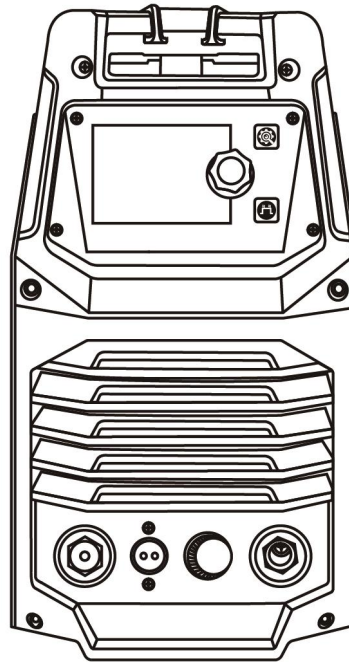


WARTER.

CUT
50 SE



 HF CUT
(PLASMA)

MANUAL INSTRUCTION

Keep this manual in a fresh and well-preserved place, and keep your proof of purchase. Only with this proof will your guarantee be valid if it comes to be needed.

This document is important for the preservation of equipment, safety, assembly, welding tips about the product.
If you need assistance, please contact our consultants through the website or e-mail office@cadabra.at

ATTENTION

Avoid losing your warranty, read the guarantee term before the equipment is used.

V.2.0 - 01

FOR YOUR SAFETY

Read and understand this manual before use

Keep this manual for future reference



EXPLANATION OF DANGER, MANDATORY AND PROHIBITION SIGNS.

	DANGER OF ELECTRIC SHOCK		DANGER OF WELDING FUMES
	DANGER OF EXPLOSION		DANGER OF ULTRAVIOLET RADIATION FROM WELDING
	WEARING PROTECTIVE CLOTHING IS COMPULSORY		WEARING PROTECTIVE GLOVES IS COMPULSORY
	DANGER OF FIRE		DANGER OF BURNS
	WARNING: MOVING PARTS		WARNING: MIND YOUR HANDS, MOVING PARTS
	DANGER OF NON-IONISING RADIATION		GENERAL HAZARD
	DO NOT USE THE HANDLE TO HANG THE WELDING MACHINE.		NO ENTRY FOR UNAUTHORISED PERSONNEL
	EYE PROTECTIONS MUST BE WORN		WEARING A PROTECTIVE MASK IS COMPULSORY
	USERS OF VITAL ELECTRICAL AND ELECTRONIC APPARATUS MUST NEVER USE THE MACHINE		PEOPLE WITH METAL PROSTHESES ARE NOT ALLOWED TO USE THE MACHINE
	DO NOT WEAR OR CARRY METAL OBJECTS, WATCHES OR MAGNETISED CARDS		NOT TO BE USED BY UNAUTHORISED PERSON USE INTENDED ONLY FOR EXPERTS OR INSTRUCTED PERSONS
			Symbol indicating separation of electrical and electronic appliances for refuse collection. The user is not allowed to dispose of these appliances as solid, mixed urban refuse, and must do it through authorised refuse collection centres.
			

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WARNING! BEFORE USING THE WELDING MACHINE READ THE INSTRUCTION MANUAL CAREFULLY.

1. SAFETY

The PLASMA CUTTING POWER SOURCE conform to international safety standards. Safety is an important issue in equipment design and manufacturing. There are, however, always certain hazards involved in using inverter power source. Therefore, to ensure your personal safety and the safety of your working environment, carefully read the safety instructions below and respect them.

1.1 General points of safety



During the cutting process, it may cause damage to you and others, please do well the protection. For the details, please refer to the safety protection guide to the operators that accord with the manufacturer accident prevention requirements.

Electric shock—it may cause death!

- In accordance with the application standard, install the grounding device well.
- When the skin is bare, wearing the wet gloves or wet clothes, contacting with live parts or working piece is strictly prohibited.
- Make sure that there is insulation state between you and ground as well as workpiece.
- Make sure that your working position is in the safe state.
- Only connect the inverter power source to an earthed electric network.
- Note the recommended mains fuse size.
- Do not take the inverter power source inside a container, vehicle or similar work piece.
- Do not place the inverter power source on a wet surface and do not work on a wet surface.
- Do not allow the mains cable to be directly exposed to water.
- Ensure cables or working torch are not squashed by heavy objects and that they are not exposed to sharp edges or a hot work piece.
- Make sure that faulty and damaged cutting torch are changed immediately as they can be lethal and may cause electrocution or fire.
- Remember that the cable, plugs and other electric devices may be installed or replaced only by an electrical contractor or engineer authorized to perform such operations.
- Turn off the PLASMA CUTTING POWER SOURCE when it is not in use.

Fume — likely do harm to health!

- Keep head out of fume.
- Use ventilation or exhauster in arc welding process to avoid breathing in weld gas.
- Ensure proper ventilation and avoid inhaling the fumes.
- Ensure sufficient supply of fresh air, particularly in closed spaces. You can also ensure the supply of clean and sufficient breathing air by using a fresh-air mask.
- Take extra precautions when working on metals or surface-treated materials containing lead, cadmium, zinc, mercury or beryllium.

Arc ray radiation—likely to injure your eyes and burnt skin!

- Wear appropriate welding mask, filter glass and protective clothing to protect your eyes and body.
- Use proper face mask or screen to protect onlooker from injury.

Spatter and fire

- Cutting spark may cause accidental fire, please make sure that there is no welding working position nearby the welding working position, equip with the fire extinguisher all around.
- Cutting is always classified as hot work, so pay attention to fire safety regulations during welding and after it.
- Remember that fire can break out from sparks even several hours after the cutting work is completed.
- Protect the environment from cutting splatter. Remove flammable materials, such as flammable fluids, from the cutting vicinity and supply the cutting site with adequate fire fighting equipment.
- In special cutting jobs, be prepared for hazards such as fire or explosion when cutting container type work pieces.
- Never direct the spark spray or cutting spray of a grinder toward the PLASMA CUTTING POWER SOURCE or flammable materials.
- Beware of hot objects or splatter falling on the machine when working above the machine.
- Cutting in flammable or explosive sites is absolutely forbidden.

Noise — excessive noise will do harm to hearing!

- Use ear shield or wear other hearing protection device to protect your ear.
- Warn the bystander that noise will cause potential damage to hearing.

Trouble—ask for help from professional personnel when trouble occurs, please contact your supplier or Our company's service center immediately to seek for help from professional personnel.

- When encounter difficulty in installation and operation, please ask for help from professional personnel.

Warning !

1. Install the leakage protection device when using the equipment!
2. Install a fuse or circuit-breaker when using the machine.
3. Non-operator (bystander) must be far away from the operation site for 5m, the operation site should be protected by enclosure.
4. It can't be used as the cardiac pacing, air pipe welding, and etc.
5. warning against the use of a welding power source for pipe thawing.

1.2 Key points of safety

This welding machine is furnished with overvoltage, overcurrent and overheating protection circuit. When electric grid voltage, output current and interior temperature exceed the setting standard, welding machine will stop automatically; but overuse(such as overvoltage) may damage PLASMA CUTTING POWER SOURCE, therefore, you should pay attention to the following points:

1.2.1 Ensure excellent ventilation!

This Plasma Cutting Power Source is of mini type welding machine. There is great working current passing through it when working, so natural ventilation could not satisfy the cooling requirement of Plasma Cutting Power Source, therefore, a built-in fan is provided to cool the Plasma Cutting Power Source effectively to make it work steadily.

The operator should ensure the ventilation not be covered or blocked, the distance from the Plasma Cutting Power Source to objects around it should not be less than 0.3m. User should always keep excellent ventilation which is vital to perfect working and long service life of Plasma Cutting Power Source.

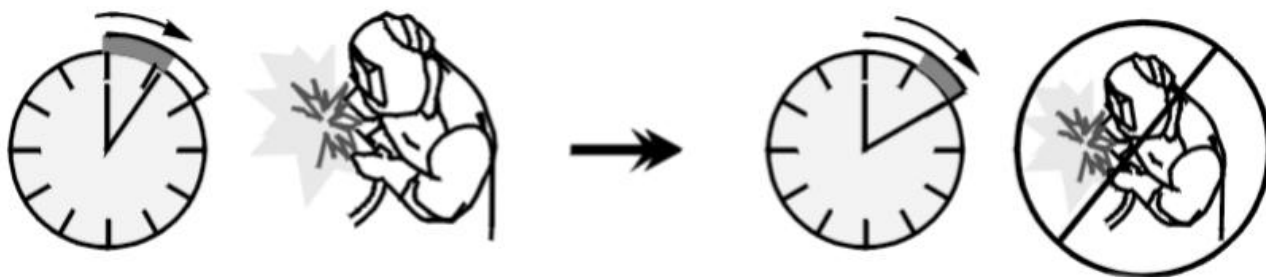
1.2.2 Overload is forbidden!

The operator shall observe and check the maximum allowable load current (relative to the selected duty cycle) from time to time to ensure that the welding current does not exceed the maximum allowable load current.

Current overload may shorten the service life of inverter power source remarkably even cause burnt of inverter power source.

The duty cycle of a inverter power source is the percentage of time in a 10-minute cycle at which the worker can operate the machine at rated working current.

30% Duty Cycle



Welding for 3 minutes.

Break for 7 minutes.

When the welder is working beyond the standard operating cycle, it may enter the protected mode and stop, which indicates that the welder has exceeded the standard operating cycle and excessive heat will activate the temperature detection switch, making the welder stop, at the same time, the indicator light on the front panel will be on. In this case, there is no need to unplug the power plug so that the cooling fan can operate continuously to cool the welding machine. When the light is off, the temperature has dropped to the standard range and can be resoldered.



Warning

When output exceed duty cycle grade, the temperature in equipment will rise up, at this moment, the protective circuit will work and disconnect the power source output, the equipment will not resume work until it cools to normal temperature.

Notice: Persistent overload may damage welding power source.

1.2.3 Overvoltage is forbidden!

The supply voltage is listed in "main performance parameter" table. In general, the automatic voltage compensation circuit in inverter power source will ensure the cutting current within the allowable range. When the power source voltage exceeds allowable value, the power source may be damaged. The operator should fully realize this instance and take corresponding preventive measures.

1.3 Use of personal protective equipment

1.3.1 The arc and its reflecting radiation damage unprotected eyes. Shield your eyes and face appropriately before you start cutting or observe cutting. Also note the different requirements for the darkness of the screen in the mask as the cutting current changes.

- 1.3.2 The arc radiation and spatters burn unprotected skin. Always wear protective gloves, clothing and footwear when cutting.
- 1.3.3 Always wear hearing protection if the ambient noise level exceeds the allowable limit (e.g., 85 dB(A)).

1.4 Other operating safety

- 1.4.1 Exercise caution when handling parts heated in cutting. For example, the tip of the cutting torch, the end of the welding tips and the work piece will heat during gouging to a burning temperature.
- 1.4.2 Never wear the device on the shoulder during cutting and never suspend it by the carrying strap during cutting.
- 1.4.3 Do not expose the machine to high temperatures, as heat may cause damage to the machine.
- 1.4.4 Keep the cutting torch cable and earth cable as close to each other as possible throughout their length. Straighten any loops in the cables. This minimizes your exposure to harmful magnetic fields, which may interfere with a pacemaker, for example.
- 1.4.5 Do not wrap the cables around the body.
- 1.4.6 In environments classified as dangerous, only use S-marked welding devices with a safe idle voltage level. These work environments include, for example, humid, hot or small spaces where the user may be directly exposed to the surrounding conductive pieces.
- 1.4.7 You should pay attention to prevent it's topple over if the welding power placed in inclined plane.
- 1.4.8 Forbid use the inverter power source to unfreeze pipeline.
- 1.4.9 Insulate yourself from the welding circuit by using dry and undamaged protective clothing.
- 1.4.10 Never touch the work piece and welding rod, welding electrode or contact tip at the same time.
- 1.4.11 Do not put the electrode holder or ground cable on the Plasma Cutting Power Source.
- 1.4.12 type (identification) of plasma cutting torches that are specified for use with the Plasma Cutting Power Source.
- 1.4.13 pressure, flow rate and type of plasma gas and if relevant, of cooling gas or cooling liquid.
- 1.4.14 steps or range of the output current and the corresponding plasma gas as a set of values

1.5 Transportation, lifting and suspension

- 1.5.1 Never pull or lift the machine by the electrode holder or other cables. Always use the lift points or handles designed for that purpose.
- 1.5.2 Only use a transportation platform designed for the equipment.
- 1.5.3 Try to transport the machine in an upright position, if possible.
- 1.5.4 Never use a welding machine when suspended
- 1.5.5 Do not exceed the maximum allowed load of suspension booms or the transportation trolley of inverter power source.

1.6 Environment

- 1.6.1 When the operator's action is limited by environment (such as: only can work on bended knees, on foot or lay), it must avoid directly contacting the current-carrying part on equipment with body.
- 1.6.2 Don't use the machine in the event the operating environmental space is very narrow and small which make the operator unable to step aside the current-carrying conductor.
- 1.6.3 Don't use the machine in humid environment, where the operators easy to sweat which make them in great electric shock risks
- 1.6.4 Don't conduct the cutting in the dust area or under the environment of corrosive gas.
- 1.6.5 Don't conduct the gas shielded cutting work under the environment of stronger air flow.
- 1.6.6 Inclination between placement of cutting machine and horizontal plane is $\leq 10^\circ$.
- 1.6.7 The inverter power source is not suitable for use in rain or snow, although it can be used and stored outdoors. Protect the equipment against rain, water and strong sunlight.
- 1.6.8 Always store the machine in a dry and clean space. Shield it from rain, and in temperatures exceeding +25 °C

from direct exposure to sun.

1.6.9 Protect the machine from sand and dust during use and in storage.

1.6.10 Place the machine so that it is not exposed to hot surfaces, sparks or spatters.

1.6.11 Make sure the airflow to and from the machine is unrestricted.

1.6.12 EMC classification of this product is class A in accordance with electromagnetic compatibility standards EN 60974-10, and therefore the product is designed to be used in industrial environment only.

1.6.13 Arc welding equipment always cause electromagnetic disturbance. To minimize the harmful effects of this, use the equipment strictly according to the operating manual and other recommendations.



WARNING: This class A equipment is not intended for use in residential locations where the electrical power is provided by a public low-voltage supply system. In those locations it may be difficult to ensure the electromagnetic compatibility due to conducted and radiated disturbances.

Ensure the welding machine is placed according to the following instructions:

- range of the temperature of the ambient air: during operation: -10 °C to +40 °C; after transport and storage at: -20 °C to +55 °C;
- relative humidity of the air: up to 50 % at 40 °C; up to 90 % at 20 °C;
- ambient air, free from abnormal amounts of dust, acids, corrosive gases or substances, etc. other than those generated by the welding process;
- altitude above sea level up to 1 000 m;
- Without oil sludge, water vapor and corrosive gas.
- No vibration and strike
- In rainproof and shade place
- More than 300mm to wall to ensure smooth cooling air-flow and excellent ventilation











1.7 Other information about the machine

1.7.1 Cooling method: fan cooling.

1.7.2 EMC is Class A according to CISPR II.

1.7.3 One Functions: Cut.

1.8 GRAPHIC SYMBOLS AND INDICATIONS

	Warning in operation
	Read this operation manual carefully before use
	It's forbidden to dispose electric waste with other ordinary waste. Please take care of our environment.
	Do not use outdoors
F	Insulation class
	Symbol of argon arc welding
	Symbol of Metal inert and active gas welding
	Symbol of Manual metal arc welding with covered electrodes
	Plasma cutting
	Single-phase static frequency converter-transformer rectifier
 1~50Hz	Symbol of single-phase AC power supply and rated frequency
S	Can be used in the environment which has high risk of electric shock.
IP	Degree of protection, such as IP21S
U₁	Rated AV input voltage (with tolerance ±10%)

I_{1max}	Rated maximum input current
I_{1eff}	Maximum effective input current
A/V-A/V	range of current regulation and corresponding load voltage.
X	Duty cycle The ratio of given duration time/the full-cycle time Note1: This ratio shall be within 0~1, and can be indicated by percentage. Note2: In this standard, the full-cycle time is 10min. For example, if the duty cycle is 60%, the load-applying time shall be 6min and the following no-load time shall be 4min.
U₀	No-load voltage, Open circuit voltage of secondary winding.
U₂	Load voltage Output voltage of rated load: U ₂ = (14+0.05I ₂) V For MIG function Output voltage of rated load: U ₂ = (10+0.04I ₂) V For TIG function Output voltage of rated load: U ₂ = (20+0.04I ₂) V For MMA function

GENERAL SAFETY INSTRUCTIONS FOR PLASMA CUTTING

The operator should be properly trained to use plasma cutting systems safely and should be informed about the risks related to arc welding/cutting procedures and associated techniques, about relevant safety measures and emergency procedures.

- Prevent direct contact with the cutting circuit; the no-load voltage supplied by the plasma cutting system may be dangerous under certain circumstances.
- When the cutting circuit cables are being connected or checks and repairs are carried, out the cutting system should be switched off and disconnected from the power supply.-Switch off the plasma cutting system and disconnect it from the power supply before replacing worn torch parts.
- Make the electrical connections and installation according to the health and safety standards and legislation in force.
- The plasma cutting system should be connected only and exclusively to a power supply network with the neutral lead
- connected to earth.
- Make sure that the power supply plug is correctly connected to the earth protection outlet.
- Do not use the plasma cutting system in damp or wet places or in the rain.
- Do not use cables with worn insulation or loosened connections.
- Do not use the cutting machine in damp or wet places and do not cut in the rain..



- Do not cut on containers or piping that contains or has contained liquid or gaseous products.
- Do not operate on materials cleaned with chlorinated solvents or near such substances.
- Do not cut on containers under pressure.
- Remove all materials (e.g. wood, paper, rags etc.) from the working area.
- Provide adequate ventilation or facilities for the removal of cut fumes near the arc; a systematic approach is needed in evaluating the exposure limits for the cut fumes, which will depend on their composition, concentration, and the length of exposure itself.
- Keep the gas bottle (if used) away from heat sources, including direct sunlight.



- Use electric insulation that is suitable for the torch, the workpiece and any metal parts that may be placed on the ground and nearby (accessible). This can normally be done by wearing gloves, footwear, head protection and clothing that are suitable for the purpose and by using insulating boards or mats.
- Always protect your eyes with the relative which must comply with UNI EN 169 or UNI EN 379, mounted on masks or use helmets that comply with UNI EN 175.
- Use the relative fire-resistant clothing (compliant with UNI EN 11611) and welding gloves (compliant with UNI EN 12477) without exposing the skin to the ultraviolet and infrared rays produced by the arc; the protection must extend to other people who are near the arc by way of screens or sheets.
- Noise: If the daily personal noise exposure (LEPd) is equal to or higher than 85 dB(A) because of particularly intensive.



- The flowing of cutting currents generates electromagnetic fields (EMF) around the cutting circuit. Electromagnetic fields can interfere with certain medical equipment (e.g. Pace-makers, respiratory equipment, metallic prostheses etc.). Adequate protective measures must be adopted for persons with these types of medical apparatus. For example, they must be forbidden access to the area in which plasma cutting systems are in operation.

This plasma cutting system conforms to technical product standards for exclusive use in an industrial environment for professional purposes. It does not assure compliance with the basic limits relative to human exposure to electromagnetic fields in the domestic environment.

The operator must adopt the following procedures in order to reduce exposure to electromagnetic fields:

- Fasten the two cables as close together as possible.
- Keep head and trunk as far away as possible from the cutting circuit.
- Never wind cables around the body.
- Do not cut with the body within the cutting circuit. Keep both cables on the same side of the body.
- Connect the cutting current return cable to the piece being cut, as close as possible to the position of the cut itself.
- Do not cut while close to, sitting on or leaning against the plasma cutting system (keep at least 50 cm away from it).
- Do not leave objects in ferromagnetic material in proximity of the cutting circuit.
- Minimum distance $d = 20$ cm .



- Class A equipment:

This PLASMA CUTTING system conforms for domestic use and industrial purpose. Please pay attention to the affection of electromagnetic field in the domestic environment and in premises directly connected to a low-voltage power supply system feeding buildings.



EXTRA PRECAUTIONS

PLASMA CUTTING OPERATIONS

- In environments with heightened risk of electric shock;
- In confined spaces;
- In the presence of inflammable or explosive materials;
- MUST be evaluated in advance by an "Expert supervisor" and must always be carried out in the presence of others who have been taught how to intervene in emergencies.
- Cutting operations MUST BE PROHIBITED if the operator is supporting the weight of the power source (using slings for example).
- The operator MUST NEVER BE ALLOWED to carry out cutting operations if above ground level, unless safety platforms are used.
- WARNING! USING THE PLASMA CUTTING SYSTEM SAFELY. The safeguards provided by the manufacturer (interlocking system) can only be guaranteed to work properly if the torch model and corresponding power source as indicated in the "TECHNICAL DATA" are used.
- DO NOT USE non-original torches or consumable parts.
- DO NOT ATTEMPT TO USE THE POWER SOURCE with torches that are made for cutting or WELDING procedures but are not contemplated in this instruction manual.
- FAILURE TO COMPLY WITH THESE RULES may give rise to a SERIOUS safety hazard for the user and may also damage the apparatus.



RESIDUAL RISKS

- TIPPING: place the plasma cutting power source on a horizontal surface with adequate load-bearing capacity; otherwise (e.g. sloping or uneven floor etc.) the apparatus is in danger of tipping over.
- IMPROPER USE: it is dangerous to use the plasma cutting system for any work other than that for which has been designed.
- Never lift the plasma cutting system without first disconnecting and removing all interconnection and power supply cables and piping.
- Do not use the handle to hang the plasma cutting system.

2. INTRODUCTION AND GENERAL DESCRIPTION

Plasma cutting system with compressed air mono-phase, with fan. Used for fast cutting without deformation on steel, stainless steel, galvanized steel, aluminum, copper, brass etc.

The cutting cycle is started by a pilot arc, which is established between the mobile electrode and the nozzle/hood of the torch by the short circuit current between these two elements: this technology also enables, other than continuous cutting, cutting of grids and/or perforated sheet metal.

Furthermore, adjustment of the current from the minimum to maximum allows you to ensure a high-quality cut as the thickness and type of metal varies.

2.1 MAIN CHARACTERISTICS

- Torch voltage control device.
- Air pressure, torch short-circuit control device.
- Thermostatic safeguard.
- No air protection (where applicable).
- Overvoltage, undervoltage.
- Air pressure display (where applicable).
- Torch cooling command (where applicable).
- Internal air compressor (where planned).

2.2 STANDARD ACCESSORIES

- Plasma cutting torch.
- Fitting for compressed air connection (where applicable).
- Earth cable

3. TECHNICAL DATA

3.1 DATA PLATE

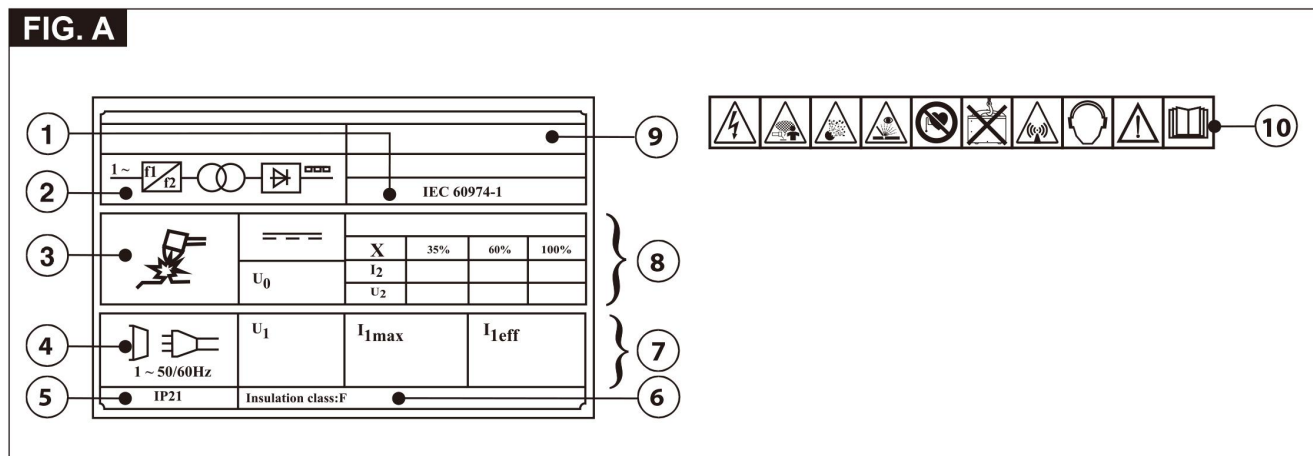


Fig. A

The most important data regarding use and performance of the welding are summarized on the rating plate and have the following meaning:

- 1- IEC standard of reference, for safety and construction of Arc welding equipment (Welding power sources).
- 2- Single- or three-phase static frequency converter-transformer rectifier.
- 3- Cutting process symbol for example.
- 4- SUPPLY CIRCUIT, number of phases (for example 1 or 3), symbol for alternating current and the rated frequency (for example 50 Hz or 60 Hz).
- 5- Degree of protection, for example IP21 or IP23.
- 6- Insulation Class information.
- 7- Technical specifications for power supply line:

- U_1 : RATED SUPPLY VOLTAGE (allowed limit $\pm 10\%$);
- I_{1max} ... A : RATED MAXIMUM SUPPLY CURRENT.
- I_{1eff} ... A : MAXIMUM EFFECTIVE SUPPLY CURRENT
- 8- Performance of the welding circuit:
 - U_0 ... V : RATED NO-LOAD VOLTAGE.
 - I_2 : Rated WELDING CURRENT symbol
 - U_2 : CONVENTIONAL LOAD VOLTAGE symbol.
 - X : Values of the DUTY CYCLE at an ambient temperature of 40 °C.
- 1) ... % : DUTY CYCLE at the RATED MAXIMUM WELDING CURRENT;
- 2) 60 % : DUTY CYCLE;
- and
- 3) 100 % DUTY CYCLE as far as relevant.
- ... % shall not be used if the DUTY CYCLE for the RATED MAXIMUM WELDING CURRENT is 60 % or 100 %.
- 60 % shall not be used if the DUTY CYCLE at the RATED MAXIMUM WELDING CURRENT is 100 %.

Exegesis: duty cycle

X

SUPERSEDED: duty factor

ratio, for a given time interval, of the uninterrupted on-load duration to the total time

Note 1 to entry: This ratio, lying between 0 and 1, is expressed as a percentage.

Note 2 to entry: For the purposes of this document, the time period of one complete cycle is 10 min. For example: in the case of a 60 % DUTY CYCLE, a continuous 6 min load period is followed by a no-load period of 4 min.

- ... A/... V to... A/... V : Range of output, minimum WELDING CURRENT and its corresponding CONVENTIONAL LOAD VOLTAGE or less, maximum WELDING CURRENT and its corresponding CONVENTIONAL LOAD VOLTAGE or greater.

9- Name and address of the manufacturer or distributor or importer and, optionally, a trademark and the country of origin, if required.

10-  : Size of delayed action fuses to be used to protect the power line.

11- Symbols referring to safety regulations, whose meaning is given in chapter 1 "General safety considerations for arc welding".

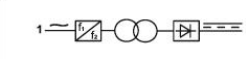
Note: The data plate shown above is an example to give the meaning of the symbols and numbers; the exact values of technical data for the welding machine in your possession must be checked directly on the data plate of the welding machine itself.

3.2 CUTTING MACHINE TECHNICAL DATA



1- TECHNICAL DATA at 40°C according to IEC 60974-1:2012 Standard


CUT 50 SE
WARTER.


IGBT INVERTER WELDING MACHINE



IEC 60974-1
IEC 60974-10(CLASS A)

		20A/88V~50A/100V			
		X	18%	60%	100%
	$U_0 = 308V$	I_2	50A	28A	23A
		U_2	100V	91.2V	89.2V
	1 ~ 50Hz	$U_1 = 230V$	$I_{1max} = 35.2A$	$I_{1eff} = 15.5A$	
Protection Class		IP21S	Insulation Grade		F







ATTENTION!

The duty cycle is tested under 40°C according to the IEC 60974-1, IEC 60974-10(CLASS A).

Normally, if you weld in an environment below 40°C, the actual duty cycle rate of the machine will be higher than the data indicated on the nameplate. To ensure your safety, we strongly recommend that you select the fuse with the highest specification (Fuse > I_{1max}) !!!



CAUTION


While cutting at 40A with higher duty cycle than table, you need to change overcurrent protection for a 20A ~ 40A type D, and change for a proper input plug (or connect directly to power network).

Practical data for overcurrent protection and cutting time.(40°C)


Fuse/Overcurrent protection type	Cutting current	Cutting time(Second)
D16/16A	40A	150'
D16/16A	20A	non Stop

Caution: that the machine can reach a load rate of 25% (150 seconds) (40°C, 50A), need to change for a proper input plug (above 20A) (or connect directly to power network)

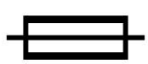
Example:

1

 PHASE

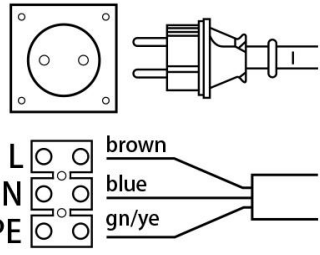
220V+/-10%
50/60 Hz



16A
SLOW

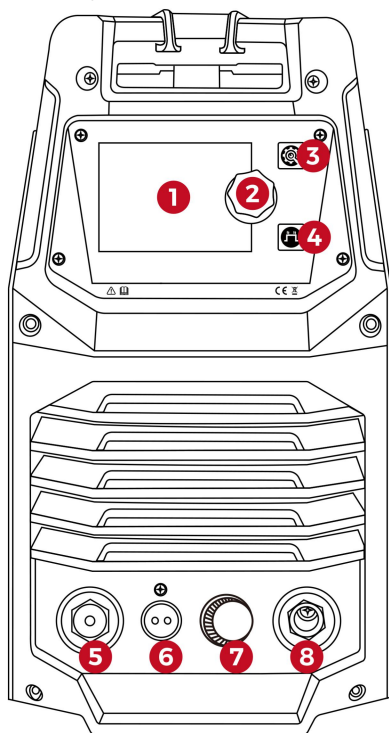


20A
SLOW



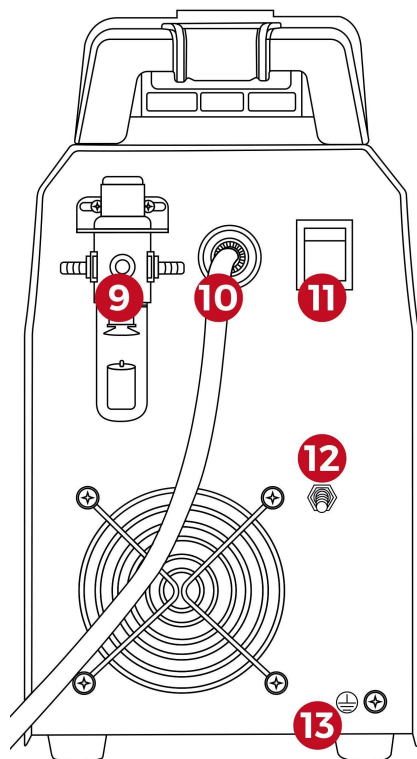
4.DESRIPTION OF THE PLASMA CUTTING MACHINE

4.1 CONTROL, ADJUSTMENT AND CONNECTING DEVICES.(Fig. B)



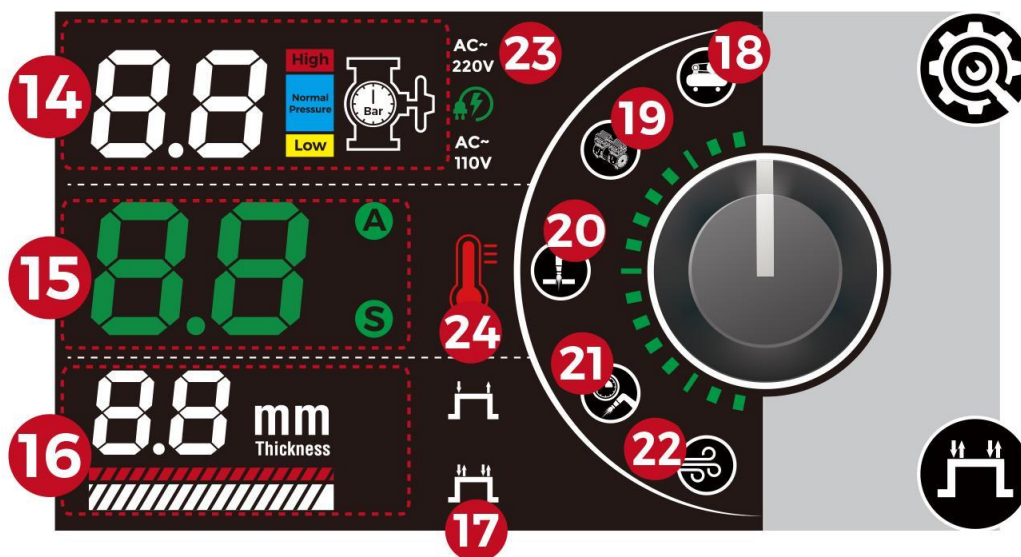
FRONT PANEL (Fig.B)

1. LED Screen.
2. Value adjustment knob.
3. Advanced Setting Button.
4. 2T/4T Selecting Button
5. Gas and electrical connector
6. Torch switch control connector
7. Arc starter wire connector
8. Grounding clamp connector



REAR PANEL (Fig.B)

9. Air regulator
10. Power core.
11. Power Switch
12. Air Inlet
13. Grounding Terminal



Front Panel Layout (Fig.B)

14. Pressure (Bar) display

- Yellow Indicator: When the air pressure is less than 2.0 bar, the yellow indicator will be activated. It means that the air pressure is too low for cutting.
- Blue Indicator: When the air pressure is within the range between 2.0 and 6.5 Bar, it will be lightened up. It means that the machine is under normal cutting air pressure.
- Red Indicator: When the air pressure is higher than 6.5 bar, the red indicator will be activated. It means that the air pressure is too high. When the air pressure is higher than 7.2 bar, the red indicator will flash, reminding the user paying attention to the risk of big air pressure may lead to the air tube exploded.

15. Current / Time display.

16. Recommended cutting thickness display.

17. 2T or 4T (It cannot adjust at the Mesh Cutting Function)

18. External air compressor mode: The icon will light up when connecting with the external air compressor.

19. Built-in air compressor mode (if there is no built-in air compressor, this icon will not light up)

20. Cutting Function Selection: Normal Plate Cutting or Mesh Cutting

- Mesh Cutting Setting: Press the Advanced Setting Button and the ICON flashing, rotate the knob to "ON", indicating that the Mesh Cutting Function is activated.

- Normal Plate Cutting: Press the Advanced Setting Button and the ICON flashing, rotate the knob to "---", and the ICON light-off, indicating that it's selected for normal Cutting.

Note: The Mesh Cutting Function cannot be used when the metal thickness exceeds 10 mm.

21. ARC Maintenance Time Setting:

In the cutting state, the arc maintenance time can be set from 2 seconds to 9.9 seconds.

22. Post-Flow Time Setting:

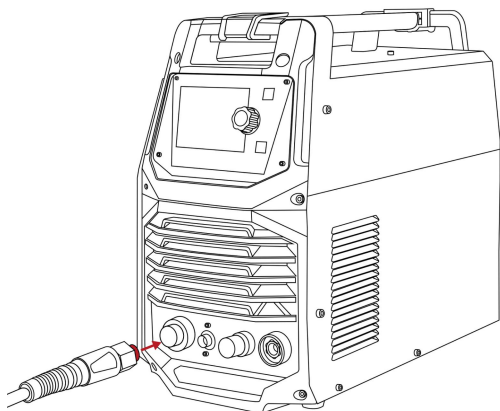
It can be adjusted the time of air flow from 2s to 9.9s for cooling the metal and cut torch after cutting.

23. Input Voltage Indication.

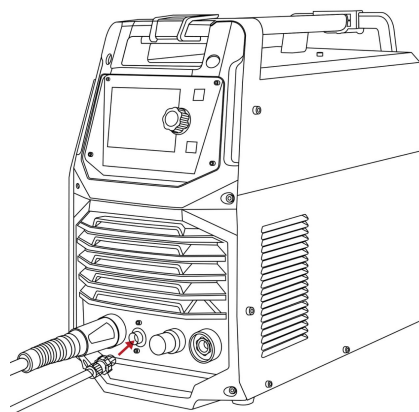
24. Error protection/warning icon.

5.SET UP FOR PLASMA CUTTING

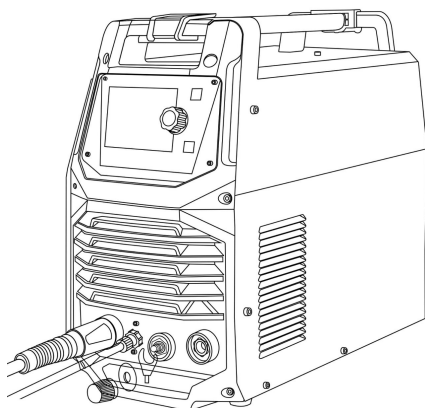
- ① Connect the gas-electric joint and rotate it to fix it.



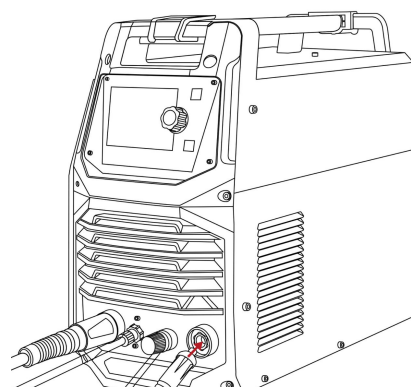
- ② Connect the torch switch.



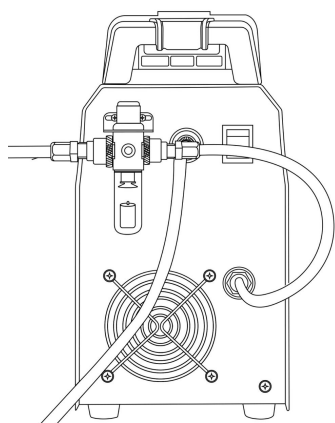
- ③ Connect the Arc starter wire.



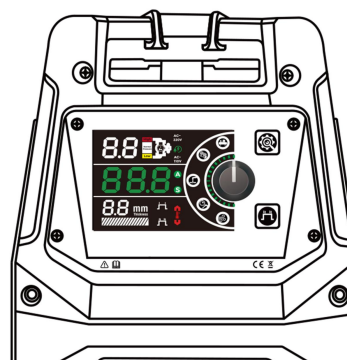
- ④ Connect the Earth Clamp, twist to lock in place. Connect to the work piece.



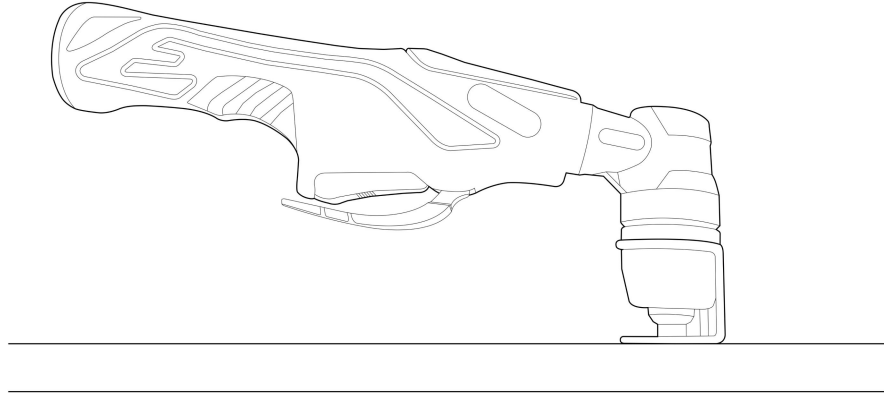
- ⑤ Connect the gas source.



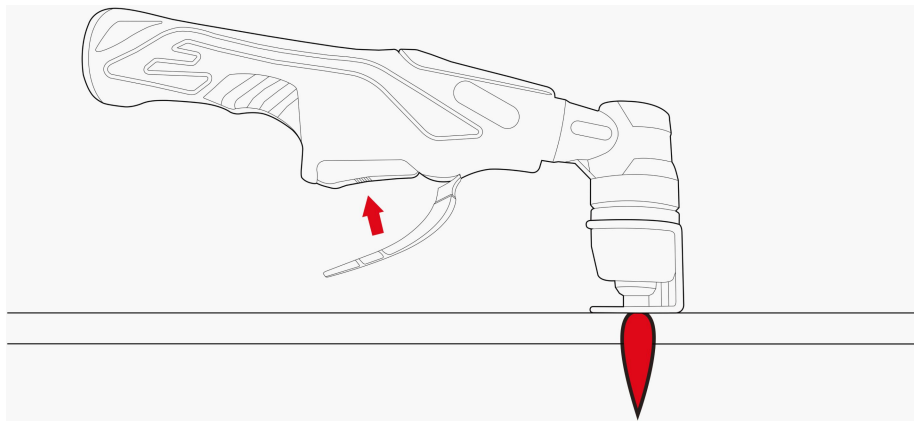
- ⑥ Turn on the machine and Set up cutting parameters.



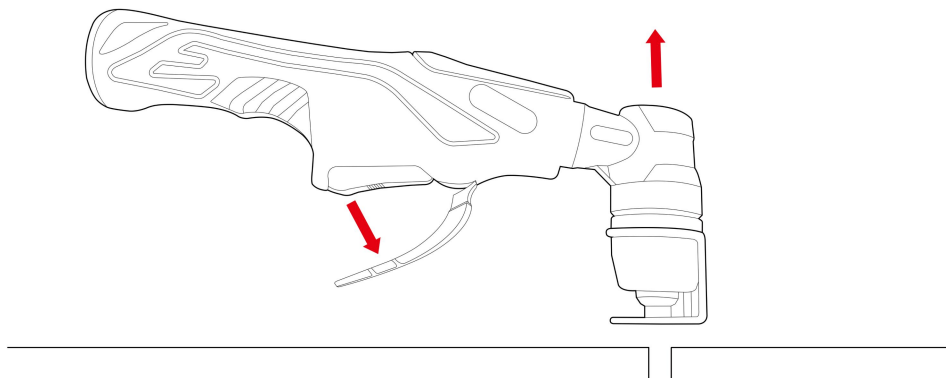
⑦ Position the torch vertically



⑧ Pull the trigger to energise the arc. When the cutting arc has cut through the edge of the plate start moving evenly in the direction you wish to cut.



⑨ To finish the cutting release the torch switch. The air flow will continue for seconds (Setting time via Post Gas function) to cool the torch head. Do not disconnect air until this cooling period has been completed. Failure to do this will result in torch head damage.



IMPORTANT!

Do not exceed the maximum input pressure of 8 bar. Air containing large quantities of humidity or oil can cause excessive wear of consumable parts or damage the torch. If in doubt concerning the quality of the compressed air available, it is recommended to use an air dryer to be installed downstream of the inlet filter. Use a hose to connect the compressed air line to the machine, using the fitting supplied for assembly on the air intake filter.

6. PLASMA CUTTING GUIDE

6.1 PROCESS DESCRIPTION

The plasma arc and plasma cutting application principle.

Plasma cutters work by passing an electric arc through a gas that is passing through a constricted opening. The electric arc elevates the temperature of the gas to the point that it enters a 4th state of matter. We all are familiar with the first three: i.e., Solid, liquid, and gas. Scientists call this additional state plasma. As the metal being cut is part of the circuit, the electrical conductivity of the plasma causes the arc to transfer to the work. The restricted opening (Tip) the gas passes through causes it to squeeze by at high speed, like air passing through a venturi in a carburettor. This high-speed gas cuts through the molten metal. Plasma cutting was invented as a result of trying to develop a better welding process. Many improvements then led to making this technology what it is today. Plasma cutters provide the best combination of accuracy, speed, and affordability for producing a variety of flat metal shapes. They can cut much finer and faster than oxy-acetylene torches.

Operation:

1. When the trigger is squeezed, DC current flows through the torch lead into the tip.
2. Next, compressed air flows through the torch head, through the air diffuser that spirals the airflow around the electrode and through the hole of the cutting tip.
3. A fixed gap is established between the electrode and the tip. (The power supply increases voltage in order to maintain a constant current through the joint.) Electrons arc across the gap, ionizing and superheating the air creating a plasma stream.
4. Finally, the regulated DC current is switched so that it no longer flows to the tip but instead flows from the electrode to the work-piece. Current and airflow continue until cutting is stopped.

Amperage

The standard rule of thumb is the thicker the material, the more amperage required. On thick material, set the machine to full output and vary your travel speed. On thinner material, you need to turn down the amperage and change to a lower-amperage tip to maintain a narrow kerf. The kerf is the width of the cut material that is removed during cutting.

Speed

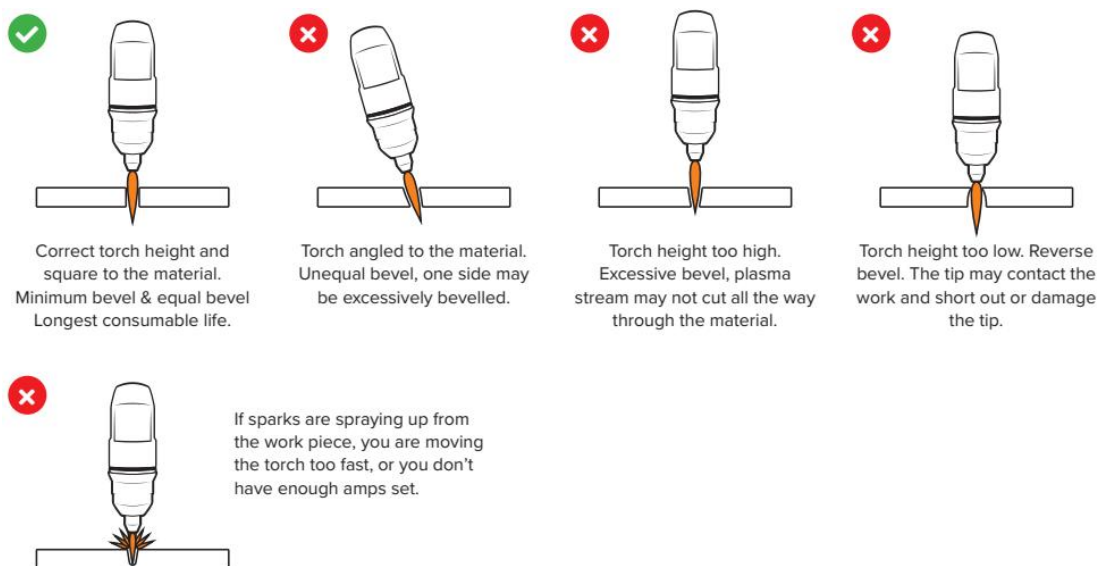
Amperage and speed are critical to producing a good quality cut. The faster you move (especially on aluminum), the cleaner your cut will be. To determine if you're going too fast or too slow, visually follow the arc that is coming from the bottom of the cut. The arc should exit the material at a slight angle away from the direction of travel. If it's going straight down, that means you're going too slow, and you'll have an unnecessary build-up of dross or slag. If you go too fast, it will start spraying back onto the surface of the material without cutting all the way through. Because the arc trails at an angle, at the end of a cut, slow your cutting speed and angle the torch in to cut through the last bit of metal.

Direction

It is easier to pull the torch towards you than push it. The plasma stream swirls as it exits the tip, biting one side and finishing off on the other, leaving a bevelled edge and a straight edge. The bevel cut effect is more noticeable on thicker material and needs to be taken into consideration before starting your cut as you want the straight side of the cut to be on the finished piece you keep.

Torch tip height & position

The distance and position of the plasma torch cutting tip affect the quality of the cut and the extent of the bevel of the cut. The easiest way to reduce bevel is by cutting at the proper speed and height for the material and amperage that is being cut.



ATTENTION!

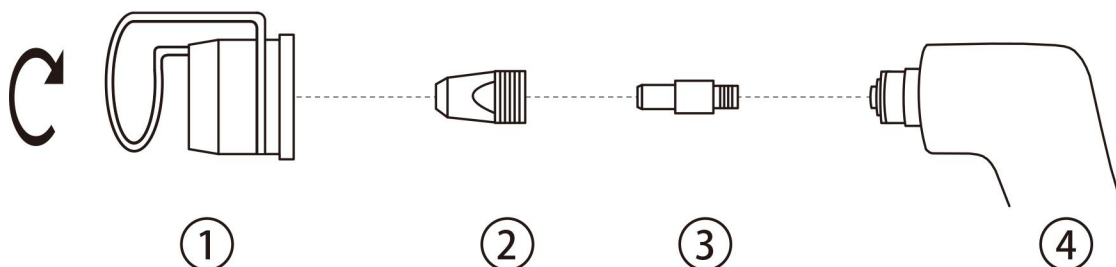
Failure to comply with the above rules renders the safety system (class I) ineffective, with resulting serious risks for people (e.g. electric shock) and for property (e.g. fire).

BEFORE MAKING THE FOLLOWING CONNECTIONS MAKE SURE THE CUTTING MACHINE IS SWITCHED OFF AND DISCONNECTED FROM THE POWER SUPPLY OUTLET.

1) Connect air compressor

- External air compressor, Please connect the air compressor correctly and adjust the appropriate pressure

2) Check whether the cutting torch is configured correctly.



Tip size and condition

The tip orifices focus the plasma stream to the workpiece. It is essential to use the correct size tip for the amperage being used, for example, a tip with a 1.0mm orifice is suitable for 0-40 amps whereas a 1.2mm orifice is better for 40-80 amps. The low-amp tip has a smaller orifice which maintains a narrow plasma stream at lower settings for use on thin-gauge material. Using a 25 amp tip at a 60 amp setting will blow out and distort the tip orifice and require replacement. Conversely, using an 80-amp tip on the lower settings will not allow you to focus the plasma stream as well and creates a wide kerf. The condition of the tip orifice is critical to the quality of the cut result, a worn or damaged tip orifice will produce a distorted plasma stream resulting in poor cut quality.

Electrode condition

A fixed gap is established between the electrode and the inside of the cutting tip — electrons arc across the gap, ionizing and superheating the air creating the plasma stream. The electrode contains an insert at the end made of a highly

conductive material called hafnium. This insert erodes with use and develops a pit at the end of the electrode when the pit becomes too much poor-quality cuts will result and necessitate replacement of the electrode.

Air pressure and volume

Air pressure, flow rate and air quality are critical to quality plasma cutting and consumable life span. The required air pressure and volume can vary from model to model, and the manufacturer will provide the specs.

A compressor with a L/min rating slightly higher than the plasma would be more than adequate. If you are doing a lot of cutting, cutting thick plate (same air consumption but slower cut speeds = longer cut time), then choose a compressor at 1.5 to 2 times the plasma system requirement.

Air quality

Good, dry air is essential to quality plasma cutting and consumable life span.

Compressors take in air at atmospheric pressure and increase the pressure and store it in a tank. Humidity in the air is condensed in the tank and the airlines producing water, more so in humid environments. Moisture that forms in airlines tends to condense into larger drops when the air pressure decreases as it is entering the plasma torch. When these droplets enter into the high temperatures (as much as 11,000°C) in the plenum of the torch, they immediately break down into oxygen and hydrogen, which alters the regular chemical content of the air in the torch. These elements will then dramatically change the plasma arc which causes the torch consumable parts to wear very quickly, alters the shape of the nozzle orifice, dramatically affecting cut quality in terms of edge squareness, dross formation, and edge smoothness.

Minimizing the moisture in the air supply is absolutely critical to quality plasma cuts and longevity of consumable parts. As a minimum be sure to drain the receiver (tank) on the air compressor at least daily.

Most air plasma systems from reputable manufacturers have an onboard particulate filter and or a coalescing filter with an auto drain that will remove some moisture from the air supply. For home workshop and light industrial users, the onboard air filter is adequate. Most situations, however, will require additional filtration to prevent moisture from affecting the quality of the plasma cutter and in most cases, it is recommended to install a submicronic particulate filter that is designed to trap water through absorption. This style of filter has a replaceable filter cartridge that absorbs water and must be changed after it is near saturation; it should be installed close as possible to the air intake of the plasma cutter.

General Tips

- It is easier to pull the torch through the cut than to push it.
- To cut thin material, reduce the amperage until you get the best quality cut.
- Use the correct size tip orifice for the amperage being used.
- For straight cuts use a straight edge or cutting buggy as a guide. For circles, use a template or circle cutting attachment.
- Check that the front end consumable parts of the plasma cutting torch are in good condition.

7. MAINTENANCE



WARNING: BEFORE CARRYING OUT MAINTENANCE OPERATIONS MAKE SURE THE CUTTING MACHINE IS SWITCHED OFF AND DISCONNECTED FROM THE MAIN POWER SUPPLY. ROUTINE MAINTENANCE CAN BE CARRIED OUT BY THE OPERATOR.

7.1 ERROR CODE

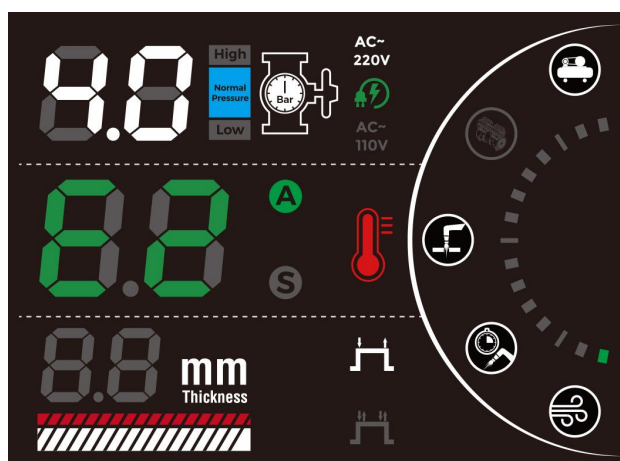
P4: This code will appear when the actual arc maintenance time exceeds the set arc maintenance time. Release the torch and restart to recover



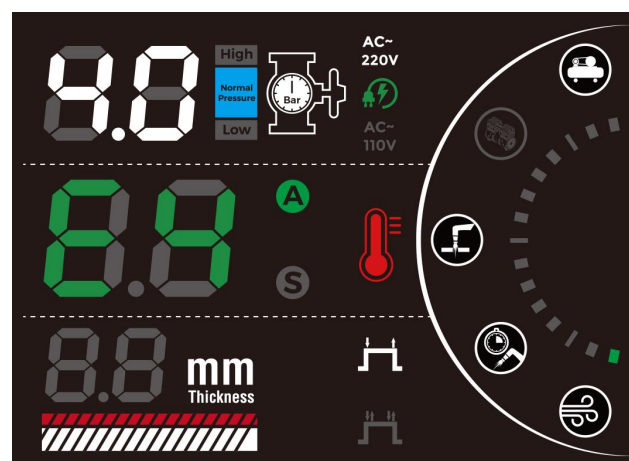
E1: Overcurrent



E2: Overheat



E4: Undervoltage



7.2 TORCH

Check the wear level of the torch parts used by the plasma arc regularly, depending on the level of use. The replacement frequency of the consumables depends on various factors: as indicated in the paragraph "MOST COMMON CUTTING DEFECTS"

1 - Nozzle holder.

Unscrew it from the torch head by hand. Clean thoroughly or replace it if damaged (burns, deformation or cracks). Check the condition of the upper metal section (torch safety actuator).

2 - Nozzle / Hood.

Check the wear level of the plasma arc flow hole and the internal and external surfaces. Replace the nozzle if the hole has widened compared to the original diameter or is deformed. If the surfaces are particularly oxidized, clean them with very fine sandpaper (FIG. M).

3 - Air distributor ring / diffuser.

Check there are no burns or cracks and that the airflow holes are not blocked. Replace immediately if damaged.

4 - Electrode.

Replace the electrode when the depth of the crater that forms on the emission surface reaches about 1.5 mm (FIG. N).

5 - Torch body, handgrip and cable

Normally these components do not require any particular maintenance except periodic inspection and thorough cleaning without using solvents of any nature. If the insulation is damaged showing cracks or burns or the electric conductors are loose, the torch can no longer be used due to lack of conformity with the required safety conditions. In this case, repairs (extraordinary maintenance) can not be performed on-site, as they must be performed by an authorized service center capable of conducting the special tests after the repair. To maintain the torch in good working condition, some fundamental precautions must be taken:

- Do not bring the torch or cable in contact with hot or scorching parts.
- Do not apply excessive strain on the cable.
- Do not lay the cable on sharp corners, points or abrasive surfaces.
- Wind the cable into regular coils if it is longer than required.
- Do not allow any vehicle to drive over the cable and do not tread on it.
- Except in special cases, we recommend changing the electrode and nozzle at the same time.
- Assemble the torch components in the correct order (the reverse of the order for dismantling).
- Make sure that the distributor ring is fitted the right way round.
- When re-assembling the nozzle holder, screw it down manually, forcing it slightly.
- Never ever fit the nozzle holder before you assemble the electrode, distributor ring and nozzle.
- Do not keep the pilot arc struck in air for no reason as this will increase electrode, diffuser and nozzle wear.
- Do not tighten the electrode too much as this could damage the torch.
- Prompt, correct inspection procedures for the consumable parts of the torch are essential for safe, correct operation of the cutting system.
- If the insulation is damaged, with breakages, cracks or burns etc., or if the electric leads are loose, the torch may not be used because it does not satisfy safety requirements. In this case repairs (extraordinary maintenance) cannot be done on the spot and the torch must be sent to an authorized service center, which will be able to carry out the special tests needed after the repair has been done.

EXTRAORDINARY MAINTENANCE

EXTRAORDINARY MAINTENANCE OPERATIONS SHOULD BE CARRIED OUT ONLY AND EXCLUSIVELY BY SKILLED OR AUTHORISED ELECTRICAL-MECHANICAL TECHNICIANS AND IN COMPLIANCE WITH THE TECHNICAL STANDARD IEC/EN 60974-4.



WARNING!

BEFORE REMOVING THE MACHINE PANELS AND WORKING INSIDE IT MAKE SURE THAT IT HAS BEEN SWITCHED OFF AND DISCONNECTED FROM THE MAIN POWER SUPPLY.

If checks are carried out inside the machine while it is live, this may cause serious electric shock due to direct contact with live parts.

- Inspect the inside of the machine regularly, with a frequency depending on the amount of use and dust in the environment, and remove dust that has deposited on the transformer, rectifier, inductance and resistors, using a jet of dry compressed air (max 10 bar).
- Do not direct the jet of compressed air onto the electronic boards; these can be cleaned with a very soft brush or suitable solvents.
- Take the opportunity to make sure the electrical connections are tight and there is no damage to the wiring insulation.
- Make sure the compressed air circuit hoses and connections are intact and leak-free.
- When these operations have been completed, re-assemble the panels on the machine and tighten the fastening screws right down.
- Never ever carry out cutting operations with the machine open.
- After having carried out maintenance or repairs, restore the connections and wiring as they were before, making

sure they do not come into contact with moving parts or parts that can reach high temperatures. Tie all the wires as they were before, being careful to keep the high voltage connections of the primary transformer separate from the low voltage ones of the secondary transformer. Use all the original washers and screws when closing the casing.

8. TROUBLESHOOTING

IF OPERATION IS UNSATISFACTORY, AND BEFORE CARRYING OUT MORE SYSTEMATIC CHECKS OR CONTACTING OUR SUPPORT CENTRE, CHECK:

- The led is not on, signaling intervention of the safety thermal switch for over or undervoltage or short circuit.
- Ensure you have observed the nominal duty cycle ratio; in the event of intervention of the thermostatic protection, wait for the machine to cool naturally, check the fan is working.
- Check the line voltage: if the value is too high or too low, the machine remains blocked.
- Check there is no short circuit on machine output: in this case, proceed to eliminate the problem.
- The cutting circuit connections are carried out correctly, particularly the earth cable clamp is actually connected to the piece and without inter-positioning insulating materials (e.g. paint).

MOST COMMONLY OCCURRING CUTTING DEFECTS

During cutting operations it is possible that defects occur, which are not normally caused by operating faults in the system but by other operational matters such as:

a - Insufficient penetration or excessive slag formation:

- Cutting rate too high.
- Over-inclined torch.
- Piece too thick or cutting current too low.
- In appropriate compressed air pressure-flow.
- Worn electrode and torch nozzle.
- Inappropriate nozzle-holder tip.

b - Arc transfer failure:

- Worn electrode.
- Poor contact of the return cable terminal clamp.

c - Interrupted cutting arc:

- Cutting rate too low.
- Torch-piece distance too high.
- Worn electrode.
- A safeguard has triggered.

d - Inclined cut (not perpendicular):

- Incorrect torch position.
- Asymmetric wear on nozzle hole and/or incorrect assembly of torch components.
- Inappropriate air pressure.

e - Excessive nozzle and electrode wear:

- Excessively low air pressure.
- Contaminated air (humidity, oil or other contaminants).
- Nozzle holder damaged.
- Excessive pilot arc start in air.
- Excessive speed with smelted particles return on the torch components.
- The average length of the cut.
- The air quality (presence of oil, humidity or other contaminants).
- Perforation of the metal or cut starting from the edge.
- The torch-piece distance is not appropriate when cutting.

DECLARATION OF CONFORMITY

Cadabra GmbH

Declares that the welding machines:

CUT-50 SE

Conforms to the following directives:

2014/35EU, 2014/30/EU

And has been designed in compliance with the following standards:

EN 60974-1:2012, EN 60974-10:2021

20.12.2024

(Cadabra GmbH)

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AUSTRIA)