



AIRCUT Series
Inverter Air Plasma
Cutting Machines

Operating Manual

WARPP ENGINEERS PVT. LTD.

Plot No. 67, Govt. Ind. Estate, Charkop, Kandivali (W), Mumbai-400 067.

Tel: 91-22-28687298 / 29672013/14 / 32404434. Fax: 28687919.

E-mail:sales@warpp.co.in Web Site: www.warpp.co.in

Thank you for selecting inverter cutting machine. In order to keep you safe away from unexpected accidents, and enjoy full benefits offered by our quality products during welding, please read the instruction in details prior to operation. Complying with procedures defined in this manual is always appreciated.

INDEX

1. Usage & Features.....	(3)
2. Safety Precautions.....	(4)
3. Installation.....	(6)
4. Principle in Brief.....	(8)
5. Operating Instruction.....	(10)
6. Attention	(13)
7. Technical Data.....	(14)

Appendix A: Ordinary failures, probable cause & countermeasures

This series inverter air plasma cutting machines which are the totally new-designed for metal processing apply state-of-the-art technologies of IGBT as well as PWM (Pulse width Modulation) soft switch. This series cutting machines can cut all types of metal material, especially for high alloy steel and non-ferrous metals which can not be cut by using flame cutting machine. This series welder enjoys reasonable static characteristic and sound dynamic characteristic, can perform HF arc start. The features are as following:

- 👉 *High power density, excellent arc stability, strong cutting force*
- 👉 *High cutting efficiency (Three to five times than flame cutting)*
- 👉 *Low cutting cost*
- 👉 *High quality cutting finish with narrow, clean and nearly vertical cutting edge.*
- 👉 *Less cutting distortion*
- 👉 *Stepless adjusting of cutting current*
- 👉 *Easier arc start*
- 👉 *Convenient for operation*
- 👉 *Small, light and portable*
- 👉 *High efficient, high power factor and energy-saving*
- 👉 *Low noise while cutting, strong adaptability.*
- 👉 *2-step and 4-step for various cutting lines, can reducing labor intensity while cutting long seam.*
- 👉 *Flexible in coupling with other machines to perform Auto Cutting.*



General safety precaution:

- Please strictly comply with rules defined in this manual to avoid unexpected accidents
- How to connect power supply ,select working area and use pressure gas, please comply with proper rules
- Not allow non-operator to enter working area
- Welder installation, inspection, maintenance, and manipulation must be completed by authorized person.
- Don't use cutting machine for unrelated purpose (Such as recharging, heating or pipeline thaw, etc.)
- Must take safe precaution in case cutter falling when it is put on the uneven ground



Avoid being electric shocked or burnt

- Never touch on hot electrical units.
- Please instruct the authorized electrician to ground the cutter frame by using proper-sized copper wire.
- Please instruct the authorized electrician to connect the welder to power supply by using proper-sized, well-insulated copper wire.
- When operating in the damp, space limited area, must ensure well-insulated between body and work piece
- When operating in the high-rising location, must ensure safety by using safe net.
- Please power off the machine while no longer cutting.



Avoid breathing in hazardous cutting fume or gas

- Please use specified ventilation to prevent being gas poisoned and asphyxiated.
- Especially in the container where oxygen is depleted easily.



Avoid being harmed by arc flash, hot spatter, slag

- Arc rays can injure your eyes and make your eyes feel uncomfortable. Hot spatter and slag can burn your skin.
- Please wear proper welding helmet, leather gloves, long- sleeved suit,

hat, apron and boots before welding.



Preventing from fire, explosion, container break accidents

- Don't put flammable material in the working area. Hot spatter and hot can easily start a fire.
- Cable must be connected the work piece firmly to ensure good conductivity in case causing fire by resistance heat.
- Don't weld in the flammable gas or weld container which contains flammable material, otherwise it can cause explode.
- Don't weld encapsulated container, otherwise it can break.
- Ensure a fire extinguisher at hand in case a fire breaks out.



Avoid being hurt by moving parts

- Never let the finger, hair, and cloth near the rotary cooling fan or other moving parts



Avoid being hurt by cutting machine while in transport

- When moving the cutting machine by fork-lift truck or crane, nobody can be allowed for standing downright the route of the moving cutter, in case being hurt by the falling welding machine.
- The ropes or wires which used for hanging up the cutting machine must be strong enough to withstand corresponding tension strength. The rope or wire inclination hanging on the tackle must be no more than 30°.

1. Installing situation

- (1) Must place welding machine in the room where is no straight sunlight, no rain, less dust, low humidity, and temperature range of $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- (2) The gradient of ground must be no more than 15°
- (3) Ensure no wind at the welding position, or use screen to block the wind.
- (4) The distance between cutter and wall must be more than 20cm, between welders more than 10cm to ensure enough heat radiation.
- (5) When using water cooled gun, must be care of not being frozen.

2. Requirement of input volt

- (1) Input volt must be standard sine wave, effective value $415\text{V} \pm 10\%$, frequency 50Hz/60Hz

Unbalance degree of 3- phase volt must be no more than 5%

3. Power supply

Product type		AIRCUT 60 I	AIRCUT 100 I	AIRCUT 120 I
Power supply		3 phase AC $415\text{V} \pm 10\%$ /50Hz/60Hz		
Min. capacity	Power network	10.5 KVA	20.5 KVA	38.5 KVA
	Generator	14 KVA	27.4 KVA	51.4 KVA
Input volt protection	Fuse	30 A	30 A	50 A
	Circuit breaker	32 A	32 A	63 A
Cable size (cross-section)	Input volt	4 mm^2	4 mm^2	4 mm^2
	Output volt	15 mm^2	15 mm^2	15 mm^2
	Ground lead	4 mm^2	4 mm^2	4 mm^2

Note: The size of fuse and breaker in the table are for reference only

4. Installation:

This series welder is small, light and portable. They will be more convenient if place them on the trolleys. Ensure the location where to place the welder is even.

Wire diagram as Fig. 1:

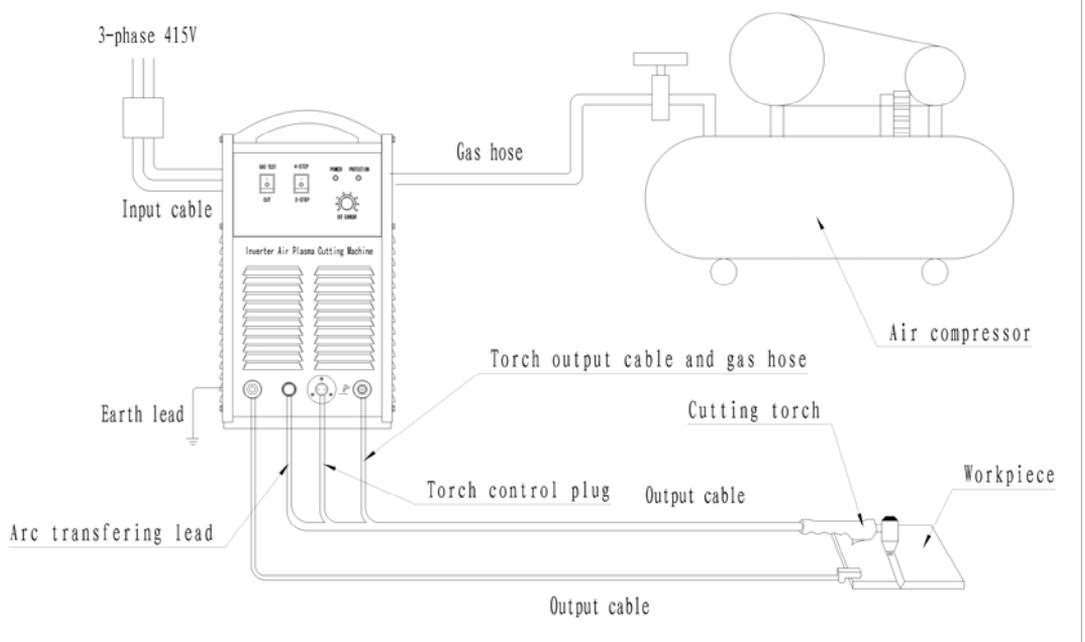


Fig 1

The max gas pressure of optional air compressor should be 0.8 Mpa and gas flow rate no less than 250L/min. Connect air compressor to inlet of air gauge on the rear panel of cutter. Power on air compressor will let gas pressure climb up to proper value for cutting. Then turn on air switch on the rear panel of the cutter.

Principle in Brief

Block diagram of principle AIRCUT series cutting machine:

Three phase 415V/50Hz

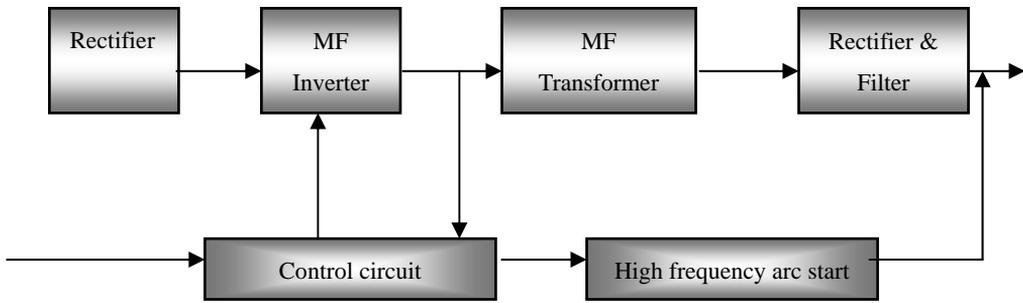


Fig. 2

This series cutting machines apply IGBT Middle Frequency inverter technology. Line frequency 3-phase input volt are rectified by rectifier, inverted into MF AC by IGBT components, insulated by MF transformer, rectified and filtered by MF rectifier, then output DC power suitable for cutting. After this process, the welder's dynamically responsive speed has been greatly increased, so the transformer and reactor size and weight are reduced noticeably result in energy saving.

Power sources enjoy sound drooping outer ability and anti-fluctuating ability to varying in input power supply due to loop control of reasonable logic circuit design. First, the signals of the set parameters transmit into set circuit to adjust output current. Secondly, the feedback circuit compare the set signals with feedback signals to determine output pulse width. Finally, driving circuit power-amplified the control pulse to drive IGBT. Meanwhile, protection circuit monitor over-current, low-voltage and overheat phenomenon to ensure reliable cutting. Because of reasonable sequence of logic control, the cutters can perform pre-gas flow, HF arc start, cutting and post-gas flow to be convenient for operator.

Output characteristic of LGK series cutting machines show as following:

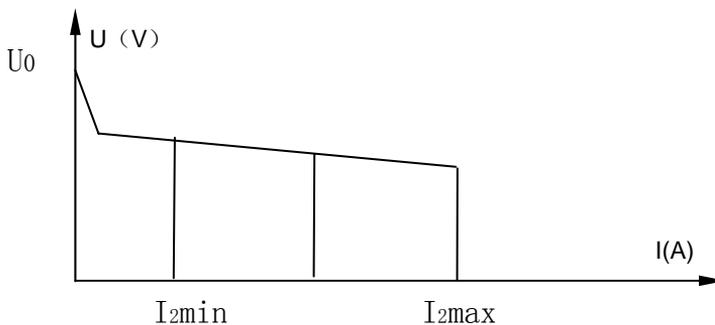


Fig. 3

1. Functional introduction

1.1 Front panel illustration and parts number reference

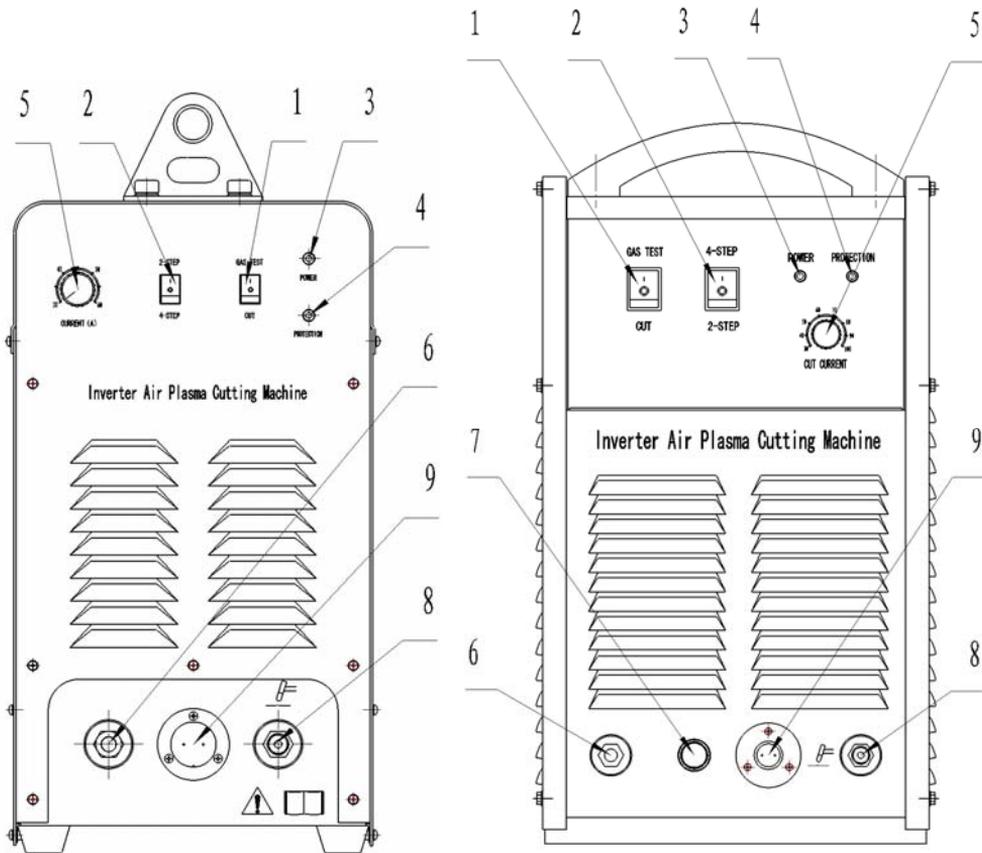


Fig.5

- (1) “Gas test/Cutting” switch (K1) (Purchase code: ASSWC09 for model 100/120; ASSWC06 for model 60)

Switch to “Gas test”, check if gas flow is normal; to “cutting” to perform air plasma cutting.

- (2) “2-step/4-step” switch (K2) (Purchase code: ASSWC09 for model 100; ASSWC06 for model 60)

Switch to “2-step”, perform cutting when push torch trigger, stop welding when release the trigger. This mode is suitable for short cutting seam. To “4-step”, after successfully starting arc by push torch trigger, then you can perform cutting by release the trigger, when you push torch trigger again, torch will stop cutting. This mode is suitable for long cutting seam.

- (3) “Power” indicator lamp (Purchase code: ASSSD07)
Lamp indicating whether power source is effectively connected to power supply
- (4) “Protection” indicator lamp (Purchase code: ASSSD09)
Cutting machine will automatically stop working when it is overheat, and the lamp will be light on.
- (5) “Welding current” regulation knob (Purchase code: ASRWN08 for knob; ASRWT02 for potentiometer)
Used to adjust welding current on panel control mode
- (6) Output cable socket (+) (Purchase code: ASCZK17)
Connect to work piece by output cable
(Purchase code for relevant quick plug: ASCZK16)
- (7) Arc transferring cable lug (+) (Purchase code: ASQT002)
Connect to arc transferring cable of non-contact type cutting torch. (Model 60 don’t have this)
- (8) Gas power connector (Purchase code: ASJTQ15)
Connect to the gas power connector of cutting torch.
- (9) Control cable socket (Purchase code: ASCZS04)
Connect to control cable of cutting torch

1.2 Rear panel illustration and parts number reference

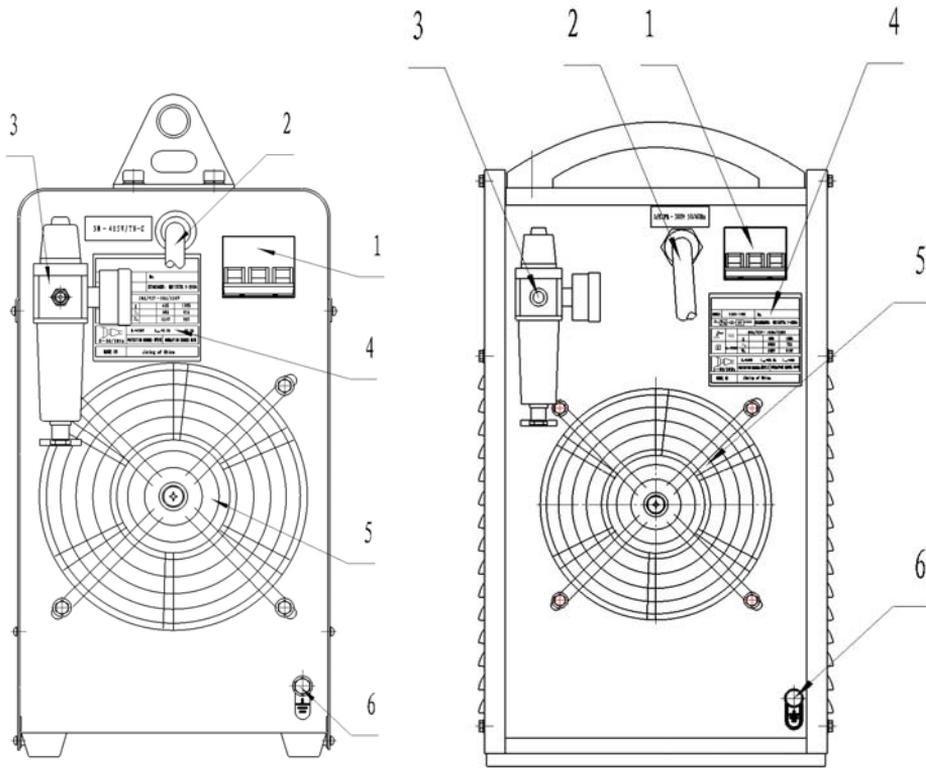


Fig 6

- (1) Air switch (Purchase code: ASSWK11 for model 120/100; ASSWK10 for 60)

The function of air switch is to protect cutting machine by automatic trip to turn-off power supply while in machine overload or failure. Normally, the switch flipped to upward means power-on. Use switch on the switch box to start or stop cutting machine, avoiding using the breaker.

- (2) Input power cable (Purchase code: ASXLD00)

It is 4-pin cable. The mixed-colored wire must be firmly grounded, the rest wires connect to corresponding 3-phase power supply (415V/50Hz).

- (3) Compressed air filter (Purchase code: AG0G0000)

Connect to air compressor by gas hose for reducing gas pressure and filtering moisture in the air. Adjust the knob to alter the output air pressure of filter, the values of air pressure displaying at the air gauge are normally in the range of 0.6-0.8Mpa. The water accumulated in the water trap should not touch on the filter element. Please let out the accumulated water in time by release the valve on the bottom. Otherwise, the cutting torch will intake water drops so that influence arc starting and cutting performance.

- (4) Name tag

- (5) Cooling fan (Purchase code: ASFFM00 for model 60; ASFFM01 for 100/120)
Cool down the heat components in the welding machine.
- (6) Ground bolt
To ensure operators not to be harmed and cutting machine to be working normally, make sure the ground bolt grounded firmly by ground lead , or ground wire(mixed-colored) of the input power cord grounded firmly.

2. Operating procedure

- 2.1 After going through periodical check process, power on the cutting machine, then working indicator will light on and cooling fan will spin.
- 2.2 Flip the “Gas test/Cutting” switch to “Gas test”.
The gas valve in the machine will turn on and let gas flow up to one minute to remove condensed water drops accumulating in the torch. Regulates the compressed air filter to let the hand of air gauge indicate 0.45 Mpa. Thus flip the “Gas test/Cutting” switch to “Cutting”.
- 2.3 Model 60 cutting machine applies contact type cutting torch. While cutting, should let the nozzle of torches touch on workpiece, then push the torch button to start arc.
Model 100 and MODEL 120 cutting machine apply non-contact type cutting torch. While cutting, should keep in distance form 3 to 5 mm between nozzle and workpiece to tart arc and allow no touch between nozzle and workpiece in the process.
- 2.4 Usually, cutting can begins at the margin of the workpiece, but also at any point on the workpiece. While in this cutting style, please tilt cutting torch a bit to blow molten metal result in forming start point of groove.
- 2.5 While in cutting, keep cutting torch moving at constant speed.
- 2.6 While stop cutting, move the torch away from workpiece after the plasma arc goes out completely. Otherwise the workpiece will be distorted by remained arc.

Attentions

1. When problems such as abnormal cutting seam, arc-interruption, difficult arc-start occurs, please check easy-worn-out consumables like nozzle or electrode and replace them if they are bad consumption.
2. When assembly electrode, gas diffuser, nozzle and nozzle cover, should aware of fitting up coaxially, nozzle cover press the nozzle toughly.
3. While in cutting, avoid moving cutting torch too quickly in case burning out nozzle due to arc flame rebounding from non-cut-through workpiece base as well as moving

too slow to influence cutting quality.

4. While in cutting, please keep air pressure in the range of 0.6 to 0.8Mpa. Let out accumulated water in the compressed air filter timely.
5. The machine equipped with low-voltage protection. The machine will automatic stop working when the input primary power is too low.
6. The machine equipped with overheat protection. The machine will automatic stop working when the temperature inside the machine is very high and the protection lamp on the front panel will light on.

Ordinary failures refer to appendix A.

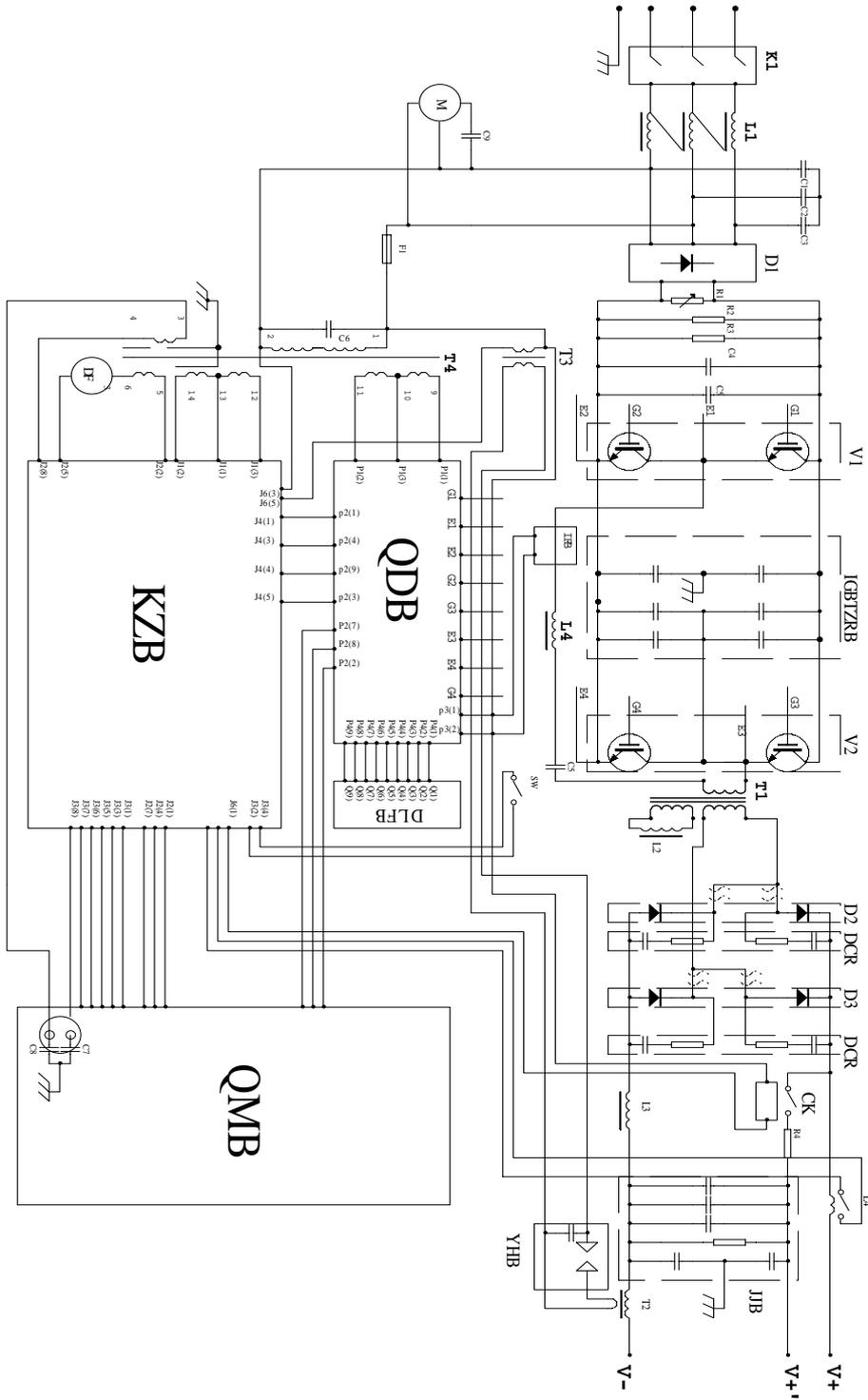
Technical Data

1. Main technical parameters

Items \ Model	AIRCUT 60 I	AIRCUT 100 I	AIRCUT 120 I
Input volt(V)	Three phase 415±10%/50Hz	Three phase 415±10%/50Hz	Three phase 415±10%/50Hz
Rated input capacity (KVA)	7.0	13.7	25.7
Rated input current (A)	6.6	14.6	27.5
Range of output current (A)	30—60	30—100	30—120
Open load (V)	385	385	345
Rated load volt (V)	104	120	128
Rated duty cycle	60%	60%	60%
Air pressure for cutting torch (MPa)	0.45	0.45	0.45
Cutting torch	G-60	G-100	G-120
Gas flow rate (L/min)	250	250	250
Max cutting thickness for carbon steel (mm)	15	30	35
Optimum cutting thickness for carbon steel	1-10	1-25	1-30
Dimension	501×232×495	576×297×557	576×297×557
Weight (Kg)	28.5	43.2	43.5
Insulated class of main transformer	H		
Insulated class of output reactor	B		

2. Main circuit diagram

MODEL 100 I, 120 I

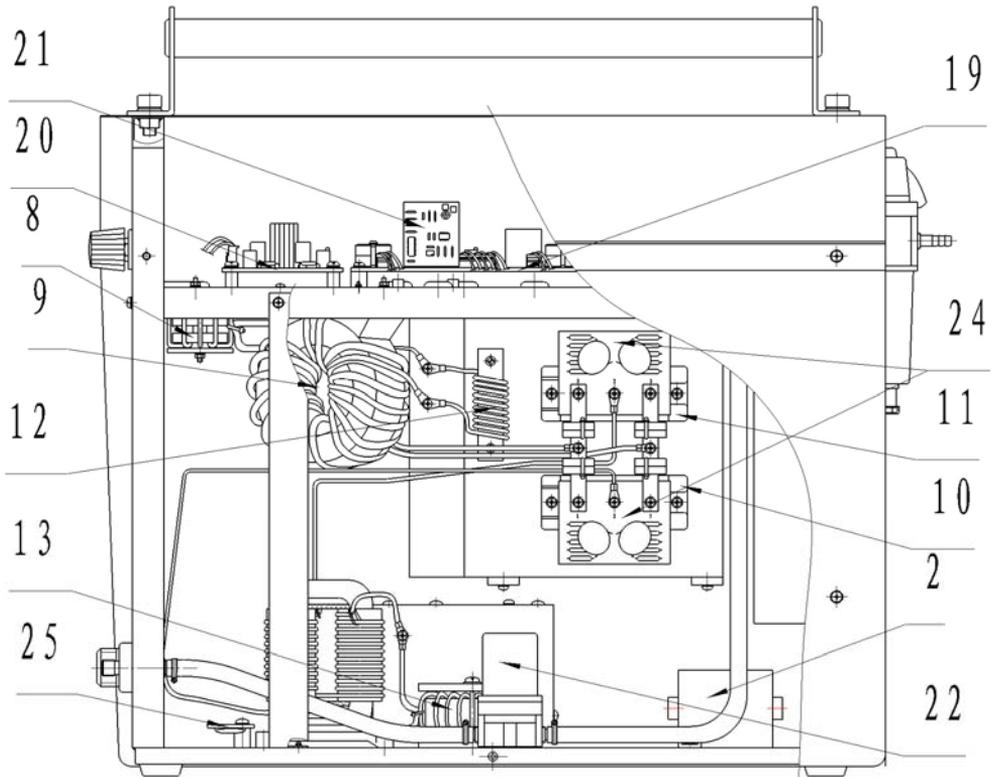


3. Main components/parts list

AIRCUT 60 I

Serial No	Parts/ components No	Name	Qty	Remark
1	ASSWK10	Air switch	1	
2	ASCCG18	Polypropylene capacitor	1	
3	ASSMZ00	3-phase rectified module	1	
4	ASRRY00	Volt sensitive resistor	1	
5	ASSMI01	IGBT module	2	
6	ABLBH0060	Current exchange inductor	1	
7	ASCCG12	Polypropylene capacitor	1	
8	ABGTX0400III	Resonance inductor	1	
9	ABLTZ0060	Main transformer	1	
10	ASSMK12	Fast recovery diode module	1	
11	ASSMK02	Fast recovery diode module	1	
12	ABNTH0250 II	Current exchange inductor	1	
13	ABLTS0100	Volt booster transformer	1	
14	ABGTG0400III	Stray transformer	1	
15	ABGTD0400IIIE	Power source transformer	1	
16	ASBXB00	Fuse	1	
17	ASFFM00	Axial flow fan	1	
18	ASSWR00	Thermal relay	1	
19	ABNQ00250 II	Driving board	1	
20	ABLK00060	Main control board	1	
21	ABLBA0060	Current feedback board	1	
22	ASDFD03	Electromagnet valve	1	
23	ASRWT02	Potentiometer	1	
24	ABLZ00100	Secondary side resistance and capacitor board	1	
25	ABLBJ0100	Capacitor board	1	

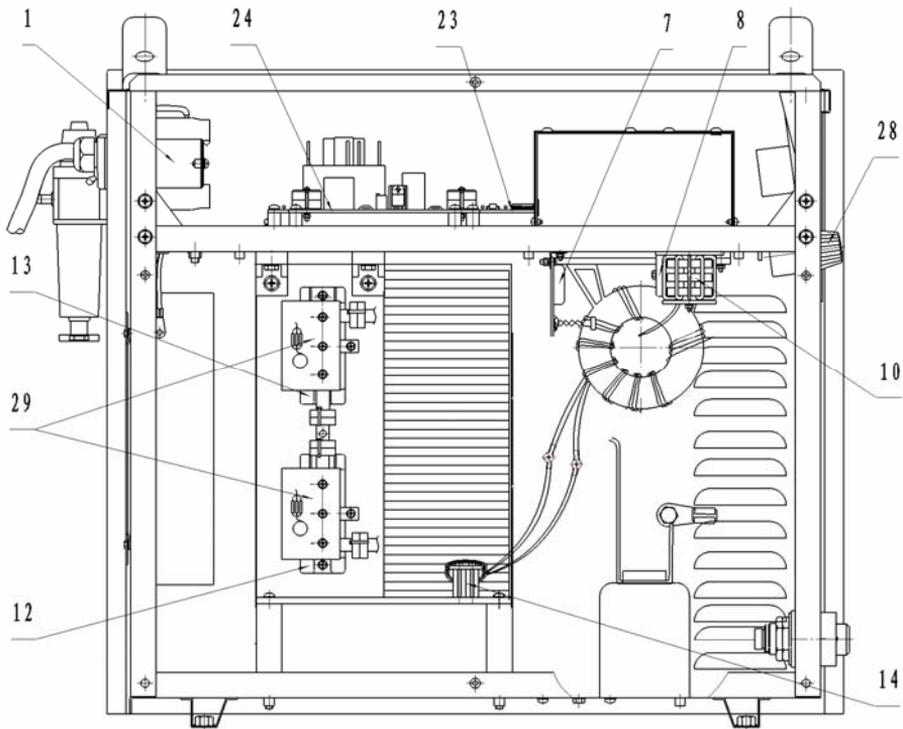
Structure schematic of AIRCUT 60 I



AIRCUT 100 I, 120 I

Serial No.	Parts/ components No	Name	Remark
1	ASSWK11	Air switch	
2	ABGTK0400	Input anti common-mode inductor	
3	ASCCG09	Polypropylene capacitor	
4	ASSMZ02	three-phase rectified module	For AIRCUT 100
	ASSMZ03		For AIRCUT 120
5	ASRRY00	Volt sensitive resistor	
6	ASSMI02	IGBT module	
7	ABLBH0100	Current exchange inductor	
8	ASCCG12	Polypropylene capacitor	
9	ABGBR0400	IGBT absorption capacitor board	For AIRCUT 100
	ABNBR0500		For AIRCUT 120
10	ABGTX0400	Resonance inductor	
11	ABLTZ0100	Main transformer	
12	ASSMK12	Fast recovery diode module	
13	ASSMK02	Fast recovery diode module	
14	ABGTH0400	Current exchange inductor	
15	ASRRX07	Wire wound resistor	
16	ABLZ001001	Dry reed components	
17	ABLTS0100	Volt booster transformer	
18	ABGTG0400	Stray transformer	
19	ABGTD0400 E	Power source transformer	
20	ASBXB00	Fuse	
21	ASFFM01	Axial flow fan	
22	ASSWR00	Thermal relay	
23	ABGQ00400	Driving board	
24	ABLK00100	Main control board	
	ABLK00120		
25	ABLBA0100	Current feedback board	
26	ASDFD03	Electromagnetic valve	
27	ASSWC09	Switch	
28	ASRWT02	Potentiometer	
29	ABLZ00100	Secondary side resistance and capacitor board	
30	ABLBJ0100	Capacitor board	

Structure schematic of AIRCUT 100 I / 120 I



Appendix A: Ordinary failures, probable cause & countermeasures

No	Trouble	Probable cause	Remedy
1	Indicator lamp does not light on and machine does not work when switches on.	<ul style="list-style-type: none"> ①Phase missing ②Fuse broken (2A) ③Power cable broken 	<ul style="list-style-type: none"> ①Inspect power source ②Inspect cooling fan, power source transformer and main control board ③Inspect cable
2	Overheat indicator lamp lights on	<ul style="list-style-type: none"> ①Too high temperature inside machine ②Thermal relay damaged 	<ul style="list-style-type: none"> ①Stop working till machine cools down ②Replace the thermal relay
3	No gas flows out while in gas test.	<ul style="list-style-type: none"> ①Electromagnet valve damaged ②Gas way blocked ③ “Gas test/Cutting” switch damaged ④ The output air pressure of air compressed filter is too high. 	<ul style="list-style-type: none"> ①Replace the electromagnet valve ②Inspect gas way ③Replace the switch ④Regulate pressure knob on the filter to reduce air pressure and release water valve. After air pressure get down, then tighten up the valve.
4	The cutting torch's button does not work.	<ul style="list-style-type: none"> ① Button damaged ② Wire broken ③Control board damaged 	<ul style="list-style-type: none"> ①Replace the button ② Connect the broken wire ③Replace control board.
5	Wider cutting clearance	<ul style="list-style-type: none"> ①Slow cutting speed ②Nozzle burnout 	<ul style="list-style-type: none"> ①Pick up cutting speed ②Replace the nozzle
6	Non- vertical cutting edge	<ul style="list-style-type: none"> ①Nozzle burnout ②Non-alignment of nozzle to electrode. ③ Tilt cutting torch 	<ul style="list-style-type: none"> ①Replace nozzle ② Re-assembly ③Adjust the cutting angle.

Note: Please consult with authorized persons if any other problems occur.

