

PLASMA CUTTING



TOPTECH

TopTech JCH Series Plasma Power Source

User Manual

(V16.3.1)

Beijing TopTech Technology Co., Ltd.

www.toptechone.com

Revision:

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**This User Manual is Applicable to
Following Models**

TopTech JCH 60A

TopTech JCH 100A

TopTech JCH 130A

**Connection for plasma power and six-cell control
interface of CNC cutting machine:**

1 and 2 arcing signal; 3 and 4 arc voltage feedback;

5 and 6 arc voltage signal (5 is positive, 6 is negative).

Please Read First

Thanks very much for purchasing this product!

Packing List:

Items	Specification	Description
Main engine	1	/
Cable	1	TopTech JCH 60A/100A/130A: 7m or custom-made agreed by both sides
Ground wire	1	2m
Six-cell plug	1 pair	/
Electrode & nozzle	10 sets	/
Toolkit (electrode, nozzle, spanner)	1 set	/
Connecting terminal	1 pair	/
Fuse	1	/
Certificate	1	/
User manual	1	/

Please check carefully, ask suppliers for the missing parts!

Series No. _____

Statement of Warranty:

Thanks very much for purchasing our products and we can have the chance to provide you with the high-quality service. For offering the better service, please read following stipulation carefully.

1. Notice

- 1) Please keep this manual and complete the form of User Information as required.
- 2) Do not tear up the labels on the back of machine.
- 3) Commitment: 3 years warranty for TopTech JCH plasma power source, 1 year for TopTech JCH torch.

2. This warranty will be invalid and the maintenance expense will be charged in following situations:

- 1) Labels are torn up or can not be recognized.
- 2) Series number can not be recognized.
- 3) Damages caused by force majeure (such as flood, fire, earthquake, lightning strike, typhoon, etc.) or operator's misuse.
- 4) Users dismantle, refit or change the circuit.
- 5) Use the components (electrode, nozzle, shield, torch, etc.) produced by other brands that are not recognized by our company.
- 6) Water fill into the machine or the power supply do not meet the requirement of national standard.
- 7) Other malfunction that are man-made.

Please read this manual carefully before installing, operating and using this machine and comply with the safety precautions for the safety of yours and others.

All the information in this manual is just from the best judgment of manufacturer, who is not liable for your operation.

Statement

This series products are manufactured according to Chinese and International Standard, meeting IEC974 International Safety Standard. It has 3 years warranty, which will be invalid if the damages were man-made or caused by the consumables offered by other brands.

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1.Safe Operation

Safety Precautions

TopTech JCH series plasma power source is mainly used for professional purposes in an industrial environment. Since it may cause radio interference when working indoors, operators should take fully preventive measures.

Electric shock——may be fatal!



Electric shock can be harmful to people, even result in death. Plasma arc can produce high voltage electricity, which will do harm to operators or others in the working area, or cause fatal electric shock.

Note the following points:

- Do not touch any live electrical parts or heating metal.
- Wear dry garments and gloves. Insulate yourself from the work piece or other circuits.
- Maintain or exchange all the broken parts and cables.
- Take protective measures when operating in a damp or wet area.
- Turn off the power before maintenance or repair.
- Leakage circuit breaker must be installed when using this machine.

Fire / Explosion



Hot slag, sparks or fire/explosion caused by plasma arc.

- Protect all the materials in working area and make sure there are no combustible and explosive materials.
- Ventilate the combustible materials and make sure there is no moisture on the work piece.
- Do not cut on the combustible containers.
- Install fire alarm in the potential areas of fire outbreak.
- It may easily gather the hydrogen that is produced when cutting aluminum work piece under the water or at water table. Do not cut aluminum work piece under water or at water table, unless the hydrogen is eliminated or removed. Otherwise, the gathered hydrogen could possibly cause explosion.

Arc rays



Arc rays could possibly cause eye and skin injury. Plasma cutting will bring violent ultraviolet and infrared rays. Without proper protection, the arc will burn eyes and skin.

- Wear helmet and masks with filtered lenses to protect eyes. Wear safety glasses with full protective parts, including side protection, filter lenses and others.

- Wear safety gloves and protective clothing to protect the skin and prevent the harm from arc rays and sparks.
- Maintain the helmet and safety glasses, exchange in time if the glasses are broken or dirty.
- Protect others in the operating area by using protective boots, covers and shielding Fence.

Fumes and gases——may be hazardous to health!



- Keep your head away from fumes.
- Use ventilator or air extractor in cutting process to avoid inhaling polluted air.

Noise——excessive noise can cause permanent hearing loss!



- Wear protective ear muffs and plugs.
- Warn others in the operating area that noise would cause potential harm to hearing.

Malfunction——in case of malfunction, request assistance from qualified personnel!

- Please troubleshoot according to this manual if there are installation and operation problems.
- If problems not solved yet, please contact the supplier or after sale service center of our company and get assistance from qualified personnel.

2. Major Features

TopTech JCH series Mechanized Plasma

1. Arc system

Non-high-frequency pilot arc, a foreign technology of high voltage pulse arc with high success rate of arcing and no interference to any system or AVTHC.

2. Controlling system

The mature Half-bridge Inverter is equipped to lower failure rate and maintenance cost.

The advanced electronic circuit enables fast adjustment and control of plasma power, enjoying first-class cutting features and high efficiency of switch.

3. Components

Main power component contains Infineon IGBT and DW modules, largely improving its reliability.

4. Cooling system

Specially-made radiator with brazing sheet and design of one air inlet and two air outlets enable the machine to work for a long time in favorable temperature, efficiently solving the problem of high failure rate and low duty cycle in Summer.

5. Cutting torch

Internal swirl ring technology and double gas control are largely improving the life span of torch. The swirl ring double gas technology brings a thinner and smoother kerf, and a better verticality.

3. Major Technical Parameters

TopTech JCH series Mechanized Plasma

Input Power:~380V/3-phase/50HZ

Voltage: 380VDC \pm 10%

Current: continuous adjustable

Duty cycle: 80%

Working air pressure: 0.45MPa (adjust according to watt)

Refer to following form of cutting data (reference data is for carbon steel)

TopTech JCH 60A/100A/130A plasma cutting parameters

Models	TopTech JCH 60A	TopTech JCH 100A	TopTech JCH 130A	
Recommended	20mm	30mm	35mm	
Pierce	16mm	20mm	25mm	
Current Adjust	20A~60A	20A~100A	20A~130A	
Cooling	Gas cooling			
Materials	Thickness (mm)	Air pressure (MPA)	Optimum cutting speed (mm/min)	Current (A)
Carbon Steel	1	0.45	4500	25
	1.5	0.45	4570	30
	3	0.45	3800	40
	3	0.45	7000	60
	3	0.45	9000	80
	6	0.45	3000	80
	6	0.45	4000	100
	10	0.45	2300	
	12	0.45	1600	
	14	0.45	1200	
20	0.5	750		

4. Structure of Mechanized Torch

TopTech JCH series Mechanized Torch

TopTech JCH series torch is only suitable for 60A, 100A and 130A.



5. Common Faults & Solution

Cutting faults and solutions

Faults	Possible Causes	Solutions
Bevel angle is too large that the cutting surface is not vertical to upper and lower surface of work piece	Torch not vertical	Adjust the torch, and make it vertical to work piece
	Torch too high	Lower the torch
	Current too low	Increase the current
	Speed too fast	Adjust the speed
	Torch is moved in wrong way	Correct the direction
	Nozzle broken	Change the nozzle
Narrow kerf, inclined or S-shape dragging lines caused by slag in high speed cutting; Few and hard globular slags attached to the the bottom and not easy to be removed.	Current too low	Increase the current
	Torch too high	Lower the torch
	Speed too fast	Adjust the speed
	Arc voltage too high	Lower the arc voltage
Wide kerf caused by slag in low speed cutting, vertical dragging lines and slags with big bubbles on the bottom of work piece and easy to be removed.	Speed too low	Adjust the speed
	Current too high	Lower the current
	Torch too low	Raise the torch
	Arc voltage too low	Increase the arc voltage
Upper corner shows an arc, which is more obvious in cutting sheet metal.	Arc voltage too high	Lower the arc voltage
	Speed too fast	Adjust the speed
Upper rough edge, a few dross is deposited on the top of cutting surface.	Speed too low	Adjust the speed
	Arc voltage too high	Lower the arc voltage
	Nozzle broken	Change the nozzle

6. Installation

1. Install TopTech JCH plasma

① Connect to CNC Cutting Machine

Six-cell control interface: 1 and 2 arcing signal; 3 and 4 arc voltage feedback; 5 and 6 arc voltage signal (5 is positive, 6 is negative).

② Supply voltage protector is equipped to TopTech JCH E series plasma power. When voltage changes among $380V \pm 10\%$, the plasma power can work as usual.

③ Connect the power line to proper distribution box according to the level of input voltage. Do not make wrong connection! Make sure the error range of voltage is acceptable. When the cable is long, it would be better to choose the wider one for reducing voltage of line loss.

Cable diameter of plasma power source(Unit: mm)

No.	Models	Diameters
1	TopTech JCH 60A	4 ² X3
2	TopTech JCH 100A	6 ² X3
3	TopTech JCH 130A	10 ² X3

④ Insert the quick plug of ground wire into the quick socket on the panel of plasma power, and tighten it clockwise. M8 screw is used to the other end for connecting cutting platform. When it needs longer ground wire, please choose the welding wire that is $\geq 35^2$.

Note: the poor connection between ground wire and work piece will impact arcing, continuous cut and cutting thickness.

⑤ Pressure of air pump is ≥ 1 MPa; Flow $\geq 0.5M^3/min$. A gas-water separator with activated carbon should be connected to the outlet of air pump. Connect to the cutting device with an oxygen tube that can withstand voltage, and tighten every connector by hose clamp or other ways in case of air leakage. Make sure the gas source can offer suitable voltage, enough dry flow for making the machine work in a normal way. Oil-water separator needs drawing off the water once a day.

⑥ Make sure the air vent of plasma power is not covered and blocked in order to avoid the failure of cooling system.

⑦ Connect the cover of machine into the ground reliably by a wire with area of electrical conduction that is $\geq 6mm^2$.

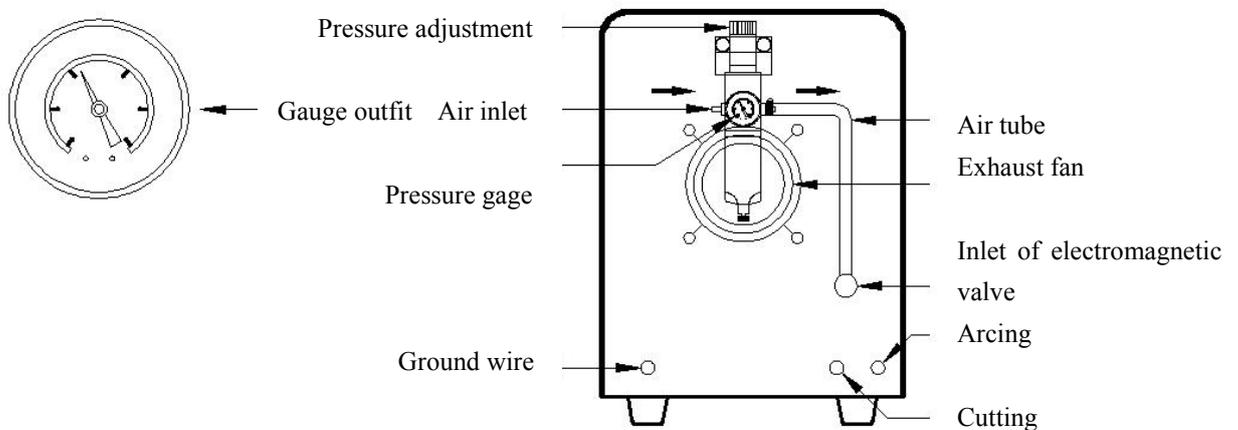
The right way is to connect into the grounding device through the back of plasma power where the screw is connected, or make sure the grounding end of plasma socket has been grounded reliably and independently. For safety, these two ways can be used at the same time.

⑧ Install the joint of gas-electric integration on the torch into the corresponding point on the panel of plasma power, and tighten it clockwise with spanner. Connect the air plug and pilot arc line on the torch into the corresponding point on the panel of cutting machine and tighten it with screw.

⑨ Do the next when the connection is well done. (Refer to Figure 3.1)

2. Installation and operation of air regulator

- ① Twine the sealing tape around the copper gas nozzle and fix to IN and OUT terminals;
- ② Twine the sealing tape around the gauge outfit and fix to installation place;
- ③ Fix the shelf with screw nuts to the air regulator at the back of plasma power;
- ④ Screw out the rubber nuts and fix the air regulator into the connecting shelf;
- ⑤ Turn on the switch of air valve, lift up the button of voltage regulation for adjusting to proper voltage (with scale of Kg) as required (“+” is for increasing voltage, “-” is for reducing voltage), and then press the button;
- ⑥ Gauge outfit reaches to the scale of 5 kg;
- ⑦ When too much water in the filter, please open the valve for drawing off the water.



Connection of Air Cooling Torch (Figure 3.1)

7. Operation

1. Turn “ON” the switch of front panel. The fan starts rotating and gauge outfit shows the current.
2. Switch on the cooling air box (if equipped), making the torch cool down in working process.
3. Adjust the pressure button to the proper pressure and open the valve of compressed air.
4. Press down the controlling button on the cutting torch. Electromagnetic valve works well and plasma arc is blowout from nozzle.
5. Set the proper cutting current according to the thickness of work piece. Adjust the nozzle of cutting torch to the proper height. Press the button on the torch for arcing, then cutting.

8. Routine Maintenance



WARNING:

Disconnect power when maintaining, inspecting or changing consumables. Unplug the power cord before opening the chassis. Blind experiment and incautious inspection may lead to expansion of fault area and make difficulties in real maintenance. When the power is on, exposed parts inside the machine have dangerous voltage that may directly or indirectly cause electric shock hazard. In serious shock incident, it will lead to death!

TopTech JCH series plasma power source is a high performance mechanized IGBT plasma. Part of its performance is as good as what the famous plasma can achieve, but with low cost for operation and maintenance.

Routine maintenance brings stable operation. Please check the following tips:

1. Monthly maintenance

- Dust extraction - twice a month. Method: turn off the power, open the both sides of shell and the top “U” cover plate, remove the dust with 0.4MPa oxygen(Air can't be used because there is water in the compressed air).
- Check and change the air tube if there is crack, leakage or worn parts.
- Check and change the connectors of all electric equipment if there is crack and worn parts.
- Check and clean cooling fan and radiator as required.

2. Daily maintenance

- Check every day and keep the torch intact, electrode and nozzle perfectly assembled.
- Check ground wire every day, especially make sure the connector between ground wire and cutting table is reliable and intact.
- Purity and dry of cutting gas will impact the reliable usage of plasma and life span

of spare parts directly. Please filter and dry the compressed air before connecting the cutting machine.

9. Cautions

1. Environment:

- Make cutting environment dry, with air humidity of under 90%.
- Keep surrounding temperature between -10°C to 40°C.
- Avoid cutting in the sun or rain, keep water and rain away from the plasma power.
- Do not operate in dust area or in the environment with corrosive gas.
- Do not operate in the environment where airflow is strong.

2. Safety tips:

Over-voltage, over-current and over-heating protection circuits are installed in the plasma power. It will stop working automatically when the network voltage, output current and inside temperature are exceeding the standard requirements; But the excessive use (higher voltage) will cause damages to plasma power, so please pay attention to following tips:

- Keep good ventilation. It has large working current in operating process and the natural wind can't meet the requirements of enough cooling air. That's why a fan should be built inside for cooling down the heating parts and keeping operation stable. Operators should confirm the ventilation is not covered or blocked. Keep the distance between plasma power and surrounding objects longer than 0.3m.

Operators should always pay attention to good ventilation because that is very important for better working process and longer service life.

- No overloading!

Operators should observe the maximum load current (selected duty cycle rate) at any time, keep the output current less than the maximum load current. Current overload will obviously cut down the service life of plasma power, even have the possibility to burn out the device.

- No over-voltage!

Generally, the automatic voltage compensation circuit will keep the current within allowed limits. Plasma power will be worn if the voltage is exceeding the allowable value. Operators should get to know this situation and take precautionary measures.

- Every plasma power has a grounding screw at its back with the mark of grounding. Before operation, choose a cable that has a sectional area of over 6mm² and make reliable grounding to release static electricity or prevent the accidents caused by electric leakage.

- If plasma power exceeds the standard duty cycle rate in operating process, it may suddenly stop working and enter into the status of protection. This means super heating triggers temperature detect switch and stop the machine continue to work, the indicator light at the front panel is on red. On this occasion, you don't need to unplug the power because the cooling fan has to work and keep cooling down the machine. When the red indicator light disappears and the temperature is among the standard range, you can re-start cutting operation.

- The pressure of compressed air should be appropriate in case of damages to small components inside the plasma power.
- Regular check the connection of interior circuit and make sure the connection is correct and every connector is reliable (especially the inserting terminals or components). If the rust and looseness happen, abrasive paper should be used to remove the rusts or oxidation film, then reconnect and fasten.
- If the plasma power will not be used for a long time, please put it back into the packing box and stay dry.

10. Troubleshooting Guide

1. Possible symptoms in cutting process

The following symptoms may be caused by the spare parts, gas supply, environment or power supply. Please first improve the operating condition for avoiding the similar troubles.

① The surface of plate is rough and rugged, the cutting performance is not as ideal as expected. This means the plasma power has not given its full play of performance.

You need to troubleshooting as follows:

- Make sure the source of compressed air is stable and has enough pressure.

Generally, the gas entered into plasma power should have the pressure of 0.5MPa (about 5kg), and range of variation is ± 0.05 MPa.

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② Difficult arcing, easy to cause arc breaking:

- Make sure the electrode has good quality, because the discharge capacity of poor electrode may fail to meet the required standard.

- When the current is low and air flow is too large, it is easy to cause arc breaking because of the strong cooling function.

- If network voltage is too low or the cable line is too long, it will cause too large pressure drop.

③ Output current can not reach rated value:

- When supply voltage is far away from rated value, it will cause non-conformity between output current and setting value, and make voltage of power failure lower than rated value. At that time, the maximum output current of the whole machine may be lower than rated value.

④ Current will be unstable when using plasma power. It may be caused by following factors:

- Network voltage varies;
- Serious disturbance from power network or other electric devices.

⑤ Too fast damage to electrode or nozzle:

- Electric current may be adjusted to be too high, but the diameter of nozzle is too small;

- Air pressure is too low to meet the required air flow. The cooling function is

weakened, but the nozzle & electrode is overheating.

⑥ Arc can not penetrate the steel plate completely, or too much dross that can not finish cutting successfully.

- May be the current can not meet the required cutting thickness, please choose the cutting power with higher current.
- Electrode or nozzle is broken and needs exchange. Make simple troubleshooting.

2. Simple troubleshooting

Operators must be professional in electric knowledge and have the qualification certificate to prove its capabilities. Also, operators should master the common sense of safety. We suggest you to contact Beijing TopTech Technology Co., Ltd. and get confirmation before troubleshooting.

Symptom	Troubleshooting
No sign of ampere meter; Fan is not rotating.	1) Confirm the air switch is closed. 2) Cable is power on. 3) Confirm no default phase.
Ampere meter and fan is working well, but the button on the torch is failed.	1) Check the patch cord and confirm no poor contact. 2) The control line on torch or the micro switch is broken. 3) Pilot circuit is broken. (contact with distributor or manufacturer)
Indicator is on, but ampere meter and fan are working well.	1) The ignition coil is penetrated. 2) IGBT is broken. 3) Rectifier tube for fast recovery is broken. 4) Malfunction of control panel. 5) Malfunction of feedback circuit (indicator is on). Please contact distributor or manufacturer.
Fan and ampere meter is working well, magnetic valve works, no pilot arc output and the indicator light is off.	1) Problems of arcing. 2) Nozzle too high and attach to other parts. 3) Ignition coil is broken. 4) Arcing relay is broken. 5) Malfunction of pilot circuit
Air switch can not work.	1) Check the quality of air switch. 2) 3-phase rectifier is broken and need exchange. 3) Check the short circuit.

If plasma cutter can not work even after above calibration and maintenance, please contact local distributor or TopTech JCH after-sale service department.

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OEM Customized solutions

