



OPERATING INSTRUCTIONS



FOREWORD

Thank you for purchasing our products. We sincerely remind you that carefully reading the instruction manual could ensure correct, safe and effective use of this device. At the work site, cooperation among colleagues is essential for the safe and smooth operation. And this tacit cooperation is based on that they are familiar with the safe operation of the device. Read the manual first to understand how to operate and maintain it. So, make sure you read, understand and take all the necessary safety precautions.

SAFETY PRECAUTIONS









This product is designed to be safe, but it can cause serious accidents if not operated correctly. Those who operate and repair this machine must read this manual thoroughly before operating, inspecting and maintaining the machine. Keep the manual near the machine so that anyone who operates the machine can refer to it if necessary.

- Do not use the machine carelessly without following the instructions in manual.
- Use the machine only after you completely understood the contents of the manual.
- If an explanation in the manual is difficult to understand, contact our company or sales service office.
- Keep the manual nearby at all times and read it so many times as necessary for a complete understanding.
- If the manual is lost or damaged, place an order with our company or sales service office for a new one.
- When transferring the machine to a new owner, be sure to hand over this instruction manual as well.

QUALIFICATIONS FOR MACHINE OPERATOR

Operators and repair staff of this machine must completely understand the contents of the instruction manual and they must have any following qualification.

1. The license for gas welding ganger
2. The diploma of the training course on gas welding.
3. The qualification certificate approbated by the ministry of labor.

Symbol	Title	Meaning
	General	General caution, warning and danger.
	Be careful not to get your fingers caught!	Possible injury to fingers if caught in the insertion part.
	Caution: Electric shock!	Possible electric shock under special conditions.
	Ground this equipment.	Operators must ground the equipment using the safety grounding terminal.
	Pull out the power plug from the outlet.	Operators must unplug the power plug from the outlet when a failure occurs or when there is a danger of lightning.
	Caution against bursting	Possible bursting under certain conditions.
	General	General warning
	Caution: Hot !	Possible injury due to high temperature under certain conditions.
	Caution: Ignition!	Possible ignition under certain conditions.

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1 Safety Instructions

Many accidents are caused by disregard for basic safety rules in the operation, inspection and maintenance of devices. So carefully read, fully understand, and comply with the safety measures and precautions described in this instruction manual and on the machine before operating, inspecting, and maintaining the machine.

The device label security classifications are as follows:

■ **WARNING** 

This word is used as a warning message or a warning label. It is positioned at places that could cause injury or serious accident.

■ **CAUTION** 

This word is used as a caution message or a caution label. It is positioned at places that could cause slight injury or machine damage. This is also used as a caution for high dangerous actions.

■ **NOTICE SIGNS** 

This is a sign to show machine operators and maintenance engineers items that relate directly to damage of machines and surrounding facilities and equipment.

1.1 General machine safety precautions

Read and understand the following important safety information:

1.1.1 Machine safety

1. The machine casing is mainly made of iron sheet to reduce weight. For this reason, be careful not to drop a heavy item on the machine, or not to drop the machine when carrying it, since sheet metal design doesn't withstand such impact.
2. Should use the wrench to tighten the nut of each pipe joint. After fastening, be sure to check them with detection liquid and confirm there is no gas leak. If a gas leak is found, retighten the nut firmly.
3. When fixing a nozzle to the torch, tighten the nut with the two wrenches. In addition, avoid damaging the conical surface of the nozzle since this may cause flashback.
4. Never disassemble the machine other than during maintenance and inspection. Otherwise, malfunction will occur.
5. Never remodel the machine. Remodeling is very dangerous.
6. Must cut the power off when the machine is not in use.
7. Never use the machine in a humid environment. Otherwise the machine will malfunction, resulting in serious injury or death accidents.

1.1.2 Safety clothing

1. During operation, be sure to wear protective objects (gauntlets, goggles, face shields, safety shoes and so on) .
2. Prohibit operating the machine with wet clothes or hands in order to prevent electric shock and serious injury or death accidents.

1.1.3 Safety precautions before operation and carrying


1. Read this instruction manual before operating the machine.
2. Before operating, install the machine properly and confirm that each movement mechanism is flexible.
3. Before connecting the external power supply, check whether the power of the machine is in the closed position.
4. Prior to operating the machine, check the safety of the surroundings to avoid accidents.
5. Never move the machine while the preheating flame burns.
6. Constantly clean up the debris on the rail. Otherwise it will affect the machine walking track, thus affect the cutting quality.
7. Be careful not to bruise or knock the track.
Instruction: Before turning on the power switch, be sure to check whether the drive knob is in the “ stop “ position. If the drive knob is in the “ on “ position, it is very dangerous to start the machine.
8. Prohibit touching the moving parts to avoid an accident while the machine is running.
9. Prevent the earthquake hit of machine in the process of cutting.
10. Properly connect the oxygen and gas hoses.
11. When checking the running of machine, be sure to turn off the preheat oxygen valve and gas valve.
12. After cutting, cutting nozzles, cutting torches, moving seats and butterfly screws are very hot, be sure to wear gloves when touching them.
13. Do not exert yourself to pull the power cable and hose
14. Don’ t put the machine on soil or muddiness.
15. Don’ t leave the machine alone before it flames out.
16. You must use hose-hoop in case of dangers.
17. When the fuse burns out frequently, it is not allowed to use high-current fuse before finding out the cause.
18. When carrying the machine, you must hold the handlebar and cannot hold other sections.

1.1.4 Electrical system precautions



1. Check the input power voltage of the machine before operation. The input power voltage should be in the range of $\pm 10\%$ of the rated voltage. The machine should not be operated out of this range.

2. The metal plugs are screw-threaded. Therefore, you should tighten them so that they will not be loose during operation.
3. Be sure to ground the rubber sleeve power cable of the machine.
4. Stop operation and cut off the power in the following cases, and ask a qualified electrician to

repair the machine. 

- 1) Broken or abraded cables.
 - 2) Leak of water or liquid, which damages the machine.
 - 3) In accordance with the operating manual, but the machine still abnormally runs.
 - 4) Machine is broken down.
 - 5) The machine has a poor performance and needs to be repaired.
5. Periodically inspect the electrical system.

1.1.5 Maintenance and inspection precautions

1. Ask a qualified electrician to perform repair and inspection service.
2. Disconnect the power plug before inspecting and repairing the machine.
3. Maintain the machine periodically.

1.2 Gas cutting safety precautions

Strictly observe the safety rules and precautions to ensure the safety of gas cutting operation. Operators and supervisors must keep “safety” in mind.

1.2.1 Prevention of explosion

1. Never cut high-pressurized cylinders or hermetically sealed containers.
2. Ensure sufficient ventilation for gas cutting, to prevent the air from being polluted.

1.2.2 Pressure regulator safety precautions

1. Before operating, check that all pressure regulators are working properly.
2. Ask a skilled repair engineer to perform maintenance and inspection service.
3. Do not use malfunctioning pressure regulators or pressure regulators from which gas is leaking.
4. Do not use pressure regulators smeared with oil or grease.

1.2.3 High pressure gas cylinder safety precautions

1. Never use broken cylinders or cylinders from which gas is leaking.
2. Install cylinder uprightly and take measures to prevent them from dumping.
3. Cylinders are used only for specified purposes.
4. Cylinders must be placed far from heat, sparks, slag, and open flame.
5. Contact the distributor if the container valves will not be opened. Never use a hammer, wrench, or

other tools to forcibly open container valves.

1.2.4 Safety precaution for hoses

1. The oxygen hose is only used for transporting oxygen gas ; In the same manner, the gas hose can only be used for transporting gas.
2. Replace the cracked hoses or other hoses which are damaged by sparks, heat, Open flame, etc.
3. When installing the hose, don' t make its winding.
4. During operation and transportation, take great care to prevent hoses from breakage.
5. Do not drag the hoses when moving the machine.
6. Periodically check the hoses for damage, air leakage, aging, loose connections, etc., to ensure safety.
7. Cut hoses to the possible shortest length. Short hoses could reduce the resistance to the flow of gas.

1.2.5 Safety precautions for fire

Before cutting, take safety precautions to avoid fire. It could cause a fire due to ignoring hot metal, sparks, and slag.

1. Prepare fire extinguishers, sand for extinguishing fire and buckets full of water on the place where gas cutting is performed.
2. Do not store flammable materials in the cutting area, to prevent being splashed onto the spark.
3. Before moving the hot steel plates, hot cut parts or scraps to flammables, you must cool them down.
4. Never cut containers with residual flammables.

1.2.6 Safety precautions to avoiding skin burn

Observe the safety precautions to avoid skin burn. It could cause a fire or skin burn due to ignoring heat, spatters, and sparks during operation.

1. Do not perform cutting near flammables. (Move flammables well away from the spark.)
2. Do not cut containers filled with flammables.
3. Do not keep lighters, matches, and other flammables nearby.
4. Flames from the torch will burn the skin. Keep your body away from the torch and nozzle, and check the safety before operating the switches and valves.
5. Wear the specified protectors to avoid being injured.
6. Correctly tighten the nozzle to prevent flashback.
 - When fixing a nozzle to the torch, tighten the nut with the two wrenches.
 - If the nozzle is tightened excessively, it will be heated during cutting and tightened still more, making it difficult to remove the nozzle.

- Users should avoid damaging the taper of nozzle because this may cause flashback.
7. Use the soapsuds to check whether there is any leakage of gas from the connection part of the distributor, hoses and torch with. You must not use oil or grease on the connection of the oxygen pipe to avoid flashback; because it may lead to explosion.
8. Pay attention to the following when igniting:
- Before igniting, install the torch to the torch holder.
 - Be sure to wear the required protectors (protective gloves, goggles, protective mask and so on)
 - Check whether there is any obstacles, hazardous materials and flammables nearby or in the direction of cutting.
- Check the gas pressure. (The pressure must be in the right range)
9. When torches, nozzle s and idler wheel lock knob had been heated to high temperature, you must wear protective gloves to carry them. As the same, the surface temperature of them is very high after cutting, so you don' t touch them even you wear protective gloves.

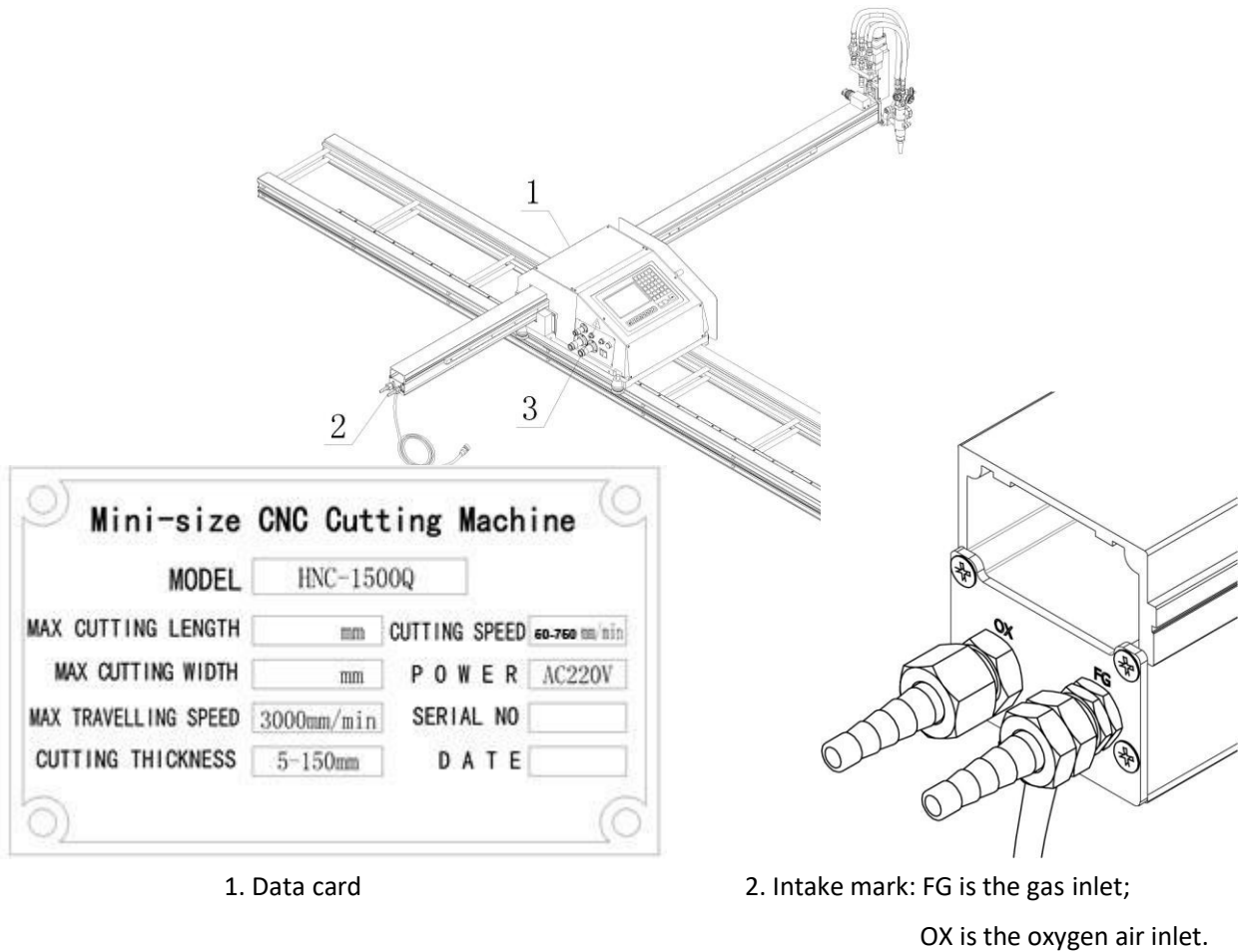
1.2.7 Safeguard measures on cutting site

- Using the cutter to perform cutting will produce the following phenomenon: sparks, slag sputtering, high temperature, thermal radiation, gas, dust, noise, light, arc light, electromagnetic radiation and so on, affecting and hurting the human body. So, it is recommended to take corresponding protective measures. During cutting, using a variety of inflammable and explosive gases, gas leaks or incorrect operation may lead to an explosion and a burn accident.
- Incorrect operation and operation which don' t obey the standard could damage the machine. If a serious malfunction occurs, flammable gas leaks may cause an explosion, and more subjected to electric shocks, burns.
- The cutting machine workplace must be equipped with fire service installations, such as fire hydrants, fire extinguishers, sand boxes.
- Must strictly implement the using regulations of acetylene bottle, oxygen bottle, and various pressure reducers, and strictly implement safety matters and attentions.
- Do not place inflammable and explosive materials near the cutter workplace.
- Operating the cutting machine will produce sparks, slag sputtering, smoke dust, noise, photoelectric radiation and so on. Thus, it is necessary to install proper ventilation in the workshop, and to provide the operator with the appropriate personal protective equipment.
- When using the equipment for cutting, the operator must confirm there is no person in the flame area, and then ignite.
- If a serious malfunction occurs, flammable gas leaks may cause an explosion. Therefore, it is recommended to install the effective exhaust equipment near the gas source.

- Attention: check the security of gas source before operating. During cutting, absolutely there should be no gas leakage. Found unusual circumstances, such as the gas odor and other odor, you should turn off the machine, cut off the gas supply and power, and ask the designated personnel to check it. Only after the troubleshooting, you can reboot it.

2 Location of safety labels

Security labels and other labels for correct operation are affixed on the device. When operating the device, you should carefully read the labels and follow the instructions. Do not take down the labels. Always keep the labels legible.



3 Outline of machine

3.1 Characters

The cutting machine is modern cutting equipment with digital program control. In addition to automated cutting, it has high cutting precision, high material utilization and high production efficiency. Along with the mechanical electronic technology and computer technology progress, the CNC cutting machine with its good man-machine dialogue operation interface, powerful auxiliary support function and relative low equipment investment, is being valued by more and more enterprises and more widely used in the production.

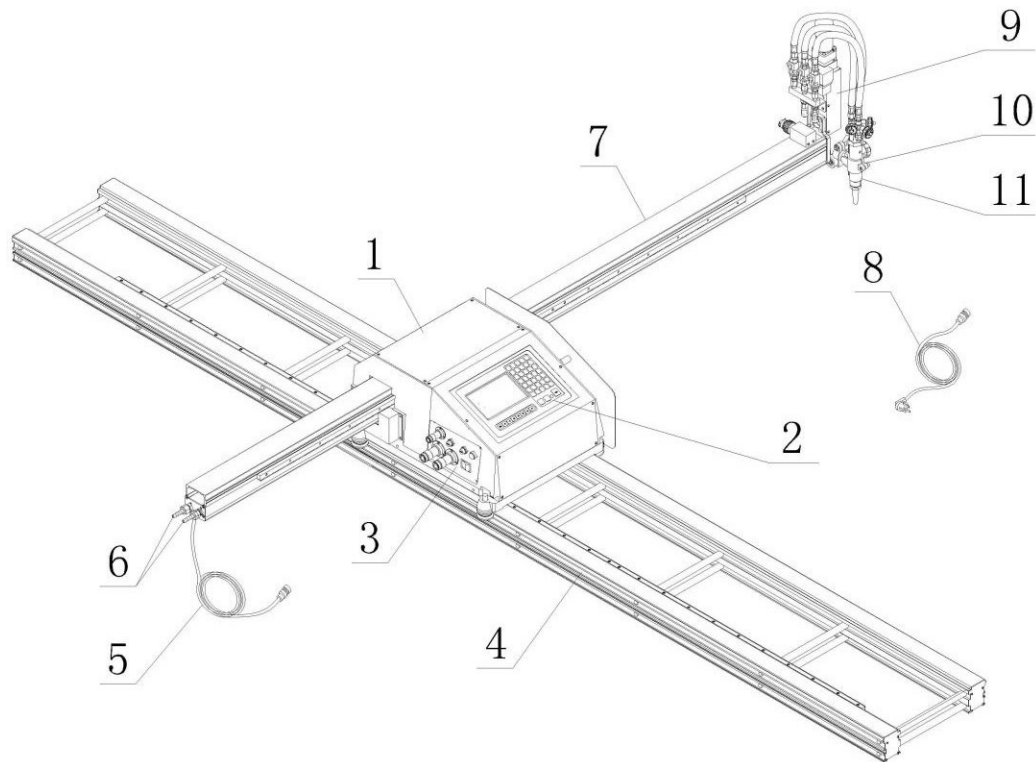
3.1.1 Main features

- This machine has CNC function like the large gantry CNC cutting machine; it can cut any complex plane figure, applying to oxygen, gas flame cutting and plasma cutting. Like the semi-automatic cutting carriage, this machine is convenient and flexible, free to move, not occupying the fixed site.
- This machine programming is simple. It can manually program simple graphics, and automatically program arbitrary complex graphics through the complimentary programming software. The software uses an interactive dialogue; graphics data is automatically converted, without manually writing code. The AutoCAD parts drawing is stored directly as a DXF file, and arranged through the programming software, then directly generates required G code files by the appropriate programming parameters.
- Transfer and storage of files is Convenient and flexible: support USB interface. The user could output the required cutting file to the U disk, and then plug the U disk into the USB interface of cutting machine; so file transfer can be realized.
- The operation is simple and convenient: This machine could manually cut like a semi- automatic carriage, and also automatically cut like a large CNC cutter.
- With the 5.7-inch high-resolution dot matrix LCD display, full Chinese menu, Chinese character prompt, static and dynamic processing graphics display, it is easy and intuitive to learn.

3.1.2 Wide range of applications

It can be widely used in automobile, shipbuilding, petrochemical, boiler and pressure vessel, engineering machinery, light industrial machinery and other industries. Suitable for cutting metal sheets, such as the carbon steel (flame cutting), stainless steel, aluminum, copper (plasma). It particularly applies to a single piece with abnormality surface and the mass production.

3.2 Name and function of each section



- | | |
|-------------------------------------|-----------------------------------|
| 1. Main engine | 7. Transverse guide rail assembly |
| 2. Control system | 8. Power cord |
| 3. Operation panel assembly | 9. Lifting device assembly |
| 4. Longitudinal guide rail assembly | 10. Torch gripper assembly |
| 5. Lifting motor line | 11. Torch assembly |
| 6. Gas supply interface | |

3.3 Technical parameters

1. Cutting range	1500X3000mm/ 1500 X6000 mm
2. The weight of the machine	87 KG / 126 KG
3. Physical size	2200mmX1500mmX750mm
4. Torch	1set
5. Supply voltage	AC230V/50
6. Cutting speed	50~750 mm/min
7. Machine walking speed	3000 mm/ min

3.4 Introduction to mechanical components

3.4.1 Mechanically mobile structure

Mechanically mobile structure is composed of the following series of single part.

1. Longitudinal drive unit: composed of longitudinal rail, linear guide, longitudinal gear, rack and so on.
2. Transverse drive unit: composed of transverse rail, linear guide, transverse gear, rack and soon.

3.4.2 Torch lifting structure

1. Torch device: composed of torch body, two-way valve and gas supply pipe etc.
2. Torch lifting device: composed of small lifting motor, gearbox, lifting screw, guide shaft etc.
3. Torch holder device: mainly composed of connector, holder and lifting hand wheel assembly. Torch height can be adjusted manually, and you can adjust the verticality of the torch, to ensure that incision is vertical. When needed to edge beveling, you can rotate the torch along the longitudinal or traverse direction to perform oblique cutting.

3.4.3 Gas system

This machine uses oxygen and gas pipeline for intake; Oxygen gas is divided into preheated oxygen and cutting oxygen by the tee in the transverse rail head. Gas on the three-way solenoid valve by two-way regulating valve into the torch, you can easily control the opening and closing of the gas system via a button on the operation panel. Three-way gas through electromagnetic valve and the two-way regulating valve goes into the cutting torch. You can conveniently control gas circuit system opened and closed through the operation panel button.

4 Preparation for operation

4.1 Packing List

The following is the standard parts list. After the goods are received, Users should count the number of items according to the packing list; and check each part to confirm intact. If you have any questions, please contact our company.

No.	Name	Quantity	Note
Assembled parts			
1	Main engine	1	
2	Transverse rails	1	Aluminum profile
3	Longitudinal rails	1	
4	Torch assembly	1	
5	Power cord	1	9m
Technical literature			
1	Mechanical operation manual	1	
2	System manual	1	
3	Programming software CD	1	
4	Dongle	1	
5	Certificate	1	
Supplied accessories			
1	Acetylene cutting nozzle	each 1	G02
2	Penetration needling	1box	
3	Wrench	1	
4	Hose clamps	2	Φ 16mm

4.2 Device assembling

4.2.1 Outline

After the micro CNC cutting machine received, users count the inventory items according to the packing list, and place them on reliable location. (Please collect the programming software CD-ROM and U disc dongle software.) For safety during transport process, the device is decomposed. So, please users self-install them.

The following is the assembly process:

4.2.2 Count essential items for installation

Count essential items for installation(main machine、 longitudinal guide rail、 transverse guide rail、 lift torch assembly and so on).(Shown in Figure 1)

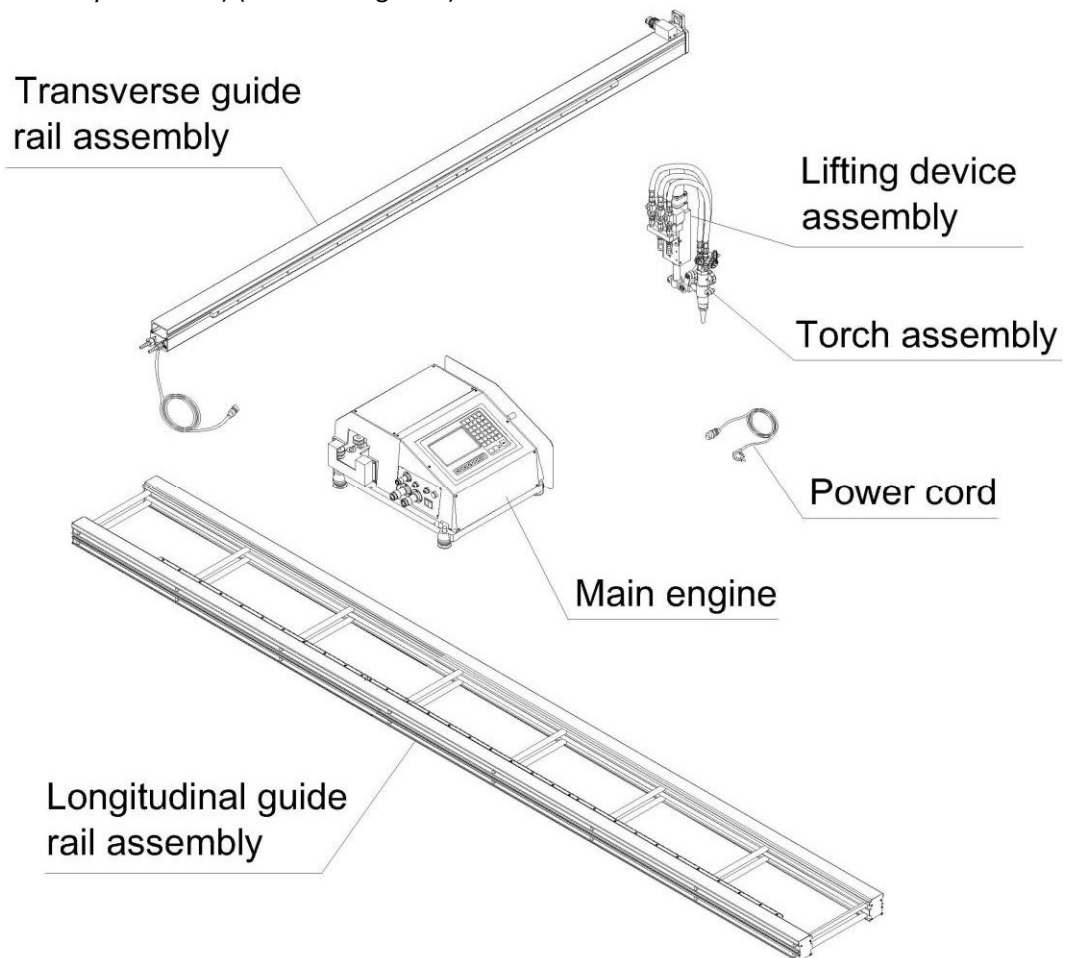


Figure 1

4.2.3 Connect the main engine and longitudinal guide rail

1. Place the longitudinal guide rail on the flat aground.Then, coordinate the guide rail slider and the linear guideway, gently push them into the longitudinal rail (as shown below). The whole process is not hindered. And then, tighten the Allen screw shown in Figure 2.

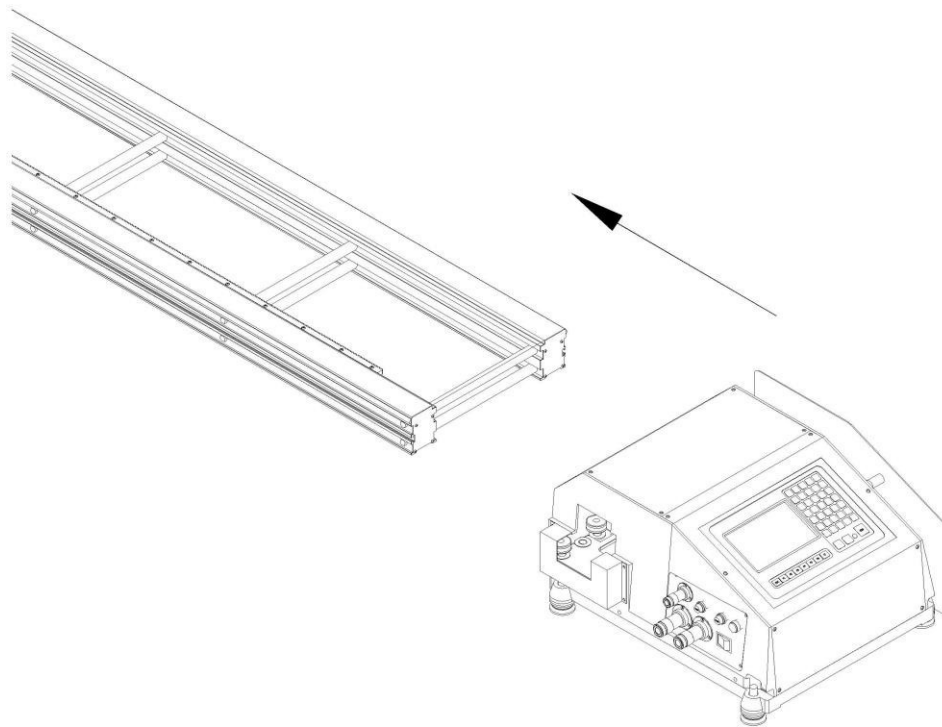
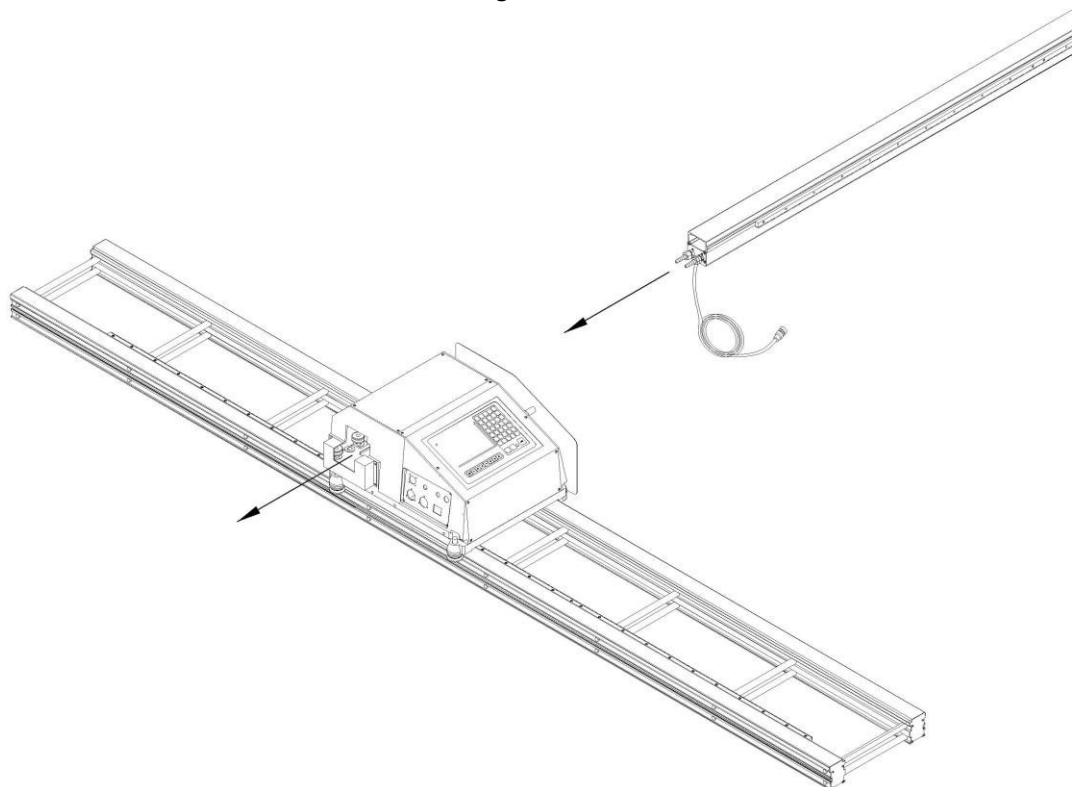


Figure 2

4.2.4 Installation of transverse guide rail

The first, make the lift control cable (with plug) go through the main case. Then place the transverse rail in horizontal direction, As shown in Figure 3, gently push the rail into the transverse leading sheave, making the rack meshes with the gear inside of the machine.

Figure 3



4.2.5 Assembling the torch lift assembly

1. Connect the lifting device assembly with the transverse guide rail, making them be tightened by the four M5 × 10 Allen screws. (Shown in Figures 4)

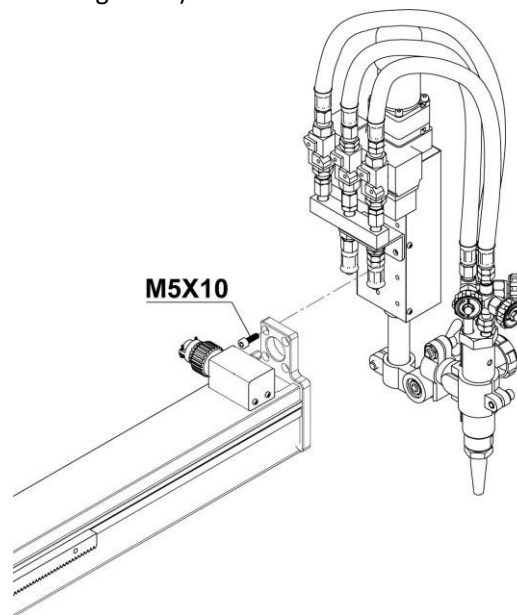


Figure 4

4.2.6 Gas line connection

1. Hose connection: Connect the oxygen connecting elbow and the gas connecting elbow to the connector of the crossbar. (Shown in Figures 5)

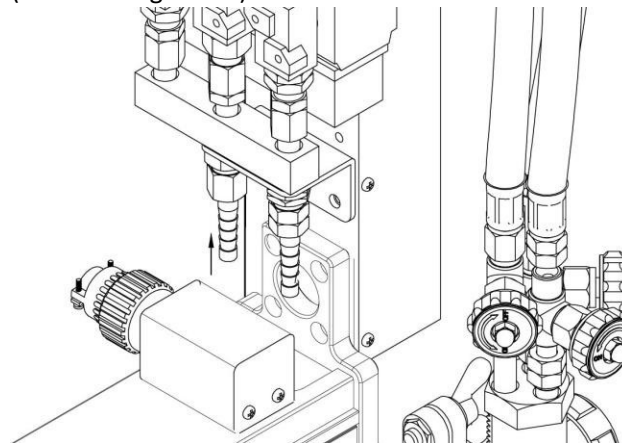


Figure 5

Note: Each hose cannot be connected with the wrong position. The gas connector screw is cross bite, leaving the mark on the connector and nut, should be counterclockwise screwing in.

2. Airtight inspection: Under the working pressure, use the liquid soap to check the air-tightness of gas circuit. No leakage, that is, completion of the equipment installation, and the equipment can be put into use.
3. About equipment air feed: The equipment intake interface is set as the national standard Φ 8mm trachea connector. According to the distance from the air supply to the device, as well as

the cutting journey, users can decide the length of air supply pipe. Please use the shortest length of the pipe, because the longer hose causes the gas flow accordingly decrease. Users must install the 200 mesh gas filter device for the air supply outlet, to avoid that impurities damage the magnetic valve and block the cutting pipeline.

4.2.7 Electrical connection

1. Push the lifting motor plug (four cores) into the four-core plug seat of the main machine. Connect the power supply of main machine. (AC220V). Connect the oxygen and the gas supply joints, and tighten them with hose clamps.
2. Plug one end of the power cord aviation plug into corresponding aviation plug.

5 Cutting operation

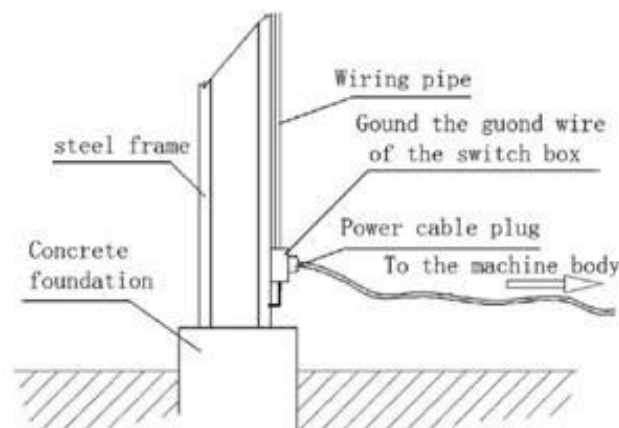
5.1 Safety precaution before operation

5.1.1 Safety precautions for grounding the machine



The cable of this machine is equipped with a grounding wire.

For safety, be sure to ground the wire as follows, as well as to check the connection of the power cable. (As shown in diagram)



5.1.2 Choosing nozzles

Reference to the cutting data, select a proper cutting nozzle according to the thickness of the steel plate. You should choose a bigger grade nozzle if the steel is rust-eaten seriously or the cutting angle of groove is bigger than 20°.

5.2 Technical description about cutting operation

5.2.1 Introduction of oxygen - Gas cutting technology

Oxygen – gas cutting process: The jet flow of pure oxygen (at least 99.5%) at the surface of the work piece is ignited to combustion; the heating flame heats the starting point of the work piece, which is to be cut, to the ignition temperature, to begin this process. Combustion begins through the transport of cutting oxygen; due to increasing heat, combustion quickly continues in the adjacent work piece, the moving cutting torch cuts a section, and the burning melted objects are blown off by the power of

cutting oxygen jet. The cutting must accomplish the following conditions:

- (1) Material ignition temperature must be lower than its melting temperature.
- (2) To exclude the metal oxide produced, the melting temperature of oxide must be lower than the melting point of material.
- (3) Continuously maintain ignition temperature in the cutting point. Heat loss is compensated by heating flame. After preheating, non-alloy steel whose carbon content less than 0.3% and low alloy steel whose carbon equivalent more than 0.4% can be cut. Along with the metal elements ratio rise, cutting process will become more and more difficult. Because of this, some materials such as chrome steel - nickel or silicon metal, cast steel etc. shall not apply to oxygen cutting without special prevention measures; these materials should use other processing method for hot cutting.

$$\text{Carbon equivalent} = C + \text{Mn}/6 + \text{Ni}/15 + \text{Cr}/5 + \text{Mo}/4 + \text{V}/5$$

5.2.1 Machine working pressure adjustment

Users must install oxygen, gas pressure regulating valves on the gas supply mouth. Through these valves you can conveniently control the working pressure needed by oxygen and gas (The value is from cutting table). Accurate adjustment pressure value must be programmed during the cutting. Using unreasonable working pressure will cause cutting efficiency low or cutting surface poor, and other defects.

5.2.2 Nozzle cutting performance and basic parameter list

The working parameters of the oxygen - acetylene cutting nozzle are listed in this table. This table can help the operator to select the cutting nozzle according to the thickness of specific steel plate, adjust the air pressure according to the heating flame and cutting oxygen, and also pre-select the correct cutting speed. If using the other gas, users can adjust according to the process parameters table provided by the manufacturer.

Nozzle type	Cutting thickness (mm)	Cutting speed (mm/min)	Acetylene pressure (Mpa)	Cutting oxygen pressure (Mpa)	Oxygen consumption (m ³ /h)	Theory kerf(mm)
1	5~10	700~500	>0.03	0.7~0.8	1.3	1.25
2	19~20	600~380	>0.03	0.7~0.8	2.5	1.5
3	20~40	500~350	>0.03	0.7~0.8	3.5	1.75
4	40~60	420~300	>0.03	0.7~0.8	5.5	2
5	60~100	320~200	>0.03	0.7~0.8	8.0	2.25
6	100~150	260~140	>0.04	0.7~0.8	11.6	2.5
7	150~180	180~130	>0.04	0.7~0.8	14.90	2.75

5.2.3 Set cutting speed and gas pressure

Cutting speed, gas consumption, and pressure predetermined in the cutting table are averages. This

machine may be higher or lower than the average numeric to operate. Operators should be based on these characteristics to master the cutting speed and the pressure parameters. Rust, dust and oxide layer can reduce the cutting oxygen, similarly, incorrect flame adjustment can make the cutting speed and quality occur deviation.

5.2.4 Before the start of cutting

Before cutting, the operating personnel should check the cutting process, simulate to run a cutting path, choose the starting point position of cutting. Determine whether the cutting torch is from the edge of the steel plate to begin or by perforation methods to begin.

A full automatic preheating and cutting cycle only needs to press the start button once, it will begin to implement NC cutting instruction.

5.3 Ignition and flame adjustment

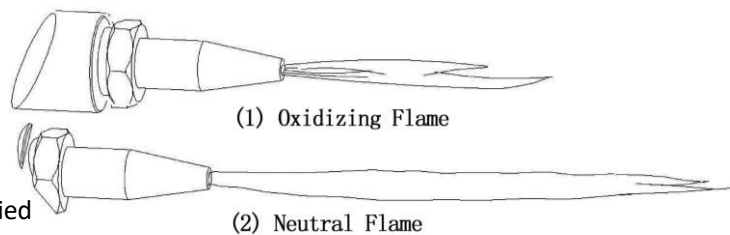
Note: Adjust the gas pressure according to the cutting data, which is the numerical value for opening all valves. After ignition, users should adjust pressure again.

1. Firstly unscrew the gas valve 1/4 turn.
2. Then unscrew the preheating oxygen valve 1/2 turn and ignite.
3. Then, gradually unscrew the preheating oxygen valve, until get a white conical standard flame (The incandescent area should be uniform, and the length is about 5 ~ 6 mm).
4. Completely unscrew the cutting oxygen valve. If the flame status changes, you should readjust the flame. Irregular cutting oxygen flow will influence the cutting surface quality. Under this kind of circumstance, you should close the

preheating oxygen and gas valve. When the cutting oxygen valve is opened, use the cutting nozzle needle to properly clear the cut oxygen hole.

5. Appropriate distance between the cutting nozzle end face and the steel plate:

Acetylene gas..... 8~10mm Liquefied
petroleum gas..... 5~8mm



6. Neutral flame can ensure the cutting surface quality is good. Oxidizing flame will not only produce a shorter cut oxygen flow, make slag attached to the cutting surface, and melt the top edge of the cutting surface, but also cause other adverse effects on the cutting surface. (Oxidizing flame can be used in the groove cutting.) When cutting oxygen pressure is too high, it also can produce the same cutting surface quality defects.

7. Users must use weak heating flame to cut thin plate, and strong heating flame to cutting thick steel plate. During cutting, if the edge of steel plate started to melt, and residual dropped to hang a string of melted ball, then heating flame is too strong. When cutting, too weak heating flame will crackle,

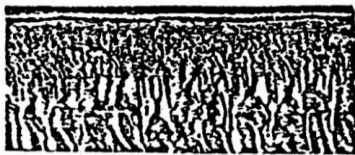
causing incision damage and even flashback. If heating flame is adjusted appropriately, cutting oxygen jet is clean and sharp.

Open the heating oxygen valve and gas valve, set fire to extrusive mixed gas, adjust suitable heating flame. See picture below.

8. Quality of cutting oxygen jet is decision factor for a good cutting surface. If the cutting oxygen jet is just located in the middle of the heating flame, and you can easily see almost a entire cone shape cutting jet, then the jet adjustment is right. After leaving the kerf, if the cutting jet scatter like a broom or fully not be seen clear, then this is a blocking phenomenon of cutting nozzle , needing to clean the nozzle .(Only can use the cutting nozzle needle recommended by manufacturers; Using inappropriate tools can lead to cutting nozzle damage).

5.4 Cutting quality

High-quality oxygen cutting should be cutting ripple form level off, ripple of tiny, and almost no cutting defects. Oxygen cutting surface quality and allowable value can be checked by consulting DIN2310 provisions. The simplest method to evaluate cutting quality is to compare the cutting surface models. Or use the visual method to observe the roughness of the cutting surface for Ra12.5.



Speed is too slow



Speed is correct



Speed is too fast

5.5 Preheating time

From the edge of the steel plate begin to cut preheating time or the drilling preheating time is decided according to the type of gas, steel plate surface quality and heating flame adjustment. The table below is reference value of required average preheating time.

Cutting thickness	Average preheating time (seconds)	
	Acetylene	propane
TO 20mm	5(30)	8(34)
TO 50mm	8(50)	10(53)
TO 100mm	10	14

Note: The numerical values shown in the parentheses apply to perforation in steel plate; preheating time can be set in the control system. Drilling the thick plate easily damage the cutting nozzle , so when you use the perforation method to cut more than 50 mm steel plate, it is recommended to drill a little hole in the punch position. Cutting nozzle which is blocked easily lead to flashback, so timely clean the cutting nozzle jet hole with a cutting nozzle needle, to avoid it.

5.6 Operate cutting torch

1. Before moving the machine, must check whether there are other stacked objects or cutting waste in the cutting table. Only after sweeping away these foreign matters, you can remove the machine. This

can prevent the torch dashing against the barrier, causing the damage of torch or other parts. The phenomenon is: flame suddenly disappears, and the cutting torch head zings or hisses; if this occurs, users shall immediately turn off the gas valve, then close the heating oxygen and cutting oxygen valves. And ask professionals for inspection. Only after finding out the flashback reason, you can reignite. Before ignition you should blow off the soot inside the pipeline and the torch.

2. Close cutting torch

When a work program ends, it is needed to close the cutting torch, then lift the cutting torch, and also move the machine into the next cutting program. Each shift ends, move the machine to the middle of the guide, finally shut off the main gas source and power.

Close the cutting torch as follows:

- 1) Cutting oxygen electromagnetic valve 2
-) Gas two-way valve
- 3) Preheating oxygen two-way valve

5.7 Safety measures to prevent flashback and backfire

5.7.1 Prevent flashback

Flashback will lead to a serious accident or fire; should take care to prevent this kind of grave accidents. When flashback occurs, should find out the reason, and accurately check and maintenance the device, and then reuse the device. The following are flashback reasons:

- 1) Incorrect gas pressure regulation
- 2) Cutting nozzle overheating.
- 3) Cutting nozzle is blocked by slag.
- 4) Flashback is caused by improper selection of cutting nozzle or conical surface damage of cutting torch.

5.7.2 Prevent backfire

Backfire may causes fire, and damages the device. If the torch flame suddenly disappears, and the cutting torch head zings or hisses, this is flashback phenomenon; you should immediately take the following measures:

- 1) Close preheating oxygen valve 2) Shut off the gas valve
- 3) Shut off the cutting oxygen valve

If backfire occurs, should ask the professionals for inspection. Only after finding out the flashback reason, you can reignite. Before ignition you should blow off the soot inside the pipeline and the torch.

6 Maintenance

According to the following matters inspect and maintain the device, in order that device is always in the best condition to be used.

6.1 Cleaning machine

Cutting machine work site and working environment is relatively poor, so you must regularly make a full cleaning and maintenance for the machine. In order to ensure smooth running of the machine and clear cutting surface, you must often clean all the transverse and longitudinal guide rails with the sanitary cloth, and then coats a layer of oil film for them. Similarly, must often clean all the guide rollers. If not cleaning, oxidation rust and all kinds of dust produced during the cutting will adhere to the surface, making these components abraded within a relatively short period of time, cause the machine running not smooth and cutting surface quality defects.

Keeping the gear meshing with the rack well, is the key to guarantee the normal operation of machine. Therefore, we must always pay attention to keep the longitudinal and transverse output gears and racks absolutely clean. The best way is to regularly clean and lubricate the rack and track. Recommend that users every day spray-wash the longitudinal, transverse rack surface with compressed air. The longitudinal, transverse tracks must be cleaned after each shift by the oil cloth, to prevent corrosion.

6.2 Machine lubrication

Longitudinal, transverse tracks and rollers must be lubricated once each day; weekly carefully clean guides and racks once, and coat them with a layer of lubricating oil.

6.3 Adjustment during the maintenance

After a period of working time, the longitudinal, transverse gears and racks shall have different degree of wear and tear. You can remove the shell, adjust the connection distance among motors, and control the clearance between the gear and the rack, to ensure the walking accuracy and stability of the machine.

6.4 Cutting nozzle maintenance

Whenever cleaning the cutting nozzle, should close the preheating oxygen and gas hand valves, press the cutting oxygen button, open the cutting oxygen electromagnetic valve, and close the cutting hand valve on the torch, so that the cutting nozzle needle can insert gas spray hole to clean inner sundries, and slowly open the cutting oxygen hand valve to blow off sundries.

7 Operation procedures of machine

(Before operation)

- 1) Check and ensure each gas pipeline and valve without leakage, and check whether the gas safety device is effective.
- 2) Check whether the gas inlet pressure provided conform to specified requirements.
- 3) Check whether the power supply voltage provided conform to specified requirements.

(Work)

- 1) Adjust the steel plate, which is to be cut, as far as possible keep parallel with the track. 2) According to the thickness and material, selecting the appropriate cutting nozzle. Make cutting nozzle and steel plate keep vertical.
- 3) According to the different plate thickness and material, reset the machine's cutting speed and preheating time, and also set the reasonable pressure of preheating oxygen, cutting oxygen.
- 4) After ignition, no one is allowed to contact the flame area. The operator should try to take the small splash cutting method, to protect cutting nozzle.
- 5) Check the heating flame and cutting oxygen jet. If finding the cutting nozzle dirty or damaged, you should replace it for another one in time and clean it. And you should use special tools to clear the cutting nozzle.
- 6) If the cutting process produces flashback phenomenon, should timely shut off the power and gas valve. Ask the professional to look for the reason and debug the trouble. Only after ensure safety you can turn on the machine. If the flashback valve plate was burn-off, should stop using and wait for manufacturers or professional staff for repairing.
- 7) When operating the machine, the operator should always pay attention to equipment running status. Once finding abnormal situations, such as gas odor and other peculiar smell, should timely press the emergency switch and immediately retreat from the work area. It is strictly prohibited that retreat from the field without turning off the machine.
- 8) The operator should pay attention that when a work piece has been cut, should lift the cutting torch and run to the next station to carry on cutting.
- 9) Operators should choose the cutting speed according to the provisions about the cutting element , and correctly handle the relationship between the service life and efficiency 、 environmental protection. It is not allowed to increase equipment load simply in order to improve the work efficiency.
- 10) The travelling crane, which is hanging objects, is not allowed above the equipment, just in case. (After work)
 - 1) After work, the equipment should be returned to the security position, and close the valve. Should exhaust the residual gas in the pipe and shut off the power.
 - 2) Should count and withdraw the special tools.
 - 3) Implement the handing-over system and make the hand-over records for the equipment running status on duty.
 - 4) Should carefully clean up the field, and keep the working area clean and orderly. (Daily maintenance)
 - 1) Don't allow people to stand, step by step on the track , and do not allow heavy pressure, more not

allow impacting guide surface. Each class should clean the dust with compressed air and wipe the rail surface with gauze with 20 # engine oil. Keep the track surface lubricating, clean at any time.

- 2) Every day should be clean the drive rack with 20 # engine oil, and the particle splash is not allowed on the rack.
- 3) Operator is only allowed to demount the cutting nozzle, but not the rest parts. The electrical junction box is allowed to be open when the relevant personnel examining and repairing it.
- 4) If the equipment fault occurs, shall promptly ask the maintenance personnel to dispose. If a big failure, should report to the equipment management office, ask the relevant personnel to joint hearing, and determine a maintenance plan. Without permission it is strictly prohibited to demount the machine for inspection.

(Security measures)

- 1) This work belongs to the special type of work, the operator must hold this type of work permit issued by the labor bureau.
- 2) Staff wears staff certificate to operate the machine; The irrelevant personnel is not allowed to enter, more forbid any unauthorized press any key, in order to avoid damage to the machine or program, causing data loss.
- 3) The equipment should avoid strong vibration source.
- 4) Move the device steadily, any parts including guide cannot be stroked.
- 5) Equipment power supply wire should be used alone, and equipped with ac voltage stabilizer. 6) Ventilation or gas renewal and clearing the cutting nozzle must be carried according to relevant dangerous gas safety operation procedure.
- 7) The operator shall not put the foreign program into the machine memory, in case the virus intrusion. Only can use the special software provided by our factory.

8 Circuit diagram

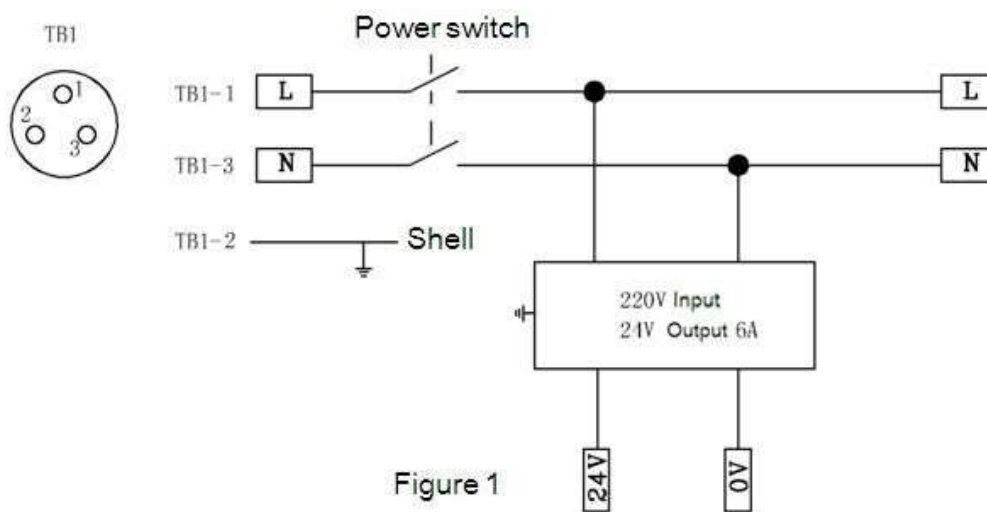


Figure 1

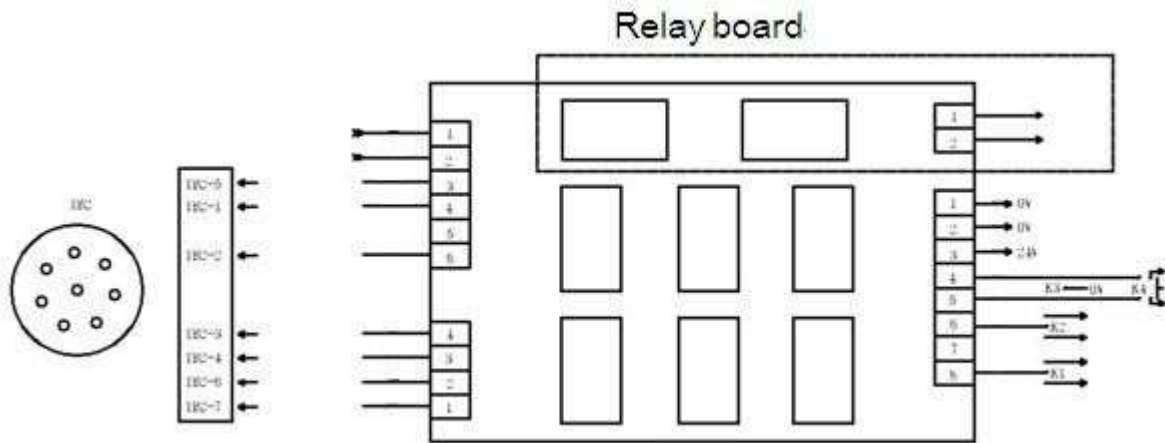


Figure2

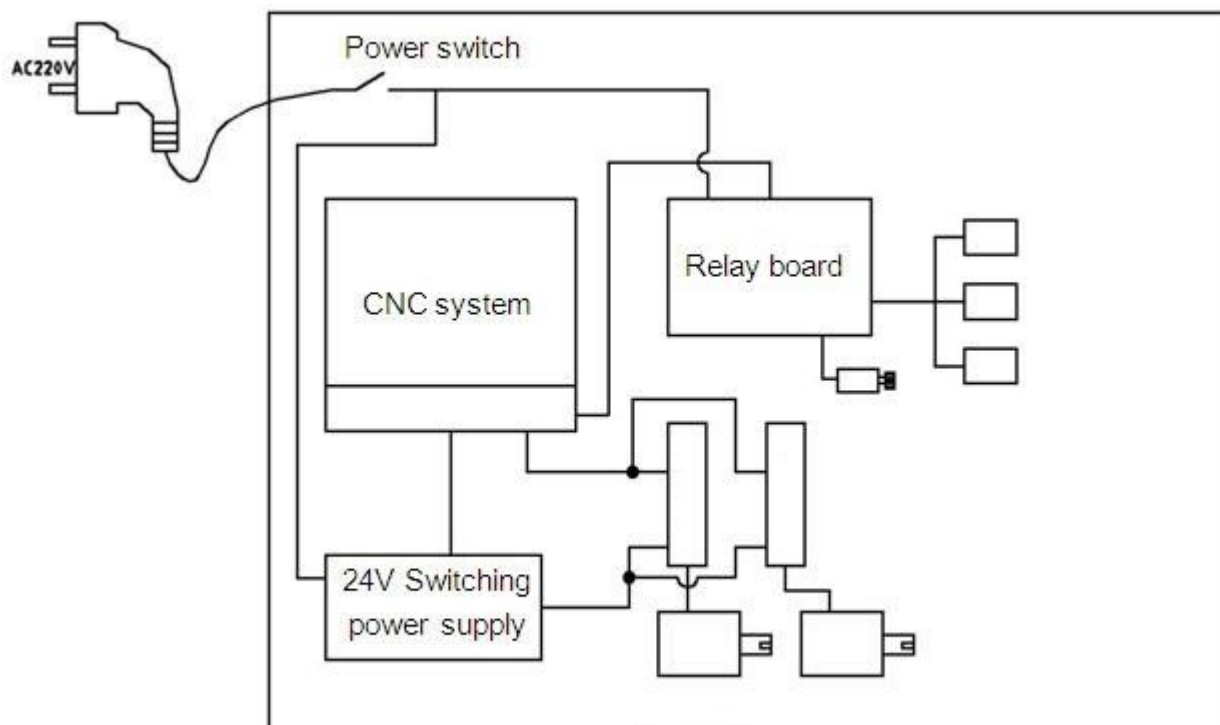


Figure3

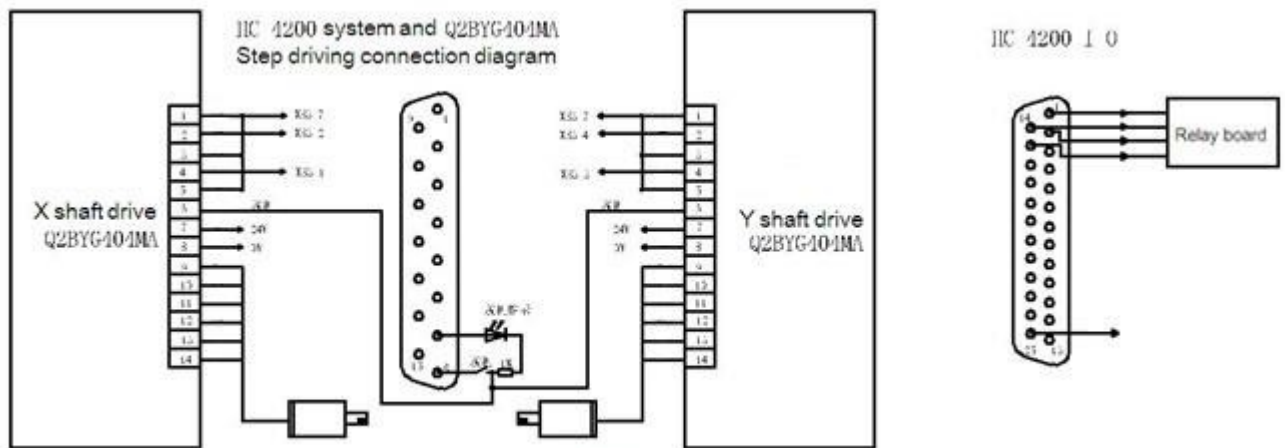


Figure4

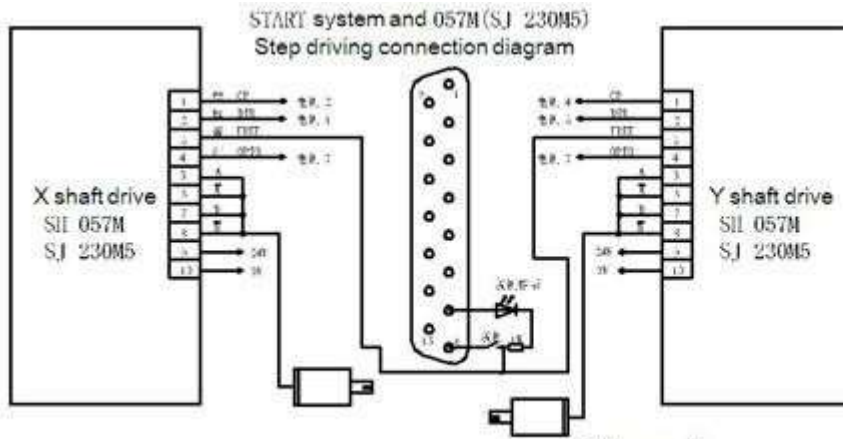


Figure5

START system 1 0

