

QINGDAO UNEED INDUSTRY&TRADE CO., LTD.

Plasma Cutting Machine Handbook

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Chapter 1 Packing List

(Only for reference, each set of machine is different)

Model	Name	Configuration	Quantity
	Attached parts:	Plasma Generator 40A,60A120A for option	1set
		DSP Control Handle	1set
		Fastcam Software	1set
		Control Handle demon CD	1piece
		Electrode(1.1,1.3)	5 sets
		Nozzle	5 piece
		Plasma Generatort	1piece
		Water Pump	1set
		Exhaust Fan	1 set
		Protective cap for nozzle	5 pieces
		Spanner	2 pieces
		Inner hexagon wrench	6 pieces
	Extra Parts		

Chapter 2 LGK Plasma Generator Introductions

2.1 Characteristics

LGK series of air plasma cutter is a new generated cutter with big power from our company. It has good characteristics as follows.

- ☞ The cutter is applied with thyristor rectified technique which is mature, reliable and efficient.
- ☞ Cutting current can be stepless adjustable and suitable for work pieces with different thickness.
- ☞ Outer and dynamic characteristics are significantly better than leakage-reactance typed cutter. Strike arc at a high success rate with stable cutting current. Arc is stiff with smooth incision.
- ☞ When cutting arc, it has function of ascending current slowly, which can effectively extend the life of wearing parts of cutting torch.
- ☞ It is fit for manual and automatic cutting.
- ☞ The cutting current is very stable. Power voltage fluctuation does not affect cutting current.

2.2 Usage

It is suitable for cutting kinds of metal materials like low carbon steel, alloy steel and non-ferrous metal and for the industries related to metal cutting, such as boiler pressure container manufacturing, chemical container manufacturing, industrial power station construction, metallurgy, chemicals, aviation and aerospace industry, automobiles and vehicle manufacturing, construction and so on.

2.3 Main technique parameters

Model Parameter	LGK-100	LGK-120	LGK-160	LGK-200	LGK-250
Shell shield rank	IP21S				
Rated input voltage	3~50Hz 380V				
Rated input capability	29.6KVA	36.2KVA	44KVA	KVA	86KVA
Rated output current	100A	120A	160A	200A	250A
Rated duty cycle	100%	100%	100%	100%	100%
Open circuit voltage	278VDC	290VDC	320VDC	320VDC	320VDC
Current adjusting range	40~100A	40~120A	40~160A	40~200A	40~250A
Insulation level	F	F	F	F	F
Quality cutting capability	0.3~22mm	0.3~25mm	1~35mm	1~45mm	1~60mm
Max cutting capability	40mm	45mm	55mm	65mm	80mm
Applying plasma air	Compressed air	Compressed air	Compressed air	Compressed air	Compressed air
Cooling mode	air	water	water	water	water
Arc striking method	Secondary arc striking with high voltage non-contact				

Dimension (L×W×H)	900×440×690 (mm)	900×440×690 (mm)	960×520×740 (mm)	960×520×740 (mm)	1120×600× 790 (mm)
Weight	155Kg	171Kg	206Kg	225Kg	250Kg

2.4 Panel and functions

Functions of front panel are shown as figure 3. Functions of back panel are shown as figure 4.

2.41 Digital voltmeter: Displaying cutting voltage

2.42 Digital amperemeter: Displaying cutting current

2.43 Cutting current adjusting knob: Adjusting cutting current

2.44 Slowly ascending current time adjusting knob: Adjusting ascending time of cutting current

2.45 Power indicator lamp: Indicating if the cutter is conducted.

2.46 Cutting indicator lamp: Indicating if cutting proceeds.

2.47 Air pressure indicator lamp: It is ON when the pressure of compressed air exceeds 0.3Mpa. It is OFF when the pressure is less than 0.2Mpa.

2.48 Water pressure indicator lamp: When connecting the water source of cooling torch, the lamp is ON. (The lamp is not available for LGK-100.)

2.49 Overload indicator lamp: It is ON when the cutter is overloaded (generally because cooling fan is damaged.)

2.410 Supply abnormality indicator lamp: It is ON when power source misses phase or it is less than 320VAC.

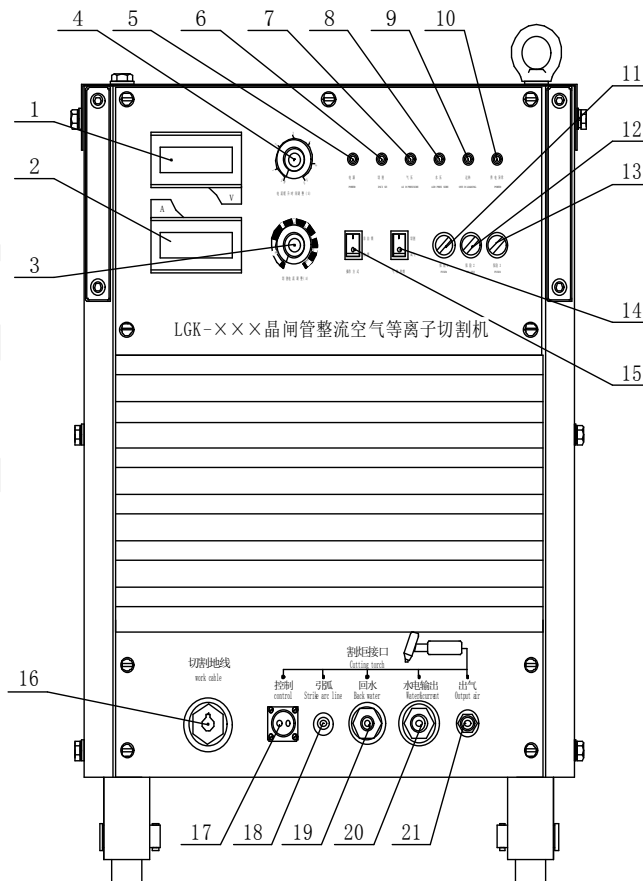


Figure 3 Front panel functions

2.411 Fuse: One of three-phase controlled power fuses

2.412 Fuse: The second one of three-phase controlled power fuses

2.413 Fuse: The third one of three-phase controlled power fuses

2.414 Gas control selection switch: When it turns on TEST, gas valve opens to test gas flux. When it turns on Cutting and cutting starts, the gas valve opens automatically.

2.415 Operation mode selection switch: When it turns on Non Self-lock, the torch switch should be pressed at the process of cutting. When it turns on Self-lock, press the torch switch and loosen it, the cutting can proceed.

2.416 Cutting ground wire outlet: To connect cutting ground wire

2.417 Torch control outlet: To connect torch control signal line

2.418 Torch arc striking terminal: To connect torch arc striking wire

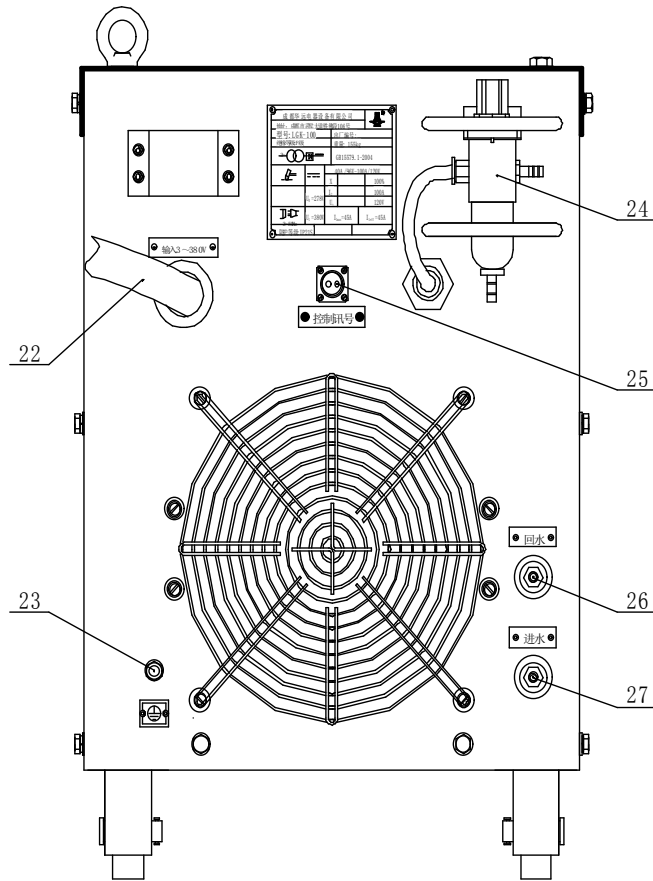


Figure 4 back panel functions

2.419 Torch back-water connect: it is for connecting return water pipe of torch. (LGK-100 has not the connector.)

2.420 Output connector of gas and power: The current output connector is also water outlet which is used for connecting water cooling cable outlet of torch. (For LGK-100, the current output connector is also compressed gas outlet which is used for connecting gas cooling cable outlet of torch.)

2.421 Compressed air outlet: it is for connecting gas pipe connector. (It is not available for LGK-100.)

2.422 Cutting power supply cable: To connect switchboard of user

2.423 Grounding bolt: To connect ground wire prepared by user

2.424 Inhaler: To connect compressed gas

2.425 Control signal connector: To control automatic cutting equipment

2.426 Back-water tip: To connect back-water pipe of the user

2.427 Water inlet: To connect the power source of the use

2.5 Plasma gas conditions

- Work pressure range: 0.35MPa~0.65MPa
- Gas supply pipe voltage-withstand: $\geq 1\text{MPa}$
- Gas supply pipe internal dimension: $\geq \Phi 8$
- Gas supply flux: $\geq 180\text{L/min}$
- Filter water from gas and then put it into cutter.

2.6 The outer characteristic curve of the cutter is shown as figure 1.

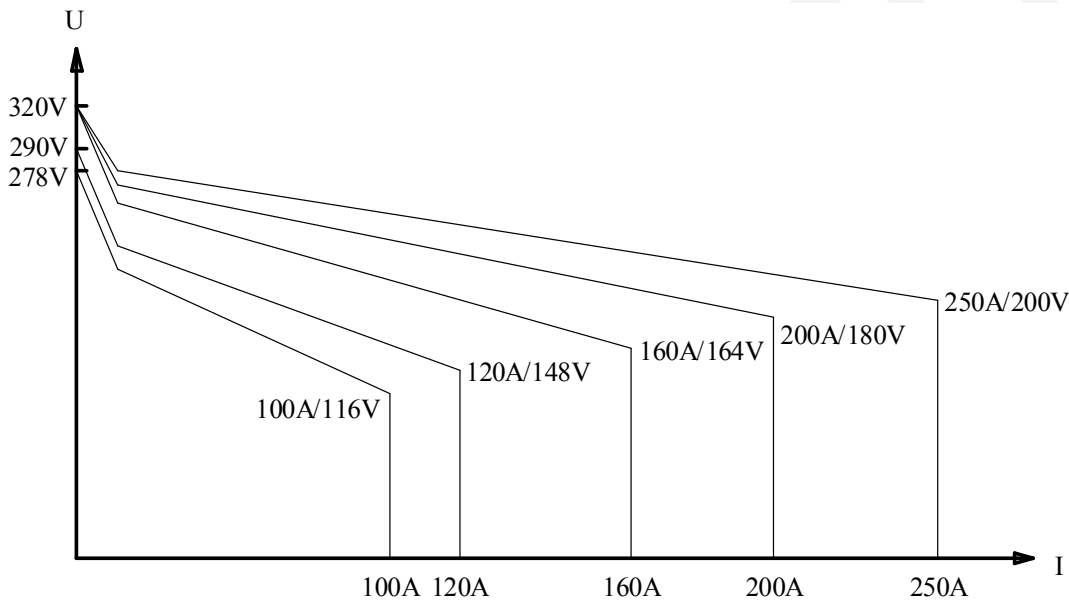


Figure 1 Outer characteristic curve

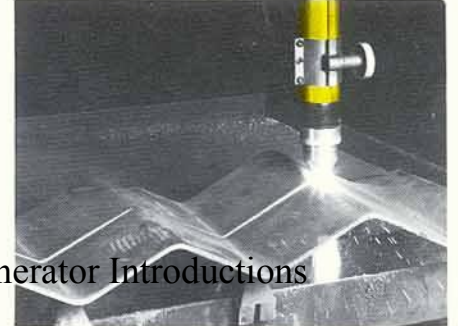
2.7 Trouble shooting

Trouble	Reasons	Solutions
1. When the power is switched on, the lamp and the digital meter are not ON.	<ol style="list-style-type: none"> 1. Three-phase power misses phase 2. Supply power is damaged 3. Power control fuse is broken 	<ol style="list-style-type: none"> 1. Check three-phase power source 2. Change power switch 3. Change power control fuse
2. Supply abnormality indicator lamp is ON without arc striking	<ol style="list-style-type: none"> 1. Three-phase power misses phase 2. Three-phase power is in low voltage. 	Check three-phase power source to ensure the supply voltage accords with the supply requirements.

4. No arc striking or arc breaking during cutting. Overheat indicator lamp is ON	<ol style="list-style-type: none"> 1. The ambient temperature is too high. 2. When cutting, cooling fan rotates slowly or do not rotate, so it cools badly 3. Temperature relay is damaged. 	<ol style="list-style-type: none"> 1. Let the machine not work for a while 2. Check fan power source or change cooling fan 3. Change temperature relay
5. It cannot start. Gas pressure lamp is not ON.	<ol style="list-style-type: none"> 1. There is no gas pressure 2. The pressure of gas supply is too low 	<ol style="list-style-type: none"> 1. Connect the gas source 2. Adjust supply gas pressure
6. It cannot start. Water pressure lamp is not ON.	<ol style="list-style-type: none"> 1. Water cannot be supplied 2. The pressure of water supply is too low 	<ol style="list-style-type: none"> 1. Connect the water source 2. Increase the pressure of water supply
7. With no arc striking, cutting indicator lamp, gas pressure lamp and water pressure lamp are ON, and supply abnormality indicator lamp and overheat lamp are not ON.	<ol style="list-style-type: none"> 1. Cutting ground wire is not well connected. 2. Gas pressure is too high. 3. Torch electrode and nozzle are badly broken. 4. Torch electrode and arc striking wire short-circuit, which cause the damage of torch. 	<ol style="list-style-type: none"> 1. Connect the cutting ground wire well 2. Lower the pressure of gas supply 3. Change the electrode and nozzle 4. Change the torch
8. Cutting with low capacity	<ol style="list-style-type: none"> 1. Gas pressure is too high or too low. 2. Work piece is too thick. 3. Torch electrode and nozzle are broken. 4. Plasma arc is not perpendicular to the work piece. 5. Cutting is too fast or too slow. 	<ol style="list-style-type: none"> 1. Adjust gas pressure 2. The thickness of work piece should be with the quality cutting range. 3. Change electrode and nozzle 4. Adjust torch angle 5. Adjust cutting speed
9. Electrode and nozzle is used for a short time	<ol style="list-style-type: none"> 1. Gas pressure is too low 2. Nozzle is too near from the work piece. The distance is less than 2mm. 	<ol style="list-style-type: none"> 1. Adjust gas pressure 2. The distance should be from 2mm to 5mm.

Thermal Arc 500 Advanced System Features

Dramatically illustrating Torch Standoff Control in action, the cover photograph is an actual time-exposure of the M200 Torch following the contour of the metal as it cuts. Small lights were attached to the torch to trace its motion. In the photograph at right, the torch is shown at the end of a cut.



Chapter 3 Thermal ARC Plasma Generator Introductions

3.1 Mainly Features

Torch Standoff Control

The Thermal Arc 500 System can be fitted with a system that controls the torch standoff automatically by operating a customer supplied motorized torch lifter. The standoff control is available in two versions: one with "manual find height" and one with "automatic find height".

When the cut is started the torch automatically maintains the same height above the plate, moving up or down as necessary to compensate for any warpage or out of level condition of the plate. The standoff control is completely electronic — no bulky torch attachments. All torch movement can be controlled from one convenient operator station, or controlled by signals from NC or computer equipment.

Pilot Arc Starter

Thermal Arc's exclusive new pilot arc starter reduces the possibility of high frequency interference with electronic control equipment. The arc starter generates a pilot arc that consists of a series of pulses rather than the "conventional" high frequency stabilized pilot arc. The Thermal Arc 500 is the first plasma system to incorporate this important advance in machine-mounted plasma cutting.

Thermal Arc 500 Operator Control Panel

The Thermal Arc 500 Cutting System features a small, lightweight Operator Control Panel for mounting at a convenient location on any shape-cutting machine. It is available as a self-enclosed unit or without enclosure, for mounting with the cutting machine controls. The Control Panel is tailored for remote control operations, containing all functions necessary for system operation: AC POWER light, system READY light, ON/OFF switch, CURRENT ADJUST knob, DC ammeter, START and STOP buttons, NORMAL/SOFT START/PIERCE and RUN/SET/PURGE switches. The Standoff Control panel is in the lower half of the Operator Control Panel.



Thermal Arc 500 System Components

3.2 Mainly Components



Reliable, Heavy-Duty Thermal Arc 500 Power Supply

The Thermal Arc 500 Power Supply is custom-designed for production cutting applications. With current continuously variable between 150 and 500 amperes, it provides ample cutting capacity for a variety of thicknesses — up to a maximum of 2 inches.

The Thermal Arc 500 power supply has a maximum rated output of 500 AMPS at 200 volts DC. Two Thermal Arc power supplies can be connected in parallel to obtain 1000 AMPS and the capability of cutting up to 4 inches thick.

The power factor of the 500 is over 85%. This results in reduced power costs.

The output amperage may be manually controlled by a dial on the remote Operator Control Panel or by signals from NC or computer equipment.

The Thermal Arc 500 system control circuitry, including the Standoff Control, is in the power supply. A feedback circuit stabilizes the cutting current against fluctuations in cutting speed, material thickness and primary input voltage.

The Thermal Arc 500 power supply can be set for automatic restart of the pilot arc if desired, permitting high speed interrupted cuts on material such as grating, expanded metal, or screens.

Durable, Versatile M200 Torch

The M200 torch is specifically designed for heavy-duty, machine-mounted production cutting. Its exclusive Dual Flow® design permits use of a wide variety of plasma and secondary gases to obtain optimum cut quality on different materials. CO₂, water, compressed air, nitrogen or argon/hydrogen can be used as the secondary gas.

Dual Flow® is unique to Thermal Arc. With dual flow, the secondary gas surrounds the plasma arc, assisting in blowing molten metal out of the cut. Fast, clean, cuts result. The secondary gas also cools the front end of the torch, improves operating efficiency, prolongs consumable parts life and reduces buildup of spatter on the front end of the torch.

With gas as a secondary, the M200 is capable of cutting up to 4" (100mm) or piercing up to 2" (50 mm). With water-shield (water as a secondary), production cutting capacity is up to 3" (76 mm) thick and piercing up to 1.5" (38 mm).

The M200 design affords easy assembly with no special tools required.





Supply Console

The supply console is a separate cabinet for the gas and water connections and power manifold. The front panel has plasma and secondary gas pressure gauges, a coolant gauge, and water shield flowmeter. Torch leads and arc starter cable connections are located on a bulkhead inside the supply console. The small, lightweight supply console is normally mounted on the cutting machine to minimize torch lead length.

3.4 Cutting speed



HE200 Coolant Recirculator

The use of a closed loop coolant recirculator is an important feature of the system. There is no discharge of waste water and improved cooling of the torch greatly adds to parts life.

The HE200 recirculator features rust-resistant construction throughout, a turbine pump, adjustable pressure and reusable filter screen. It also includes a deionizer to prevent corrosion.

Thermal Arc 500 System Cutting Speeds

ONE 500 POWER SUPPLY

MATERIAL THICKNESS AND TYPE	CURRENT* (AMPERES)	CUTTING SPEED (INCHES PER MINUTE)			
		MINIMUM SPEED ACCEPTABLE QUALITY	MAXIMUM SPEED ACCEPTABLE QUALITY	BEST QUALITY	
1/4"	250	Stainless Steel	80	250	140
		Mild Steel	80	200	100
		Aluminum	50	250	135
1/4"	500	Stainless Steel	†	†	250
		Mild Steel	†	†	150
		Aluminum	†	†	250
1/2"	250	Stainless Steel	40	125	85
		Mild Steel	40	80	60
		Aluminum	25	135	100
1/2"	500	Stainless Steel	†	†	150
		Mild Steel	†	125	75
		Aluminum	†	†	180
3/4"	500	Stainless Steel	75	125	90
		Mild Steel	50	75	55
		Aluminum	75	140	110
1"	500	Stainless Steel	50	80	60
		Mild Steel	30	50	35
		Aluminum	60	100	80
1 1/2"	500	Stainless Steel	30	50	40
		Mild Steel	15	30	20
		Aluminum	40	60	50
2"	500	Stainless Steel	20	30	25
		Mild Steel	15	25	15
		Aluminum	25	45	35

TWO 500 POWER SUPPLIES

1/2"	750	Stainless Steel	†	180
		Mild Steel	†	140
		Aluminum	†	200
3/4"	750	Stainless Steel	150	120
		Mild Steel	95	75
		Aluminum	180	160
1"	750	Stainless Steel	100	80
		Mild Steel	65	50
		Aluminum	130	100
1 1/2"	750	Stainless Steel	60	50
		Mild Steel	40	30
		Aluminum	100	80
2"	1000	Stainless Steel	65	50
		Mild Steel	35	30
		Aluminum	75	60
2 1/2"	1000	Stainless Steel	50	35
		Aluminum	70	55
3"	1000	Stainless Steel	30	20
		Aluminum	60	40
4"	1000	Stainless Steel		10
		Aluminum		20

* These are typical conditions for the current shown. Higher or lower current may be used with corresponding adjustment of speeds.

† Exceeds maximum speed of most motorized torch carriers.

The charts above represent typical cutting speeds for various types and thicknesses of material using one and two power supplies. Nitrogen was used as the plasma gas and carbon dioxide or water as the secondary for cutting up to 3 inches thick. A mixture of 65% argon and 35% hydrogen was used as the secondary gas and nitrogen as the plasma gas for material over 3 inches thick.

This information represents our best judgment but Thermal Dynamics Corporation assumes no liability for its use.

Thermal Arc 500 System Specifications

Optional HI-Flow Water Shield

To reduce smoke and fumes, noise and arc glare, Thermal Arc's HI-Flow Water Shield is recommended. The process produces a high flow of shielding water around the plasma cutting arc on the outside of the torch. A complete assembly consists of a water shield ring for installation on the torch, a supply hose, and a pump assembly with filter. The water is recirculated from a user-supplied water table.



3.5 Mainly Specifications

Thermal Arc 500 Power Supply

Rated Output: 500 amperes at 200 volts
 Current Range: 150 amperes to 500 amperes at 200 volts
 Input: 3 phase AC-50/60 Hz.
 208/230/460 volts*
 400/360/180 amperes
 Power factor: over 85%

Dimensions:
 Length: 42" (107 cm.)
 Width: 32" (81 cm.)
 Height: 45" (114 cm.)
 Weight: 1875 lbs. (841.3 kg.)

Operator Control Panel

Dimensions:
 Width: 8 1/4" (21 cm.)
 Height: 9-5/8" (22 cm.)
 Weight: 10 lbs. (4.5 kg.)

Standoff Control

Power: Uses 115 VAC from power supply
 Output: Relay contacts or 120 volts AC
 Dimensions: Control Panel Unit: 7" x 4" x 3 1/2" (18 cm. x 10 cm. x 9 cm.)
 Electronics located in power supply

Weight: 15 lbs. (6.8 kg.)

Supply Console

Dimensions:
 Length: 19" (48 cm.)
 Width: 16-5/8" (42 cm.)
 Height: 9 3/4" (25 cm.)
 Weight: 50 lbs. (22.7 kg.)

M200 Torch

Current Rating: 1000 Amperes maximum
 — General Purpose 750 Amperes maximum
 — Water Shield DC Straight Polarity
 Gas — Plasma: Nitrogen: 140 SCFH (66 lpm) maximum
 — Secondary: Carbon Dioxide: 350 SCFH (165 lpm) maximum
 or: Water: 12 GPH (56 lph)

HE200 Coolant Recirculator

Pump capacity: 5.2 GPM (23.6 lpm)
 Capacity: 80,000 BTU/hr.
 Input power: 230 V. 60 Hz. three phase 5.5 amps*
 460 V. 60 Hz. three phase 2.75 amps*
 Dimensions: 38.5" (98 cm.) wide
 28" (71 cm.) deep
 28" (71 cm.) high
 Weight: 163 lbs. (119.4 kg.)

Chapter 4 Machine Installation

Thank you very much for your right choice.

Safety

Ruijie Plasma Cutting Machine are designed and built with ample safety consideration.

However, proper installing and operating the machine can increase your safety.

*User specified input power characteristics optional

DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT CASUALLY

WITHOUT READING THIS MANUAL THROUGHOUT.



Attention:

*Before connect all the lines, please check all the switches in Power off position

*Please check there is connector for 380V and 220V in your place.

1. Connect Lines



Thermal Dynamics

82 Benning Drive
 West Lebanon, N.H. 03784
 603/298-5711

Catalog no.0-0351

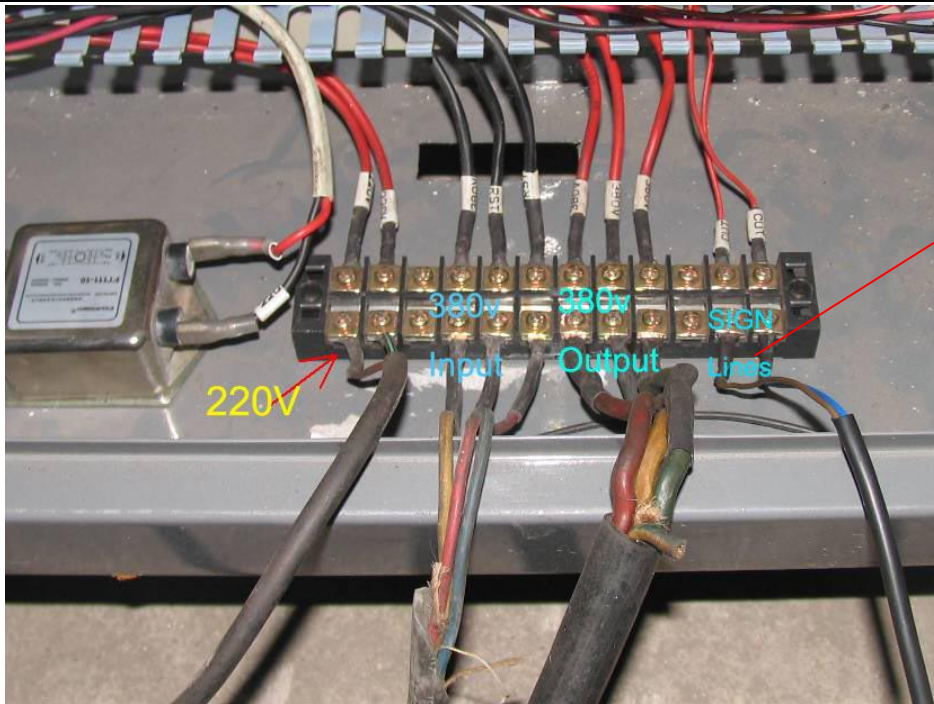


Photo 1.-Machine electric parts connecting

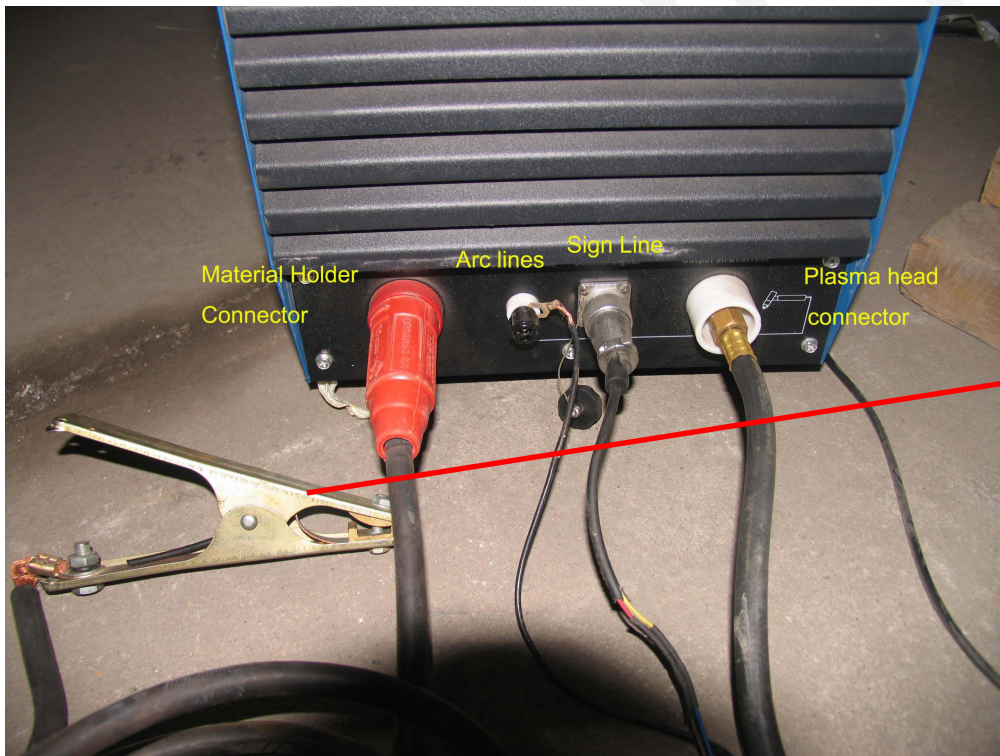
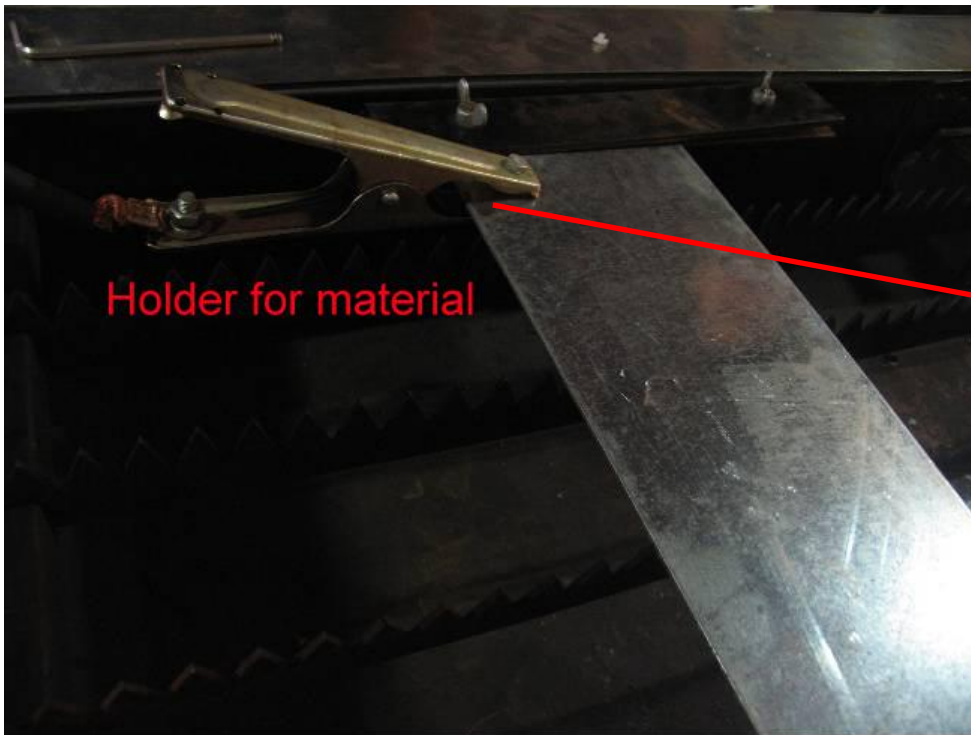


Photo 2.—Plasma Power connect



Holder for material

This is Holder
for material.

Photo 3- Material holder



Attention:

- * ***Ground function. Must touch with material when working***
- * ***This holder can put any place of the material.***
- * ***During working process , Do Not touch this holder.***



Photo 4—Air compressor power connect



Photo 5-Air compressor connector with plasma power

Power on Air pump by air pressure 0.8 Mpa, Press Control panel button “Home” to test the machine come back home in normal position.



Photo 6- Air compressor connect with plasma power



Photo 7- Water Pump connect with machine pipe



Photo8- Water pump connector ,another side in water.



Photo 9 -- Open Red and Green

Buttons on panel are as follows:

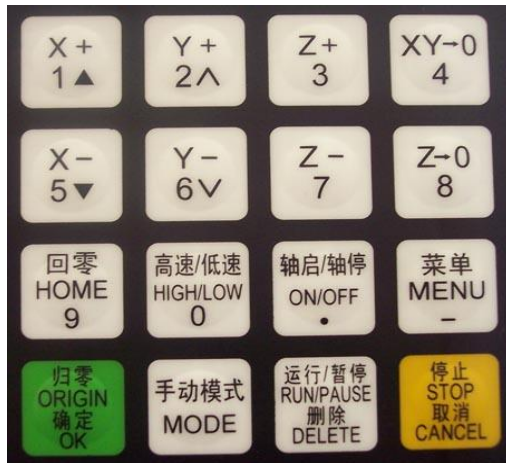


Photo 9-1

2 Control Handle Function

Button	Function
	Positive movement of X axis, Menu upward , figure 1 inputting
	Positive movement of Y axis, accelerate process speed, figure 2 inputting, different property selecting in Menu
	Positive movement of Z axis, figure 3 inputting, rise spindle speed in process
	Working origin of X axis and Y axis setting, figure 4 inputting
	Negative movement of X axis; Menu downward, figure 5 inputting
	Negative movement of Y axis; slowdown process speed; figure 6 inputting different property selecting in Menu
	Negative movement of Z axis, figure 7 inputting, spindle speed adjusting in process
	Z axis origin setting ; figure 8 inputting
	Axes home to machine tool origin, figure 9 inputting
	Manual moving mode, high speed or low speed selection, figure 0 inputting
	Manual control ARC start and stop
	Menu setting entering, negative symbol inputting, multi process state checking,
	All axes go working piece origin: confirm of motions /inputting/operating
	Manual move, continue, step and distance modes selection
	Search files/Inpuffed words delete
	Stop working files

Chapter 5 Parameters Adjustment for Control Handle

Name			D a t a		
Machine Setup	1	Equivalent Pulse/mm	X: 20.30	Y: 54.35/61.4	Z: 200/640
	2	Table Size	X: 1300.00	Y: 2500.00	Z: 120.00
	3	Motor Direction	X:-Dir	Y:-Dir	Z:-Dir
	4	Home Setup	Home Speed:X:3000.00 Y:3000.00 Z:1800.00 Set Home Direction: X:-Dir Y:-Dir Z: +Dir		
AUTO PRO SETUP		Linear Accl	Linear Accl: unit mm/sec ² 1600		
		Curve Accl	Curve Accl: mm/second ² 2000		
		Process Speed	No need to change		
		Travel Speed	No need to change		
		Z Up Height	Z Up Height unit mm 50.000		
		Arc Delay	Arc Delay,unitm/s:500 It can be changed according to the different materials.		

Chapter 6 Adjustment

During work, there need adjust according different material.

First step :Adjusting Air Pressure

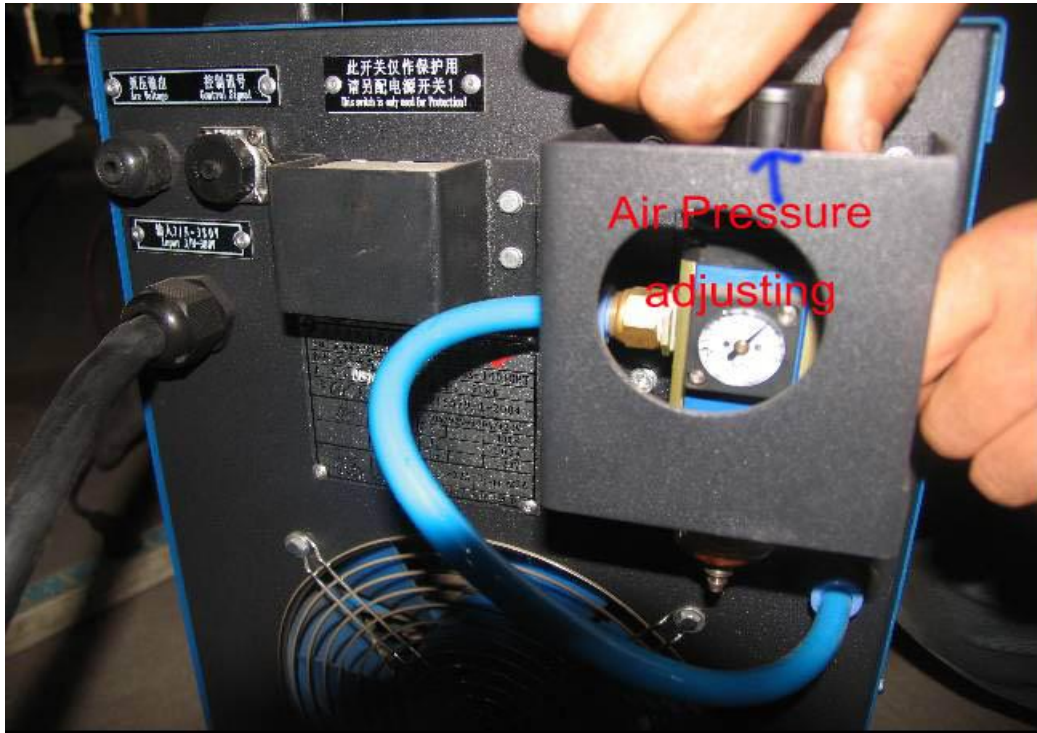


Photo 10. Air pressure adjusting



Attention:

*Need pull button up then adjusting. When finish, please put down this button.

*High thickness material need higher air pressure

Step 1. Power on Plasma power

Step 2. Press the button into **Check Air**(Photo 11th)

Step 3. Adjusting Air pressure on 0.5Mpa

Step 4. Press the button into **INCISE** (Photo 11)and start to work

Second Step: Adjusting Current according to different



Photo 11--Current Adjusting

Step 1. Power on Plasma power

Step 2. Press the button into Incise

Step 3. Adjusting current(See attachment suggestion)



Attention:

*Adjusting current when working according to material.

*Data setting is on the basic of material thickness



Operation:

After adjusting, now let's start to operate.

Firstly, move plasma head to left bottom of working piece

Second, Press

XY-0
4

 +

Z-0
8

 together and make original point of working piece

Third, Press

运行/暂停
RUN/PAUSE
删除
DELETE

 to find file, then press

归零
ORIGIN
确定
OK

.

Chapter 7 Maintenance

Change the Electrode

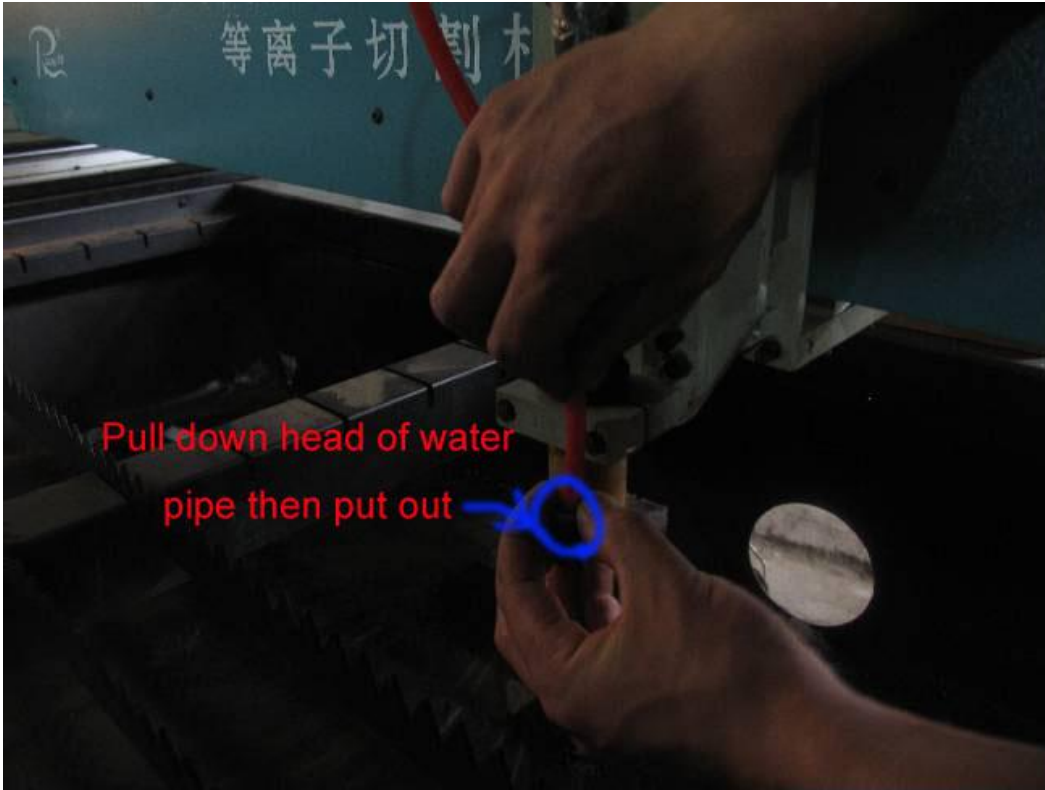


Photo 12—Pull down the head of water pipe from plasma head

💡 *Press water pipe head then pull out.



Photo 13—Loosen yellow head

 *From Left direction to Right side

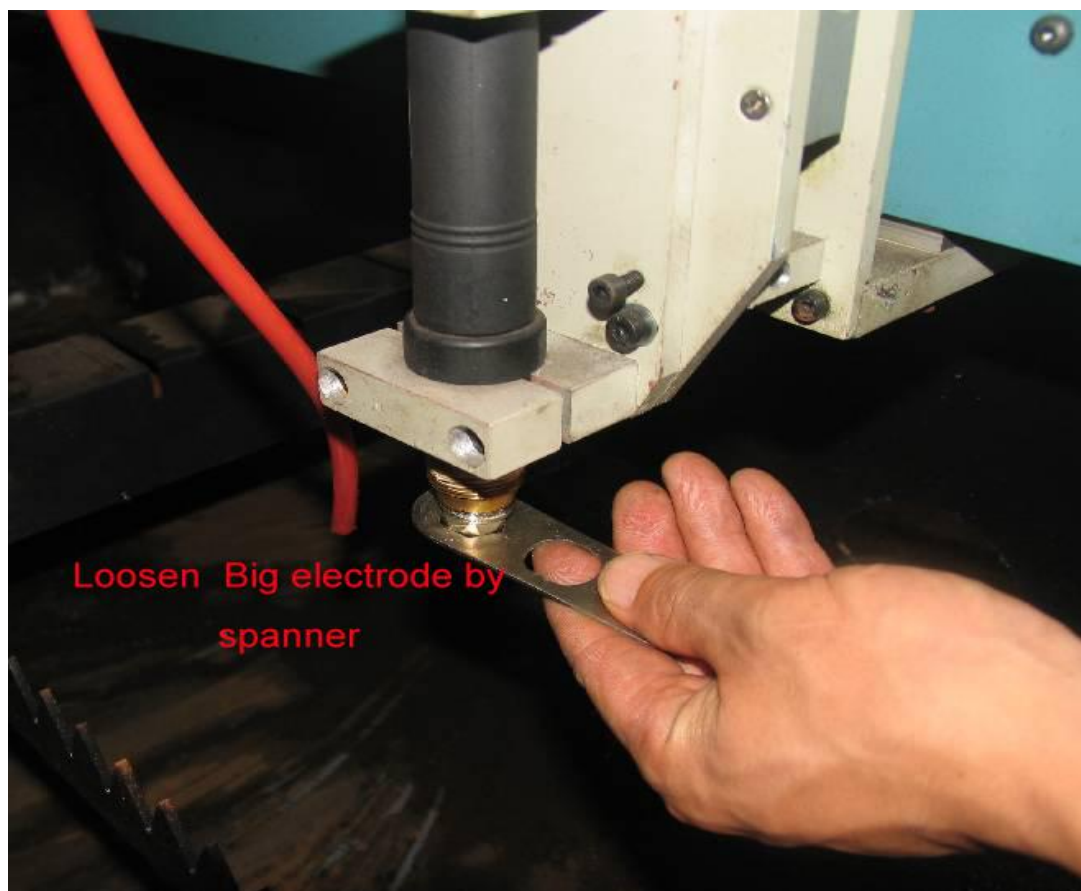


Photo 14—Loosen Big electrode by spanner.

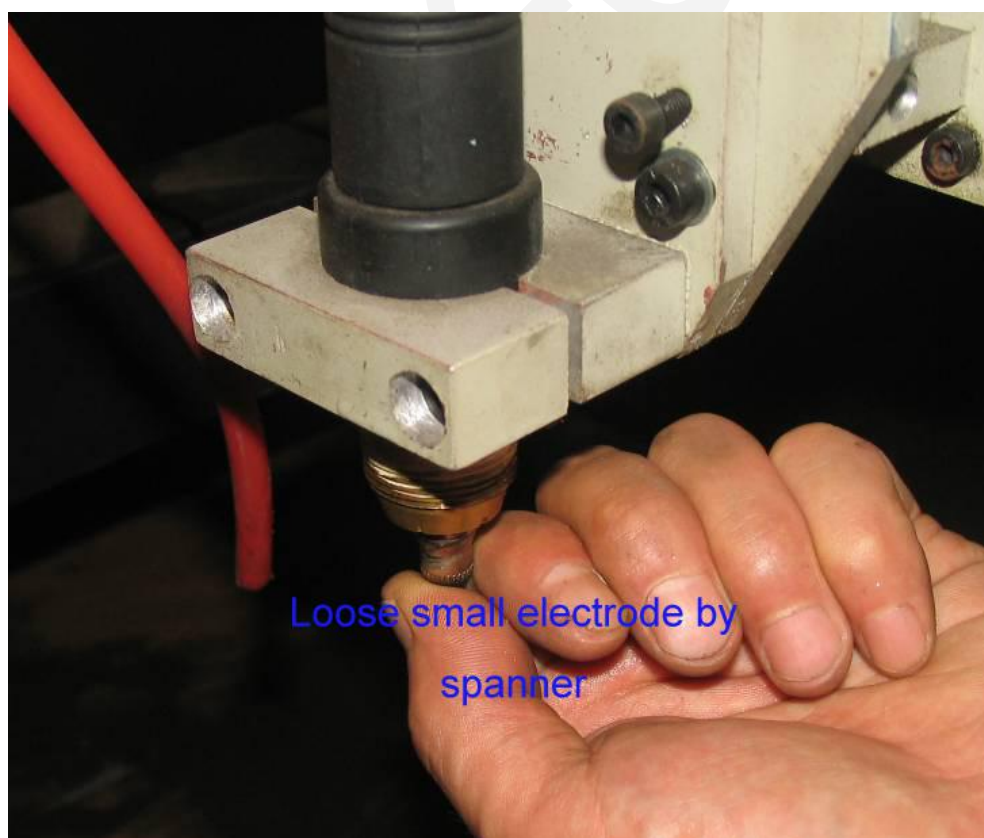


Photo 15—Loosen small electrode by spanner then put it out by hand.



*Direction same as Big electrode.

Other point need pay attention:

1. Put material flat before working
2. Cleaning Rail and insert oil before work off
3. Power off when change Nozzle and electrode
4. Fulfill water into water pump during work process
5. Adopt Pure water to keep electromagnetic valve in long life time
6. Check water pump in working process (Water out) before working.
7. Operator DO NOT leave during work process
8. Big water tank for water pump.
9. After changing nozzle and electrode, put water pipe(Photo 12) lower than Nozzle 0.5-0.7mm
- 11.If plasma head do not move up when working, please use control panel make touch up then power off. Press button “RUN/ PAUSE”.

Thank you for your reading this handbook. Please offer us feedback of our machine.

Looking forward your reply.

Attachment

No.1

Material Name	Thickness mm	Current Am	Air Pressure Mpa	Speed (M/Min)
Steel	0.3	20	0.6	4.5
	0.6	25	0.5	4
	1.0	40	0.6	5
	1.5	50	0.6	4
	2.0	55	0.65	3.5
	3.0	70	0.65	3
Titanium Steel	0.5	20	0.5	5
	0.8	25	0.5	5
	1.0	30	0.55	4.8
	1.5	40	0.6	4.5