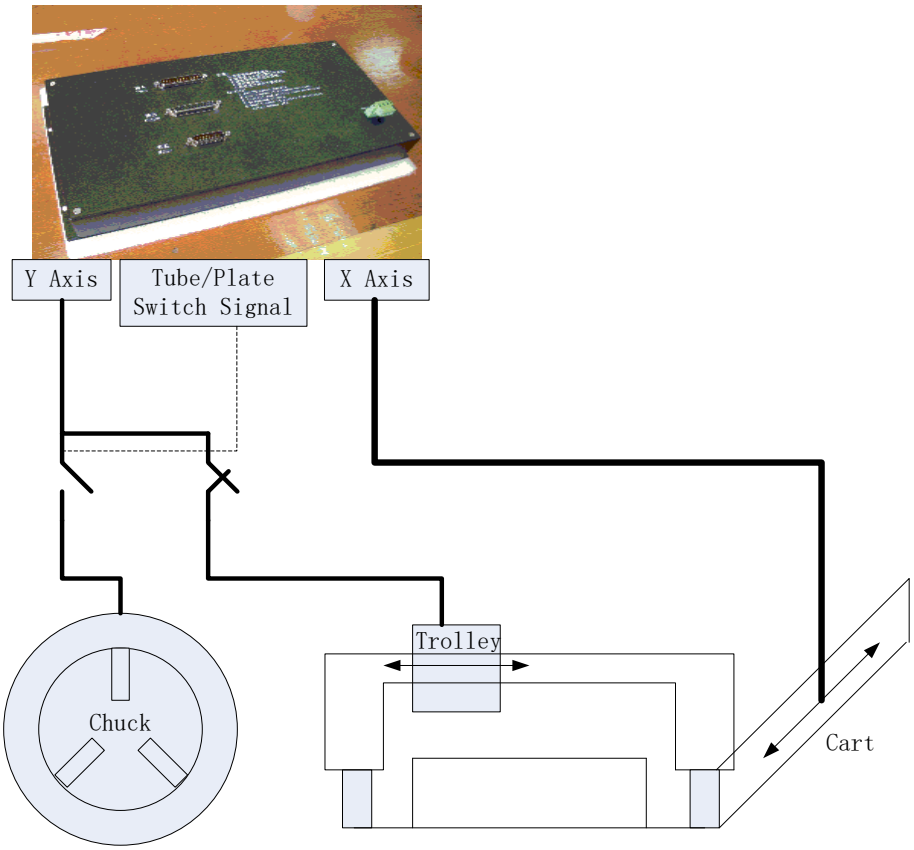


Fig 16.10.1 Tube/plate all-in-one system controller topology Schematic

X axis and Y axis can be changed to control Cart and Trolley motors. The chuck motor can select any one of the two axis to make output control.At the same time, only one of the chuck's ortrolley's motor is always enable(Using the tube/plate switch signal by the system outputs).

16.5 IO Port

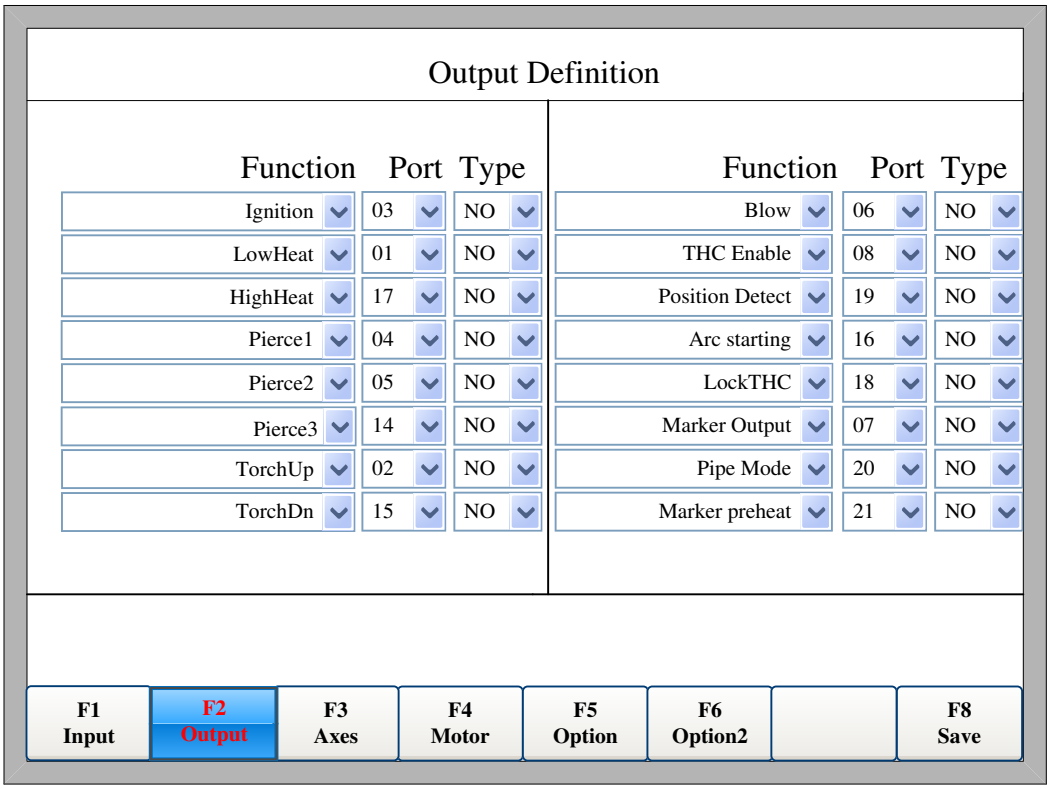


Fig 16.11 Output definition

[Pipe Mode] This port keeps open all the time in the mode of tube cutting, keeps closed in the mode of plate cutting. Using this signal, you can switch between trolley and chuck enable.

16.6 Code Explanation

16.6.1 Code Symbol

Tube cutting program code is similar to plate cutting program code,, its differences areas following:

- Letters and Units:

  X: The cart's axis, unit(mm)

  Y: chuck(it's trolley in the mode of cutting plate), unit is degree.

  (When don't use chuck, unit is mm)

- Diameter Code

  The tube cutting code starts with the following procedures (must) (D=168)

  It interprets that the tube's diameter is 168 mm in this cutting program.

- Wall Thickness Code

  There is one line code in the cutting tube code as follow(omissible):

  (T=8)

  It interprets that the tube's wall thickness is 8 mm in this cutting program.

- Annotation

The content contained within parentheses in the tube cutting program areannotation. Besides diameter annotation code, the rest annotations can all beomitted..

16.6.2 Typical Code

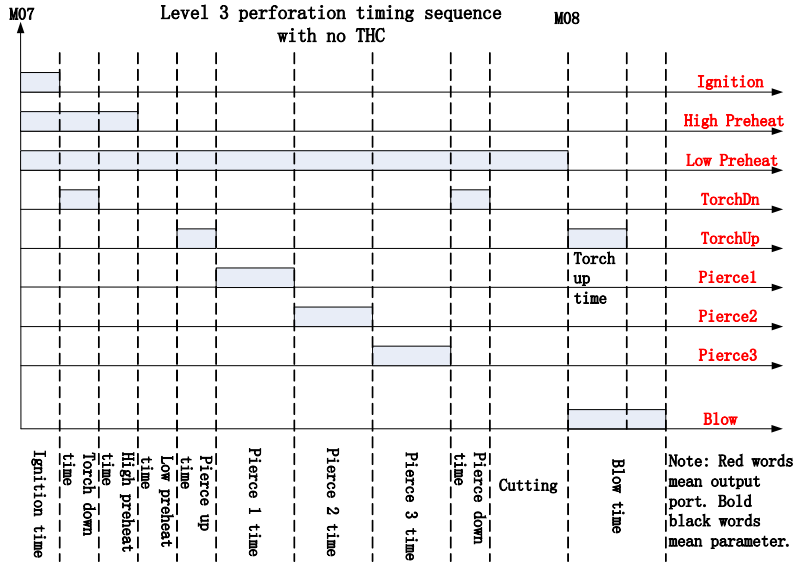
```
(D=452)
(T=55)
(M=Q235-A)
(F=1)
G71
G90
G92X0Y0
(Sit,90,-570.787,Sit,1200,50,90,0)
G00 X0 Y-0.634 B0
M07
G01 X4.33 Y0 B0 F500
G01 X4.454 Y4 B0 F1000
G01 X4.822 Y8 B0 F1000
G01 X5.428 Y12 B0 F1000
M08
M02
```

Appendix 1 G, M Code Rapid Consult

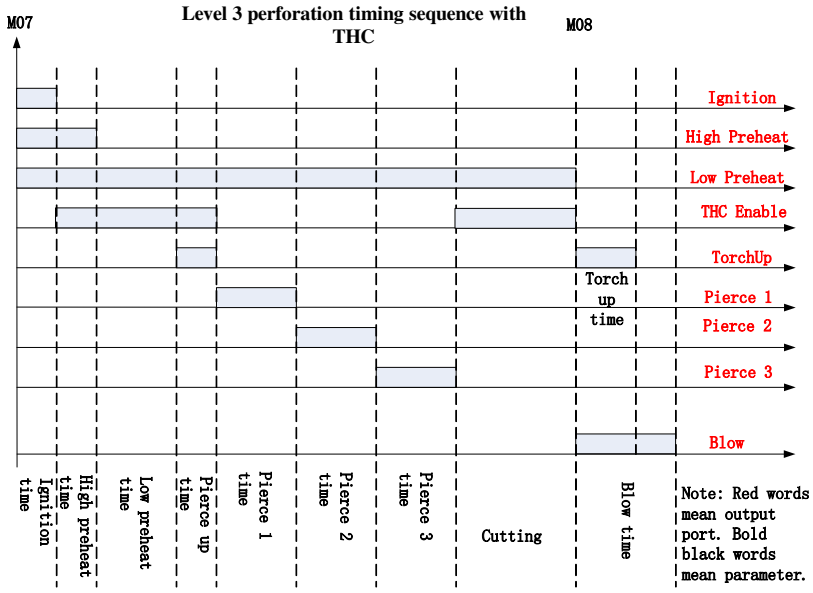
Serial number	Order	Function
1	G99	rotation, proportion, mirror image
2	G92	reference coordinate
3	G91	Relative coordinate system
4	G90	Absolute coordinate system
5	G20	English unit
6	G21	Metric unit
7	G26	X axis quick return reference point
8	G27	Y axis quick return reference point
9	G28	X, Y axis quick return reference point
10	G41	Left kerf gap compensation
11	G42	Right kerf gap compensation
12	G40	Cancel kerf gap compensation
13	G00	Quickly move
14	G01	Liner cutting
15	G02	Clockwise arc cutting
16	G03	Anticlockwise arc cutting
17	G04	Program delay
18	M07	Start cutting cycle
19	M08	Stop cutting cycle
20	M11	Marker offset open
21	M12	Marker offset off
22	M09	Open the powder
23	M10	Stop of the powder
24	M00	Pause
25	M02	Program end

Appendix 2 IO Timing Sequence Figure of ProGantry 2560 Series Numerical Control System

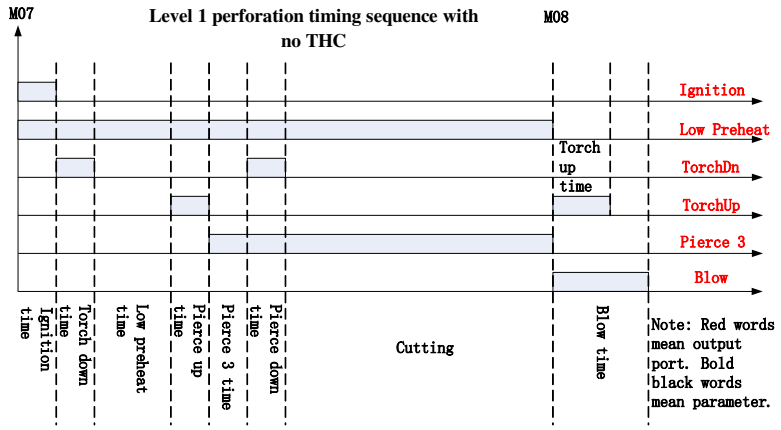
A2.1 Flame Cutting Timing Sequence



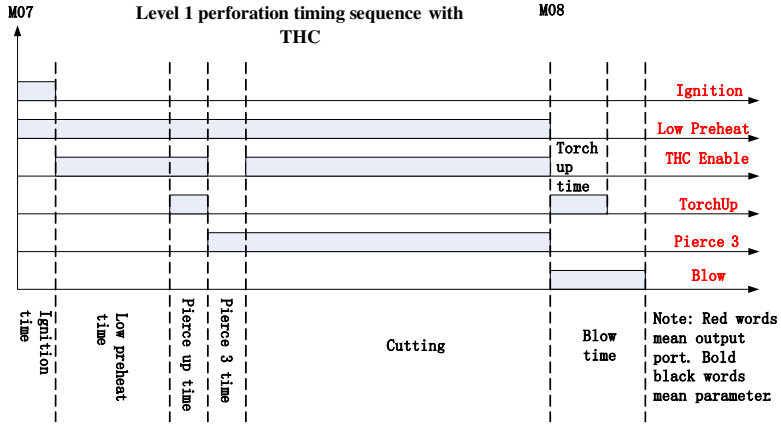
Appendix fig 2.1 Flame cutting timing sequence (Level 3 perforation with no THC)



Appendix fig 2.2 Flame cutting timing sequence (Level 3 perforation with THC)

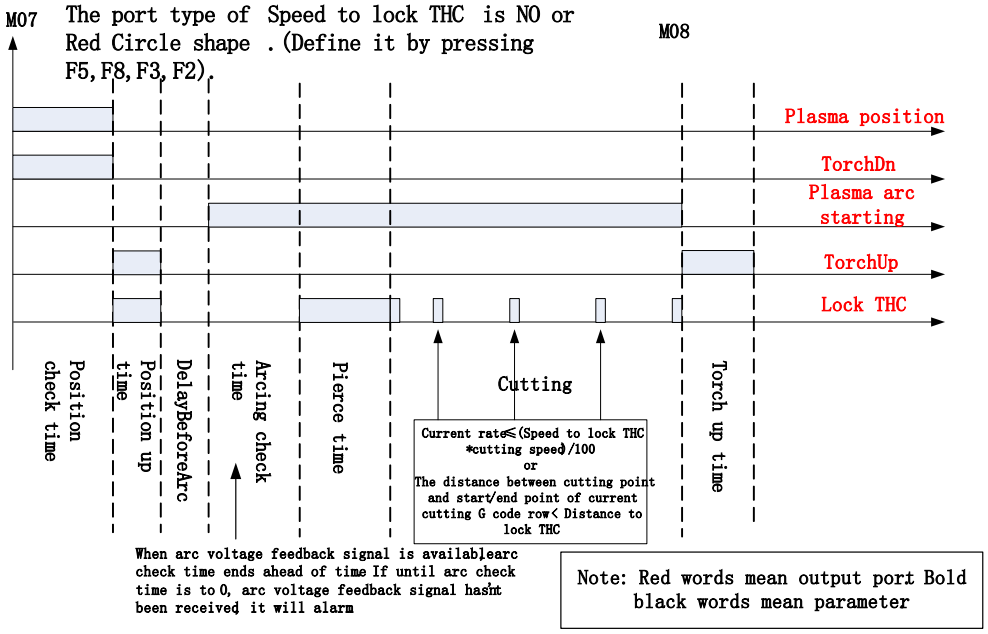


Appendix fig 2.3 Flame cutting timing sequence (Level 1 perforation with no THC)

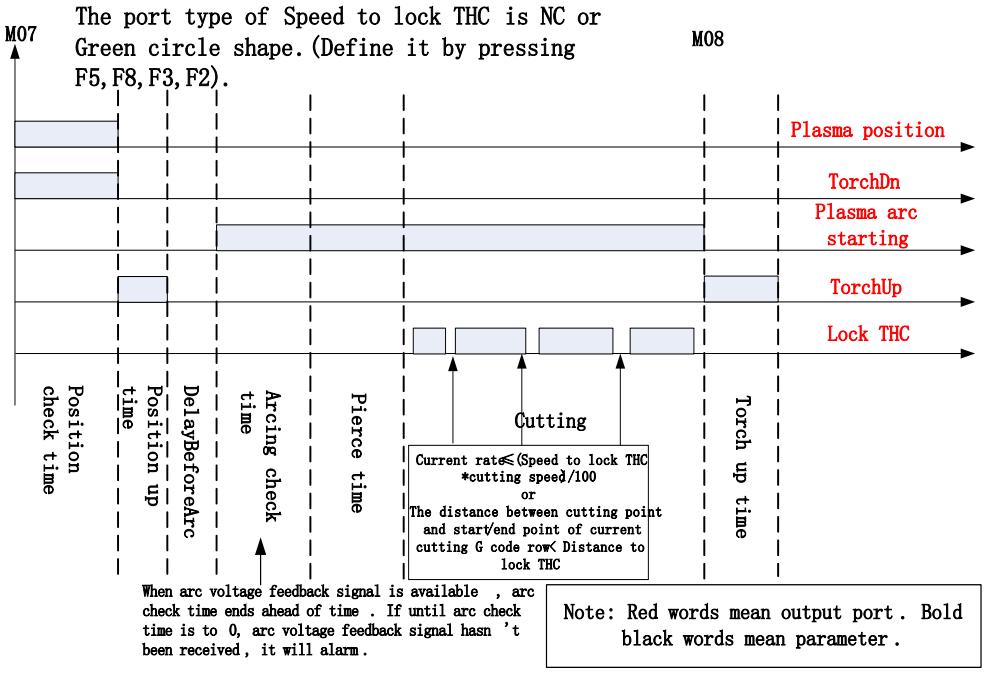


Appendix fig 2.4 Flame cutting timing sequence (Level 1 perforation with THC)

A2.2 Plasma IO Timing Sequence



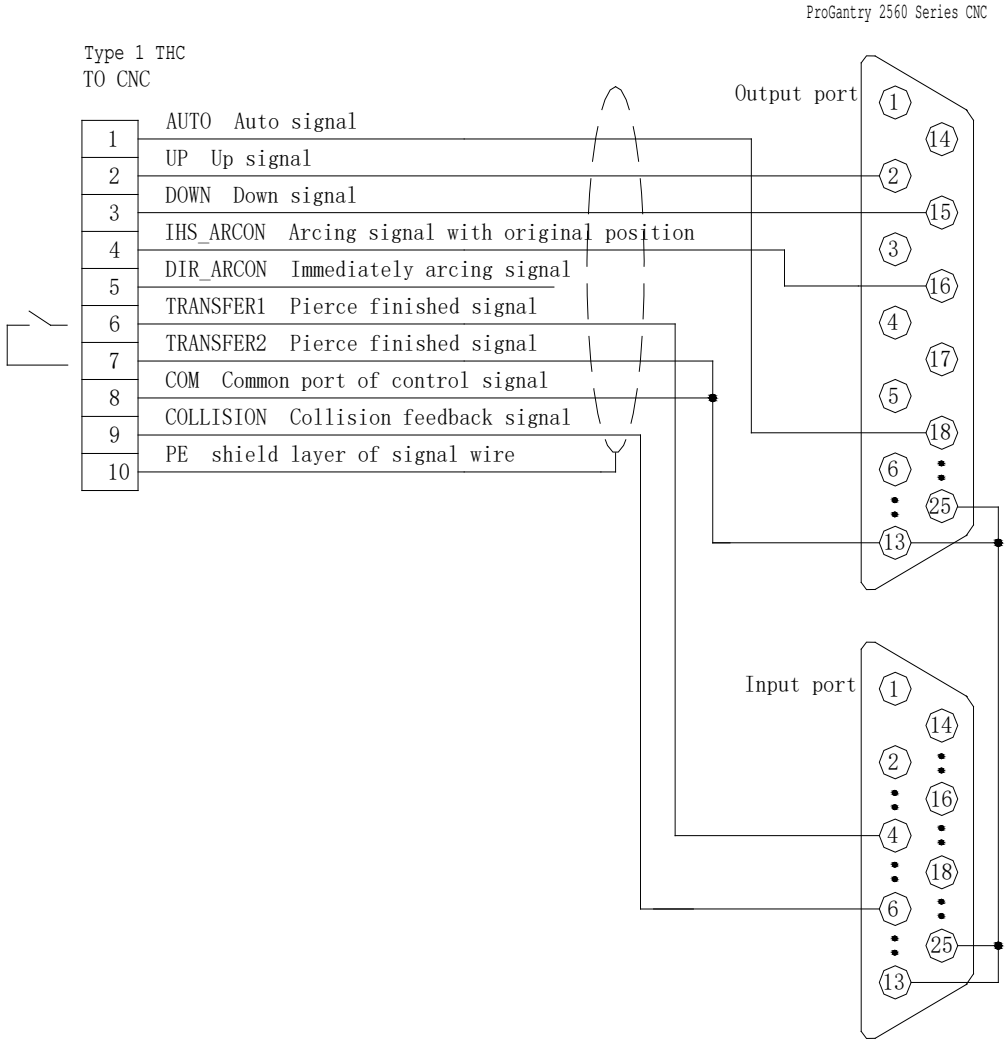
Appendix fig 2.5 Plasma IO timing sequence



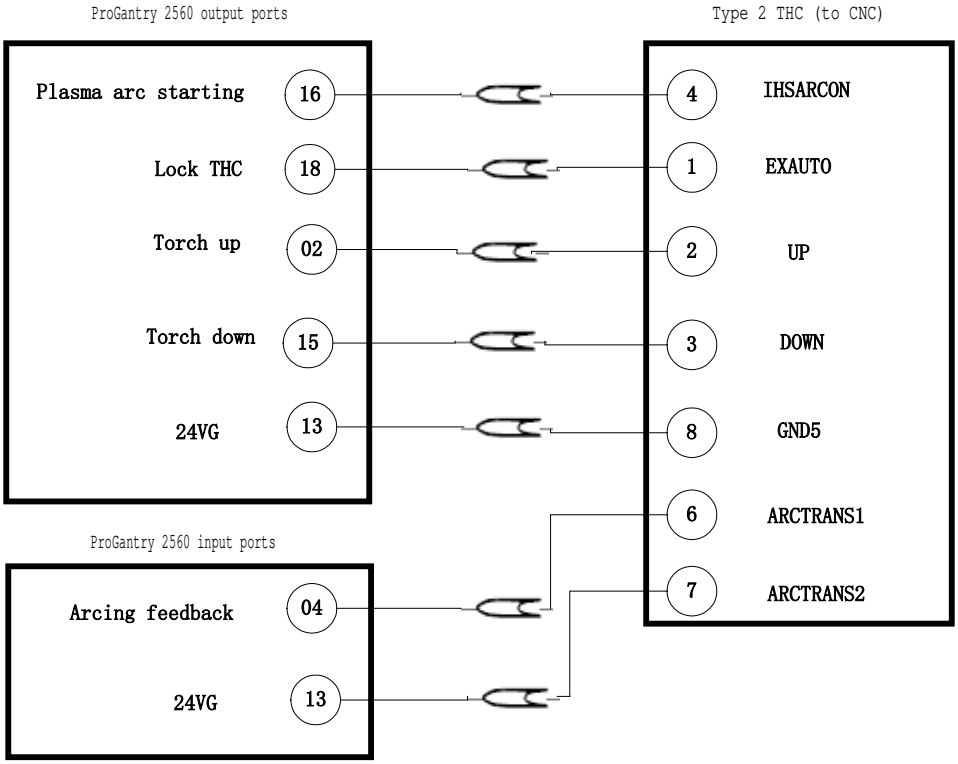
Appendix fig 2.6 Plasma IO timing sequence 2

Appendix 3 Interpretation of Wiring Connection between ProGantry 2560 Series and Common THC

A3.1 Connection with Type 1 THC



A3.2 Connection with Type 2 THC



Plasma parameter	Range of value	Recommended value
Delay Before Arc	0	0
Pierce time	0	0
Torch up time	0-3	3
Arcing Check Time:	5-30	30
Position check Time:	0	0
Speed to lock THC	90-100	95
Distance to lock THC	0-15	10
Lose arc delay	0-1	0.5
Watch arc enable	Yes	Yes

The method of setting parameter:

PG2560-A, PG2560-AT, PG2560-B A/B, PG2560-BT A/B, PG2560-C A/B, PG2560-CT A/B, PG2560-DT:

F4 (Setups), F3 (Plasma).

Input definition

	Port	Type
Position detect	05	●

Output definition

	Port	Type

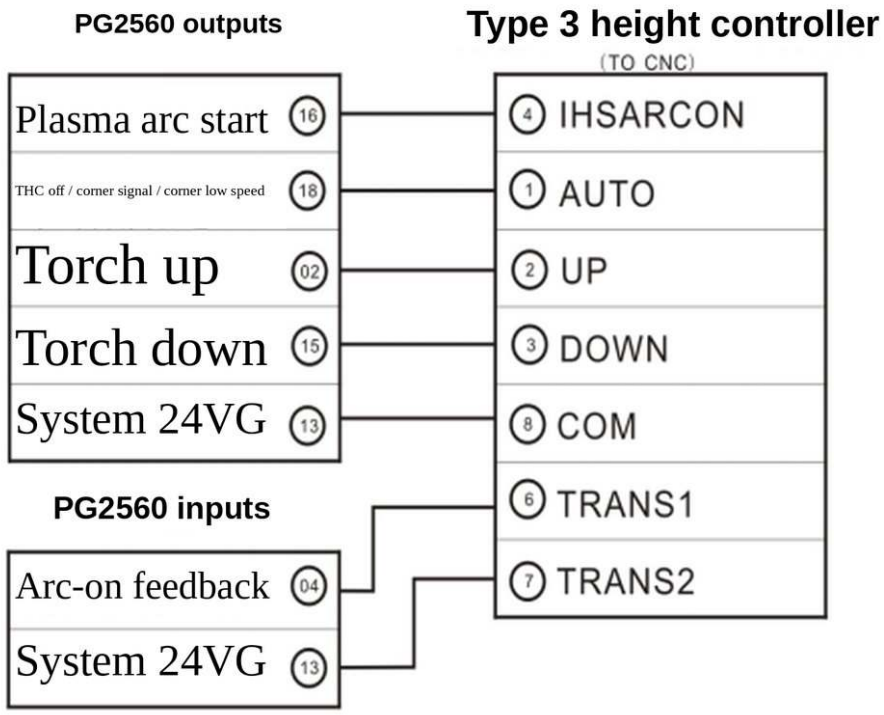
Lock THC	18	●

The method of definition:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT:

F5(Diagnose), F8(System Def), F3(define), input password: 1396.

A3.3 Connection with Type 3 THC



Plasma parameter	Range of value	Recommended value
Delay Before Arc	0	0
Pierce time	0	0
Torch up time	0-3	3
Arcing Check Time:	5-30	30
Position check Time:	0	0
Speed to lock THC	90-100	95
Distance to lock THC	0-15	5
Lose arc delay	0-1	1
Watch arc enable	Yes	Yes

The method of setting parameter:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT:

F4 (Setups), F3 (Plasma).

Input definition

	Port	**Type**
Position detect	05	NC

Output definition

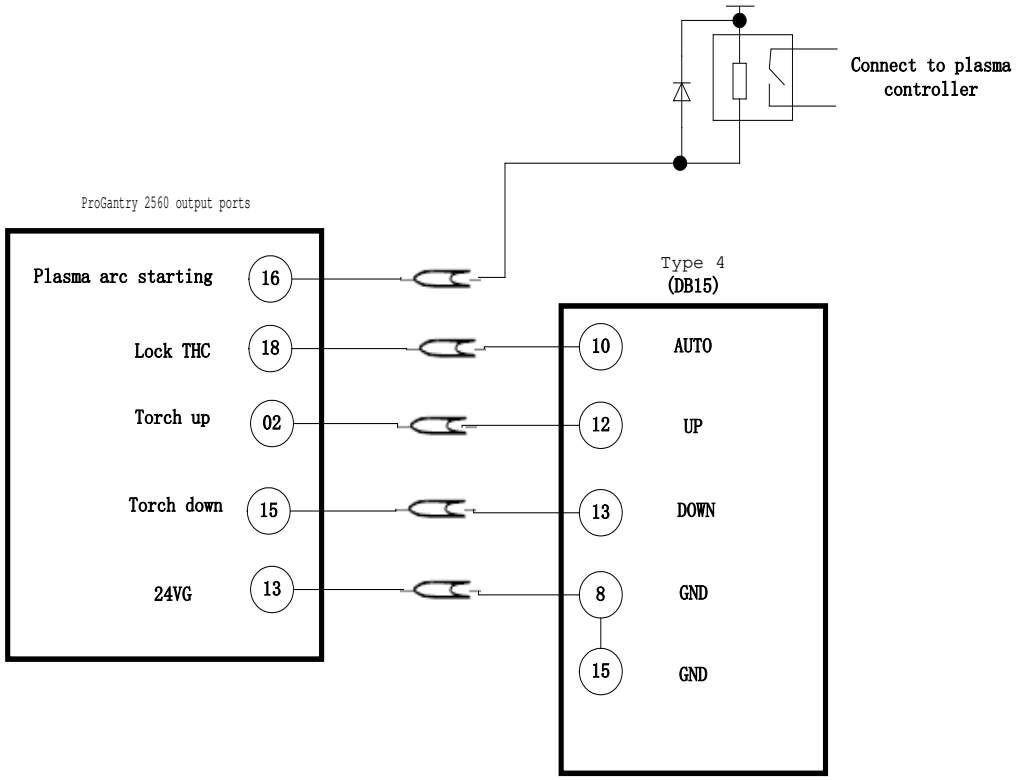
	Port	**Type**
Lock THC	18	NO

The method of definition:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT:

F5(Diagnose), F8(System Def), F3(define), input password: 1396.

A3.4 Connection with Type 4 THC



Plasma parameter	Range of value	Recommended value
Delay Before Arc	0	0
Pierce time	0-3	According to thickness of plating
Torch up time	0-3	3
Arcing Check Time:	0	0
Position check Time:	3-30	15
Speed to lock THC	90-100	95
Distance to lock THC	0-15	10
Lose arc delay	0-1	0.5
Watch arc enable	No	No

The method of setting parameter:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT:

F4 (Setups)， F3 (Plasma).

Input definition

	Port	Type
Position detect	05	NC

Output definition

	Port	Type

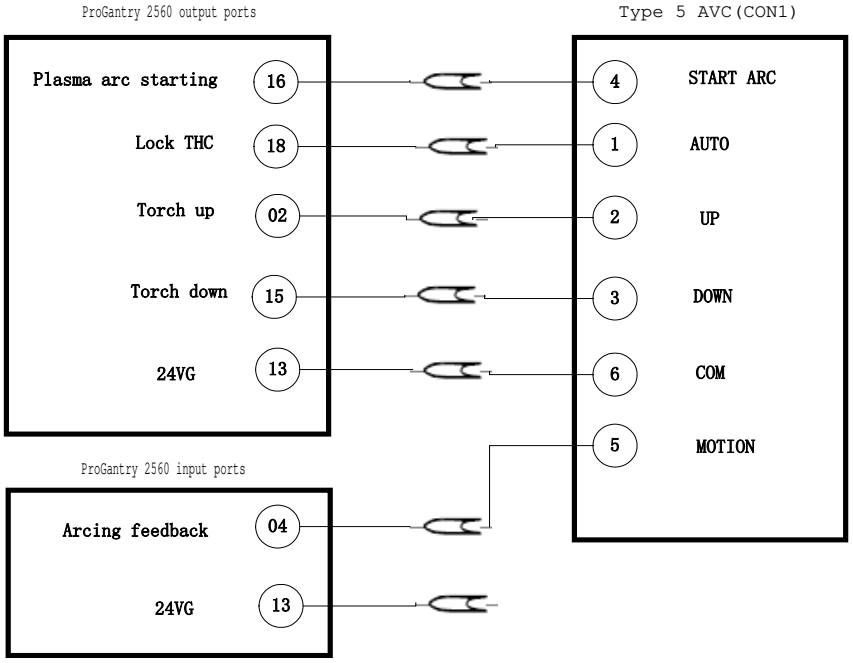
Lock THC	18	NC

The method of definition:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT:

F5 (Diagnose), F8 (System Def), F3 (define), input password: 1396.

A3.5 Connection with Type 5 THC



Plasma parameter	Range of value	Recommended value
Delay Before Arc	0	0
Pierce time	0	0
Torch up time	0-3	3
Arcing Check Time:	5-30	30
Position check Time:	0	0
Speed to lock THC	90-100	95
Distance to lock THC	0-15	10
Lose arc delay	0-1	0.5
Watch arc enable	Yes	Yes

The method of setting parameter:

PG2560-A, PG2560-AT, PG2560-B A/B, PG2560-BT A/B, PG2560-C A/B, PG2560-CT A/B, PG2560-DT :

F4 (Setups), F3 (Plasma).

Input definition

	Port	Type
Position detect	05	NC

Output definition

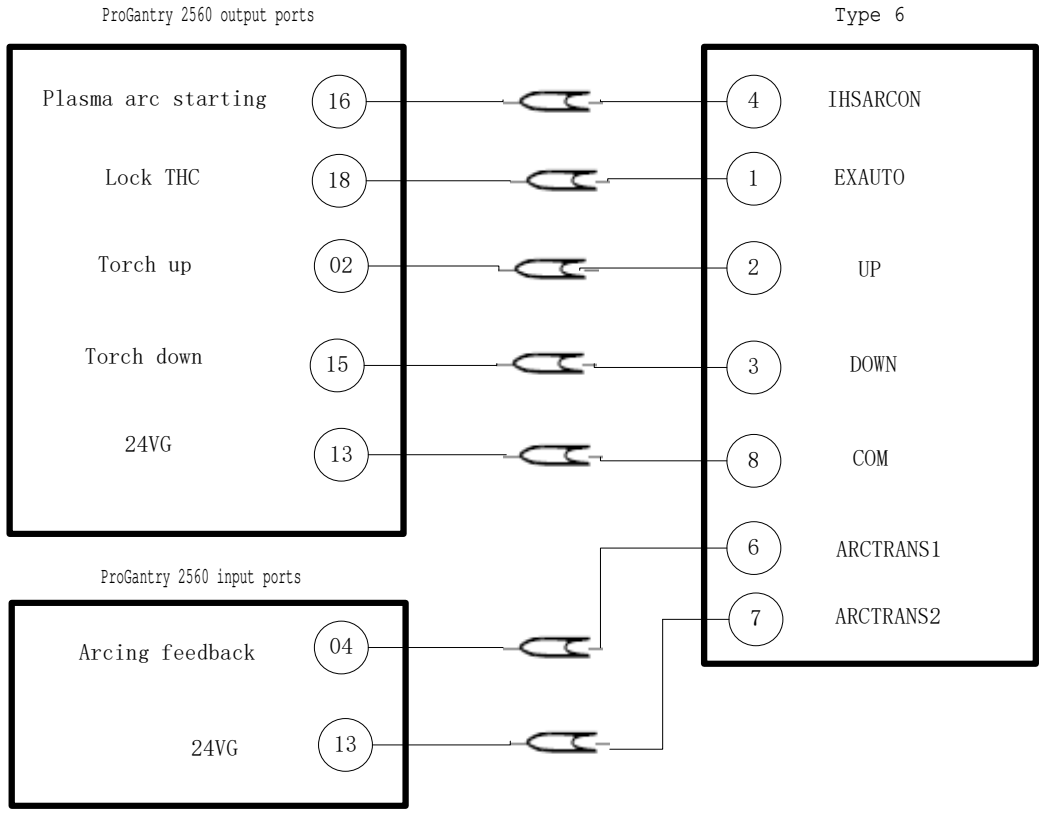
	Port	Type
Lock THC	18	NO

The method of definition:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT :

F5 (Diagnose), F8 (System Def), F3 (define), input password: 1396.

A3.6 Connection with Type 6



Plasma parameter	Range of value	Recommended value
Delay Before Arc	0	0
Pierce time	0	0
Torch up time	0-3	3
Arcing Check Time:	5-30	30
Position check Time:	0	0
Speed to lock THC	90-100	95
Distance to lock THC	0-15	10
Lose arc delay	0-1	0.5
Watch arc enable	Yes	Yes

The method of setting parameter:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT :

F4 (Setups)， F3 (Plasma).

Input definition

	Port	Type
Position detect	05	NC

Output definition

	Port	Type
Lock THC	18	NO

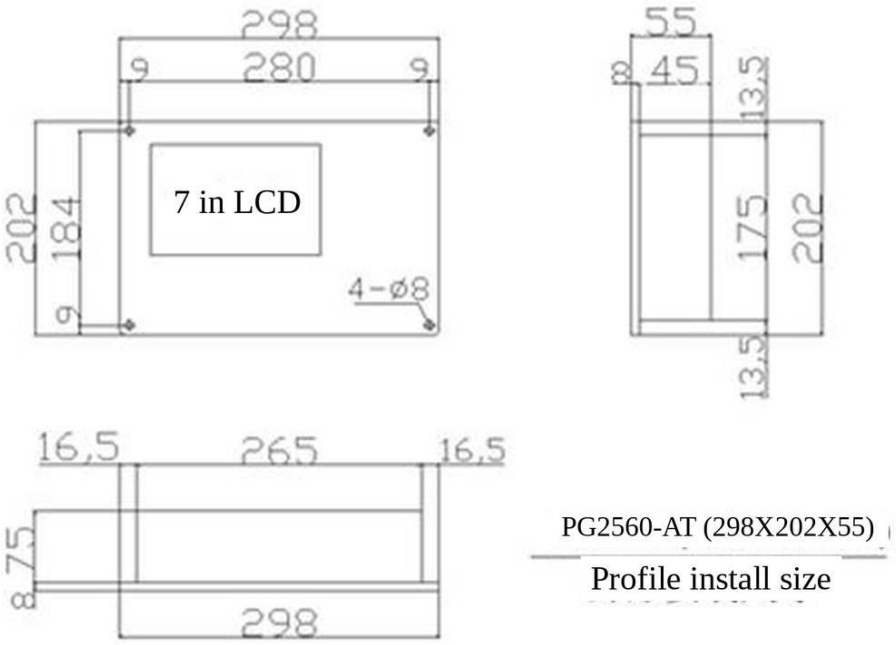
The method of definition:

PG2560-A，PG2560-AT，PG2560-B A/B，PG2560-BT A/B，PG2560-C A/B，PG2560-CT A/B，PG2560-DT :

F5 (Diagnose), F8 (System Def), F3 (define), input password: 1396.

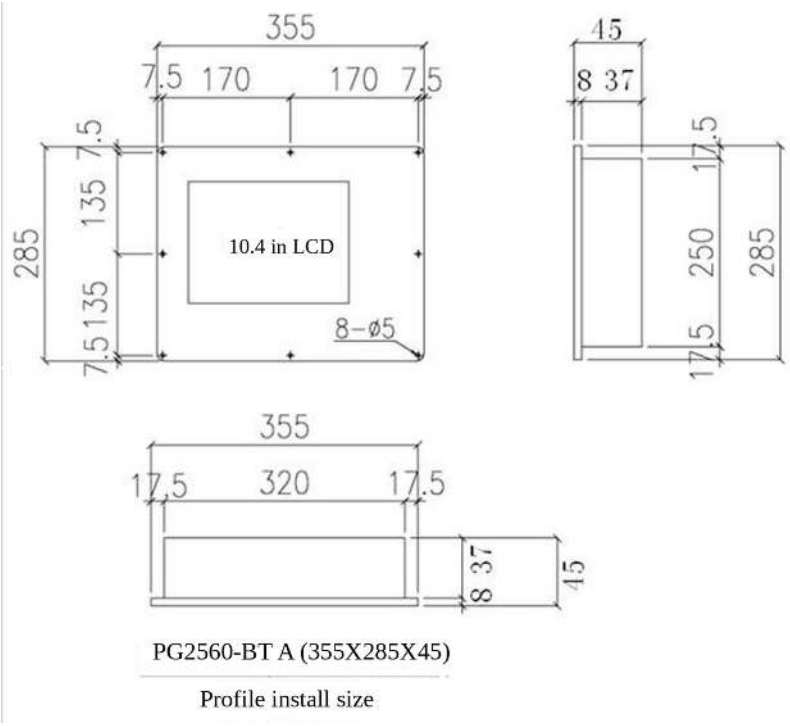
Appendix 4 Interpretation of ProGantry 2560 Full Series System Install Size

A4.1 PG2560-A，PG2560-AT Profile Install Size

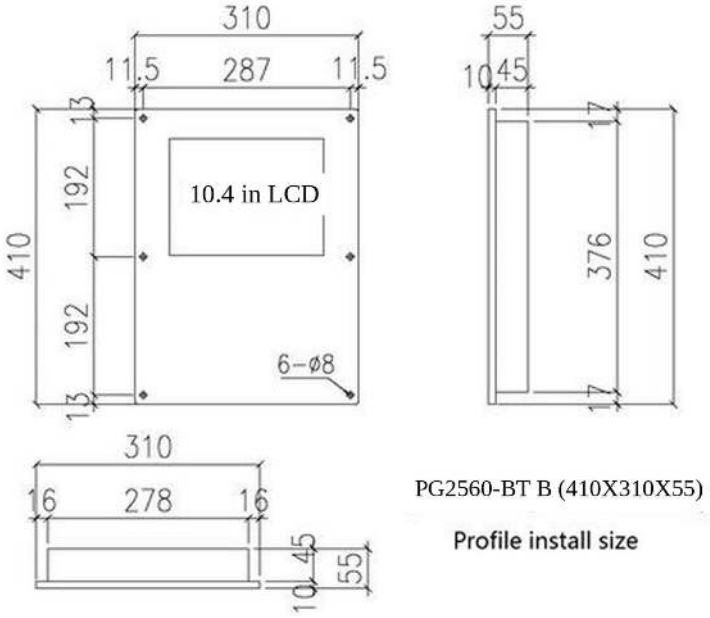


Appendix fig.4.1 PG2560-A，PG2560-AT installation size

A4.2 PG2560-B A/B，PG2560-BT A/B Profile Install Size

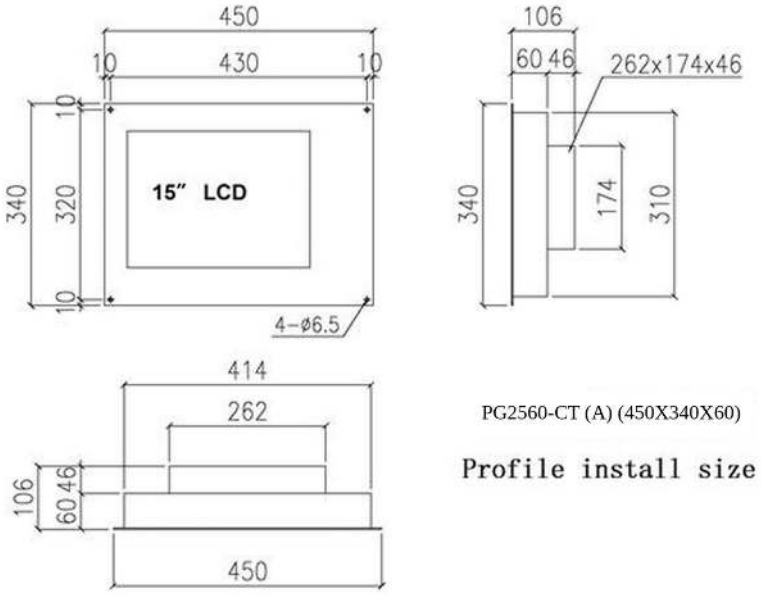


Appendix fig.4.2 PG2560-B/ET A installation size

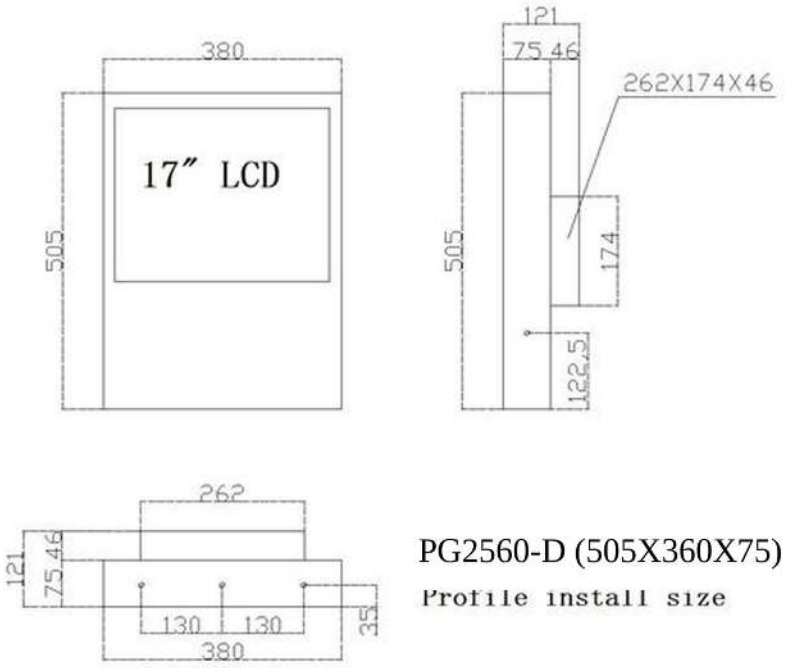


Appendix fig.4.3 PG2560-B/ET B installation size

A4.3 PG2560-C A/B，PG2560-CT A/BProfile Install Size

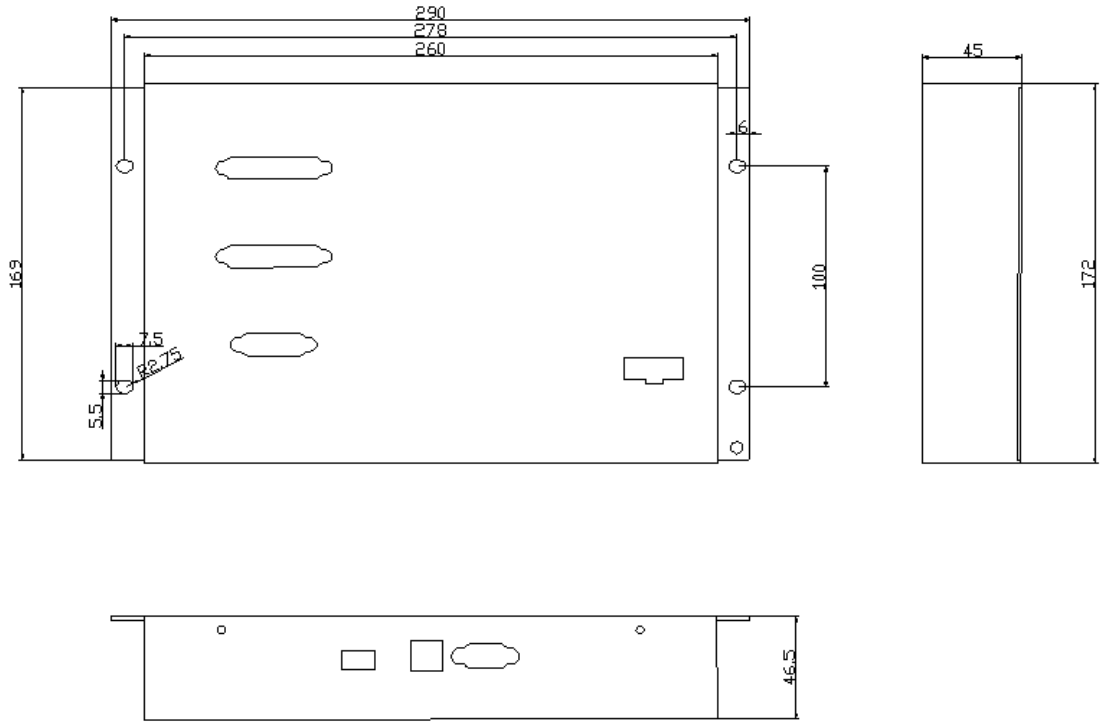


Appendix fig.4.4 PG2560-C/ET Ainstallation size



Appendix fig.4.5 PG2560-C/ET B installation size

A4.4 PG2560-D/DT Profile Install Size



Appendix fig.4.6 PG2560-D/DT installation size

Appendix 5 Common Problems

Error Code	Fault performance	Reasons	Solutions
No	X, Y axis-motor not move	1. Wiring error 2. Motor chip is broken	1. Detection of wiring 2. Refer to A5.1
No	X, Y axis-move in opposite direction	1. Wiring error 2. Wrong parameter setting	1. Detection of external wiring 2. Refer to section 8.7.5, change motor direction
No	X, Y axis-move towards only one direction	1. Wiring error 2. Servo parameter setting is wrong 3. motor chip is broken	1. Detection of wiring 2. Detection of servo parameter setting: Is motor control mode set as pulse+direction 3. Refer to A5.1
No	X, Y axis interact	1. Wiring error 2. Wrong parameter setting	1. Detection of external wiring 2. Refer to section 8.7.5, set parameter "XY interchange" as "YES"
No	X, Y axis-motor sometimes turn, while sometimes not	1. system and motor plug contact undesirable 2. Motor chip is rosin joint	1. Plug the motor interface 2. Return to factory maintenance
No	Cutting graphics is smaller than normal	1. Pulse setting error 2. Mechanical problem	1. F5 system parameter of the pulse number is too small 2. Detection of mechanical
No	Cutting graphics is bigger than normal	1. Pulse setting error 2. Zero drift 3. Mechanical problem	1. Adjust the pulse number of F5 system parameter 2. Well grounding jacketed&magnetic ring 3. Detection of mechanical
No	Cutting size of inner circle and outer circle size are not correct	The kerf setting is too large or too small	Reset the kerf value
No	Cutting parts size suddenly large and small	1. Mechanical problem 2. Electrical matching problem	1. Check gear, gear rack and the speed reducer 2. Pulse signal matching problem of system and driver, Parallel 4.7K-10K resistance at both ends of Pul+ and Pul-
No	All input ports have no response	Wiring error, public end is wrong	Check the wiring, input public end should be P13 or P15 of the CN1, Input power

			24V-
No	Individual input port has no response	1. Wiring error, public end is wrong 2. Input port is broken	1. Check the wiring, input public end should be 0V 2. Read Appendix A5.2
No	Automatic interface crash after boot	1. File error 2. Parameter error	1. Boot to welcome picture, press DEL to enter 2. Parameter recovery (F5diagnose, F8definition, F1 recovery)
No	crash after entering file management	File system error	1. Factory settings (press F5, F8, F8, press F4 in pop-up window, password 6931) 2. Empty code (press F5, F8, F8, press F7 in pop-up window)
No	once boot on, it moves towards one direction	Eight remote control ports(NO and NC ports) on the right side of the input port are opposite	Refer to A5.3
No	Manual move tip: hard limit alarm	1. Four limit of input port NO&NC are opposite 2. Machine tool meet the hard limit	1. Read Appendix A5.4 2. Cancel the alarm limit
No	Manual move tip: emergency stop	1. Emergency stop button is pressed 2. Input port emergency stop NO&NC are opposite	1. Emergency stop button restoration 2. Refer to A5.5
No	No action after the start of plasma cutting	1. Positioning input signal back 2. Arc output port bad 3. Edge perforation setting 4. Arc time set to 0 5. DSP program missing	1. Refer to Appendix A5.6 2. Refer to Appendix A5.7 3. Change this parameter in the parameter settings 4. Set up arc time 5. Upgrade program
No	Collision tip, but no collision happens	1. Interference 2. Collision switch	1. Control jamming source 2. Detect collision switch
No	Collision warning tip	Cutting torch hit the plate	Improve the cutting torch position
No	All output ports can not open	1. Wrong connect of public output port end 2. U50/U51 chip burning	1. Check connection 2. Replacement chip
No	Individual output port can not open	Output port damage	Refer to Appendix A5.8
No	"Close the height adjust corner signal"	1. NO&NC are opposite for closing the height adjust	1. Refer to Appendix A5.8 2. Recommend parameter

	not open at the corner	corner signal 2. Wrong setting of speed shut down and closing height-adjust minimum distance in plasma parameter	speed closing height-adjust is set to 95% 3. The minimum distance is 5mm
No	Motor's four directions have no action	1. Motor or driver is bad 2. Wrong connection from system to driver 3. Motor chip is bad 4. Speed is set to 0 5. DSP loss	1. Check motor and driver 2. Check connection 3. Replace motor chip 4. Set speed 5. Upgrade program
No	Movement direction is opposite	1. Line pick reverse 2. Servo parameter error 3. System settings error	1. Check line 2. Adjust servo parameters 3. Refer to section 8.7.5 for modifying system parameters
No	Positive and negative poles of a certain axis go towards one direction	Motor chip destroy	Replace motor chip
No	Some axis only one button can move	1. Servo parameter 2. Motor chip destroy	1. Adjust servo parameter 2. Replace motor chip
No	Motor walk short	1. Pulse equivalent 2. Mechanical problem	1. Adjust precision 2. Adjust machinery
No	Motor walk more	1. Pulse equivalent 2. Zero drift 3. Mechanical problem	1. Adjust precision 2. Add magnet ring for servo encoder line 3. Adjust machinery
No	Fail to open file	1. Check file format 2. Version is old	1. Refer to the various formats of the instruction manual 2. Program upgrade
No	Edit file, can't edit file tip	No file in hard disk	Put at least one file in hard disk
No	Keyboard keys no action	1. Wrong interface 2. Keys destroy	1. Go to the right interface 2. Replace keyboard keys
No	Keyboard hang in the balance	Keyboard line loose	Plug keyboard line
No	Keyboard has no action	1. Code card damage 2. Keyboard wire loose 3. Foreign body stuck	1. Press DEL after boot to the welcome screen 2. Plug in keyboard line 3. Removal of foreign body
No	U disk insertion no response	1. U disk is bad 2. USB interface is bad 3. USB connecting wire loose	1. Replace U disk 2. Replace USB line 3. Plug in USB line

No	Tip open file failed	1. File format is incorrect 2. Folder deleted	1. Check if file format is TXT, CNC, NC, etc. 2. Make new folder
No	Tip no file	1. File format is incorrect 2. No file in U disk 3. U disk format is incorrect	1. Check if file format is TXT, CNC, NC, etc. 2. Check if there's a file in U disk, if the file is under root of U disk 3. Format the U disk into FAT or FAT32 format
No	Tip"can't edit file"	No file in hard disk, at least put one file in it	Copy one file from U disk to hard disk
No	Tip"cutting speed error"	Speed in common parameters exceed the max speed of system	Adjust the max cutting speed limit in system parameters
No	Tip "manual shift speed error "	Speed in common parameters exceed the max speed of system	Adjust the max speed limit of manual shift in system parameters
No	Tip "empty range shift car speed error"	Speed in common parameters exceed the max speed of system	Adjust the max speed limit of empty range shift car in system parameters
No	Tip "Cutting slot error, clear cutting slot"	The slot value exceeds the introduction of cutting graphics or the minimum radius of a circular arc in a graph	1. Modify the introduction of lead 2. Reduce the slotting compensation value 3. Delete the small arc inside the graphics
No	Tip "parameter import failed "	1. There is no parameter file in the U disk. 2. USB interface problem 3. U disc problem	1. Detection of U disk to find PG2560B.DAT file 2. Detection of USB interface 3. Replace U disk
No	Tip "parameter export failed "	1. U disk is not plugged well 2. U disc problem	1. Re plug U disk 2. Replace U disk
No	Tip "please insert U dick" when upgrading program	1. Not insert U disk when upgrading program 2. USB interface problem 3. U disc problem	1. Please insert the U disk before upgrading 2. Replace USB interface 3. Replace U disk
No	Tip "Upgrade file not found" when upgrading program	1. U disk has no upgrade file 2. The upgrade file is not on the root directory of U disk	1. Check if there's upgrade file in U disk 2. Put the upgrade file on the root directory of U disk
No	Tip "upgrade fail"	Upgrade failed	Re upgrade after reboot
Error code 0	Tip "error code 0"	Encryption time expires	Need to decryption

No	Blank screen after booting	1. The system is not powered 2. Insufficient supply voltage 3. 3A fuse is bad 4. Motherboard does not start	1. Test switch power supply 2. Detection of DC24V voltage 3. Replace fuse 4. Send back to replace motherboard
No	Appear white screen, flower screen, flash screen after booting	1. Drive plate destroy 2. Display destroy 3. Cable loosening	1. Replace drive plate 2. Change display screen 3. Re plug display cable

A5.1 Motor Chip Detection

1. X axis motor not move, you can test system CN3 socket according to the following four cases:

● The measurement of running state, the correct voltage for pins 1 and 9 should be DC 3V-3.5V

● The measurement of stop state, the correct voltage for pins 1 and 9 should be DC 3V-3.5V

● The measurement of running state, the correct voltage for pins 2 and 10 should be DC 0V

● The measurement of stop state, the correct voltage for pins 2 and 10 should be DC 3V-3.5V

If one of the above four cases is not correct, motor chip is bad. Then it should be sent back to factory for maintenance.

2. Y axis motor not move can test system CN3 socket according to the following four cases:

● The measurement of running state, the correct voltage for pins 3 and 11 should be DC 3V-3.5V

● The measurement of stop state, the correct voltage for pins 3 and 11 should be DC 3V-3.5V

● The measurement of running state, the correct voltage for pins 4 and 12 should be DC 0V

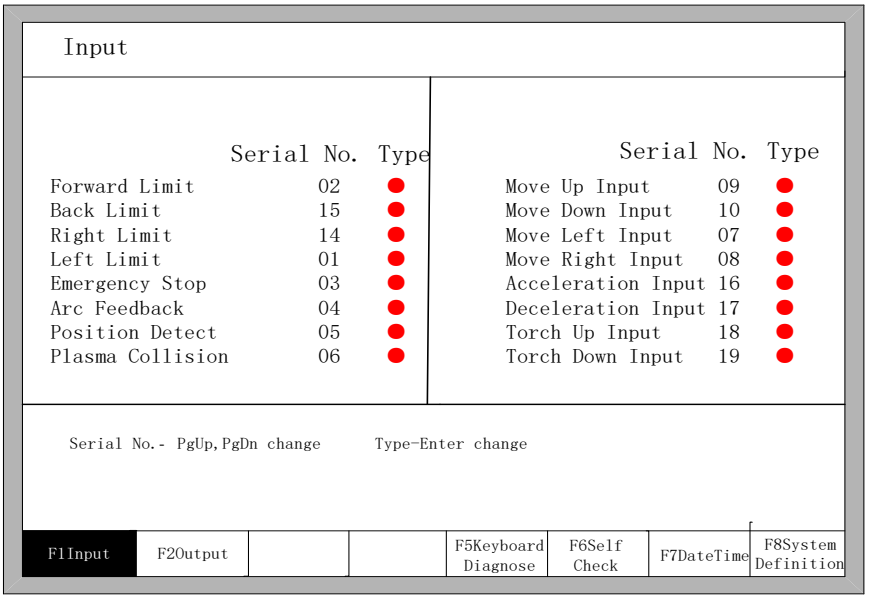
● The measurement of stop state, the correct voltage for pins 4 and 12 should be DC 3V-3.5V

If one of the four cases is not correct, motor chip is bad. Then it should be sent back to factory for maintenance.

A5.2 Input Port Detection

If individual input port has no response, please enter into input diagnose interface to check.

Press F5(system diagnose) to enter input diagnose interface



You can connect the input corresponding to CN1 pin number (such as the front limit of 02 foot) with 0V (CN1-13 number foot) to make short test:

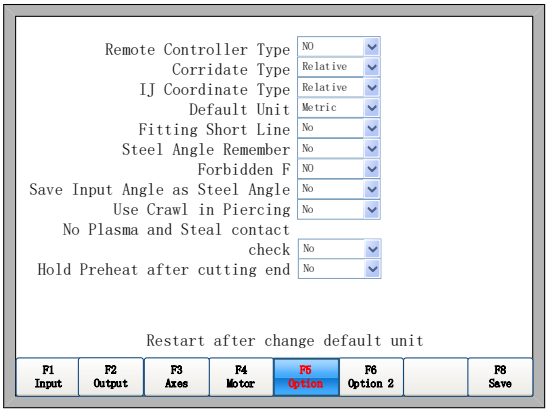
● If input the corresponding input port into the diagnose, with change of status indicator, then it is normal.

● If input the corresponding input port into the diagnose, with no change of status indicator, then it is abnormal.

Please redefinition of input port.(refer to operation manual V2.1, section 8.7.2)

A5.3 Remote Controller Type Problem

Machine walks on its own after powering to system, usually because of the incorrect settings of remote type by YES, and "forward" "back" "left" "right" all have signal.



Please set remote controller type to NO.

A5.4 Hard Limit Alarm Problem

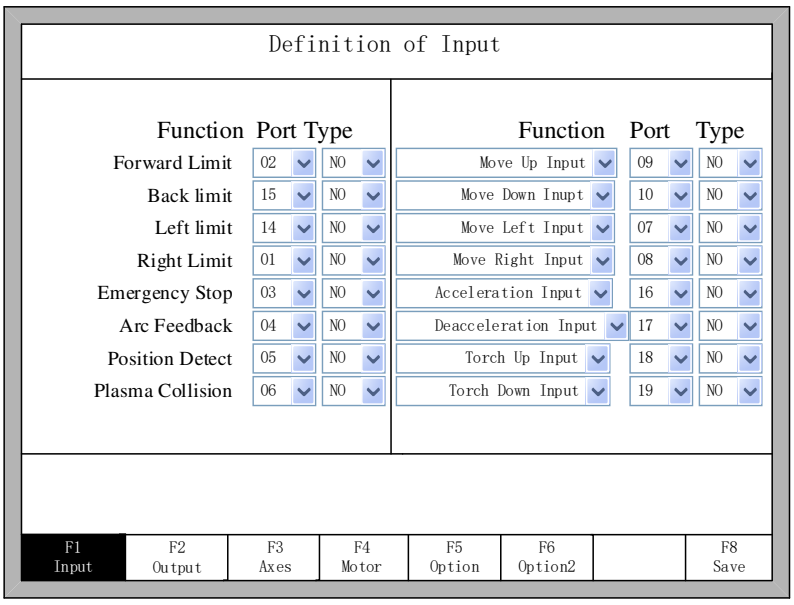
Tip: hard limit alarm

If machine doesn't collide the limit, it's usually caused by the opposite connection of input port NO&NC. You can enter into system input definition to modify:

PressF5(System diagnose)

F8(system definition)

F3(definition) password: 1396, modify the condition of input port NO and NC



Eg. If back limit has limit alarm, you can set "back limit" to the opposite side, that is, red to green or green to red.

A5.5 Emergency Stop Alarm Problem

Tip: emergency stop

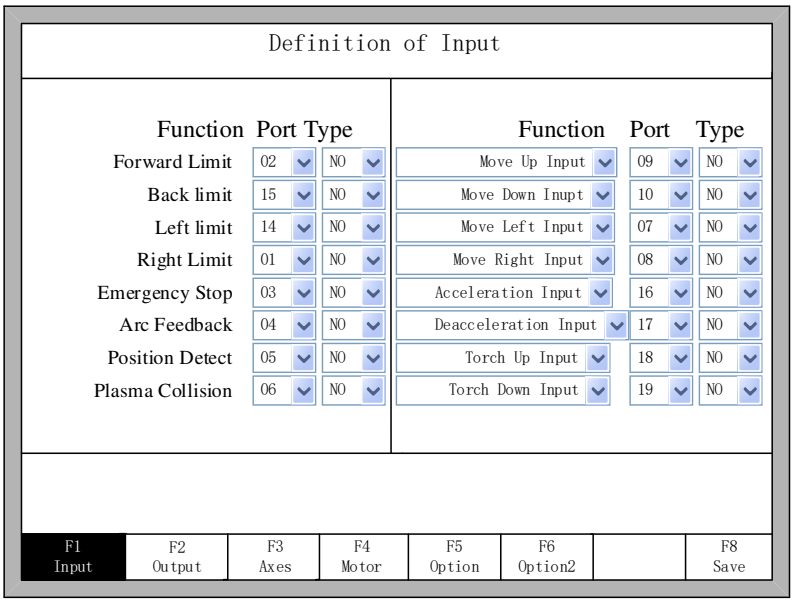
If the emergency stop button is not pressed down, it's usually caused by the opposite connection of NO and NC for emergency stop alarm signal.

You can enter into system input definition to modify:

Press F5(System diagnose)

F8(system definition)

F3(definition) password: 1396, modify the input type of emergency stop in system definition interface.



You can set "emergency stop" type to the opposite side, that is, NC to NO,NO to NC.

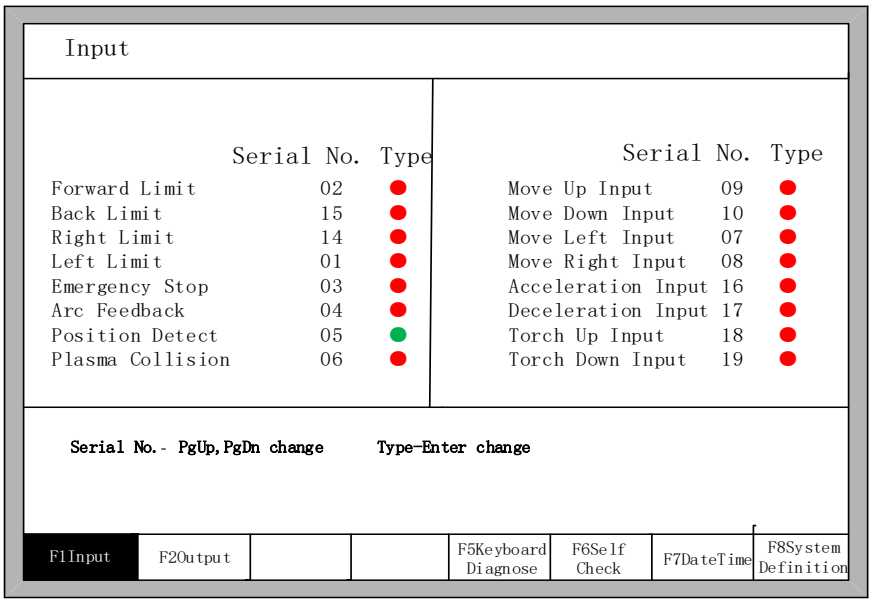
A5.6 THC Problem

Usually, common arc voltage THC has two types: with the initial positioning function and without initial positioning function.

1. System plasma parameter settings for THC with initial positioning function are as follows:

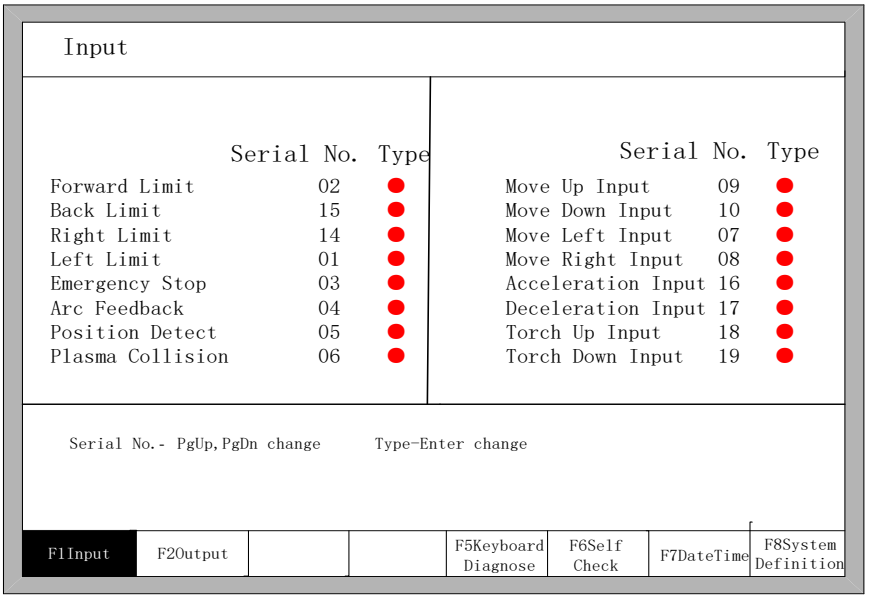
- The detection time is set to 0
- The location rise time is set to 0

●The diagnosis successful feedback status indicator for input interface positioning must be green as the interface:



2. System plasma parameter settings for THC without initial positioning function are as follows:

- The detection time is set to 15S
- The location rise time is set to 0.8S
- The diagnosis successful feedback status indicator for input interface positioning must be green as the interface:



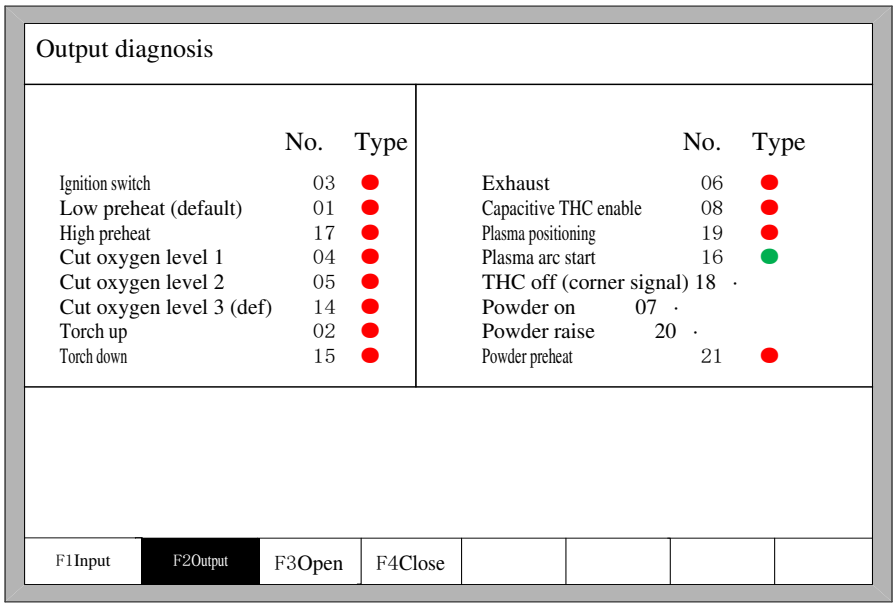
A5.7 Plasma Arc Starting Problem

The method of testing the normal working for plasma arc output is as follows:

1. Press F5(system diagnose)

F2(output) open plasma arc port

2. Plasma arc status indicator should be green after press "F3 open"



3. Test system's back output socket CN2 pin 16 foot and common end pin (12 or 24 foot) to see if there's DC24V voltage.

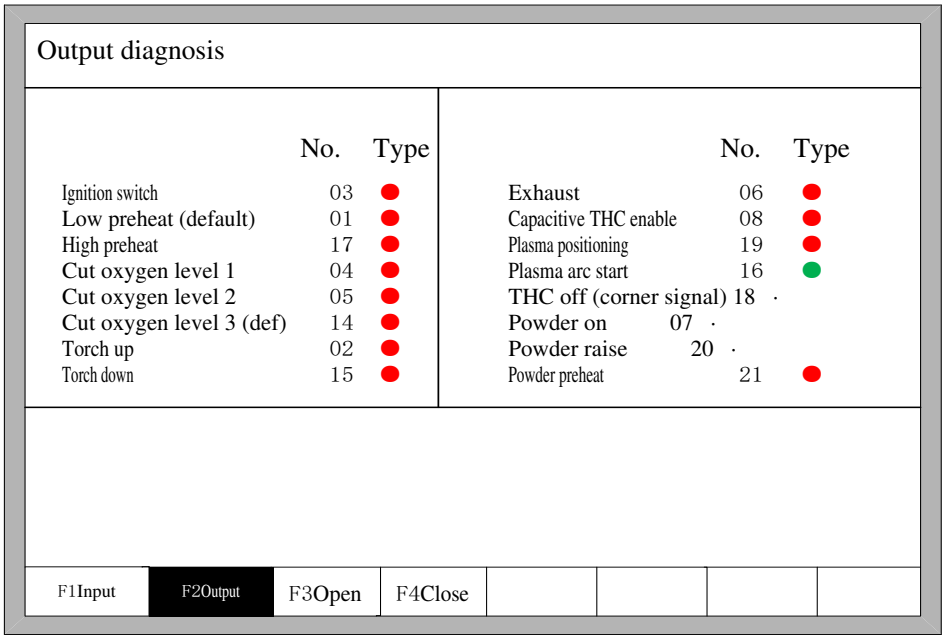
· If there's DC24V voltage, plasma arc port is normal

· If there's no DC24V voltage, plasma arc port is burnout. Please redefine the output port. ((refer to operation manual V2.1, section 8.7.3)

A5.8 Input/Output Problem

The method of testing the normal working of individual output port is as follows:

1. Press F5(system diagnose), F2(output)



2. Open the output port for testing

Open system back output CN2's corresponding output pin number (e.g. "ignition switch" pin 03) and pubic port(12 or 24 feet) to check the correct voltage DC 24V.

· If there's no voltage, output port is burnout.

· If it's not correct, please redefine the output port. (refer to operation manual V2.1, section 8.7.3)

INDUSTRIAL EQUIPMENTS PVT. LTD.

Cruxweld Industrial Equipments Pvt. Ltd.

5, Sector 29, Faridabad - 121008 (Haryana), India

Phone: +91 8800 882 983 | +91 (129) 489 2868

Email: sales@cruxweld.com | Service: support@cruxweld.com

www.cruxweld.com