



MODEL

# NOVACUT 66 LCD

## **INSTRUCTION MANUAL**

for installation,  
use and maintenance  
of welding  
machines.

Original instructions in Italian.  
Please keep for future use.

1.995.227 EN - Rev. 1.1



# Contents

<b>1. PREFACE</b>	<b>4</b>
1.1. PURPOSE OF THE INSTRUCTION MANUAL FOR USE AND MAINTENANCE	4
1.2. RECIPIENTS	4
1.3. STORAGE OF THE INSTRUCTION MANUAL	5
1.4. UPDATING THE INSTRUCTION MANUAL	5
1.5. HOW TO READ THE INSTRUCTION MANUAL	5
1.6. TERMS, SYMBOLS AND PICTOGRAMS	5
<b>2. GENERAL INFORMATION</b>	<b>6</b>
2.1. MANUFACTURER IDENTIFICATION DATA	6
2.2. MACHINE IDENTIFICATION DATA AND PLATES	6
2.3. DECLARATIONS OF CONFORMITY	7
2.4. SAFETY STANDARDS	7
2.5. INFORMATION ON TECHNICAL ASSISTANCE	7
2.6. PREPARATION BY THE CUSTOMER	7
<b>3. SAFETY</b>	<b>8</b>
3.1. GENERAL SAFETY WARNINGS	8
3.2. INTENDED USE	12
3.3. CONTRAINDICATIONS FOR USE	13
3.4. HAZARDOUS AREAS	13
3.5. SAFETY DEVICES	13
3.6. SIGNS	13
3.7. RESIDUAL RISKS	14
<b>4. INSTALLATION</b>	<b>15</b>
4.1. SHIPPING	15
4.2. PACKAGING	15
4.3. MACHINE RECEIPT	15
4.4. HANDLING AND LIFTING	15
4.5. UNPACKING	16
4.6. STORAGE	17
4.7. PREPARATIONS	17
4.8. ASSEMBLY/POSITIONING	17
4.9. CONNECTIONS	18
4.10. PRELIMINARY CHECKS	18
<b>5. MACHINE DESCRIPTION</b>	<b>19</b>
5.1. OPERATING PRINCIPLE	19
5.2. FEATURES AND MAIN COMPONENTS	19
5.3. ENVIRONMENTAL CONDITIONS	19
5.4. LIGHTING	19
5.5. VIBRATIONS	19
5.6. NOISE	20
5.7. TECHNICAL SPECIFICATIONS	20

<b>6. MACHINE USE</b>	<b>21</b>
6.1. MACHINE LAYOUT DESCRIPTION	21
6.1.1. LAYOUT FOR THE FRONT AND REAR PANEL	21
6.1.2. FURTHER CONTROLS EXPLAINED	21
6.2. INSTALLATION & OPERATION	23
6.2.1. ELECTRICAL CONNECTION	23
6.2.2. COMPRESSED AIR REQUIREMENTS	23
6.2.3. BASIC OPERATION	23
6.2.4. CUTTING OPERATION	23
6.2.5. CNC SOCKET DIAGRAM	25
6.3. PLASMA CUTTING GUIDE	26
6.3.1. CUTTING GUIDE	26
6.3.2. OPERATING TECHNIQUES	26
6.4. START-UP	27
6.5. NORMAL STOP	27
6.6. DECOMMISSIONING	28
<b>7. MAINTENANCE</b>	<b>28</b>
7.1. MACHINE ISOLATION	28
7.2. SPECIAL PRECAUTIONS	28
7.3. CLEANING	28
7.4. ROUTINE MAINTENANCE	29
7.5. WELDING MACHINE REPAIRS	29
7.6. DIAGNOSTICS AND TROUBLESHOOTING	31
<b>8. ACCESSORIES AND SPARE PARTS</b>	<b>32</b>
8.1. CUSTOMER SERVICE	32
8.2. SPARE PARTS	32
<b>9. ADDITIONAL INSTRUCTIONS</b>	<b>32</b>
9.1. WASTE DISPOSAL	32
9.2. DECOMMISSIONING AND DISMANTLING	32
<b>10. ANNEXES</b>	<b>34</b>
10.1. ELECTRICAL SCHEMATIC DRAWING	34
10.2. SPARE PARTS	35

## 1. PREFACE

### 1.1. PURPOSE OF THE INSTRUCTION MANUAL FOR USE AND MAINTENANCE

This manual has been designed to provide the user with general knowledge of the machine and to allow it to be used safely.

This instruction manual is an integral part of the machine and has the purpose of providing all the information necessary to ensure:

1. safe handling of the machine, either packaged and unpackaged;
2. correct machine installation;
3. knowledge of the technical specifications of the machine;
4. thorough understanding of machine operations and limitations;
5. indication of the qualifications and specific training required of those operating and carrying out maintenance work on the machine
6. in-depth knowledge of its intended, unforeseen and prohibited uses;
7. its proper and safe use;
8. how to carry out correct and safe maintenance and repair operations;
9. technical assistance and management of spare parts;
10. disposal of waste produced by the machine;
11. the safe dismantling of the machine in accordance with applicable regulations to protect workers' health and the environment.

This document assumes that the applicable occupational health & safety and hygiene regulations are complied with at the site where the machine will be used.

**IMPORTANT: Those in charge have the responsibility, in accordance with current legislation, to carefully read the contents of this Instruction Manual and ensure that operators and maintenance personnel read the parts relevant to them.**

The customer has the responsibility to make sure that, if this document is modified by the Manufacturer, only the updated versions of the manual are actually present at the workplace.

The instructions, documentation and drawings found in this Manual are of a confidential technical nature and strictly the property of the Manufacturer, therefore, aside from the purpose for which it was produced, any reproduction in whole or in part of the contents and/or format must have the prior consent of the Manufacturer.

THE OFFICIAL LANGUAGE CHOSEN BY THE MANUFACTURER IS ITALIAN. The manufacturer cannot be held liable for translations in other languages that do not conform to the original meaning (ORIGINAL INSTRUCTIONS).

### 1.2. RECIPIENTS

This Instruction Manual is intended for the installer, the operator/user, the system manager, the system safety manager and the qualified or qualified and authorised technician authorised to maintain the machine.

**INSTALLER:** Technician authorised by the manufacturer and expert in handling, installation, connection and adjustment of the machine.

**OPERATOR/USER:** This is the person in charge of using the machine and cleaning it.

**PLANT MANAGER:** The individual who makes the adjustments and the programming.

**PLANT SAFETY MANAGER:** Person responsible for verifying that all applicable safety regulations and the provisions set out in this manual are observed.

**QUALIFIED TECHNICIAN:** Qualified person who, by virtue of an accurate technical knowledge of the machine and all the safety procedures, performs ordinary maintenance and minor repairs.

**QUALIFIED AND AUTHORISED TECHNICIAN:** Highly qualified person, trained and authorised by the manufacturer to make significant adjustments and extraordinary maintenance or repairs during the warranty period.

**EXPOSED PERSON:** Any person who is wholly or partly in a dangerous area (near the machine and exposed to risk due to his or her safety).

The machine is intended for industrial use, so its use is strictly for qualified, skilled technical personnel, in particular those:

- over 18 years of age;
- physically and psychologically capable of performing particularly difficult technical work;
- sufficiently trained to use the machine and carry out maintenance work on it;
- deemed suitable for carrying out the task entrusted to them by their employer;

- capable of comprehending and interpreting the operator manual and the safety instructions;
- familiar with the emergency procedures and how to implement them;
- have understood the operational procedures established by the machine's Manufacturer.

### 1.3. STORAGE OF THE INSTRUCTION MANUAL

The Instruction Manual must be carefully stored and must accompany the machine each time it changes hands throughout its life cycle.

It should be kept in good condition by handling it with care, with clean hands, and not placing it on dirty surfaces.

Parts of the manual must not be removed, torn or changed.

The Manual should be kept close to the machine to which it refers in an environment free from humidity and heat.

### 1.4. UPDATING THE INSTRUCTION MANUAL

The Manufacturer is only liable for the Instructions issued and validated by itself (Original Instructions); any translations **MUST** always be accompanied by the Original Instructions to verify the correctness of the translation. In any case, the Manufacturer is not liable for translations that have not been approved by the Manufacturer himself, thus if an inconsistency is detected, attention must be paid to the original language and, if necessary, the manufacturer's sales office should be contacted, which will make the changes deemed appropriate.

The Manufacturer reserves the right to make changes to the project, changes/improvements to the machine and updates to the Instruction Manual without previously informing Customers. However, should changes be made to the machine installed at the Customer's site, in agreement with the Manufacturer and involving the adaptation of one or more chapters of the Instruction Manual, the Manufacturer shall provide the Customer with the parts of the Instruction Manual that concern the change, with the new global revision model. The Customer shall be responsible, following the instructions that accompany the updated documentation, for replacing any parts that are no longer valid with the new ones.

### 1.5. HOW TO READ THE INSTRUCTION MANUAL

The Manual is split into chapters, each one dedicated to a specific category of information addressed to the personnel for whom the relevant qualifications have been defined.

To facilitate immediate comprehension of the text, terms, abbreviations and pictograms are used, the meanings of which can be found in Paragraph 1.6.

### 1.6. TERMS, SYMBOLS AND PICTOGRAMS

To highlight parts of text of significant importance the following symbols were adopted:

**ATTENTION:** Indicates the need to adopt appropriate behaviours so as not to put people's health and safety at risk and not to cause damage to the machine or the environment.

**HAZARD:** Indicates situations of serious danger that can seriously endanger the health and safety of people.

**IMPORTANT:** Indicates technical information of particular importance which should not be neglected.

The following pictogram stickers are affixed to the machine, depending on the version:



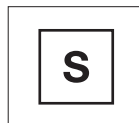
The product complies with the safety requirements provided by the applicable EU directives or regulations.



Carefully read the instructions listed in the manual.



Machine subjected to general danger (see instruction manual).



Machine used in environments with a high risk of electric shock.



**WARNING!**  
Moving mechanical parts.  
(For MIG generators only)

## 2. GENERAL INFORMATION

### 2.1. MANUFACTURER IDENTIFICATION DATA

MANUFACTURER: SINCOSALD S.r.l

HEADQUARTERS - OFFICES

**via della Fisica, 26/28**

**20864 Agrate Brianza (MB) Italy**

**Tel: +39 039 641171**

**Fax: +39 039 6057122**

CONTACTS:









**export@sincosald.it www.sincosald.it**

### 2.2. MACHINE IDENTIFICATION DATA AND PLATES

Each machine is identified by a CE plate on which its reference data is indelibly marked. For any communication with the manufacturer or service centre always quote these references.

**IMPORTANT: The plate must not be removed for any reason, under penalty of forfeiture of the guarantee and the unavailability of spare parts due to failure to be identified. The position of the nameplate on the Machine can vary from machine to machine.**

NOVACUT 66 LCD

SINCOSALD S.r.l Via della Fisica 26/28 Agrate B.za - MB - Italy		 <b>sincosald</b>		
NOVACUT 66 LCD		SERIAL NUMBER		
		EN 60974 - 1		
		20A - 88 V / 65A - 106 V		
	U <sub>o</sub> 450 V	X	90 %	100 %
		I <sub>2</sub>	65 A	61 A
		U <sub>2</sub>	106 V	104 V
		CL = H		
3 ~ 50/60 Hz.		U <sub>1</sub> = 400 V	I <sub>1max</sub> = 18 A	I <sub>1eff</sub> = 17.1 A
IP 23				
				

### NOVACUT 66 LCD plate explanation

- Pos. 1** Name and address of the manufacturer and trademark
- Pos. 2** Identification of the welding machine model
- Pos. 3** Welding machine serial number
- Pos. 4** Welding machine type symbol: Transformer - Rectifier for arch welding
- Pos. 5** Reference to the legislation followed for welding machine construction: EN 60974-1
- Pos. 6** Welding with PLASMA procedure
- Pos. 7** Symbol indicating that the welding machine can be used in environments with an increased risk of electric shock
- Pos. 8** Welding current symbol: Direct/Alternating Current
- Pos. 9** Rated no-load voltage U<sub>0</sub> in V
- Pos. 10** Electric adjustment range of the welding machine: minimum and maximum rated welding current, with the relevant charged voltages
- Pos. 11** Welding machine service factor (X): this figure indicates the welding machine service factor as a percentage of a 10-minute work cycle. Example X = 60% - I<sub>2</sub> 350 A, these data indicate that the welding machine on a work cycle can weld with a current I<sub>2</sub> = 350 A for a time of 6 minutes out of 10, that is 60%.
- Pos. 11a** Service factor: 90 %
- Pos. 11b** Service factor: 100 %
- Pos. 12** Rated welding current (I<sub>2</sub>)
- Pos. 12a** Value of the rated welding current at 90 %
- Pos. 12b** Value of rated welding current at 100 %
- Pos. 13** Conventional load voltage (U<sub>2</sub>)
- Pos. 13a** Voltage at 90 % load
- Pos. 13b** Voltage at 100 % load
- Pos. 14** Symbol for the welding machine power supply and number of phases (3) followed by the direct/alternating current symbol
- Pos. 15** Indicates the degree of welding machine protection: IP 23
- Pos. 16** Insulation class
- Pos. 17** Rated power voltage
- Pos. 18** Maximum current in PLASMA welding
- Pos. 19** Actual current in PLASMA welding
- Pos. 20** Product complies with the safety requirements established by the applicable EU directives or regulations
- Pos. 21** See chapter 9. ADDITIONAL INSTRUCTIONS

## 2.3. DECLARATIONS OF CONFORMITY

The machine is constructed in compliance with the relevant EU Directives, applicable at the time of its entering onto the market.

## 2.4. SAFETY STANDARDS

The machine was built in accordance with the following standards and directives:

Harmonised standards
IEC 60974-1 - IEC 60974-5 - IEC 60974-10
Directives
EN 60204-1 - 2014-35-EV - 9231 EEC - 9368 EEC
Standards
EN/IEC 61000-3-12 - EN/IEC 61000-3-11 - EN/IEC 61000-3-3

## 2.5. INFORMATION ON TECHNICAL ASSISTANCE

The machines are covered by a warranty, as provided for in the general conditions of sale.

If during the warranty period you experience a malfunction or failure of the machine parts, which fall under the cases covered by the warranty, the manufacturer, after the necessary machine checks, will repair or replace defective parts.

The goods travel at the customer's risk; product damage caused by transportation or unloading is not covered by the warranty. All equipment and consumables supplied with the product are also excluded from the warranty.

It is reminded that any modifications carried out by the user, without the express written consent of the manufacturer, will void the warranty and free the manufacturer from any liability for damage caused by a defective product.

This applies in particular to alterations made to safety devices that reduce their effectiveness.

The same considerations apply when using non-original spare parts or those different to the ones explicitly specified by the manufacturer.

For these reasons, we recommend our customers to always contact our Customer Service.

## 2.6. PREPARATION BY THE CUSTOMER

Unless otherwise agreed in the contract, the following are normally the Customer's responsibility:

- Room preparations, including any building work and/or ducting systems required;
- Electrical supply of the equipment, in compliance with the standards in force in the country of use. Particular care must be given to the protective conductor commonly known as "earthing" and to the efficiency of the circuit breaker installed to protect the power outlet. It is the purchaser's responsibility to keep the above system adequately efficient, in compliance with current accident prevention regulations.
- Consumables or material normally subject to wear;
- Equipment unloading at delivery and the consequent liabilities.



## 3. SAFETY

### 3.1. GENERAL SAFETY WARNINGS

**WARNING: your safety depends on you!!!**

- Follow all safety rules carefully.
- It is your duty to protect yourself and others from the risks of welding operations.
- The operator is responsible for his own safety and that of those in the work area. He must therefore know all the safety rules and observe them.

**Nothing can replace common sense!!!**

**IMPORTANT: Before operating the machine, carefully read the instructions contained in this manual and follow them thoroughly.**

The manufacturer has made every effort to design this machine and to make it as **INTRINSICALLY SAFE** as possible.

The manufacturer has also equipped the machine with all the protective and safety devices considered necessary. Finally, it has provided enough information for it to be used safely and correctly.

**IMPORTANT: This information must be scrupulously followed.**

The user may choose to appropriately add to the information provided by the manufacturer with additional processing instructions, which, obviously, do not contradict that contained in this Instruction Manual, in order to contribute to safe machine use.

For example, you must pay close attention to the clothing that anyone working on the machine is wearing:

- Avoid using clothes with hooks that can remain attached to parts of the machine;
- Avoid using ties or other fluttering clothing parts;
- Avoid wearing bulky rings or bracelets that may get caught in parts of the machine.

Whenever necessary, further recommendations for use will be provided in the Manual for the user related to preventive measures, personal protective equipment, information to prevent human error and any reasonably foreseeable prohibited behaviour.

It is, however, essential to diligently follow the following indications:

- It is absolutely forbidden to operate the machine automatically with the fixed and/or mobile guards removed;
- It is strictly prohibited to disable the safety mechanisms installed on the machine;

- Operations at reduced safety levels must be carried out in strict accordance with the instructions given in the relevant descriptions;
- After any operation with reduced safety levels, guards/safety devices should be replaced on the machine as soon as possible;
- Any cleaning must be carried out with the electrical and pneumatic separation devices sectioned.
- Do not alter parts of the machine for any reason; in the event of malfunction, due to non-compliance with the above, the manufacturer cannot be held liable for the consequences. We recommend that you request any changes to be made directly to the manufacturer;
- Clean the casing of the machines, the panels and the controls with soft cloths that are dry or have been lightly soaked in a mild detergent solution; do not use any type of solvent, such as alcohol or petrol, as the surfaces may be damaged;
- Position the machines as determined at the time of order according to the diagrams provided by the manufacturer, otherwise it cannot be held liable for any problems.

**ATTENTION:**

**The Manufacturer cannot be held liable for damage caused by the machine to persons, animals or property in the event of:**

- **use of the machine by personnel who are not adequately trained;**
- **improper use of the machine;**
- **electrical, hydraulic or pneumatic power supply faults;**
- **incorrect installation;**
- **failure to perform scheduled maintenance;**
- **unauthorised modifications or operations;**
- **the use of spare parts that are not original or not specific to the model;**
- **total or partial failure to follow the instructions;**
- **use contrary to the specific national regulations;**
- **calamities and exceptional events.**

**General requirements**

The moving parts must always be used according to the manufacturer's instructions, as indicated in this manual, which must always be available at the workplace.

All safety features placed on moving parts to prevent accidents and safeguard safety can not be modified or removed, but must be adequately safeguarded.

The user must promptly inform the employer or his direct superior of any defects or anomalies presented on the mobile parts.



## A) Electric shock

### ELECTRIC SHOCK CAN BE FATAL!!!

- All electric shocks are potentially fatal.
- Do not touch live parts.
- Insulate yourself from the piece to be welded and from the earth, wearing insulating gloves and clothes.
- Keep clothing (gloves, shoes, headgear, clothes) and body dry.
- Do not work in damp or wet environments. Do not lean on the piece to be welded.
- If you have to work near or in an area at risk, use all possible precautions.
- If you also feel a little electric shock, stop welding immediately; do not use the device until the problem is identified and resolved.
- Provide an automatic wall switch, of adequate capacity and possibly in the vicinity of the machine, to immediately cut off the device in the event of an emergency situation.
- Frequently inspect the power cord.
- Disconnect the power cord from the mains before working on the cables or before opening the machine.
- Do not use the machine without the protective bulkheads.
- Always replace any damaged parts of the machine with original materials.
- Never bypass machine safety devices.
- Make sure that the power supply line is equipped with an efficient earth socket.
- Make sure that the work bench and the work piece are connected to an efficient earth socket.
- Never electrically and simultaneously touch "hot" parts of pliers connected to two welders because the voltage between the two can be the total of the no-load voltage of both welding machines.
- Any maintenance must be performed only by expert personnel, aware of the risks due to the voltages necessary for the operation of the equipment.

## B) Radiation

Ultraviolet radiation, emitted from the electric arc, can damage the eyes and burn the skin.

Follow the instructions below:

- Wear appropriate clothing and protective masks.
- DO NOT use CONTACT LENSES!!! The intense heat emanating from the electric arc could stick them to the cornea.
- Use masks with lenses, with a minimum DIN 10 or DIN 11 protection grade.
- Protect people near the welding area.

- **REMEMBER:** The arc can blind or damage your eyes. The arc is dangerous up to a distance of 15 metres. Never look at the arc with the naked eye!
- Prepare the welding area so as to reduce reflection and transmission of ultraviolet radiation: paint walls and exposed surfaces black to reduce reflection, installing protective screens or curtains, to reduce ultraviolet transmissions.
- Replace the mask lenses when they are damaged or broken.

## C) Welding wire

**Attention: the welding wire can cause perforated wounds.**

- Do not press the button on the welding torch before carefully reading the instructions for use.
- Do not point the torch towards parts of the body, other people or metals, when mounting the welding wire on the welding machine.

## D) Explosions

- Do not weld above or near pressurised containers.
- Do not weld in an atmosphere containing explosive powders, gases or vapours.

This welder uses inert gases such as CO<sub>2</sub>, ARGON, or ARGON + CO<sub>2</sub> mixtures to protect the arc, therefore it is necessary to pay the utmost attention to:

### 1) Cylinders:

- Handle or use pressurised cylinders in accordance with the regulations in force.
- Do not connect the cylinder directly to the machine's gas pipe, without using a pressure regulator.
- Do not use cylinders that leak or are physically damaged.
- Do not use cylinders that are not well secured to the welding machine or to suitable supports.
- Do not transport cylinders without the valve protection fitted.
- Do not use cylinders whose contents have not been clearly identified.
- Do not put the cylinder in electrical contact with the arc.
- Do not expose cylinders to excessive heat, sparks, molten slag or flames.
- Do not tamper with the cylinder valves.
- Do not attempt to unlock blocked valves with hammers, keys, tools or other systems.
- Never delete or alter the name, number or other markings on the cylinders. It is illegal and dangerous.
- Do not lift the cylinders from the ground by holding them by the valve or by the cap, or by using chains, slings or magnets.
- Do not attempt to mix any gas inside the cylinders.

- Never refill the cylinders, but have them refilled by specialised companies.
- Do not modify or exchange the cylinder fittings.

## 2) Pressure regulators:

- Keep pressure regulators in good condition. Damaged regulators can cause damage or serious accidents; they must be repaired only by qualified personnel.
- Do not use regulators for gases other than those for which they were manufactured.
- Never use a regulator that leaks or appears physically damaged.
- Never lubricate a regulator with oil or grease.

## 3) Hoses:

- Replace hoses that appear damaged.
- Keep hoses taut to avoid accidental creases.
- Keep the excess hose collected and keep it out of the work area to prevent damage.

## E) Fire

- Avoid igniting fire due to sparks and hot slag or incandescent parts.
- Ensure that appropriate fire protection devices are available near the work area.
- Remove flammable and combustible materials from the work area and the surrounding area (minimum 10 metres).
- Do not weld/cut fuel and lubricant containers, even if empty; these must be carefully cleaned before being processing.
- Allow the piece to cool before touching it or putting it in contact with combustible or flammable materials.
- Do not work on parts with cavities containing flammable materials.
- Do not operate in atmospheres with high concentrations of combustible vapours, flammable gases or dust.
- Always check the work area thirty minutes after the end of work to ensure that there are no fires.
- Do not keep combustible materials such as lighters or matches in your pocket.

## F) Burns

Protect the skin against burns caused by ultraviolet radiation emitted by the electric arc, by sparks and slag from molten metal, using fireproof clothing, which covers all exposed surfaces of the body. Wear protective clothing and welder gloves, head-gear and high shoes with safety tip. Button the shirt collars and pocket flaps and wear trousers without cuff to avoid the entry of sparks and slag.

Wear a mask with protective glass on the outside and diatonic glass filter inside. This is MANDATORY for welding/cutting operations, in order to protect the eyes from radiant energy and volatile metals. Replace the protective glass if it is broken, pitted or spotted. Avoid oily or greasy clothes; a spark could ignite them. Incandescent metal parts, such as work pieces, should always be handled with gloves.

First aid equipment and a qualified person should be available for each shift, unless there are health facilities nearby for immediate treatment of eye and skin burns.

## G) Fumes

Welding/cutting operations produce harmful fumes and metal dust, which can damage health:

- Do not work in spaces without adequate ventilation. Keep your head out of the fumes.
- In closed environments, use suitable exhaust fans. If ventilation is not adequate, use suitable respirators.
- Clean the material to be welded/cut if there are solvents or halogen degreasers, which give rise to toxic gases. During work, some chlorinated solvents can decompose in the presence of radiation emitted by the electric arc and produce phosgene gas.
- Do not weld/cut coated metals or those containing lead, graphite, cadmium, zinc, chromium, mercury or beryllium, unless a suitable respirator is available.

The electric arc generates ozone. Prolonged exposure, in environments with high concentrations of ozone, can cause headaches, irritation of the nose, throat and eyes and severe congestion and chest pain.

## IMPORTANT: DO NOT USE OXYGEN FOR VENTILATION!!!

Gas leaks must be avoided in small spaces. Large gas leaks can dangerously change the oxygen concentration.

Do not place cylinders in small spaces.

DO NOT WELD or CUT where solvent vapours can be drawn into the welding atmosphere or if radiant energy can penetrate into atmospheres containing even tiny amounts of trichloroethylene and perchloroethylene.

### H) Moving parts can cause damage

Moving parts, such as the fan, can cut fingers and hands and catch clothes.

Keep all doors, covers and guards closed and securely in place.

Protections and coverings can be removed, for possible maintenance and checks, only by qualified personnel.

Keep hands, hair, loose clothing and tools away from moving parts.

Refit the covers and guards and close the doors when the operation is completed and before restarting the machine.

### I) Noise

These welders do not in themselves produce any noise exceeding 70 dB. Arc welding processes can produce noise levels above this limit. Therefore, users must implement the precautions required by law.

Ear plugs should be used when working overhead or in a small space.

A rigid helmet should be used when others work in the area above.

Welders should not use flammable hair products.

### WARNINGS ABOUT ELECTROMAGNETIC COMPATIBILITY

Although these welding machines have been built according to the regulations, they can generate electromagnetic disturbances, that is disturbances to the telecommunication systems (telephone, radio, television) or to the control and safety systems. Read the instructions carefully to eliminate or minimise interference.

**ATTENTION: the welding machine has been designed to work in an industrial environment, therefore, to operate in domestic environments it may be necessary to observe special precautions in order to avoid possible electromagnetic interference.**

You must install and use the welding machine according to the manufacturer's instructions. If electromagnetic interference is detected, countermeasures must be taken to eliminate the problem, possibly using the manufacturer's technical assistance. In any case, do not modify the welding machine without the manufacturer's approval.

#### Work area control to prevent E.M. interference

Before installing the welding machine it is necessary to check the work area to detect the existence of services that could malfunction in the event of electromagnetic disturbances.

Below is a list of services to consider:

- a) Power cables, control cables, transmission system and telephone cables that pass near the welding machine.
- b) Radio or television transmitters and receivers.
- c) Computer or control equipment.
- d) Safety and industrial process control equipment.
- e) Calibration and measurement instruments.
- f) Check the level of electromagnetic immunity of the equipment operating in the work area.
- g) The health of people in the vicinity, for example people who use pacemakers and earphones for hearing.
- h) The daily duration of welding operations or other activities.

The other devices must be electromagnetically compatible. This operation may require additional protective measures.

The dimensions of the area to be considered depend on the structure of the building and the type of activity in progress.

### PACEMAKERS AND HEARING AIDS

Magnetic fields deriving from high currents can affect the correct functioning of pacemakers and hearing aids. Wearers of electronic equipment should consult a physician before approaching arc welding operations.

### METHODS FOR REDUCING EMISSIONS

#### A) Power supply

The welding or cutting device must be connected to the power supply following the manufacturer's recommendations.

When interference problems arise, it may be necessary to take measures to solve the problem, such as the addition of filters on the power supply.

In the case of permanent installation of the equipment, the metal shielding of the power cables can be taken into consideration. The shielding must be connected to the welding machine so that there is good electrical contact between it and the mantle of the welding machine itself.

#### B) Welding machine maintenance

The welding machine must be periodically subjected to maintenance, according to the manufacturer's instructions.

Remove dust or foreign materials every 6 months, which may have been deposited on the transformer or on the diodes of the rectifier unit; to do this use a jet of dry, clean air.

The mantle and all the possible accesses inside the welding machine must be correctly closed during the welding and cutting operations. The welding ma-

chine must never be modified in any part except for modifications planned and authorised by the manufacturer and carried out by persons authorised by the manufacturer.

In particular, the distance of the arc from the work piece and the stabilisation devices must be adjusted and maintained according to the manufacturer's recommendations.

### C) Cables

Cables must be kept as short as possible and must be placed close to each other and passed on the floor or as low as possible.

### D) Work piece earthing

The earth connection of the work piece can reduce electromagnetic emissions in some cases.

The operator must pay attention to avoid that the earthing of the piece is not a source of danger for people and damage to the equipment. Where necessary, earthing must be carried out with a direct connection between the work piece and the ground, while in countries where this is not permitted, the connection must be made using a capacitor in accordance with the regulations of the country.

### E) Shielding

Cable and equipment shielding in the work area can reduce interference. Shielding of the entire welding or cutting installation can be considered for special applications.

### F) Equipotential connections

The equipotential connections of all metal components in and near welding installations should be considered.

In any case the metal components connected to the piece to be welded will increase the risk for the operator to receive an electric shock from the simultaneous contact with these metal components and the electrode. The operator should be isolated from all these metal components rendered equipotential.

### Checks and inspections

Checks must be carried out by a qualified technician or a qualified and authorised technician; they must be visual and functional, with the aim of guaranteeing the safety of the machine.

They include:

- inspection of all supporting structures, which must not show any signs of cracking, breakage, damage, deformation, corrosion, wear or alteration to the original characteristics;
- checking all mechanical parts;

- inspection of all the safety devices installed on the machine;
- II connections with pins and screws;
- inspection of the machine operations;
- inspection of the machine status;
- verification of the correct operation and efficiency of the electrical system;
- checking the seal and efficiency of the pneumatic and/or hydraulic system.

The results of these checks must be reported on a specific sheet.

**ATTENTION: If worn or faulty parts are not promptly replaced, the manufacturer cannot be held in any way liable for the damage caused by accidents that may result.**

**If faults or anomalies are detected, they must be eliminated before the machine is put into operation, and the expert carrying out the inspection will have to certify that the repair has been made, thus allowing the machine to be used.**

If the person performing the inspection detects hazardous faults, they must promptly inform the machine manufacturer.

Place the machine out of service if operating faults are found while performing the appropriate checks/inspections and/or repairs. Check that no objects are left between the moving parts after any maintenance work.

In order to guarantee maximum safety of the machine it is, nonetheless, PROHIBITED to:

- Tamper with any part of the machine;
- Leave moving parts unattended;
- Use the machine when not operating at full efficiency;
- Modify the machine to change the originally established use, without explicit authorisation from the Manufacturer;
- Run moving parts with manual operations in case of power failure.

## 3.2. INTENDED USE

The system should only be used for the purpose for which it was manufactured meaning to generate an electrical arch for MIG/MAG, TIG, MMA welding or plasma cutting accordingly.

**ATTENTION: It cannot therefore be used as a device for thaw pipes; any improper use automatically voids the warranty and excludes the manufacturer from any liability in case of damage to persons and property.**

### 3.3. CONTRAINDICATIONS FOR USE

The machine must not be used:

- For uses other than those specified by the manufacturer, for different uses or not mentioned in this manual;
- In explosive, corrosive atmospheres or with a high concentration of dust or oily substances suspended in the air;
- In atmospheres with high fire risks;
- Exposed to adverse weather conditions;
- With safety devices bypassed or out of order;
- With electrical bridges and/or other means that exclude power/parts of the machine.

### 3.4. HAZARDOUS AREAS

The work area pertaining to the operator which is substantially the entire perimeter of the machine is considered hazardous.

It is the responsibility of the operator to keep the work area clear of persons or objects while using the machine and to avoid damage to persons, things or animals.

The use of the machine near other equipment or machines introduces additional risks. The operator is asked to evaluate these risks in order to prevent accidents.

### 3.5. SAFETY DEVICES

Welding machines are equipped with safety devices designed to prevent damage to the operator or to the welding machine itself. A safety device is any object or system that can reduce the risk of such damage. Do not tamper with active safety devices or their connections.

Do not operate with the welding machine without the metal covers or with non-insulated connections. If necessary, during installation and connection, they must be integrated with others in order to guarantee compliance with the laws in force.

**IMPORTANT: Daily check that the safety devices are functioning properly and efficient.**

### 3.6. SIGNS

The safety signs must always be clearly visible and it is absolutely forbidden to remove or hide them.

Generally there are signals or signs on the machine or in the work environment that indicate dangerous situations, prohibitions or instructions during use or operations connected to it, as in the following examples:



**Emission of optical radiation:**

The risk of optical radiation exists where the sign is affixed. Cat. 2 (EN 12198).



**Fire hazard:**

Fire hazards exist where the sign is affixed.



**General warning:**

This symbol indicates a hazard of any nature that may cause personal and property damages.

**Explosion hazard:**

This symbol indicates the presence of explosive substances or explosion hazard.

**Warning:**

Contact injuries may occur in this point (i.e. Electrical shock).

**Blinding:**

Protection goggles or mask must be worn near this symbol.

**Fatal hazard:**

Pay the utmost attention near this indication!!! Never touch the area indicated by this symbol since it indicates a fatal hazard.

**Noise:**

Protection goggles or mask near this symbol.

### 3.7. RESIDUAL RISKS

Careful use of the machine minimises the probability of accidents; however, during the use of the machine it is necessary to strictly observe the safety rules described in this manual.



## 4. INSTALLATION

### 4.1. SHIPPING

The shipment, also depending on the destination, can be carried out by different means.

The packed machine must be properly anchored to the means of transport in order to avoid uncontrolled movements.

The shipment is always carried out under the responsibility of the purchaser who assumes all charges for accidents and thefts that could occur during the transport itself.

### 4.2. PACKAGING

The machine is shipped packed in a special container and, if necessary, it is suitably stabilised with shock-proof material to ensure its integrity.

The packaging is made, with containment of the overall dimensions, also depending on the type of transport adopted.

To facilitate transport, the shipment can be performed with some components disassembled and properly protected and packaged.

#### THE PACKAGING CONTAINS:

- No. 1 **NOVACUT 66 LCD** welding machine
- No. 1 Earth cable
- No. 1 PLASMA Welding torch
- No. 1 Instruction manual

### 4.3. MACHINE RECEIPT

Upon receipt of the machine, check that the information in the shipping document actually corresponds to the material received and check that the packaging is perfectly intact.

**IMPORTANT: in case of damage or absence of some parts, immediately report the anomaly to the carrier, making any descriptive notes of the damage on the transport document before signing.**

**Do not use the machine, but contact the seller to agree on the procedure to be adopted.**

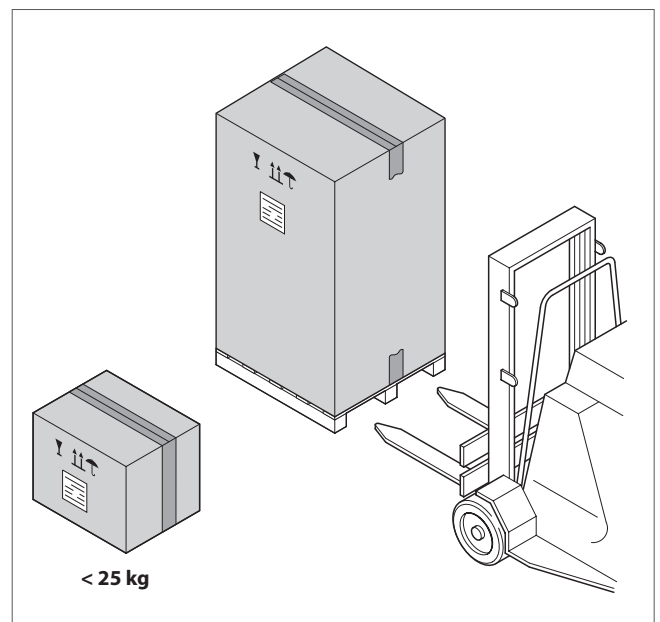
**To this end, it is advisable to carry out a check of the packaging during the unloading phase and, in suspicious cases, open the packaging and to verify the safety of the machine and any loose units.**

### 4.4. HANDLING AND LIFTING

**ATTENTION: handling and lifting must be carried out by trained and qualified operators, using appropriate means and methods, to avoid risks to personal health and damage to the machine. Before carrying out handling and lifting, check the position of the centre of gravity of the load; always check the correct weight balance of the machine when it is transported, so as to prevent unexpected machine movements or falls. It is recommended to always use vehicles capable of supporting the weight and dimensions of the machine ("TECHNICAL SPECIFICATIONS" paragraph of this manual), so as to avoid damage to the machine or to persons or things around it.**

**IMPORTANT: the customer is always exclusively liable during the equipment loading and unloading phases.**

For transport to the final installation site, it is preferable to use a forklift or pallet truck, taking care that the lifting forks support the entire crate.



For movements within the plant, the machine may be transported with a crane by properly harnessing it using cables with the appropriate resistance characteristics, depending on the weight of the machine itself.

If the supply includes only the welding machine, generally weighing less than 25 kg, the packaging consists of a cardboard box without lifting pallets. It can be easily lifted by two operators and taken to the place of use.

**ATTENTION:** The machine must remain packed during unloading from the means of transport and until it is transferred to its destination.

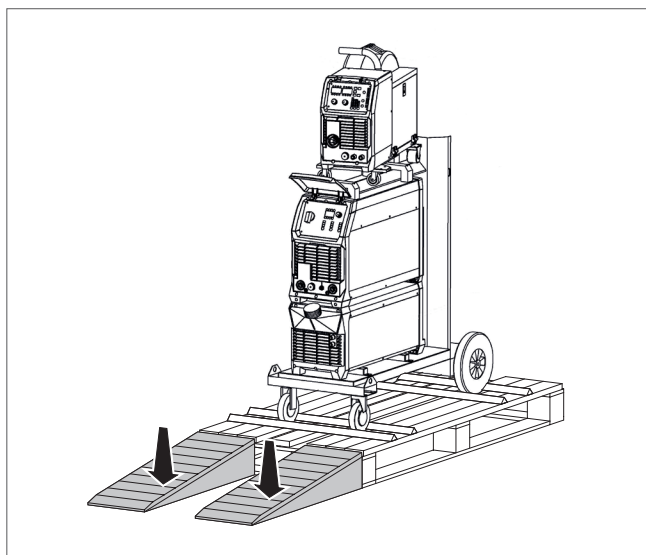
**IMPORTANT:** The Manufacturer cannot be held liable for damage caused to persons or property due to utilising lifting systems other than those described above.

## 4.5. UNPACKING

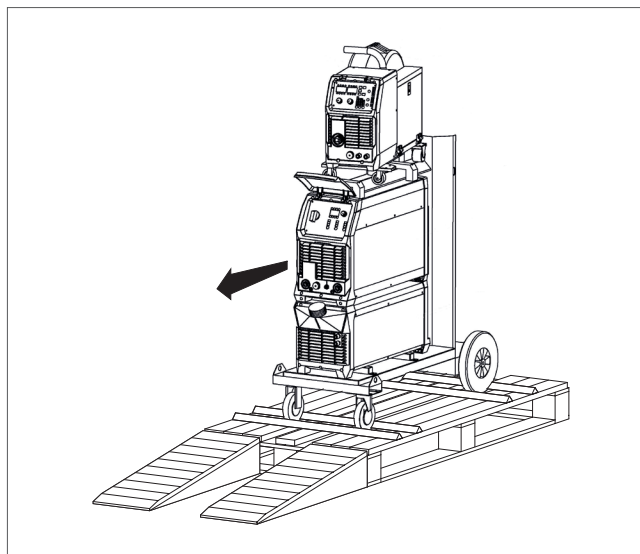
**IMPORTANT:** Consult the "Handling and lifting" paragraph to correctly handle the machine.

**ATTENTION:** To remove the machine from the packaging, use appropriate means and methods to avoid risks to human health. The packaging material must be properly disposed of in compliance with the laws in force.

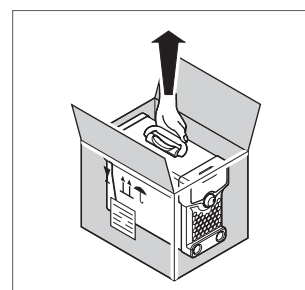
- Remove the protective covers such as straps, boxes, etc. using appropriate tools so as not to ruin the content.
- Remove the protective covers such as straps, boxes, etc. using appropriate tools so as not to ruin the content.
- Position appropriate descent ramps from the pallet verifying that the slides are well hooked to the pallet.



- Complete the unloading operations by carefully lowering the machine from the pallet.



If only the welding machine is present, this must be handled using the convenient handle on the upper part of the welding machine itself.

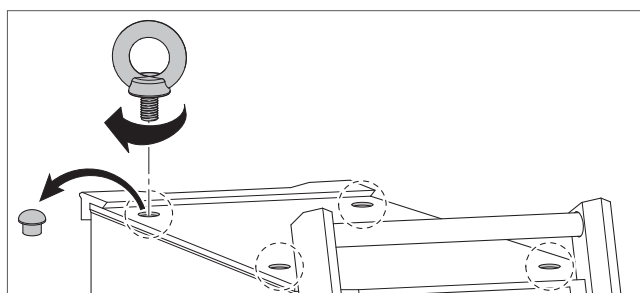


**ATTENTION:** risk of overturning when unloading the machine from the pallet equipped with descent ramps.

**ATTENTION:** when carrying out unpacking operations, it may be necessary to have two persons equipped with suitable personal protective equipment.

**IMPORTANT:** in addition to handling the machine using the special trolley, it can be lifted from the ground after having wrapped it with lifting straps, by slinging it from the bottom in a stable and safe way. If provided, the machine must be lifted only and exclusively by using M10 eye-bolts which are not supplied.

Remove the protective caps from the threaded holes and tighten up the lifting eye-bolts.



**Do not lift the machine by the FEEDER or generator handles.**

**The machine has a sturdy handle integrated in the frame for handling.**

**N.B. These lifting and handling devices comply with the provisions prescribed by European standards. Do not use other devices such as lifting and handling equipment.**

## 4.6. STORAGE

In the case of inactivity, the machine must be stored in compliance with the following precautions:

- Store the machine in an enclosed area accessible only to employees; the storage area must have a stable support surface with an adequate load coefficient and must be free of fire and/or explosion risk; it must have adequate humidity and temperature and sufficient lighting.
- Protect the machine from any impact and stresses;
- Protect the machine from humidity and high temperatures;
- Ensure the machine does not come into contact with corrosive substances;
- In the event of prolonged storage, periodically check that there are no variations in the condition of the packages.

## 4.7. PREPARATIONS

### Installation preparations

For the installation, it is necessary to prepare a manoeuvring area suited to the machine dimensions and selected lifting means. The machine must be positioned so that it is ideally ergonomic and provides maximum safety in the work place: leave an area around it large enough to allow easy operations and handling of the material to be processed and for maintenance and adjustment operations to be carried out.

Before installing the machine, check that the selected area is suitable and has the necessary authorisations to carry out the activity, sufficiently ventilated and illuminated, with a stable and levelled support surface. For installations on a raised floor, check that the slab can withstand the load.

### Electrical system preparation

Connection to the electrical system which powers and combines the synchronisation with other machines should be done by specialised and qualified staff following the wiring diagram and arrangements set out in Laws and/or Technical Standards currently in force for safety in workplaces and electrical installations.

Appropriate safety devices must be provided for its operation in line with those required in the area of safety in the workplace.

**IMPORTANT: The manufacturer cannot be held liable for any damage to property, persons and/or animals caused by non-compliance with this provision.**

To achieve an adequate level of safety, the electrical system to which the machine is connected must provide, at the user's full charge, an earthing system according to the provisions of the user's country, a circuit breaker to protect the power supply socket with value  $\Delta I$  (current variation) not less than 30mA and anything else for a correct execution in a workmanlike manner, according to Laws and/or Technical standards in matters of safety in the workplace and electrical systems. Prepare connections for earthing the machine casing.

**ATTENTION: These preparations are always the sole liability of the user and nothing can be attributed to the manufacturer for damage to property, persons and/or animals due to poor electrical connections.**

## 4.8. ASSEMBLY/POSITIONING

**WARNING: the assembly of any detached units and the installation of the machine must be carried out exclusively by technicians authorised by the manufacturer.**

To allow for correct operations, the machine must always be positioned in places that comply with the environmental conditions described in this manual.

The machine must always be positioned in a perfectly levelled area; levelling can also be carried out using any adjustment systems present on the machine.

**ATTENTION: The machine must be positioned so as not to obstruct the entry and exit of the air from the cooling slots. REDUCED FLOW OF AIR causes overheating and possible damage to internal parts. Keep at least 500 mm of free space around the device.**

**IMPORTANT: Do not place any filtering device on the air intake passages of this welding machine. The warranty is void if any type of filtering device is used.**

## 4.9. CONNECTIONS

### Electrical connections

The machine's internal connections are carried out by qualified personnel sent by the manufacturer. The electrical connection between the machine panel and the customer's power distribution supply line must be carried out by qualified personnel from the Customer.

**IMPORTANT: The personnel qualified to carry out the electrical connection must make sure of the perfect efficiency of the earthing of the electrical system and must check that the line voltage and the frequency correspond to the data shown on the identification plate. Incorrect supply voltages can cause serious damage to the system.**

If the system is set to operate at single-phase 230 V at 50-60 Hz, wire the end of the power cable to an EEC plug with the same capacity as the socket on the line switch as per the following diagram:

#### SINGLE-PHASE connections

Wire colour	Connection
Brown	Phase
Blue	Neutral
Yellow/Green	Earth

If the system is set to operate at three-phase 400 V at 50-60 Hz, wire the end of the power cable to an EEC plug with the same capacity as the socket on the line switch as per the following diagram:

#### THREE-PHASE connections

Wire colour	Connection
Black	"R" phase
Brown	"S" phase
Blue/Grey	"T" phase
Yellow/Green	Earth

**ATTENTION: Make sure the system line switch is in the "0" position before connecting the power cable.**

**ATTENTION: It is mandatory to install a circuit breaker with interlocked CEE socket, of adequate capacity and verifying that the earth socket is efficient and separate from the rest of the electrical system of the working environment.**

**ATTENTION: the yellow-green wire of the welding machine power cable must always be connected to the protection conductor (system earth). The yellow-green wire should NEVER be combined with another phase wire for a voltage withdrawal. Do not touch live parts.**

### Gas hose connection

**ATTENTION: Cylinders can explode if damaged!!!**

- Keep the cylinders upright and chained to the appropriate support.
- Keep the cylinders in a place where they cannot be damaged accidentally.
- Do not lift the machine with the cylinder attached.
- Never touch the cylinder with the welding wire.
- Keep the cylinder away from the welding area or from non-insulated electrical circuits.

The inert gas cylinder must be equipped with a pressure reducer and possibly also a flow meter. Only after having correctly positioned the cylinder, connect the gas hose, exiting from the rear of the machine, to the pressure reducer. Next you can open the cylinder and adjust the pressure reducer.

## 4.10. PRELIMINARY CHECKS

It is necessary to carry out the following operations before each machine start-up:

- Check all the safety systems;
- Check protection and signs.

Before putting the machine into operation, a number of checks and controls must be carried out in order to prevent errors or accidents during the Start-up phase:

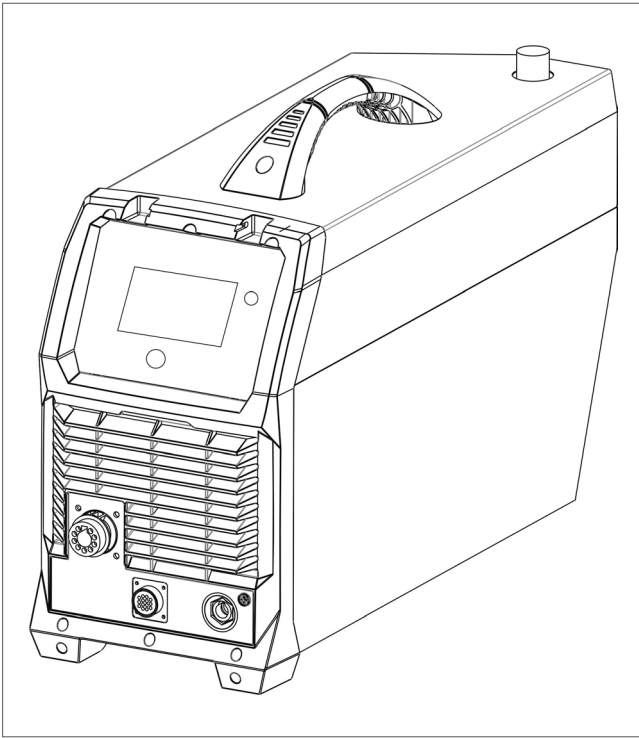
- Check that the machine has not been damaged during assembly;
- Verify, with particular care, the integrity of the electrical panels, control panels, electrical wiring and tubing;
- Check the exact connection of all external power sources;
- Check the free movement and free rotation of all moving parts;
- Check that hydraulic and pneumatic connections are tight so that they do not cause dangerous leakage.

## 5. MACHINE DESCRIPTION

### 5.1. OPERATING PRINCIPLE

**NOVACUT** series systems are designed for plasma cutting.

The **NOVACUT** series system composition is shown below.



### 5.2. FEATURES AND MAIN COMPONENTS

- IGBT module inverter technology for smooth, stable output, increased reliability .
- Microprocessor control system for superior & dynamic arc characteristics.
- CNC interface connection.
- Euro connect torch system with safe & robust connection to machine.
- Advanced strata plasma torch with european torch head for superior cutting performance and consumable life.
- Non HF arc starting system for increased reliability and low EMF pollution.
- Automatic pilot arc control system for increased cutting capability and speed, especially for discontinuous cutting.
- Strong environmental protection against moisture, salt spray and corrosion .
- Intelligent protection system protects plasma torch from damage/incorrect /air pressure, con-

sumables not in place, excessive pilot arc use.

- Air flow manual activation switch to set & test air pressure, pressure without the need to trigger the torch.
- 4.3 inch color LCD screen, easier to operate, real time display of welding content.

### 5.3. ENVIRONMENTAL CONDITIONS

The machine does not require particular environmental conditions. The machine must be installed indoors in a well-lit, ventilated industrial building with solid and level flooring.

The machine is suitable for operating in environments that:

- have an altitude not exceeding 2000 m a.s.l.;
- temperature between + 5 ° and + 35 ° C;
- relative humidity not higher than 80%.

It is forbidden to use the machine in environments that are:

- dusty;
- in corrosive atmosphere;
- at fire risk;
- in an explosive atmosphere.

**ATTENTION: The welding machine has an IP 23 protection grade, therefore its use is precluded in certain environmental situations, such as rain, excessive presence of metallic dust, presence of acids and corrosive atmospheres.**

### 5.4. LIGHTING

The lighting of the area of installation must comply with the laws in force in the country where the machine is installed and must, however, ensure good visibility at all points, not create hazardous reflections and allow clear reading of the control panels as well as identification of emergency buttons.

As the machine does not have its own light, it is necessary for the working environment to be equipped with general lighting to guarantee the machine has a value of 200 and 300 lux at all points of the machine.

### 5.5. VIBRATIONS

Under operating conditions that comply with the indications for proper use, the vibrations are not such as to cause hazardous situations. If this happens, you must request technical assistance and suspend the use of the equipment until the fault is resolved.



## 5.6. NOISE

The equivalent continuous A-weighted sound pressure level, emitted by the machine at the workplace in full operating conditions, is less than 70 dB (A). These emissions comply with the limits of the regulations in force and are not such as to generate danger for operators.

Plasma cutting processes can, however, produce noise levels above this limit. Therefore, users must implement the precautions required by law.

## 5.7. TECHNICAL SPECIFICATIONS

The following table shows the main technical specifications relating to the machine:

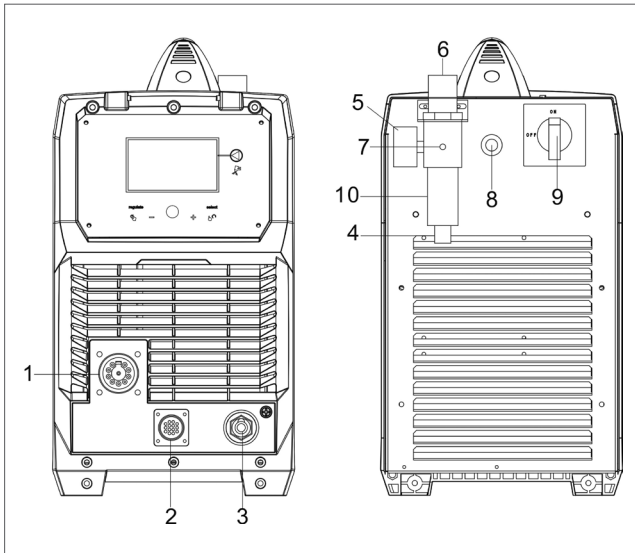
Parameters	NOVACUT 66 LCD
Power supply, three phases	400 V - 50/60 Hz
Fuse	20 A
MAX absorption	18 A
MAX power	6.75 KW
Open circuit voltage	450 V
Duty cycle 100 %	61 A
Duty cycle 90 %	65 A
MAX cutting capacity (Fe)	20 mm
Cut - separation	25 mm
Output range	20 - 65 A
Efficiency (%)	85.0
Max energy consumption value in the inactive state (W)	18.5
EC Standards	EN 60974 - 1 - 5 - 10
Dimensions, mm (L x W x H)	640 x 240 x 445
Weight, kg	23
Insulation class	H
Protection class	IP23
Cooling system	AF
Operating temperature	- 10 + 40 °C
Noise emissions	< 70 dB



## 6. MACHINE USE

### 6.1. MACHINE LAYOUT DESCRIPTION

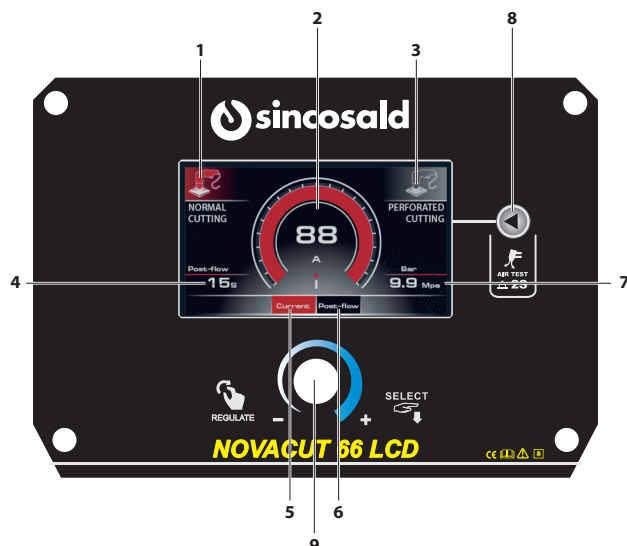
#### 6.1.1. Layout for the front and rear panel



1. Plasma Torch Euro/ Central Connector.
2. CNC Interface Connection
3. Earth Lead Connection Socket.
4. Air Filter Condensate Drain Tube.
5. Air Pressure Regulator Outlet Pressure Gauge.
6. Air Pressure Regulator Knob.
7. Compressed Air Inlet.
8. Input Power Cable.
9. Power Switch: Turn on or off the power source.
10. Air Condensate Filter/Trap Bowl.

#### 6.1.2. Further Controls Explained

##### Main interface description



1. Normal cutting model
2. Current parameter display area
3. Perforated cutting model
4. Post flow display area
5. The regulating current is the display area(Press the knob to switch between 5 and 6)
6. The regulating Post flow is the display area(Press the knob to switch between 5 and 6)
7. Barometric display area
8. Select mode button
9. Parameter setting knob

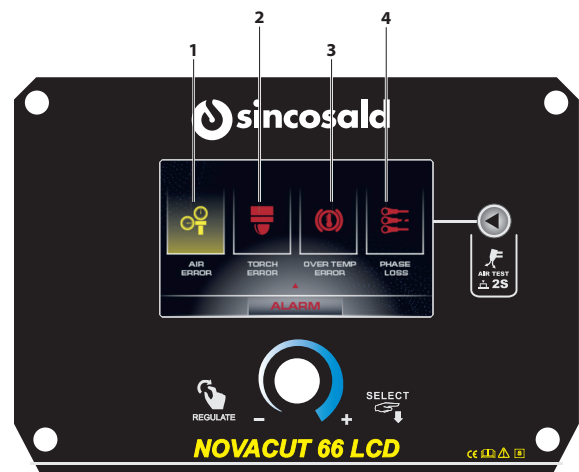
##### Compressed Air Testing/Setting button (8)



Long press button(8) for 2 seconds to enter the check gas, and the display screen will display the above interface.

When positioned as 'set' compressed air control valve is open continuously. This is useful for testing and setting the air pressure without having to activate the trigger circuit. 'Run' position is normal operation.

##### AIR Error Display (1)



The above interface is displayed when the machine has no gas input or the air pressure is low.

Correct air pressure is critical for plasma cutting. Incorrect air pressure will cause poor cut quality, lack of cutting power, damage to the plasma torch and consumables and potentially damage the power source. Optimum air pressure is between 0.45 and 0.5MPa (65-75psi). Air pressure should be set with the air flowing through the torch, as the pressure with the air flowing will normally be less than static pressure, due to flow losses through the torch system. To unlock the pressure regulator knob in order to adjust it, pull the knob upwards. Once the pressure is set correctly, push the knob down again to lock it into place.

### Torch Error Display (2)

Lights when issue with torch system or air supply detected and cutting output is disabled as a result. Flashing light means that torch shield cap is not installed. Continuous light means likely damaged or missing torch consumables or insufficient air pressure supply to the torch.

### Alarm Error Display (3)

Lights when over voltage, over current or electrical overheating (due to exceeding duty cycle) is detected and protection is activated. When protection is activated, welding output will be disabled until the safety system senses the overload has reduced sufficiently and indicator lamp goes out. May also trigger if machine experiences an internal power circuit failure.

### Phase loss Error Display (4)

### System setup interface

Press the knob(9) for 3 seconds to enter the setting interface, Switch(8) the setting interface by pressing the button and set parameters by the knob (9)

### Language selection interface (1)



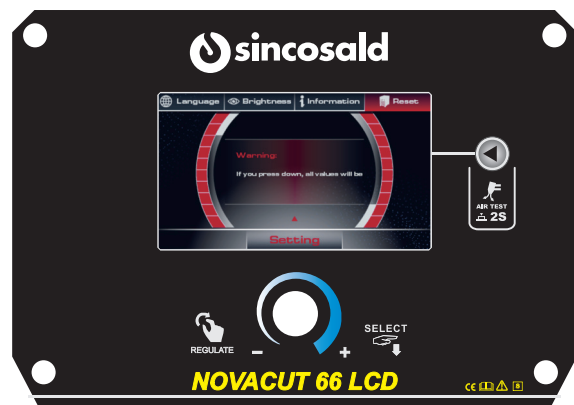
### Brightness adjustment interface (2)



### Information interface (3)



### Reset interface (4)



### Pilot Arc System

The Air Plasma Cutting welder CUT series is equipped with a pilot arc system to transfer the main cutting arc. The pilot arc system is a circuit where return is through the torch head and cable. This means that a small arc can be created with a certain cutting power, without any electrical connection with the positive machine pole. This system is particularly helpful in starting cuts on materials that do not have good initial grounding connections such as paint, rust, en-

crustations.

Once the pilot arc is established and the energy returns to flow through the positive pole, the pilot arc turns off and the main one turns on. Please remember that the pilot arc circuit is only designed to work for short periods of time as an auxiliary ignition system and thus it has a safety system that only allows the pilot arc to work for consecutive short periods. Furthermore, these models have a pilot arc control system that re-ignites the arc if the main one is interrupted and the torch button has not been released. This function is helpful when cutting discontinuous parts such as mesh or grates.

It is very important to recognize that plasma torch consumables wear as part of normal operation and should be replaced in a timely manner. Operating a torch with worn consumables will cause poor cutting results and possible damage to the torch and machine itself. Damage caused by untimely replacement of consumables will not be covered by warranty.

Use the following guidelines to determine when consumables should be replaced:

**Cutting Tips:** The cutting tip has a small calibrated orifice that the plasma passes through. If the orifice becomes partially blocked, deformed or enlarged, the cutting tip should be replaced.

**Electrodes:** The electrode has a small silver 'hafnium' insert in the end of the tip. This is what generates the plasma ions. Once the hafnium insert is gone or is damaged the tip must be replaced.

**Swirl Ring/Retaining Cap:** These should be replaced if broken, chipped, cracked or badly heat damaged.

**Tips and electrodes:** These should wear reasonably evenly and it is normal practice to replace them both together. If a new tip is inserted with a worn electrode the tip will wear much more quickly than if the electrode was also replaced at that same time. If tips or electrodes are wearing much faster than the other component it is likely to be caused by one of the following: poor operator technique, incorrect air supply or damaged torch head.

It is also important not to use non original parts that can compromise performance, reduce equipment working life, cause torch and welder damages and void the warranty.

## 6.2. INSTALLATION & OPERATION

### 6.2.1. Electrical Connection

The CUT series is designed to operate on a 3 phase 380V AC power supply.

When the supply voltage is too high or too low, a

protection circuit triggers to isolate the inverter. The alarm led turns on and output current is interrupted. If the power supply voltage continually goes beyond the safe work voltage range, it will shorten the welder life span. The below measures can be used:

- Change the input power supply. For example, connect the machine to a socket with stable voltage;
- Induce the machines using power supply in the same time;
- Connect the machine to a voltage stabiliser.

### 6.2.2. Compressed Air Requirements

A reliable and consistent supply of clean dry compressed air is essential for proper operation. Although the machine contains its own internal air supply filtration system it is recommended the compressed air supply should have external filtration in the line feeding the machine, both a standard water trap (sintered bronze filter) and also a coalescing filter (for oil in air). The air requirement is a minimum of 120 l/min (4.5cfm) Free Air Delivery (FAD) at 75psi pressure. This normally means the compressor must be a belt drive model or if a direct drive it must have a motor power of 2.5HP or greater.

The air must be dry and free of oil and moisture (normally a symptom of older, worn out compressors). The air hose must also be of sufficient size (3/8"/10mm minimum) to supply the machine.

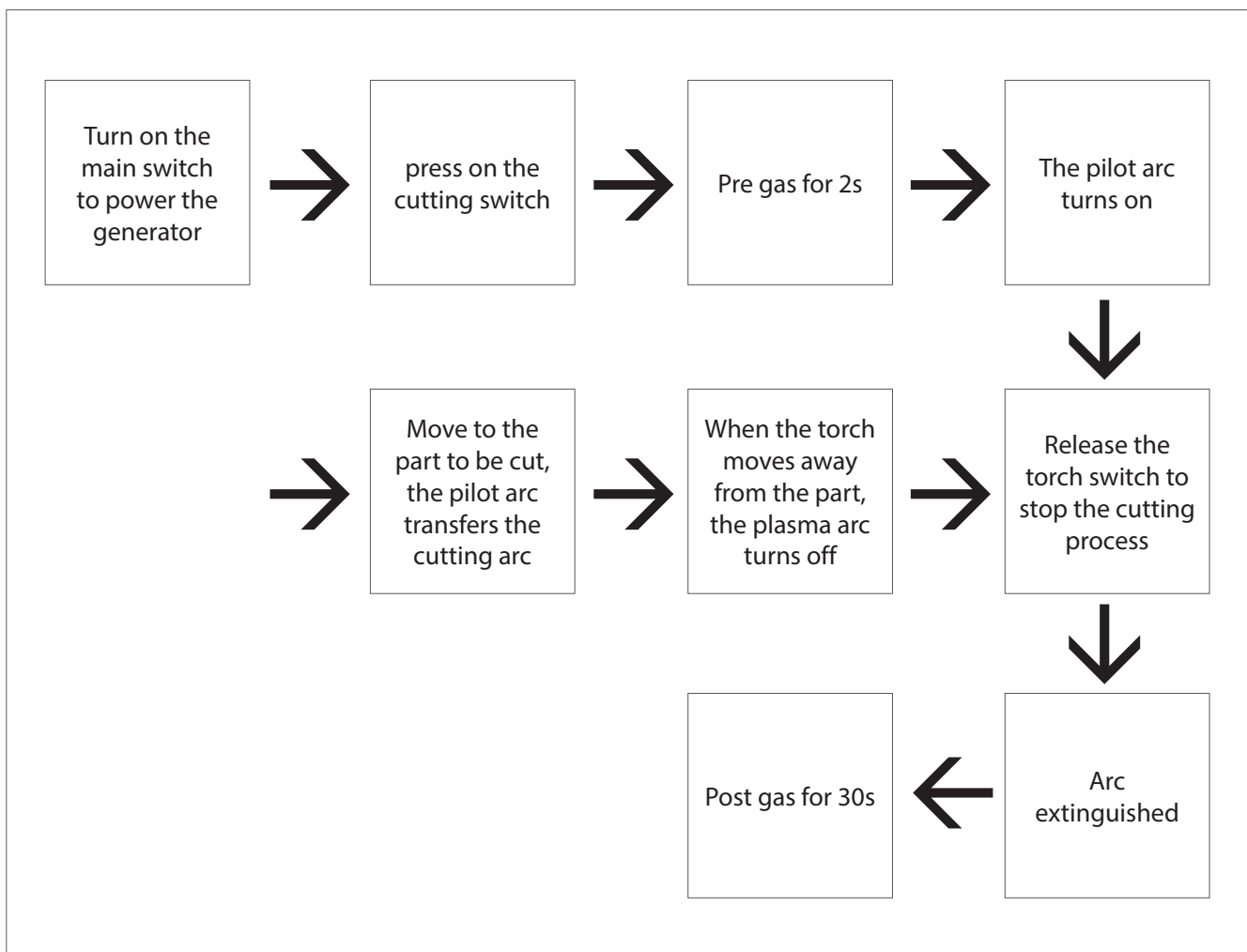
### 6.2.3. Basic Operation

1. Connect the earth cable quick connector to the earth connection socket (9) Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.
2. Connect the plasma torch to the machine central connector (7) ensuring the collar is done up firmly.
3. Connect the machine to adequate electrical mains using the input power cable. Turn on the electric power switch to start the machine.
4. Connect the compressed air supply to the filter/regulator inlet (13). Check the air pressure (12). Trigger the air flow using the 'set' function (6), check the air pressure again and adjust if necessary. Return the switch to 'run' position.
5. Select the output current using the current control knob (1). You are now ready to plasma cut!

### 6.2.4. Cutting Operation

After turning the Power Switch to the ON position and making control and air pressure adjustments, proceed as follows:

1. Rest the torch spacer nozzle against the part with a 5.15° angle to avoid damaging the tip.
2. Press the torch switch; the air flow and pilot arc turn on.
3. When the pilot arc hits the work piece, the main plasma arc turns on and starts cutting.
4. After starting the cut, the tip can be dragged along the work piece if cutting up to 3mm thick material. When cutting material greater than 3mm, maintain a 3.2mm tip to work (standoff) distance.
5. When ending a cut, the torch switch should be released and lifted off the work piece just before the end of the cut to minimize double arcing which can damage the tip. This is to prevent the high frequency arc starting from reigniting after cutting arc extinguishes.
6. In post flow mode, the arc can be immediate turned back on by pressing the torch switch.



**Note:**

- The alarm lamp on when cutting, it is needed to loose the switch of the torch until the alarm release, then press on the switch to start cutting again.
- In automatic gas control mode, press the the cutting torch.
- After prolonged use, the electrode surface and nozzle will have an oxidation reaction. Replace the electrode and nozzle. When unscrewing the production nozzle, the alarm light turns on and the machine stops.

### 6.2.5. CNC Socket Diagram

The CUT power supplies are equipped with an optional, factory installed, four position voltage divider that is designed to be safely connected without tools. The built in voltage divider provides a scaled down arc voltage of 20:1, 30:1, 40:1, and 50:1 (maximum output of 18 V). An optional receptacle on the rear of the power supply provides access to the scaled down arc voltage and signals for arc transfer and plasma start.

#### Note:

The factory presets the voltage divider to 20:1. To change the voltage divider to a different setting, refer to the section on the next page.



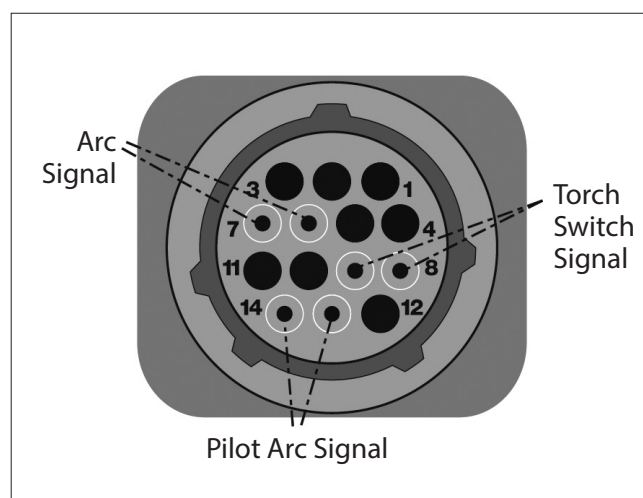
**The factory installed internal voltage divider provides a maximum of 18V under opencircuit conditions. This is an impedance protected functional extra low voltage (ELV) output to prevent shock, energy, and fire under normal conditions at the machineinterface receptacle and under single fault conditions with the machine interfacewiring. The voltage divider is not fault tolerant and ELV outputs do not comply withsafety extra low voltage (SELV) requirements for direct connection to computerproducts.**

#### Note:

The cover on the machine interface receptacle prevents dust and moisture from damaging the receptacle when not in use. This cover should be replaced if damaged or lost.

Installation of the machine interface cable must be performed by a qualified service technician. To install a machine interface cable:

1. Turn OFF the power and disconnect the power cord.
2. Remove the machine interface receptacle's cover from the rear of the power supply.
3. Connect the machine interface cable to the power supply.



Refer to the following table when connecting the CUT system to a torch height controller or CNC controller with a machine interface cable.

Signal	Type	Instruction	The connector socket	Cable ends
Start (start plasma)	Input	Normally open. 18 VDC open circuit voltage at START terminals. Requires dry contact closure to activate.	8 - 9	8 (yellow) - 9 green
Transfer(start machine motion)	Output	Normally open. Dry contact closure when the arc transfers. 120 VAC/1 A maximum at the machine interface relay or switching device (supplied by the customer).	13 - 14	13 (blue) - 14 white
Ground	Ground			
Voltage divider	Output	CUT: Divided arc signal of 20:1, 30:1, 40:1, 50:1 (provides a maximum of 18 V).	6(+) 7(-)	6 (red) - 7 black



## Setting the five position voltage divider on the CUT

The factory presets the voltage divider to 20:1. To change the voltage divider to a different setting:

1. Turn OFF the power supply and disconnect the power cord.
2. Remove the power supply cover.
3. Locate the voltage divider DIP switches on the left side of the power supply.



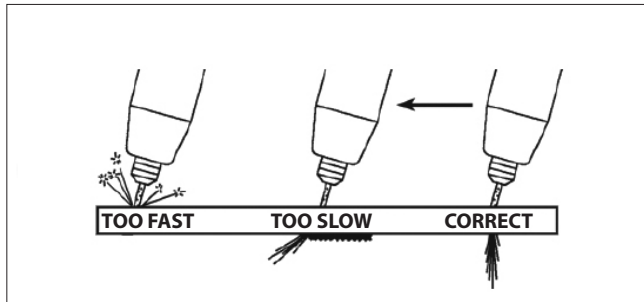
**Note:** the table below for the shift and scale selection:

Dial number	Scale selection			
	20:1	30:1	40:1	50:1
1	ON	1	1	1
2	2	ON	2	2
3	3	3	ON	3
4	4	4	4	ON

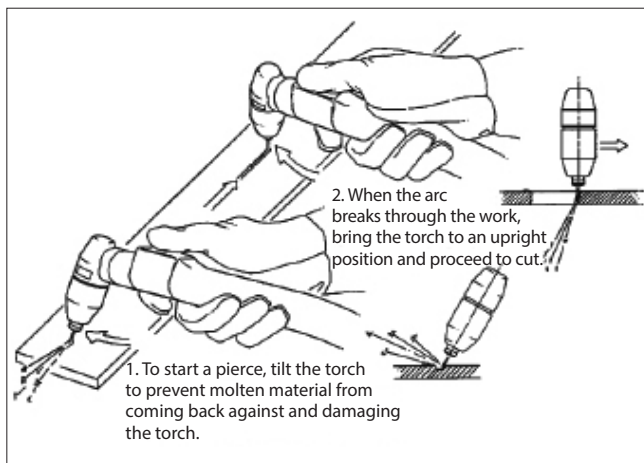
## 6.3. PLASMA CUTTING GUIDE

### 6.3.1. Cutting Guide

#### Effect of Cutting Speed



### Piercing Technique



**Note:** Keep moving while cutting. Cut at a steady speed without pausing. Use a 5° 15° leading angle in the direction of the cut.

### 6.3.2. Operating Techniques

1. **Piercing** - Materials (up to 3.2mm/1/8in. thick) work. When piercing thicker materials (up to 4.8mm stainless or carbon steel) at an angle, position the torch 0.5mm (.02") above the work piece. It is advisable when piercing thicker materials to drill a small pilot/starting hole in the work piece which makes it a lot easier and gives increased tip life. Start the cutting arc, then immediately raise the torch to 1.6mm (1/16") stand off and move the torch along the cut path. This will reduce the chance of spatter from entering the torch and prevent the possibility of welding the tip to the plate. The torch should be angled at about 30° when starting to pierce, and then straightened after accomplishing the pierce.
2. **Grate Cutting** - For rapid restarts, such as grate or heavy mesh cutting, do not release the torch switch. This avoids the 2 second preflow portion of the cutting cycle.
3. **Edge Starting** - For edge starts, hold the torch perpendicular to the work piece with the front of the tip near (not touching) the edge of the work piece at the point where the cut is to start. When starting at the edge of the plate, do not pause at the edge and force the arc to 'reach' for the edge of the metal.

### Cutting Speed Guide

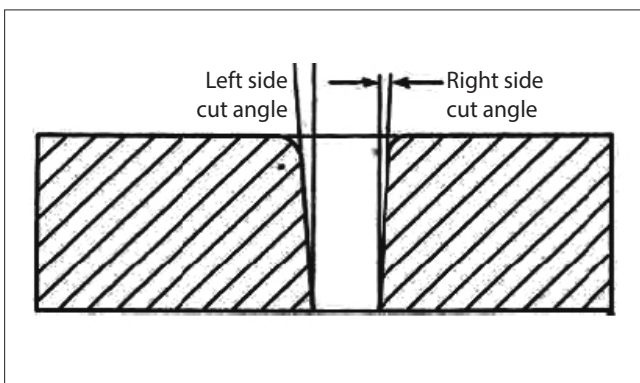
Material	Thickness (mm)	Cutting Speed (mm/s)
Carbon Steel (AISI 1020)	1.6	150
	3.2	50
	6.4	20
Stainless Steel (AISI 304)	1.6	140
	3.2	40
	6.4	15
Aluminium (6061)	1.6	190
	3.2	85
	6.4	30



**Note:** The speeds given here are typical for best quality cuts. Your actual speeds may vary depending on material composition, surface condition, operator technique, etc. If cutting speed is too fast, you may lose the cut. With slower speeds excessive dross may accumulate. If speed is too slow, the arc may extinguish. Air cutting typically produces a rough face on stainless steel and aluminium.

#### Establish the Cutting Arc as Quickly as Possible.

4. **Drag Cutting** - Position torch tip slightly above work piece, press torch switch and lower torch tip forward work piece until contact is made and cutting arc is established. After cutting arc is established, move the torch in the desired direction keeping the torch tip slightly angled, maintaining contact with the work piece. Avoid moving too fast as would be indicated by sparks radiating from the topside of the work piece. Move the torch just fast enough to maintain sparks concentration at the underside of the work piece and making sure the material is completely cut through before moving on. Adjust drag speed as desired/ required.
5. **Direction of Cut** - The plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being more square than the other. Viewed along the direction of travel, the right side of the cut is more square than the left.



To make a square edged cut along an inside diameter of a circle, the torch should move counter clockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

6. **Quality Cuts** - Dross (slag) is the excess material that spatters and builds up on the underside of the work piece as you cut. Dross occurs when the operating procedure and technique is less than optimal. It will require practice and experience to obtain cuts without dross. Although less than op-

timal cuts will contain dross, it is relatively easy to remove by breaking it off using pliers or chipping off with a chisel or scraping or grinding the finished cut as needed and is generally only a minor inconvenience.

A combination of factors contributes to the build up of dross. They include; material type, material thickness, amperage used for the cut, speed of the torch across the work piece, condition of the torch tip, input line voltage, air pressure, etc. Generally there is an inversely proportional relationship between output current and speed of cut. Do not use more output current than is necessary and adjust speed of cut toward minimizing dross build up on underside of cut. Experiment with adjusting current and speed to minimize dross.

When dross is present on carbon steel, it is commonly referred to as either 'high speed, slow speed, or top dross'. Dross present on top of the plate is normally caused by too great a torch to plate distance.

'Top dross' is normally very easy to remove and can often be wiped off with a welding glove. 'Slow speed dross' is normally present on the bottom edge of the plate. It can vary from a light to heavy bead, but does not adhere tightly to the cut edge, and can be easily scraped off. 'High speed dross' usually forms a narrow bead along the bottom of the cut edge and is very difficult to remove. When cutting troublesome steel, it is sometimes useful to reduce the cutting speed to produce 'slow speed dross'. Any resultant clean up can be accomplished by scraping, not grinding.

## 6.4. START-UP

After turning on machine or line power, conduct a careful visual inspection of the entire machine and make sure that no persons or material are obstructing its normal operation, and that no objects have inadvertently been left on it.

Check that all the machine safety devices are enabled; if necessary, reset them, and in particular check for:

- Unlocked emergency stops;
- Correct operation of the safety barriers, if installed, or the guards not removed
- Protection guard.

## 6.5. NORMAL STOP

Turn the switch on the welder panel to **OFF**.

To completely disconnect the power supply from the power line, turn the switch on the main panel to **O**.

## 6.6. DECOMMISSIONING

During long periods of inactivity it is necessary to:

- Disconnect the power supply from the general electrical panel and all other power supplies (pneumatic and/or hydraulic) which the machine needs.
- Perform all maintenance operations.
- Accurately clean the machine.
- Store the machine in a protected area with a stable support surface.
- Cover the machine to avoid dust accumulation.
- Make sure that the environmental conditions are suitable for preserving the machine over time.

## 7. MAINTENANCE

### 7.1. MACHINE ISOLATION

Before carrying out any type of Maintenance or Repair, it is necessary to isolate the machine from the power supply and from all other energy sources present.

### 7.2. SPECIAL PRECAUTIONS

When carrying out any maintenance or repair work, the following recommendations should be followed:

- Before starting work, display a sign stating "MACHINE UNDER MAINTENANCE" in a visible spot;
- Do not use flammable materials or solvents;
- Be careful not to pollute the environment with coolants;
- To access the highest parts of the machine, use the appropriate means and procedures;
- Do not climb on the machine parts, as they are not designed to support people;
- When finished, refit and properly secure all safety guards and devices that may have been removed or opened.

**IMPORTANT: The Manufacturer cannot be held liable for the failure to comply with the aforementioned recommendations nor for any other use that is inconsistent or not mentioned in these instructions.**

### 7.3. CLEANING

Before carrying out any cleaning operation, disconnect the device from the mains and from the energy sources present.

Do not use corrosive cleaning products, flammable or containing substances harmful to health.

Make sure that the parts being cleaned are completely cold.

Do not wet the internal parts to avoid damaging the electrical and electronic components.

Do not direct any jets of compressed air directly on the electrical and electronic components so as not to damage them.

**ATTENTION: Always use the appropriate PPE such as gloves, mask, glasses according to current safety standards.**

## 7.4. ROUTINE MAINTENANCE

### General requirements

The machine is designed to minimise routine maintenance, thus it is up to the operator to assess its condition and suitability for use.

It is recommended to stop and perform maintenance whenever non-optimal operation is detected, so as to ensure maximum efficiency at all times. Check the operation of safety devices monthly. In the event of faults or malfunction, entrust only qualified personnel to search for the fault or call the manufacturer's technical support. Check the continuity of the earth circuit every 2 years by performing the continuity measurement according to the provisions of the CEI 44 - 5 III Art. 19 standard. Visually check the condition of the individual parts of the machine, verifying that there is no alteration due to sagging or deformation. At each use of the machine, if equipped with a cooling unit, check the coolant level and top up if necessary.

**ATTENTION: Use only "SincoFluid" coolant supplied on request by the manufacturer or an authorised dealer.**

**The use of different coolants automatically voids the warranty and excludes the manufacturer from any liability.**

**ATTENTION: Allow the system to cool before proceeding with maintenance; hot surfaces can cause serious burns.**

**ATTENTION: For the entire duration of maintenance, it is necessary to stop the system by disconnecting the plug from the mains power supply or by disconnecting the power supply from the main panel circuit breaker, moving it to the "O" position and locking it with a special padlock.**

Always use the appropriate PPE - Personal Protective Equipment:

- Gloves;
- Non-slip shoes;
- Suitable clothing.

### Scheduled maintenance

The operations described below must be carried out in line with the schedules indicated.

**IMPORTANT: Failure to comply with the above shall exempt the manufacturer from any liability as specified in the Warranty.**

**ATTENTION: These operations, although simple, must be performed by a Qualified or Qualified and Authorised Technician.**

Remove dust or foreign materials every 6 months, which may have been deposited on the transformer or on the diodes of the rectifier unit; to do this use a jet of dry, clean air.

Do not direct the compressed air jet directly onto the electrical and electronic components so as not to damage them.

When reassembling the wire feeder roller, after having cleaned or replaced it, make sure that the groove is aligned with the wire and that it corresponds to the diameter of the wire used.

Keep the inside of the gas nozzle constantly clean, so as to avoid metal bridges consisting of welding sprays between the gas nozzle and the contact tip.

Make sure that the output hole of the current collector nozzle is not excessively enlarged, otherwise replace it.

Absolutely avoid beating the torch or subjecting it to violent impacts.

## 7.5. WELDING MACHINE REPAIRS

Experience has shown that many accidents originate from repairs not performed to perfection.

For this reason, careful and complete control over a repaired welding machine is just as important as that performed on a new welding machine. Moreover, in this way, manufacturers can be protected from being held liable for defects, when the liability is to be attributed to others.

Welding machine repairs must be carried out exclusively by trained and qualified personnel, in possession of the necessary requisites to guarantee a workmanlike repair and in full compliance with safety standards EN 60974-4.

### A) Instructions for repairs

- After rewinding the transformer or the inductances, the welding machine must pass the same applied voltage tests, passed at the time of the first test according to the regulations in force.
- If no rewinding has been carried out, a welding machine, which has been cleaned and/or overhauled, must pass a particular applied voltage test with values given by current regulations.
- After rewinding and/or replacing parts, the no-load voltage must not exceed certain values given by current regulations.
- If repairs are not carried out by the manufacturer,

repaired welding machines, in which some components have been replaced or modified, must be marked so that the person who carried out the repair can be identified.

**B) Additional repair Instructions**

- After having carried out a repair, be careful to re-order the wiring, so that there is a secure insulation between the primary side and the secondary side of the machine.
- Do not allow the wires to come into contact with moving parts (i.e. with the fan motor) or parts that become hot during operation.
- Also re-assemble all the clamps that hold the wiring, as originally arranged on the machine, so that, if a conductor is accidentally broken or disconnected, it is still possible to avoid a connection between the primary and the secondary.
- Avoid cleaning the electronic boards with a jet of compressed air to preserve the integrity of the components.
- At the end of any repair, make sure that you have not forgotten any tools inside the machine and close the machine with all the bulkheads available and taking care to replace all the fixing devices of the bulkheads themselves.

## 7.6. DIAGNOSTICS AND TROUBLESHOOTING

For defects or malfunctions of the machine not described in this manual, please contact the manufacturer.

### List of error code

Trouble	Possible Reason	Suggested Remedy
Torch will not come on	1. Power switch OFF 2. Air supply is not of sufficient volume or pressure 3. Work piece ground clamp not attached.	1. Turn power switch to the ON position 2. Check air supply (60 80 PSI, 3.5cfm required) 3. Attach to work piece or to steel table with work piece securely clamped to table
Sparks are shooting upward instead of down through the material.	1. Plasma torch is not piercing the material 2. Torch may be too far away from the work piece 3. Material may not be earthed properly 4. Travel speed too fast	1. Increase current 2. Decrease the distance of your torch to the work piece 3. Check connections for proper earth 4. Reduce speed
Beginning of cut not completely pierced	Possible earth connection problem	Check all connections
Dross build up on parts of cuts	1. Tool/material building up heat 2. Cutting speed too slow or current too high 3. Worn torch parts	1. Allow material to cool then continue cut. 2. Increase speed and/or reduce current until dross is reduced to minimum 3. Inspect and repair or replace worn parts
Arc stops while cutting	1. Cutting speed too slow 2. Torch is too high, away from material 3. Worn torch parts 4. Work piece earth cable disconnected	1. Increase speed until problem solved 2. Lower torch to recommended height 3. Inspect and repair or replace worn parts 4. Connect work piece earth clamp to work piece or steel table.
Insufficient penetration	1. Cutting speed too fast 2. Torch tilted too much 3. Metal too thick for plasma capacity 4. Worn torch parts	1. Slow down travel speed 2. Adjust tilt 3. Several passes may be necessary 4. Inspect and repair or replace worn parts
Arc sputters/flares	Water in the air supply	Install air drier or additional filtration
Consumables wear quickly	1. Exceeding unit capability 2. Excessive ARC starting HF use 3. Improperly assembled torch 4. Inadequate air supply, pressure too low 5. Faulty air compressor	1. Material too thick, increase angle to prevent blow back into torch tip 2. Do not operate HF ARC starting for more than 3 seconds you can also start with torch in contact with metal or within 1/16" of metal 3. See section 'Replacing Consumables' 4. Check air filters, increase air pressure 5. Check air compressor operation and make sure input air pressure is at least 100 PSI
Circuit breaker/fuse trips while operating	Extensioncord being used is not heavy duty	Use a heavy duty extension cord (2.5mm diameter)

If you have any problems in setting up or operating the machine, please first re consult this manual.

## 8. ACCESSORIES AND SPARE PARTS

### 8.1. CUSTOMER SERVICE

The Manufacturer is always at your disposal for any type of information regarding the use, maintenance, and installation of the equipment.

It is suggested that the Customer asks clear questions, making reference to this Manual and the instructions listed.

### 8.2. SPARE PARTS

**IMPORTANT: ALWAYS USE ORIGINAL SPARE PARTS. The Manufacturer cannot be held liable for breakages, malfunctions or damage to persons or property arising from the use of non-original parts.**

In the event that non-original spare parts are used, the conditions of the Warranty (if still in place) and of the Manufacturer's liability in the use of the machine and any damage deriving to persons and/or property are void.

## 9. ADDITIONAL INSTRUCTIONS

### 9.1. WASTE DISPOSAL

It is the responsibility of the user, in accordance with the laws in force in their country, to ensure correct disposal of the waste produced by the machine during production.

The disposal of hydraulic oil lubricants and the replaced parts must be carried out in compliance with the regulations in force in the country where the machine is in use.

### 9.2. DECOMMISSIONING AND DISMANTLING

With reference to the WEEE Directive 2012/19 / EU (Waste Electrical and Electronic Equipment), the user, during disposal, must dispose of the equipment in the appropriate authorised collection centres, or return it still installed to the seller at the time of a new purchase.

**IMPORTANT: do not dispose of polluting materials in the environment. Dispose of such products in compliance with legislation in force.**

**IMPORTANT: the illegal disposal of Waste Electrical and Electronic Equipment is punished with sanctions regulated by the laws in force in the territory in which the infringement is ascertained. Waste Electrical and Electronic Equipment may contain hazardous substances with potentially harmful effects on the environment and on people's health. It is recommended to dispose of it properly.**

WEEE refers to Waste Electrical and Electronic Equipment (EEE) including all components, sub-assemblies and consumables that are an integral part of the product at the time the decision is made to discard it. The law divides these into 2 main categories called **PROFESSIONAL WEEE** or **DOMESTIC WEEE**.

**PROFESSIONAL WEEE** means all waste electrical and electronic equipment intended for purely industrial use.

**DOMESTIC WEEE** means all waste electrical and electronic equipment intended for mixed use both in an industrial environment and in a domestic environment.

**DOMESTIC WEEE** is identified as all single-phase power supply generators with output current MAX  $\leq$  200A with their accessories.



There are 2 ways to discard **DOMESTIC WEEE**:

- a) If you decide to buy a new equivalent equipment, the user can deliver it to the distributor, who will have to collect it for free.
- b) Alternatively, it must be deposited in the Municipal pitch, in the container or specific area identified as "GROUPING 4".

As of the date of preparation of the Instruction Manual, as the application of the Regulations is not yet definitive, please contact the distributor and/or the manufacturer for information on **PROFESSIONAL WEEE** disposal.

**THE SYSTEM DESCRIBED IN THE MANUAL BELONGS TO CATEGORY: PROFESSIONAL "EEE"**

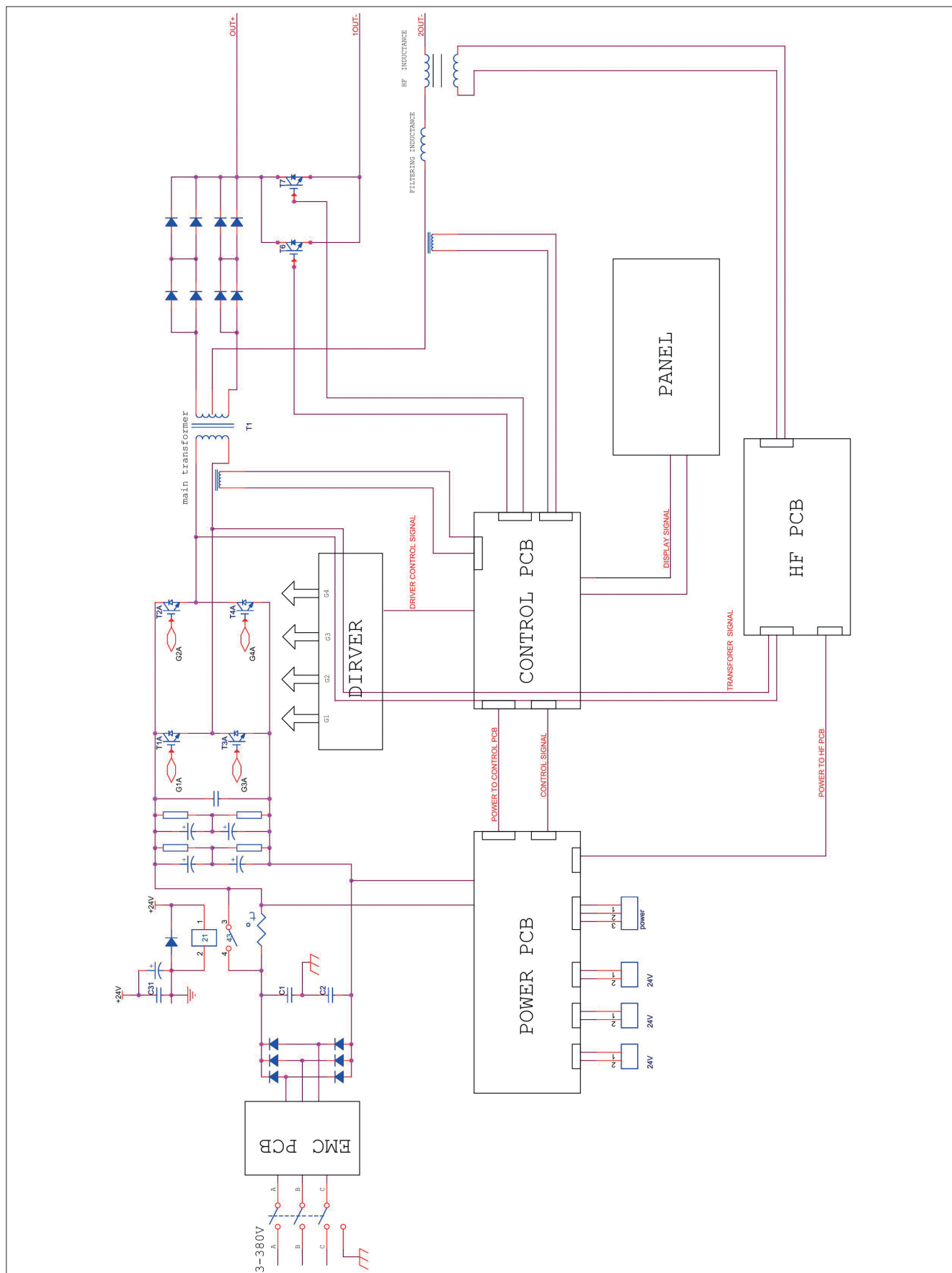
**For the management of "WEEE", SINCOSALD relies on ecoR Consortium "it"**



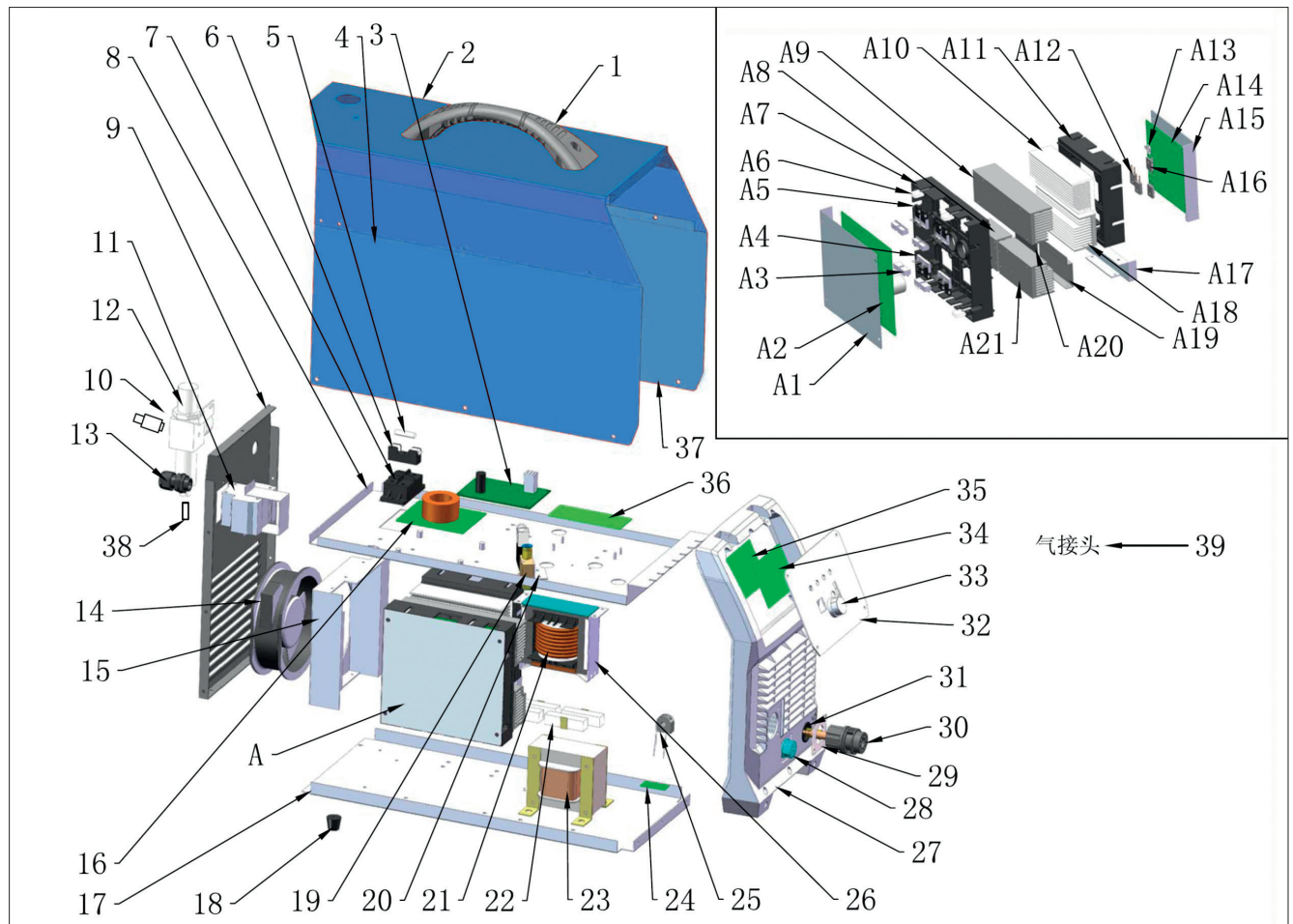
**AS OF THE DATE OF THE PREPARATION OF THIS INSTRUCTION MANUAL THIS INFORMATION SHOULD BE CONSIDERED TO BE NON-DEFINITIVE AS SUBJECT TO POSSIBLE CHANGES ACCORDING TO THE OBLIGATIONS LINKED TO LEGISLATIVE DECREE N ° 151/2005 THAT WILL COMPLETE DIRECTIVE 2002/96/EC.**

## 10. ANNEXES

### 10.1. ELECTRICAL SCHEMATIC DRAWING



## 10.2. SPARE PARTS



Pos.	Codice	Descrizione
1	8.295.099	handle
2	8.231.048	machine cover
3	8.233.032	power PCB
4	8.231.049	left panel
5	8.215.171	Fuse (lengthened)
6	8.215.198	Fuse plate
7	8.292.012	3 phase rectifier bridge
8	8.231.050	fixing plate for PCB
9	8.231.051	rear panel
10	8.235.045	Gas fitting
11	8.295.078	Rotary switch
12	8.235.027	oil water separator
13	8.295.072	Fixing clamp for power cable
14	8.235.046	fan
15	8.231.052	fixing plate for fan
16	8.293.004	EMC PCB
17	8.231.053	bottom plate
18	8.235.043	machine feet
19	8.232.010	Two position three way solenoid valve
20	8.235.047	fixing plate for air valve

Pos.	Codice	Descrizione
21	8.232.016	main transformer
22	8.215.163	cement resistance
23	8.232.017	Inductance
24	8.233.033	Output safety gauge PCB
25	8.232.015	current sensor
26	8.235.048	transformer pressing plate
27	8.230.003	front panel
28	8.295.068	14 pin socket
29	8.235.049	fixing plate for central socket
30	8.235.050	Central socket
31	8.235.025	10~25SQ euro socket
32	8.231.054	fixing plate for front panel
33	8.295.088	knob
34	8.213.079	serial port screen
35	8.233.034	control PCB
36	8.235.030	CNC Interface PCB
37	8.231.055	right panel
38	8.235.051	oil water separator connector
39	8.235.052	air connector for central socket
A1	8.231.056	fixing plate

Pos.	Codice	Descrizione
A2	8.233.035	IGBT PCB
A3	8.235.053	insulating sleeve
A4	8.235.054	insulating sleeve
A5	8.235.036	IGBT
A6	8.235.055	fixing block
A7	8.235.056	fixing box for heat sink
A8	8.231.057	heat sink
A9	8.231.058	heat sink
A10	8.231.059	FRD heat sink
A11	8.235.057	fixing box for heat sink
A12	8.245.042	IGBT
A13	8.235.058	Thermal switch (normally open)
A14	8.233.036	FRD PCB
A15	8.231.065	fixing plate
A16	8.235.035	Fast recovery diode
A17	8.231.060	support plate
A18	8.231.061	FRD heat sink
A19	8.231.062	windbreak plate
A20	8.231.063	windbreak plate
A21	8.231.064	heat sink

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