



MODEL

# **NOVAMIG 353C DP G.R.3**

## **INSTRUCTION MANUAL**

for installation,  
use and maintenance  
of welding  
machines.

**Original instructions in Italian.**  
Please keep for future use.

1.995.238 EN - Rev. 1.3



# 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	20
5.3. ENVIRONMENTAL CONDITIONS	20
5.4. LIGHTING	20
5.5. VIBRATIONS	20
5.6. NOISE	20
5.7. TECHNICAL SPECIFICATIONS	21

<b>6. MACHINE USE</b>	<b>22</b>
6.1. MACHINE LAYOUT DESCRIPTION	22
6.1.1. Front and rear panel layout of welding machine	22
6.1.2. Front and rear panel layout of water cooling	22
6.2. CONTROL PANEL OF WELDING MACHINE	22
6.2.1. Controls Explained	23
6.2.2. MMA Function Front Panel Description	26
6.2.3. TIG Function Front Panel Description	26
6.2.4. MIG function - Front panel descript	27
6.3. INSTALLATION & OPERATION FOR MMA WELDING	29
6.4. INSTALLATION & OPERATION FOR TIG WELDING	30
6.4.1. Gun switch control current	33
6.4.2. Spool Gun Control	34
6.5. INSTALLATION & OPERATION FOR MIG WELDING	35
6.5.1. Set up installation for MIG Welding Gas shielded wire	35
6.5.2. Set up installation for MIG Welding Gasless wire	38
6.6. START-UP	40
6.7. NORMAL STOP	40
6.8. DECOMMISSIONING	40
<b>7. MAINTENANCE</b>	<b>41</b>
7.1. MACHINE ISOLATION	41
7.2. SPECIAL PRECAUTIONS	41
7.3. CLEANING	41
7.4. ROUTINE MAINTENANCE	41
7.5. WELDING MACHINE REPAIRS	42
7.6. DIAGNOSTICS AND TROUBLESHOOTING	43
<b>8. ACCESSORIES AND SPARE PARTS</b>	<b>44</b>
8.1. CUSTOMER SERVICE	44
8.2. SPARE PARTS	44
<b>9. ADDITIONAL INSTRUCTIONS</b>	<b>44</b>
9.1. WASTE DISPOSAL	44
9.2. DECOMMISSIONING AND DISMANTLING	44
<b>10. ANNEXES</b>	<b>46</b>
10.1. WIRING DIAGRAMS	46
10.2. SPARE PARTS	47

## 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:



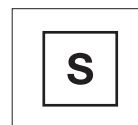
The product complies with the safety requirements provided by the applicable EU directives or regulations.



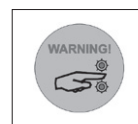
Carefully read the instructions listed in the manual.



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 machines 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.**



NOVAMIG 353C DP plate

1 SINCOSALD S.r.l Via della Fisica 26/28 Agrate B.za - MB - Italy			
NOVAMIG 353C DP 2		SERIAL NUMBER	
3 ~		EN 60974 - 1 4	
6	8 10A - 14.5V / 350A - 31.5V 10	X 11	40% 11a 60% 11b 100% 11c
7 S	Uo 14.5 V 9	I2 12	350 12a 286 A 12b 221 A 12c
		U2 13	31.5 13a 28.3 13b 25.1 13c
6a	10A - 10.4V / 350A - 24V	X	40% 60% 100%
S	Uo 14.5 V	I2	350 A 286 A 221 A
		U2	24 V 21.4 V 18.9 V
6b	10A - 20.4V / 350A - 34V	X	40% 60% 100%
S	Uo 14.5 V	I2	350 A 286 A 221 A
		U2	34 V 31.4 V 28.9 V
14	Imax MIG = 24.9 A 18 Ieff MIG = 15.7 A 19		
3 ~ 50/60 Hz.	U1 = 400 V 15	CL = H	
IP 23 16		17	

### Explanation of the NOVAMIG 353C DP plate

- 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 arc welding
- Pos. 5** Reference to the legislation followed for welding machine construction: EN 60974-1
- Pos. 6** Welding with MIG/MAG procedure
- Pos. 6a** Welding with TIG procedure
- Pos. 6b** Welding with MMA 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 Current / Alternating Current
- Pos. 9** Rated no-load voltage U0 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% - I2 350 A, these data indicate that the welding machine on a work cycle can weld with a current I2 = 350 A for a time of 6 minutes out of 10, that is 60%.
- Pos. 11a** Service factor: 40 %
- Pos. 11b** Service factor: 60 %
- Pos. 11c** Service factor: 100 %
- Pos. 12** Rated welding current (I2)
- Pos. 12a** Value of the rated welding current at 40%
- Pos. 12b** Value of rated welding current at 60%
- Pos. 12c** Value of rated welding current at 100%
- Pos. 13** Conventional load voltage (U2)
- Pos. 13a** Voltage at 40 % load
- Pos. 13b** Voltage at 60 % load
- Pos. 13c** Voltage at 100 % load
- Pos. 14** Symbol for the welding machine power supply and number of phases followed by the direct/alternating current symbol
- Pos. 15** Rated power voltage
- Pos. 16** Indicates the degree of welding machine protection: IP 23
- Pos. 17** See chapter 9.
- Pos. 18** ADDITIONAL INSTRUCTIONS
- Pos. 18** Maximum current in MIG welding
- Pos. 19** Actual current in MIG welding
- Pos. 20** Product complies with the safety requirements established by the applicable EU directives or regulations

G.R.3 plate

SINCOSALD s.r.l. 20864 AGRATE BRIANZA ( MB ) ITALY Via della Fisica, 26 / 28	
<b>G.R.3</b>	IEC 60974-2
U1 = 400V - 1 - 50/60 Hz	I1max = 0.8 A
IP 23	
MAX FLOW = 10 LT/min	INPUT Capacity = 220 W

**Explanation of the G.R.3 plate**

- Pos. 1** Name and address of the manufacturer and trademark
- Pos. 2** Cooling unit model identification
- Pos. 3** Reference to the regulation followed for cooling unit construction: IEC 60974-2
- Pos. 4** Cooling unit power voltage
- Pos. 5** Maximum current
- Pos. 6** Cooling unit protection grade: IP 23
- Pos. 7** See chapter 9.  
ADDITIONAL INSTRUCTIONS
- Pos. 8** Maximum flow (LT/min)
- Pos. 9** Absorbed power

**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:

<b>Harmonised standards</b>
IEC 60974-1 - IEC 60974-5 - IEC 60974-10
<b>Directives</b>
EN 60204-1 - 2014-35-EV - 9231 EEC - 9368 EEC
<b>Standards</b>
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 processed.
- 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, headgear 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 diactinic 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 machine 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 **NOVAMIG 353C DP** welding machine
- No. 1 **G.R.3.** cooling unit or Case Compartment
- No. 1 Instruction manual

#### OPTIONAL ACCESSORIES:

- No. 1 Earth cable
- No. 1 Welding torch

### 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.**

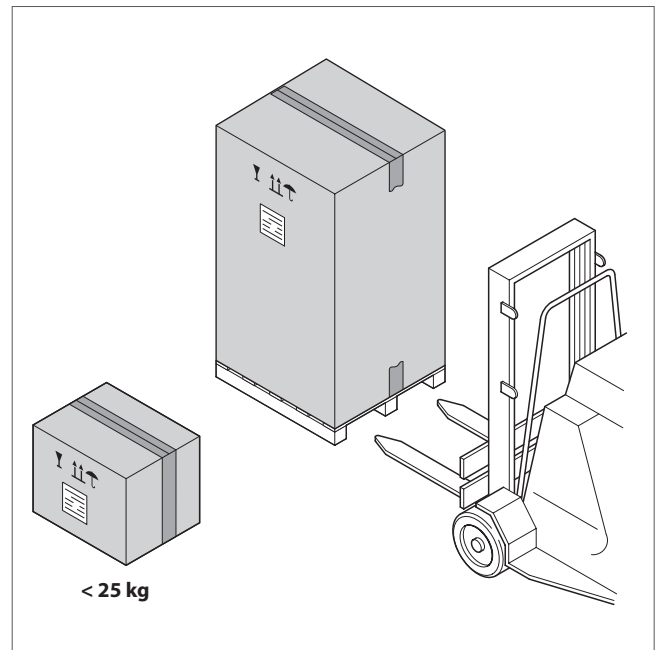
**To this end, it is advisable to carry out a check of the packaging during the unloading phase and, in suspicious cases, open the packaging and to verify the safety of the machine and any loose units.**

### 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.

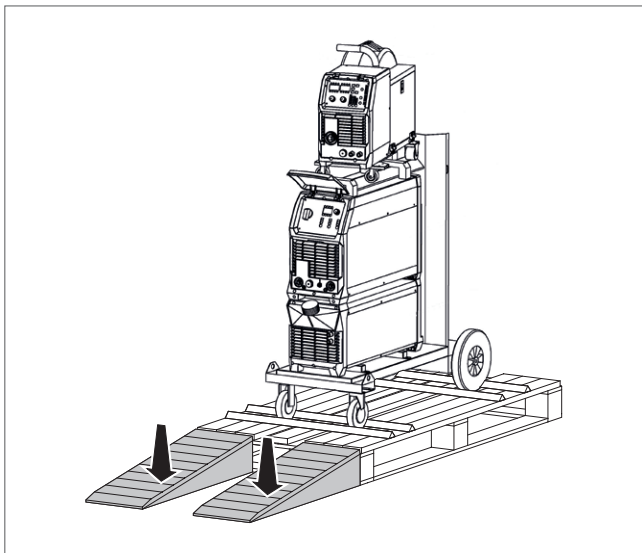
**IMPORTANT:** The Manufacturer cannot be held liable for damage caused to persons or property due to utilising lifting systems other than those described above.

## 4.5. UNPACKING

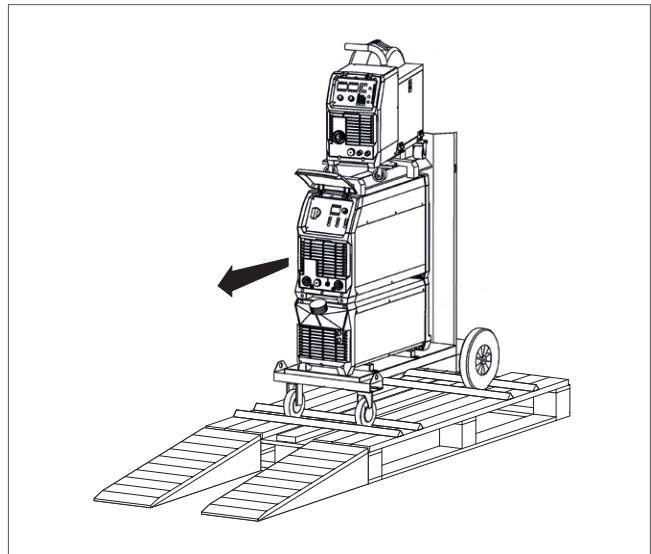
**IMPORTANT:** Consult the "Handling and lifting" paragraph to correctly handle the machine.

**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.

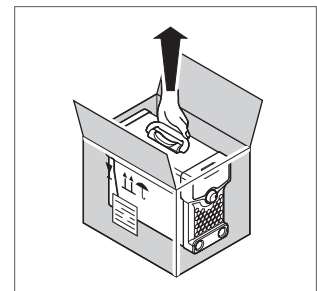
- Remove the protective covers such as straps, boxes, etc. using appropriate tools so as not to ruin the content.
- Remove the protective covers such as straps, boxes, etc. using appropriate tools so as not to ruin the content.
- Position appropriate descent ramps from the pallet verifying that the slides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



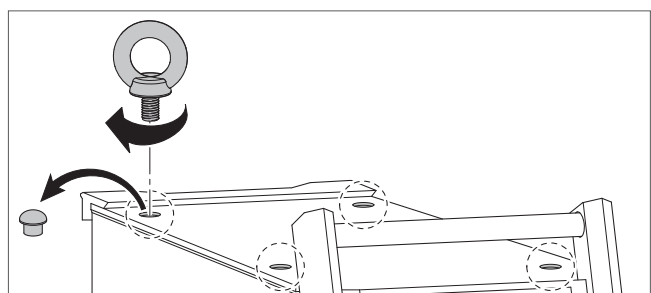
**ATTENTION:** risk of overturning when unloading the machine from the pallet equipped with descent ramps.

**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:

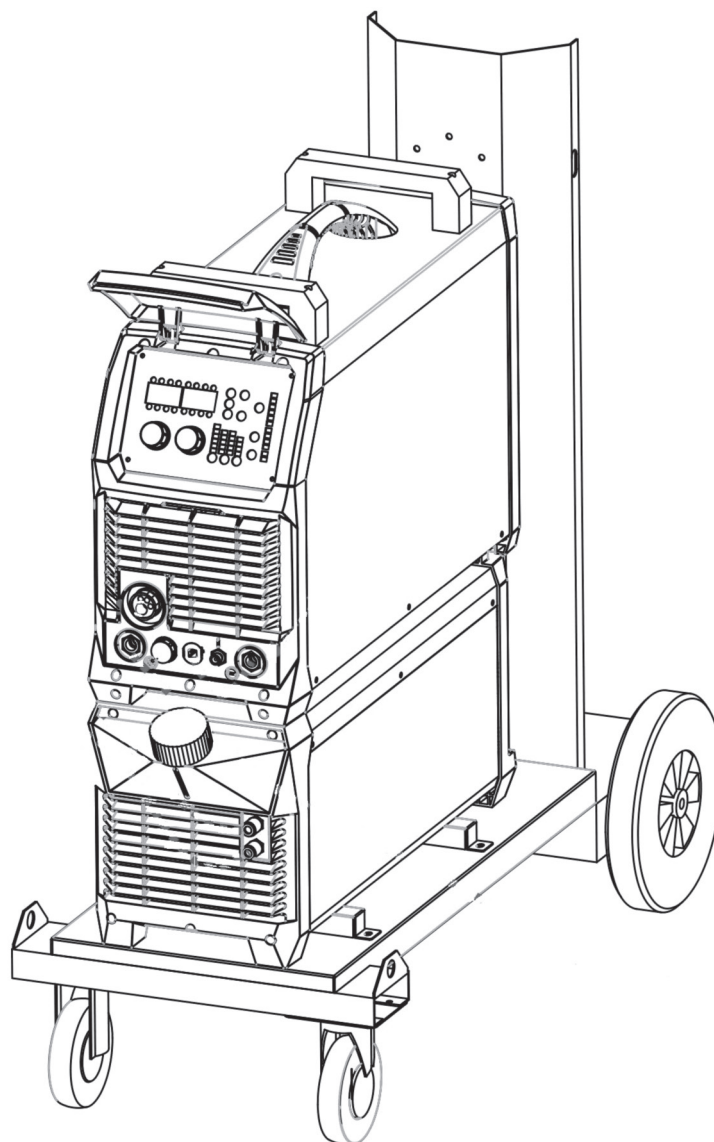
- Check that the machine has not been damaged during assembly;
- Verify, with particular care, the integrity of the electrical panels, control panels, electrical wiring and tubing;
- Check the exact connection of all external power sources;
- Check the free movement and free rotation of all moving parts;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

## 5. MACHINE DESCRIPTION

### 5.1. OPERATING PRINCIPLE

**NOVAMIG** series welding systems have been designed for continuous wire welding under protection of gas, in short and spray arc, with the use of solid and animated steel, stainless steel and aluminium wires.

The **NOVAMIG** series welding system composition is shown below.



## 5.2. FEATURES AND MAIN COMPONENTS

- New PWM technology and IGBT inverter technology.
- Active PFC technology for increased duty cycle and energy efficiency.
- Multi voltage input, can use with long extension lead.
- MIG/MAG with Pulse SYN/Dual pulse SYN/Manual and SYN function
- Synergic programs for aluminum, mill steel, stainless steel and CuSi
- JOB mode (Save and call 100 different job records)
- 2T /4T/S4T/Spot Weld welding mode
- Function parameter adjustment
- MMA function (Stick electrode)
- Hot start (improves electrode starting)
- Adjustable Arc Force
- DC TIG
- Lift Arc ignition (prevents tungsten sticking during arc ignition)
- 2T /4T Trigger Control
- Adjustable Down slope
- Gas/air cooling mode
- Internal wire feeder, gear driven for up to 300mm Ø spool
- Euro style MIG torch connection
- IP23 rating for environmental/safety protection
- Spool Gun Connection

## 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.

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

## 5.7. TECHNICAL SPECIFICATIONS

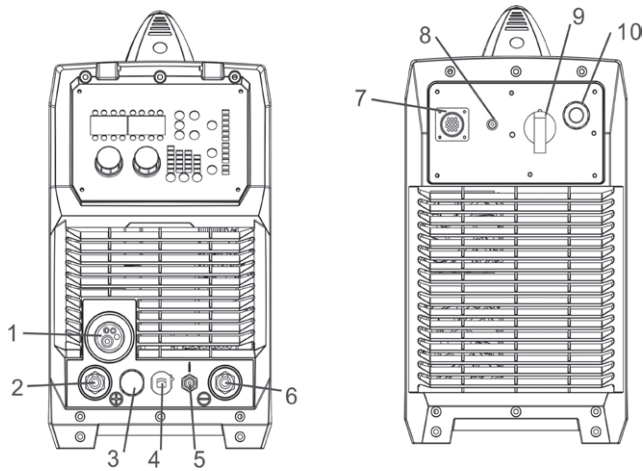
The following table shows the main technical specifications relating to the machine:

Parameters		NOVAMIG 353C DP
Power supply		400 V – 50/60 Hz
Fuse		40 A
MAX current		24,9 A
Noise emissions		< 70 dB
MAX power		14 KW (MIG)
Duty cycle 100%		221 A
Duty cycle 60%		286 A
Duty cycle 40%		350 A
Open circuit voltage		14,5 V
Output range		10 - 350 A
Efficiency (%)		85.2
Max energy consumption value in the inactive state (W)		41.0
Compliant with standards		EN 60974 - 1 - 5 - 10
Insulation class		H
Protection class		IP23
Cooling system		AF
Operating temperature		- 10 + 40 °C
Weight, kg		26
Dimensions, mm (L x W x H)		670 x 240 x 450
Wire diameters	Iron	0.8 - 1.2 mm
	STAINLESS steel	0.8 - 1.2 mm
	Cored wire	0.9 - 1.2 mm
	Aluminium	1.0 - 1.6 mm
Wire speed		2 - 20 mt./min
Wire spool capacity		16 Kg

## 6. MACHINE USE

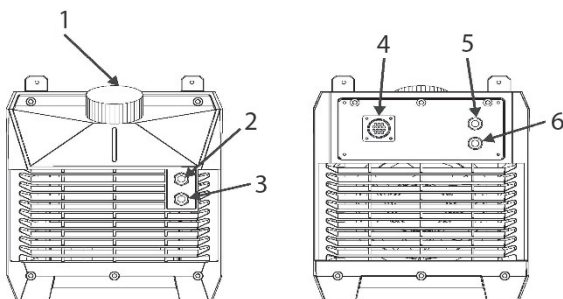
### 6.1. MACHINE LAYOUT DESCRIPTION

#### 6.1.1. Front and rear panel layout of welding machine



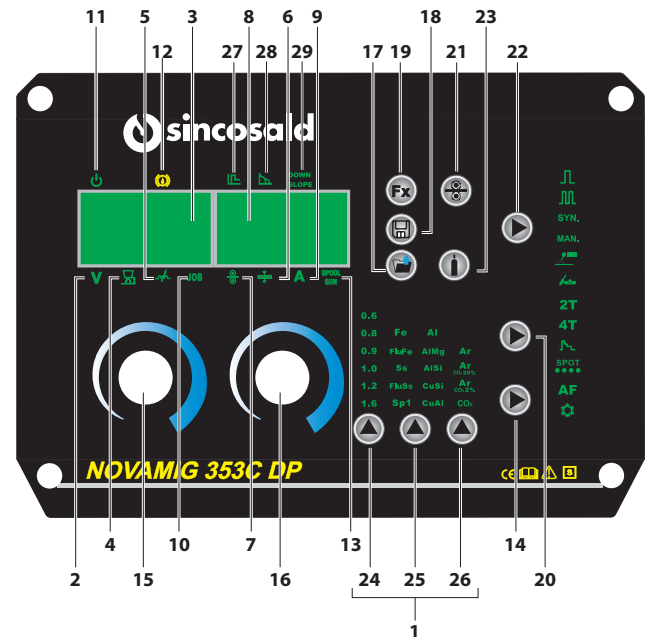
1. MIG torch euro connector.
2. Positive (+) welding power output connection socket.
3. Remote connection plug.
4. MIG Torch Polarity Change Power Connection.
5. TIG torch gas connector.
6. Negative (-) welding power output connection socket.
7. Water cooling control connector.
8. Gas inlet connector.
9. Power switch.
10. Input power cable.

#### 6.1.2. Front and rear panel layout of water cooling



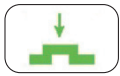
1. Water inlet
2. Water Inlet connector (blue)
3. Water outlet connector (red)
4. The water cooling control connector
5. Water Inlet connector (blue)
6. Water outlet connector (red)

### 6.2. CONTROL PANEL OF WELDING MACHINE

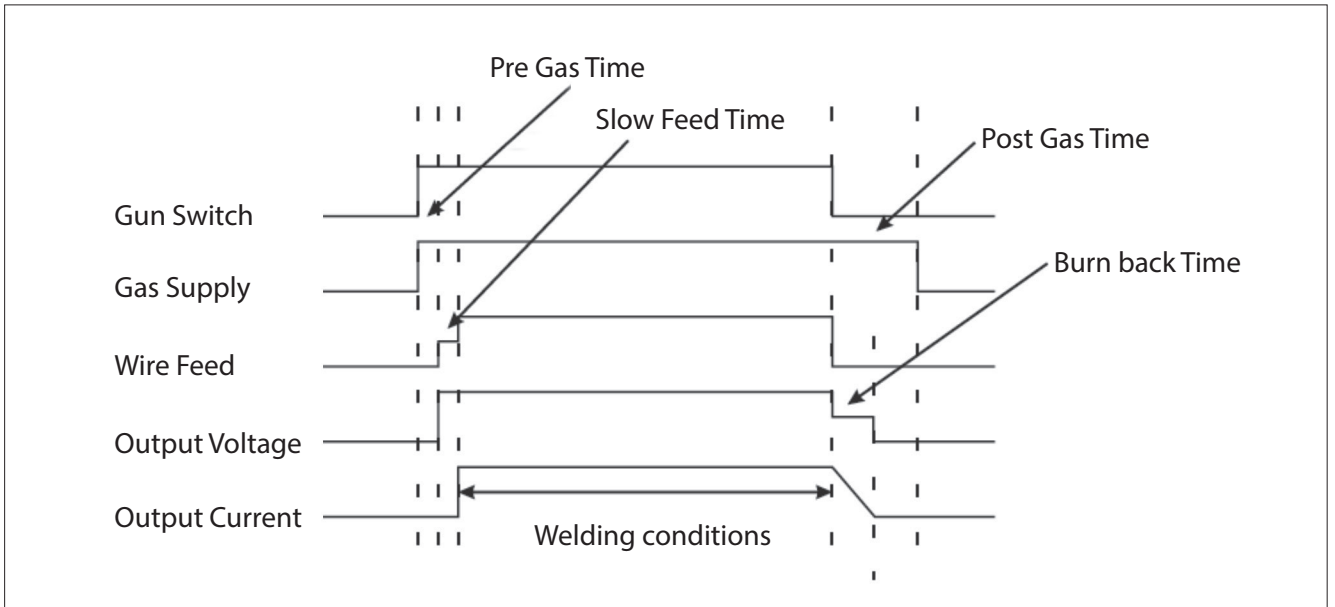


1. Synergic programs indicator.
2. Welding voltage indicator.
3. L digital multifunction display.
4. Arc length indicator.
5. Inductance indicator.
6. Material thickness indicator.
7. Wire feed indicator.
8. R digital multifunction display.
9. Welding current indicator.
10. JOB indicator.
11. Power indicator: Lights when input power connected and machine switched on.
12. Water cooling system error indicator / Alarm indicator
13. Spool Gun indicator.
14. Gas / Air cooling mode selector switch.
15. L parameter select/ adjust knob.
16. R parameter select/ adjust knob.
17. JOB button.
18. Program save/delete button.
19. Function button.
20. Trigger mode select button: Select 2T/4T/S4T/ Spot Weld
21. Manual wire button.
22. Welding process select button: Select MIG MAG Pulse SYN/MIG MAG dual pulse SYN/MIG MAG Manual / MIG MAG SYN/MMA/TIG
23. Air check button.
24. Welding Wire diameter.
25. Welding Wire material.
26. Gas select.
27. Hot Start
28. Arc Force
29. Down Slope

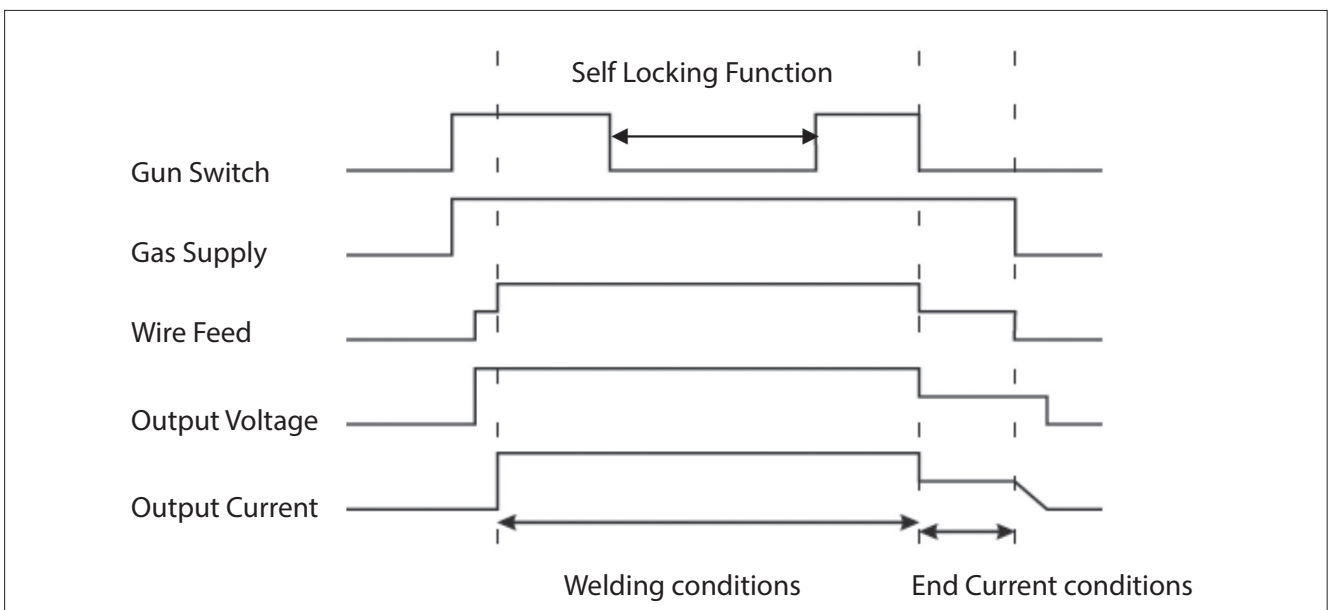
**6.2.1. Controls Explained**  
**Trigger mode select button (20)**



**2T mode**

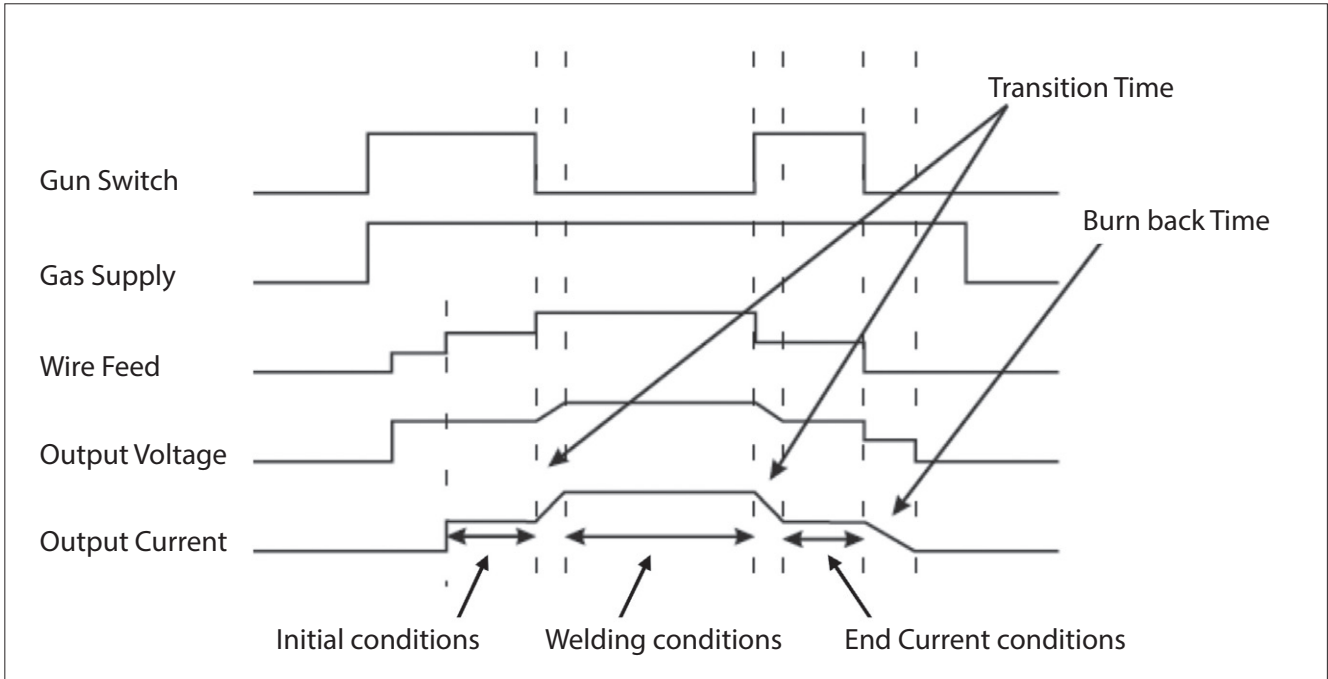


**4T mode**

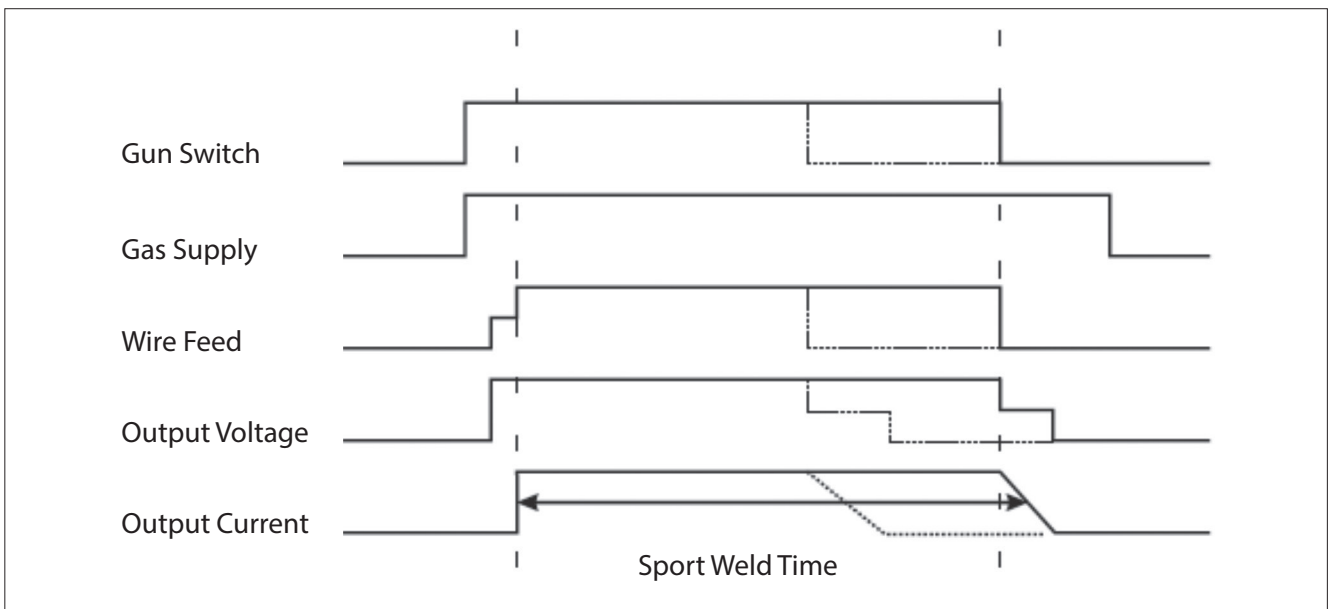




**S4T mode**



**Spot weld**





### Function button (19)

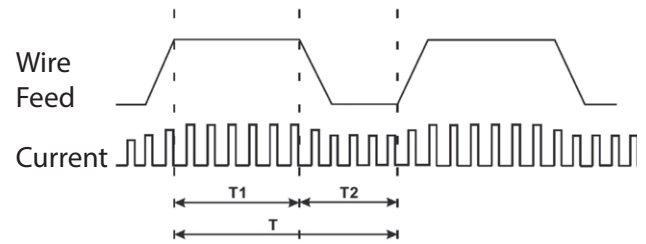
- User parameter menu and parameter adjustment method for import and export.
  - Press the function button (19), the indicator light that into the user function parameter adjusting mode.
  - Select the parameter code that needs to be modified by the knob (15), it will show on the digital meter (3); Adjust the parameter value by the knob (16), it will show on the digital meter (8).
  - Press the function button (19), again, the indicator light is off, exit user function parameter adjusting mode.
- User parameter function introduction

Display	Function	Adjustable range	Mode
PrG	pre gas	0-5s	
PoG	post gas	0-10s	
SFt	slow feed time	0-10s	
bub	burn back	0-10	
SPt	spot weld time	0-10s	
FdP	dual pulse frequency	0.5-3.0hz	dual pulse
dut	dual pulse duty	20-80%	
bAL	dual pulse base current arc length	-30 +30	
SCP	start current percent	1-200%	S4T
SAL	start current arc length	-30 +30	
ECP	end current percent	1-200%	
EAL	end current arc length	-30 +30	
SPG	spool gun	off/on	
HSt	HOT START	0 10	
ACF	ARC FORCE	0 10	MMA
dSL	DOWN SLOPE	0 10S	MMA TIG

### 3. Dual pulse function introduction

Dual pulse welding in single pulse welding with low frequency modulated pulse, low frequency pulse frequency 0.5-3.0Hz. Single pulse compared to dual pulse has the advantages of: without welding swing,

weld automatic fish squamous and fish scale pattern density, the depth can be adjusted; to be more precise control of heat input. During the low current, cooling the molten pool, reduce workpiece deformation, reduce the hot cracking tendency; and periodically stirring molten pool, grain refinement, the hydrogen gas from the molten pool in precipitation to reduce the porosity and reduce welding defects. Dual pulse reference waveform as shown below:



### DUAL PULSE FREQUENCY

Set low frequency pulse frequency, as shown in Figure regulating the value of time T, namely, fish scale pattern of density regulation.

### DUAL PULSE DUTY

Dual pulse duty set strong pulse group time T1 and low-frequency cycle T ratio, namely the regulation of the proportion of the fish scale pattern in the protruding part and the groove.

The U-D function enables and disables the regulation of the up-down torch. Precisely with the function U-D in the ON position can only be adjusted from the torch up-down, while in the OFF position it can only be adjusted from control panel.

### JOB button (17)

In the JOB mode, 100 different JOB records can be stored and called, improve the quality of welding process.

### Save the JOB programs

Welding machine before leaving the factory did not save the JOB programs, to be called before, you must first save the JOB programs

- Set JOB mode parameters (welding function, welding mode, welding parameters, etc).
- Press the JOB button (17), go in save state.
- Select JOB number by the adjustment Knob (16), it will show on the digital meter (8).

NOTE: the digital meter (3) display "---", the JOB number no JOB programs .

- Press the Save/Delete button (18), save successful.

### Call the JOB programs

- Press the JOB button (17), the JOB LED is on.
- Select the required JOB number by the adjustment Knob (16), it will show on the digital meter (8).
- Press the JOB button (17) again, the JOB LED is off, exit JOB mode.

### Water cooling system error indicator (12)

When using the integrated water cooler, the system is equipped with a pressure sensor. If the coolant pressure is insufficient, this indicator will light and the welding output will not be able to be active, in order to protect the torch and cooling system.

### Alarm indicator (14)

Lights when over voltage, over current, input phase loss 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.

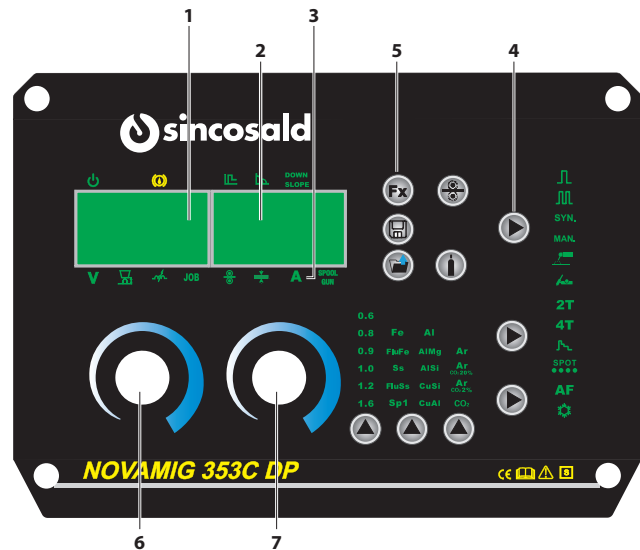
### Synergic programs indicator (1)

#### Synergic Function

This makes the setup of MIG welding more simple, the operator simply sets the welding current like MMA or TIG welding and the machine calculates the optimal voltage and wire speed for the material type, wire type and size and shielding gas being used. Obviously other variables such as welding joint type and thickness, air temperature affect the optimal voltage and wire feed setting, so the program provides a voltage fine tuning function for the synergic program selected. Once the voltage is adjusted in a synergic program, it will stay fixed at this variation when the current setting is changed. To reset the voltage for a synergic program back to factory default, change to another program and back again.

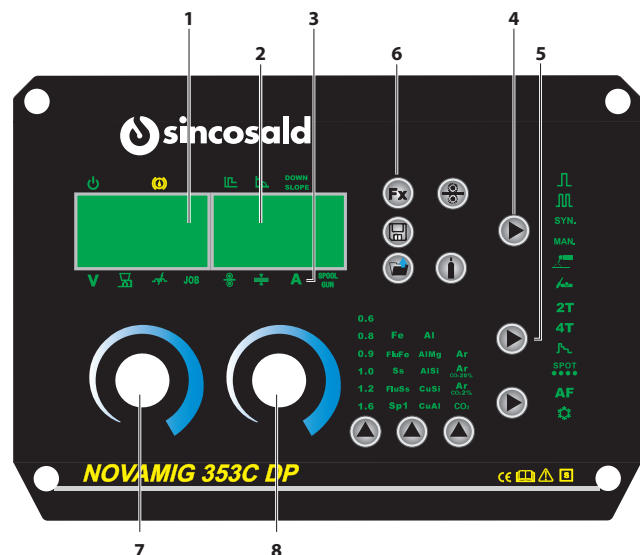
The synergic programs are given a number from 1-17, this is accessed on the L display (3) using the L knob (15), the letter 'P' appears on the display. To select the relevant program for the welding application, check the chart printed on the inside door of the wire feeder or further on in this manual.

### 6.2.2. MMA Function Front Panel Description



1. Hot Start / Arc Force Parameter code Display
2. Welding Current /Hot Start / Arc Force Display
3. Welding Current Indicator
4. Press button for select MMA function
5. Hot Start / Arc Force Parameter Select
6. Hot Start / Arc Force Parameter code Select
7. Welding Current /Hot Start / Arc Force Set

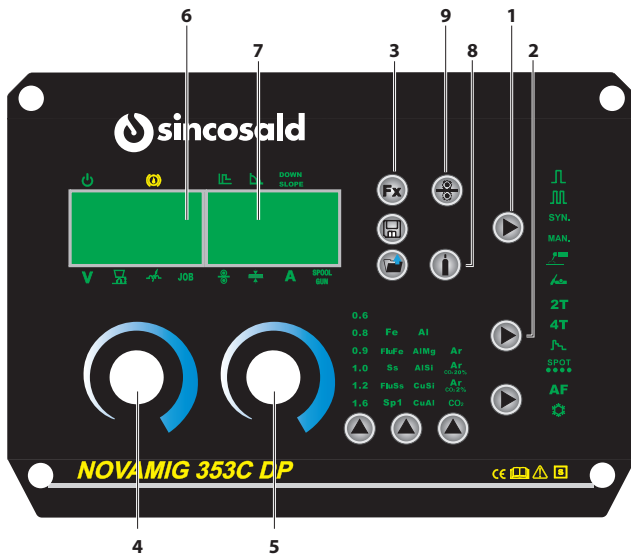
### 6.2.3. TIG Function Front Panel Description



1. Down Slope / Hydrocooling code Display
2. Welding Current / Down Slope Time / Hydrocooling (on/off) Display
3. Welding Current Indicator
4. Press button for select TIG function
5. 2T/4T Trigger Select.
6. Down Slope / Hydrocooling Parameter Select
7. Down Slope / Hydrocooling code Select
8. Welding Current /Down Slope Time / Hydrocooling (on/off) Set

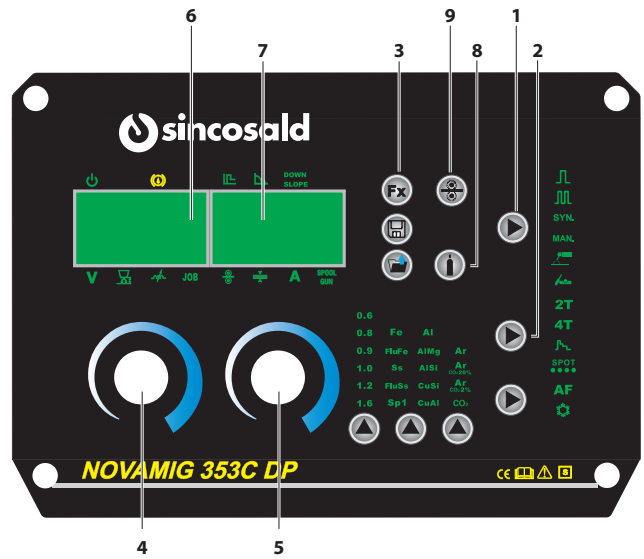
## 6.2.4. MIG function - Front panel descript

### MIG MAG Pulse SYN Function



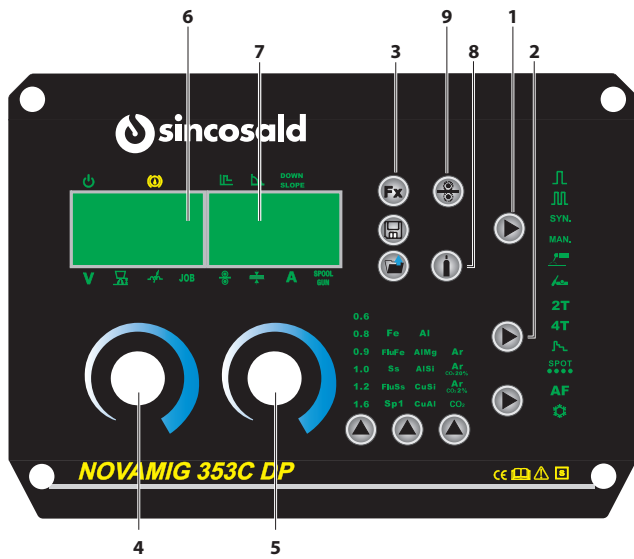
1. Press button for select MIG MAG Pulse SYN function
2. 2T/4T/S4T/Spot Weld Select
3. Function Select
4. Synergic programs numbers select
4. Voltage/ Arc length/ Inductance Set
5. Material thickness /Current/ Wire Speed Set
6. Programs Numbers/Voltage/Arc length/ Inductance Display
7. Current/ Wire Speed / Material Thickness Display
8. Air Check Select
9. Manual Wire Select

### MIG MAG Dual Pulse SYN Function



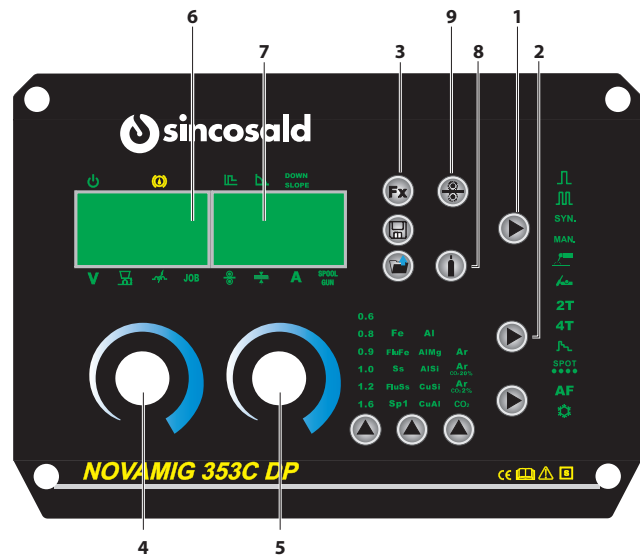
1. Press button for select MIG MAG Dual Pulse SYN function
2. 2T/4T/S4T/Spot Weld Select
3. Function Select
4. Synergic programs numbers select
4. Voltage/ Arc length/ Inductance Set
5. Material thickness /Current/ Wire Speed Set
6. Programs Numbers/ Voltage/ Arc length/ Inductance Display.
7. Current/ Wire Speed / Material Thickness Display
8. Air Check Select
9. Manual Wire Select

### MIG MAG Manual Function



1. Press button for select MIG MAG Manual Function
2. 2T/4T /Spot Weld Select
3. Function Select
4. Voltage/ Inductance Set
5. Material thickness /Current/ Wire Speed Set
6. Voltage/ Inductance Display
7. Material thickness /Current/ Wire Speed Display
8. Air Check Select
9. Manual Wire Select

### MIG MAG SYN Function



1. Press button for select MIG MAG SYN Function
2. 2T/4T /S4T/Spot Weld Select
3. Function Select
4. Synergic programs numbers select, refer to 4.4
4. Voltage/ Inductance Set
5. Material thickness /Current/ Wire Speed Set
6. Programs Numbers /Voltage/ Inductance Display
7. Material thickness /Current/ Wire Speed Display
8. Air Check Select
9. Manual Wire Select

### 6.3. INSTALLATION & OPERATION FOR MMA WELDING

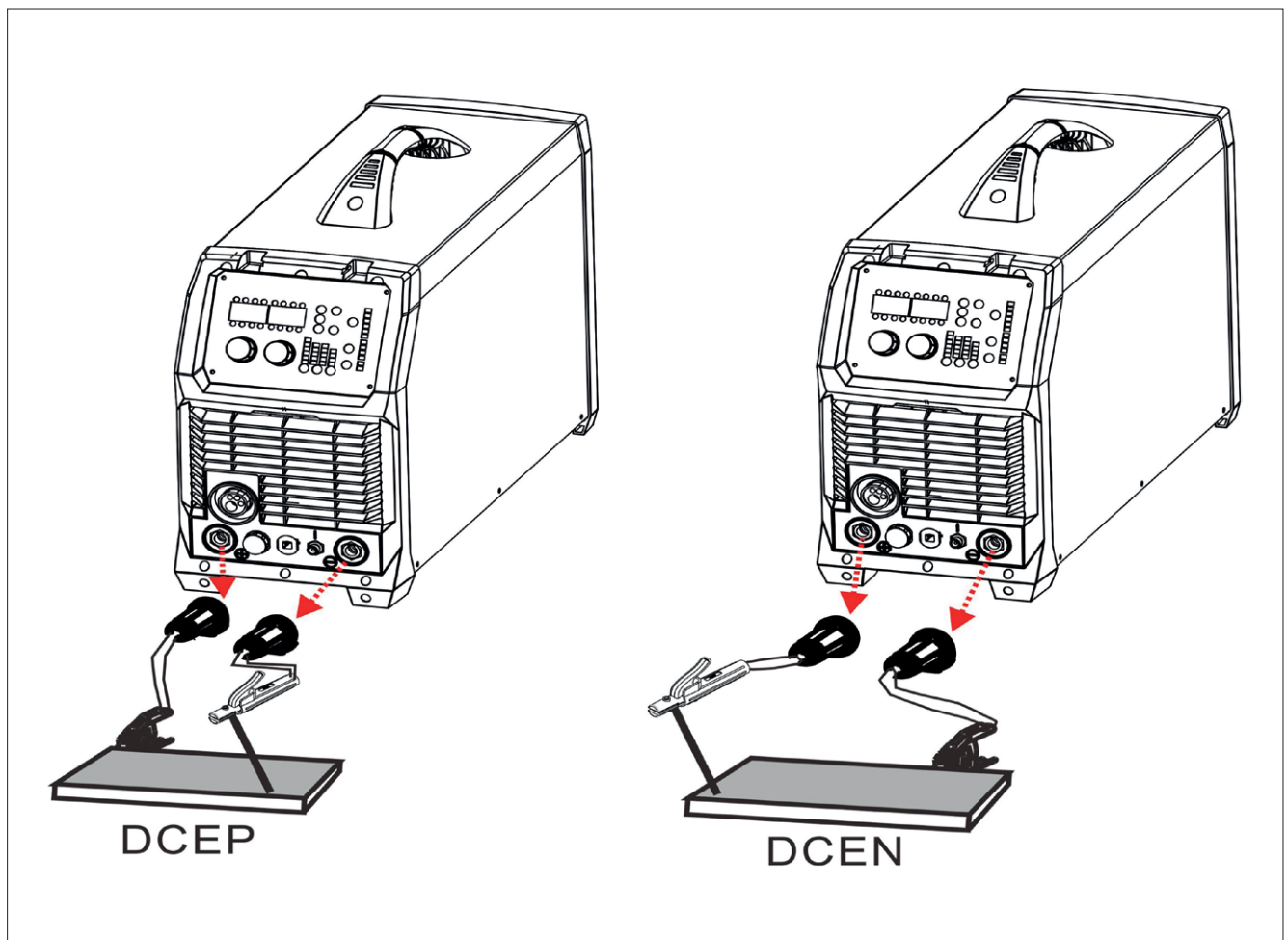
#### 1. Connection of Output Cables

Connection of Output Cables Two sockets are available on this welding machine. For MMA welding the electrode holder is shown be connected to the positive socket, while the earth lead (work piece) is connected to the negative socket, this is known as DCEP. However various electrodes require a different polarity for optimum results and careful attention should be paid to the polarity, refer to the electrode manufacturers information for the correct polarity.

DCEP: Electrode connected to "+" output socket.

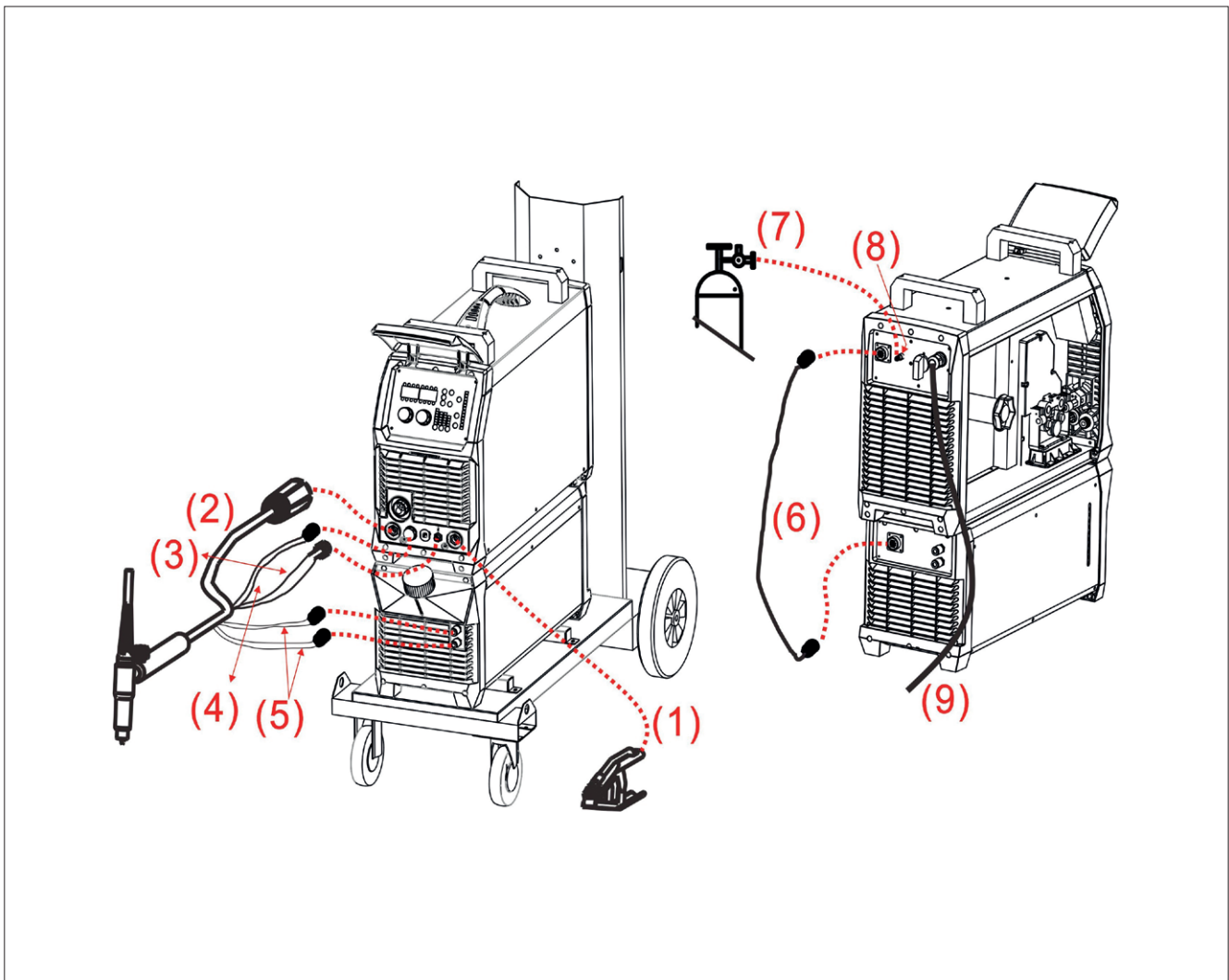
DCEN: Electrode connected to "-" output socket.

2. Turn the power source on and press the TIG/MMA/MIG key to select the MMA function.
3. Set the welding current relevant to the electrode type and size being used as recommended by the electrode manufacturer.
4. Set the Hot Start and Arc Force using the button and knobs.
5. Place the electrode into the electrode holder and clamp tight.
6. Strike the electrode against the work piece to create an arc and hold the electrode steady to maintain the arc.



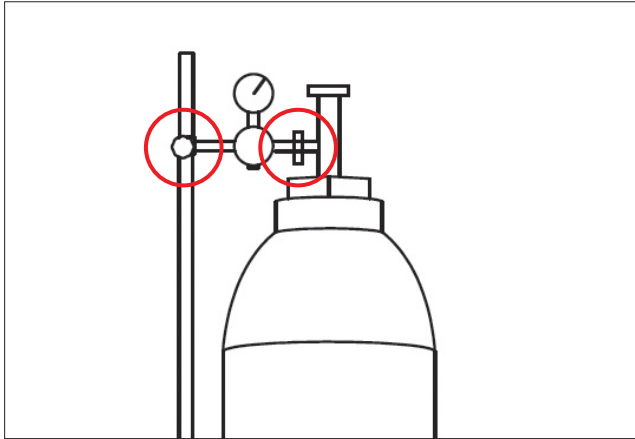
## 6.4. INSTALLATION & OPERATION FOR TIG WELDING

1. Insert the earth cable plug into the positive socket on the front of the machine and tighten it.
2. Plug the welding torch into the negative socket on the front panel, and tighten it.
3. Connect the gas line of TIG Gun to outlet gas connector on the front of the machine.
- Check for Leaks!**
4. Connect the control cable of torch switch to 9 pin socket on the front of the machine.
5. Connect the water inlet and outlet pipe of TIG Gun to inlet and outlet water connector on the front of the cooling water.
6. Connect the control cable of cooling water with the aero socket on the rear panel of welding machine.
7. Connect the gas regulator to the Gas Cylinder and connect the gas line to the Gas Regulator.
- Check for Leaks!**
8. Connect the gas line to the machine inlet gas connector via the quick push lock connector located on the rear panel.
- Check for Leaks!**
9. Connect the power cable of welding machine with the output switch in electric box on site.

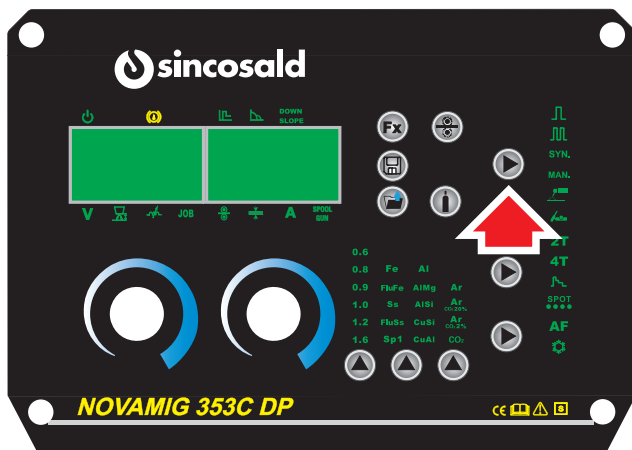


**NOTE: Air cooling mode without cooling device, and the water pipe is not needed for the air cooling mode.**

10. Carefully open the valve of the gas cylinder, set the required gas flow rate.

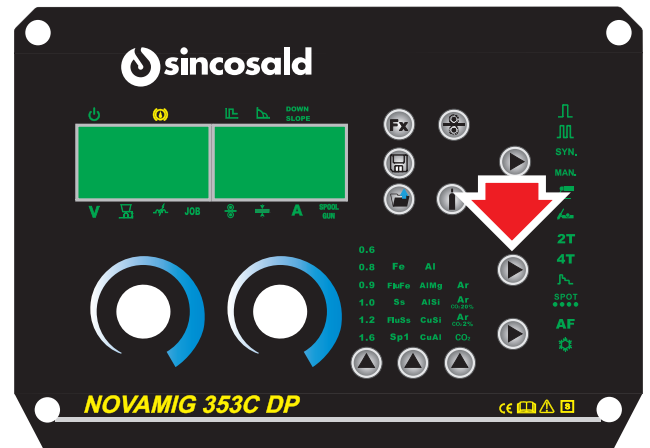


11. Select TIG function on the front panel.

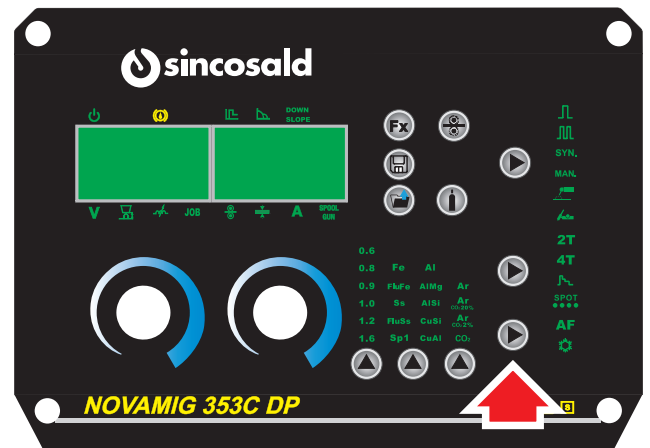


12. Set torch operation 2T / 4T.

- When 2T operation is selected press trigger Gas starts, touch and lift arc start, release trigger Gas and Arc stops.
- When 4T operation is selected press and release trigger Gas starts, touch and lift arc start, press and release trigger Gas and Arc stops.



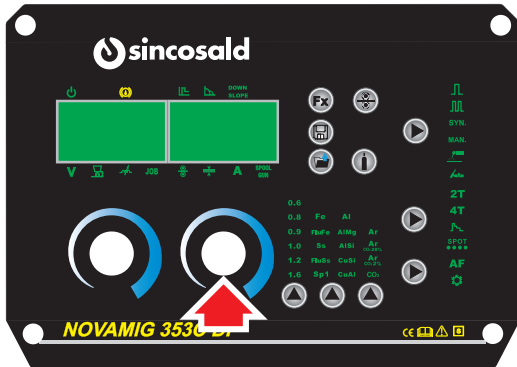
13. Select water cooling mode on the front panel.



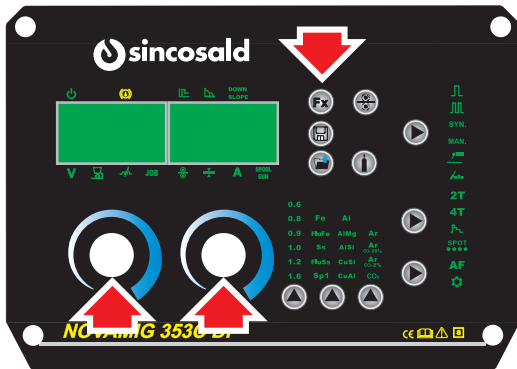
### LIFT ARC DC TIG Operation

Lift Arc ignition allows the arc to be started easily in DC TIG by simply touching the tungsten to the work piece and lifting it up to start the arc. This prevents the tungsten tip sticking to the work piece and breaking the tip from the tungsten electrode. There is a particular technique called “rocking the cup” used in the Lift Arc process that provides easy use of the Lift Arc function.

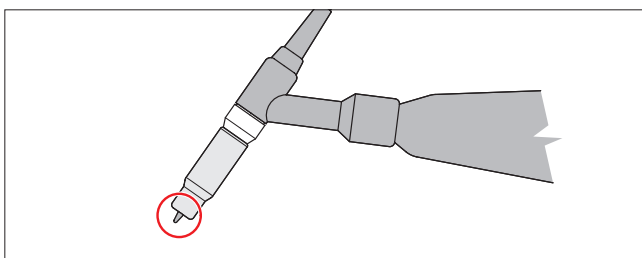
14. Select welding current as required on the front panel. The selected welding current will show on the digital meter.



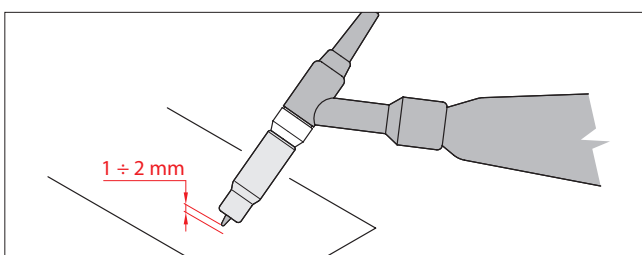
15. Set down slope time as required on the front panel. The down slope time will show on the digital meter.



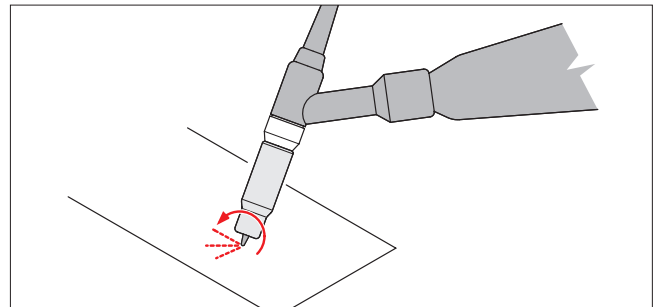
16. Assemble front end parts of the TIG torch making sure they are correctly assembled, use the correct size and type of tungsten electrode for the job, the tungsten electrode requires a sharpened point for DC welding.



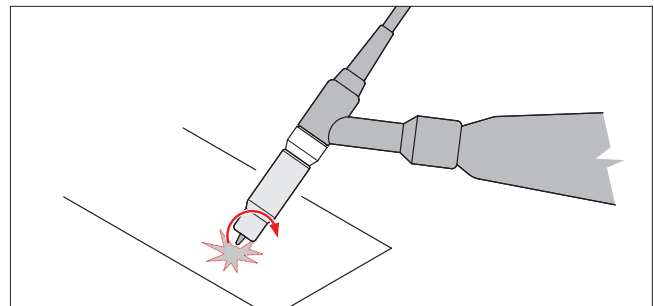
17. Lay the outside edge of the Gas Cup on the work piece with the Tungsten Electrode 1- 2mm from the work piece. Press and hold the torch switch to activate to gas flow and welding power.



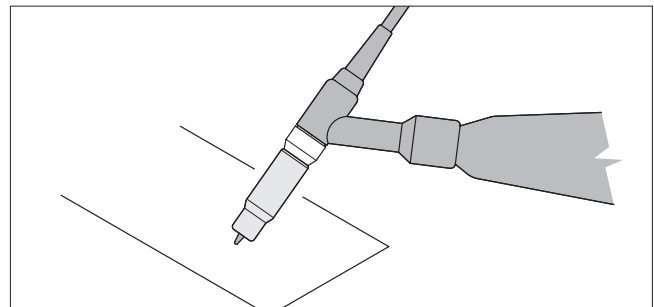
18. With a small movement rotate the Gas Cup forward so that the Tungsten Electrode touches the work piece.



19. Now rotate the Gas Cup in the reverse direction to lift the Tungsten electrode from the work piece to create the arc.



20. Release the trigger to stop the welding.

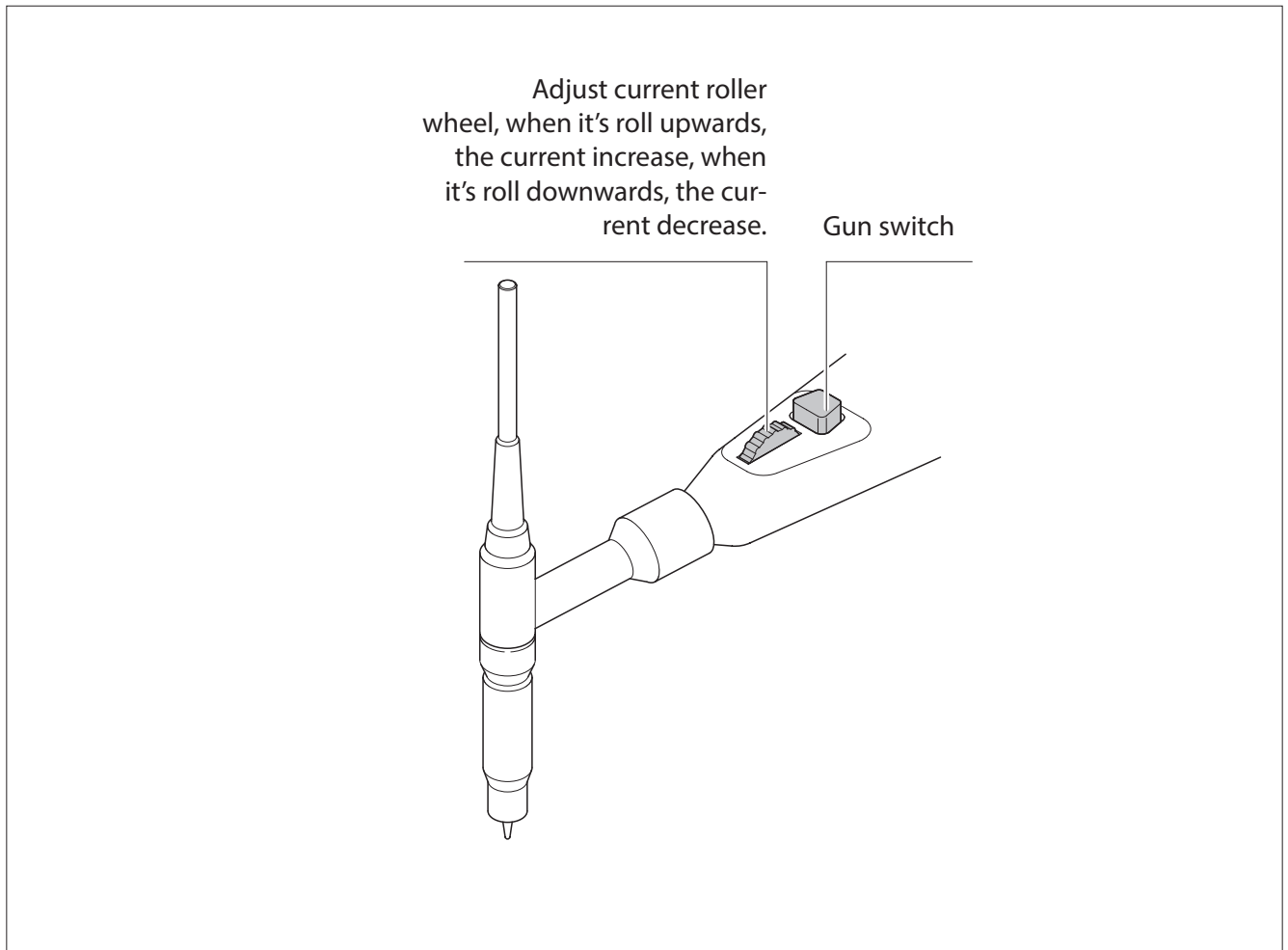


**IMPORTANT! We strongly recommend that you check for gas leaks prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use.**

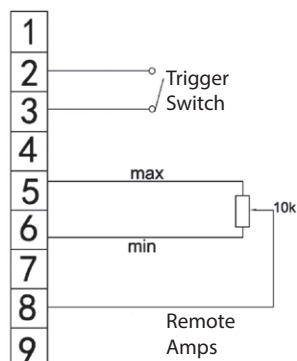
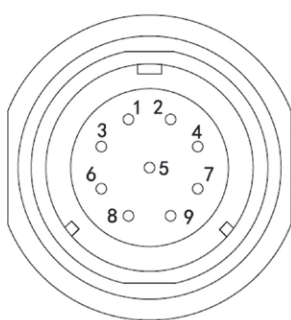


### 6.4.1. Gun switch control current

#### REMOTE GUN



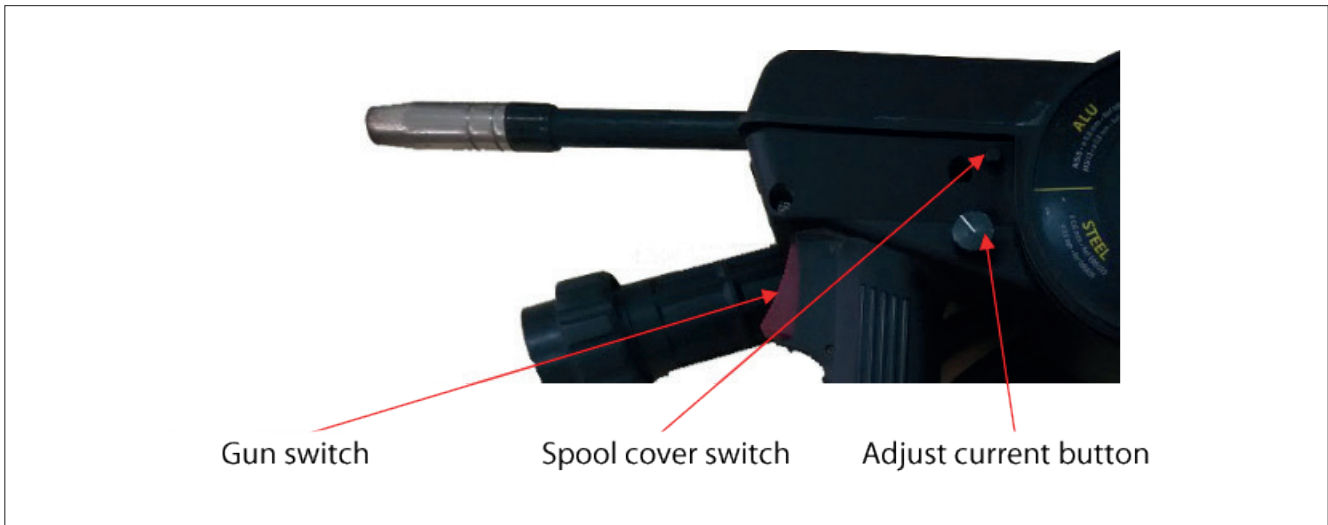
#### Remote Control Socket



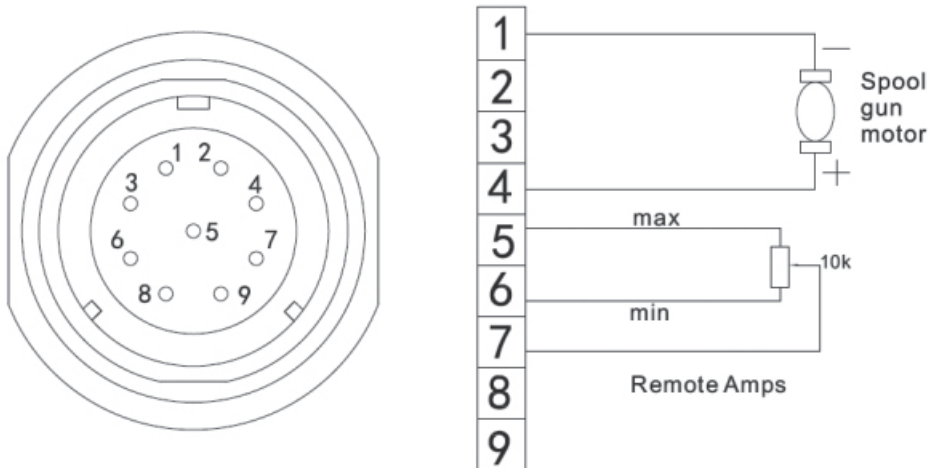
Socket Pin	Function
1	Not connected
2	Trigger Switch Input
3	Trigger Switch Input
4	Not connected
5	10k ohm (maximum) connection to 10k ohm remote control potentiometer
6	Zero ohm (minimum) connection to 10k ohm remote control potentiometer
7	Not connected
8	Wiper arm connection to 10k ohm remote control potentiometer
9	Not connected

## 6.4.2. Spool Gun Control

### 226 Spool Gun



### Remote Control Socket



Socket Pin	Function
1	Spool gun motor
2	Not connected
3	Not connected
4	Spool gun motor
5	10k ohm (maximum) connection to 10k ohm remote control potentiometer.
6	Zero ohm (minimum) connection to 10k ohm remote control potentiometer.
7	Wiper arm connection to 10k ohm remote control potentiometer.
8	Not connected
9	Not connected

## 6.5. INSTALLATION & OPERATION FOR MIG WELDING

### 6.5.1. Set up installation for MIG Welding Gas shielded wire

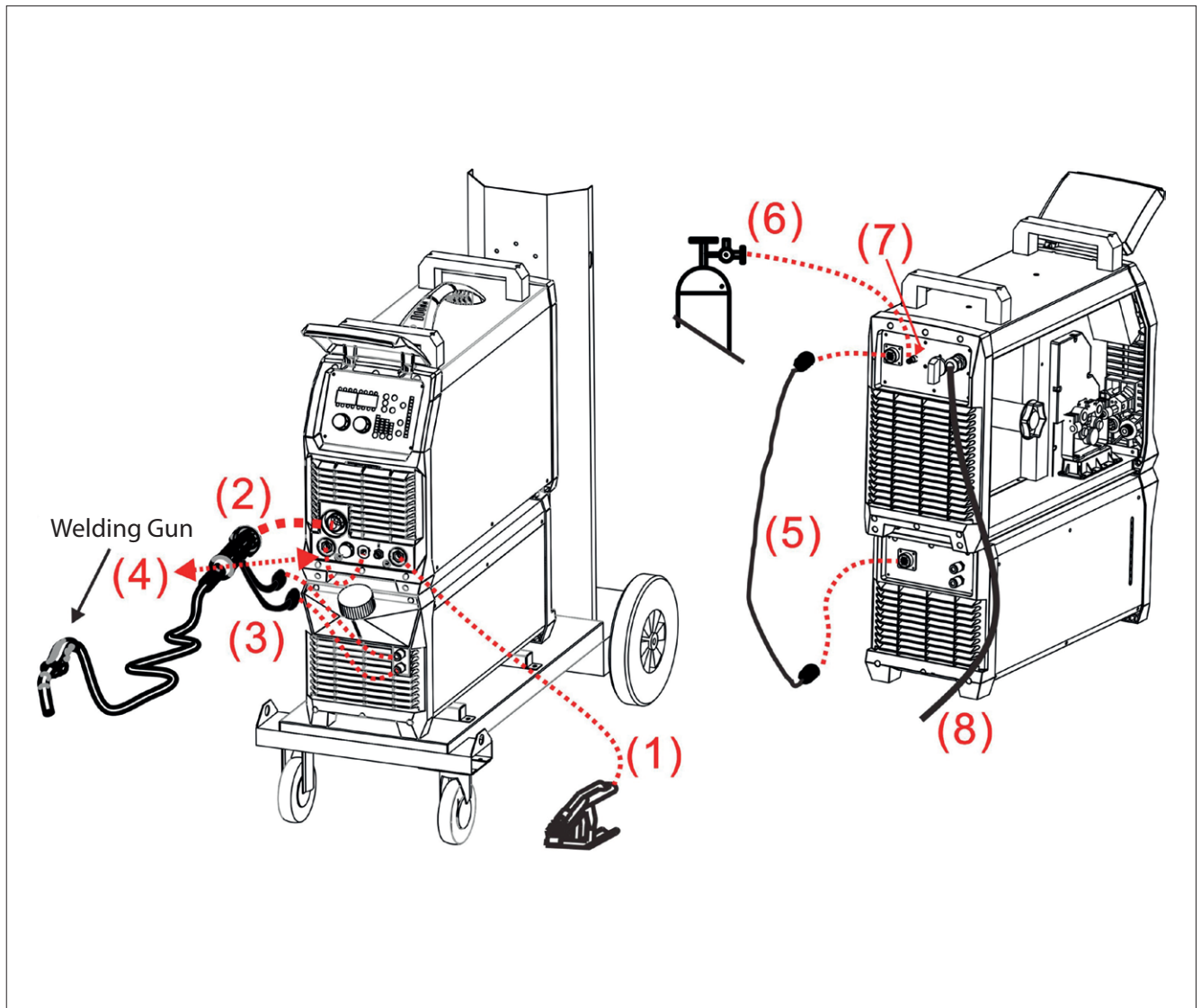
1. Insert the earth cable plug into the negative socket on the front of the machine and tighten it.
2. Plug the welding torch into the MIG torch connection socket on the front panel, and tighten it.

**IMPORTANT: When connecting the torch be sure to tighten the connection. A loose connection can result in the connector arcing and damaging the machine and gun connector.**

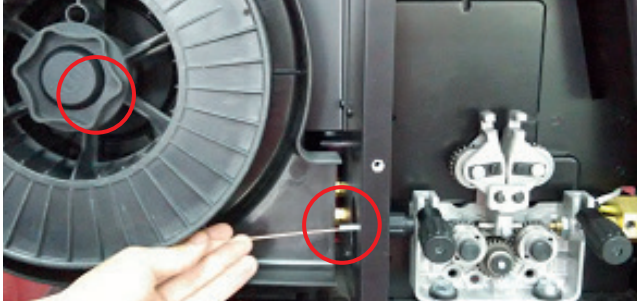
3. Connect the water inlet and outlet pipe of MIG Gun to the water inlet and outlet connectors on the front of the cooling water.

4. Connect the MIG power connection lead to the positive welding power output socket.  
Note if this connection is not made, there will be no electrical connection to the welding torch!
5. Connect the control cable of cooling water with the aero socket on the rear panel.
6. Connect the gas regulator to the Gas Cylinder and connect the gas line to the Gas Regulator. Check for Leaks!
7. Connect the gas line to gas connector on the rear panel. Check for Leaks!
8. Connect the power cable of welding machine with the output switch in electric box on site.

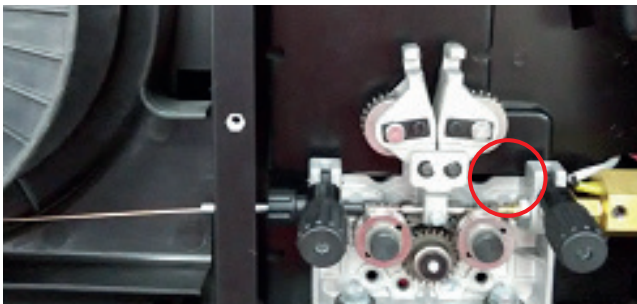
**NOTE: Air cooling mode without cooling device and the water pipe is not needed for the air cooling mode.**



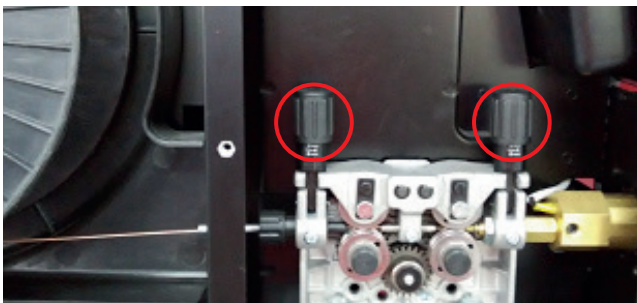
9. Place the Wire Spool onto the Spool Holder. Snip the wire from the spool being sure to hold the wire to prevent rapid uncoiling. Feed the wire into the wire feeder inlet guide tube through to the drive roller.



10. Carefully feed the wire over the drive roller into the outlet guide tube, feed through about 150mm into the torch receptacle. Check that the drive roller size is compatible with the wire diameter, replace the roller if necessary.



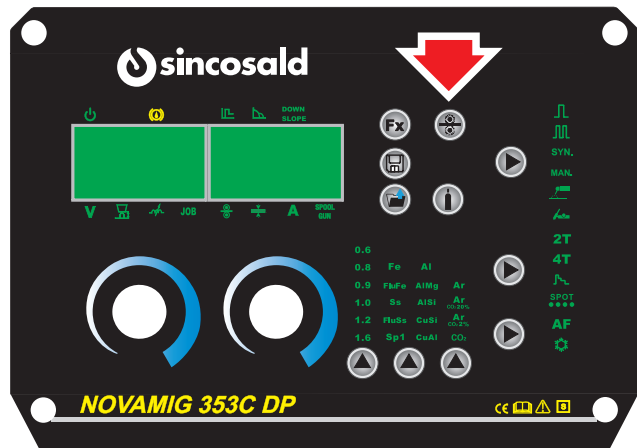
11. Align the wire into the groove of the drive roller and close down the top roller making sure the wire is in the groove of the bottom drive roller, lock the pressure arm into place. Apply a medium amount of pressure to the drive roller.



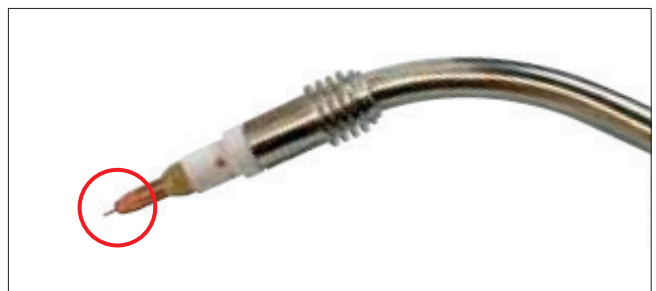
12. Remove the gas nozzle and contact tip from the torch neck.



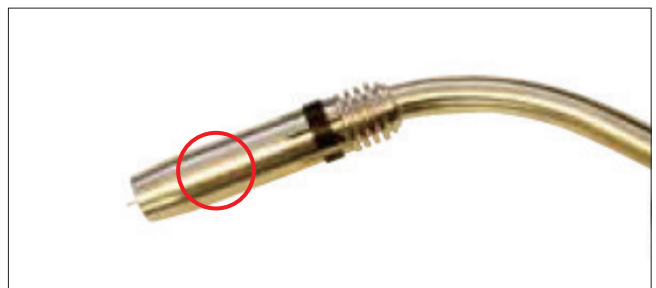
13. Press and hold the manual wire key to feed the wire through to the torch neck, release the manual wire key when the wire exits the torch neck.



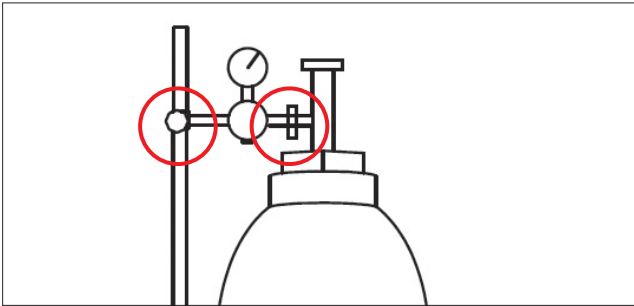
14. Fit the correct sized contact tip and feed the wire through it, screw the contact tip into the tip holder of the torch head and nip it up tightly.



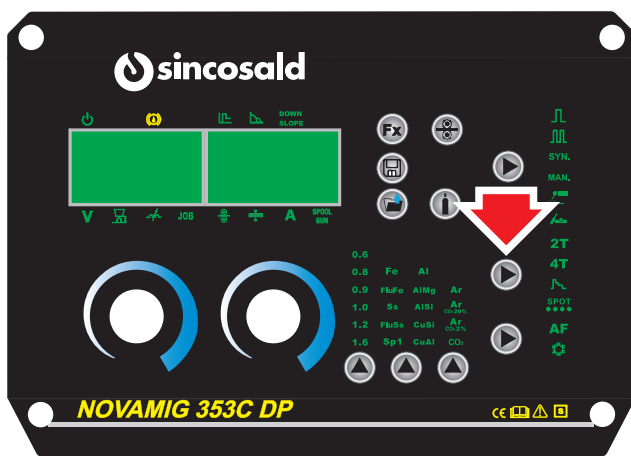
15. Fit the gas nozzle to the torch head.



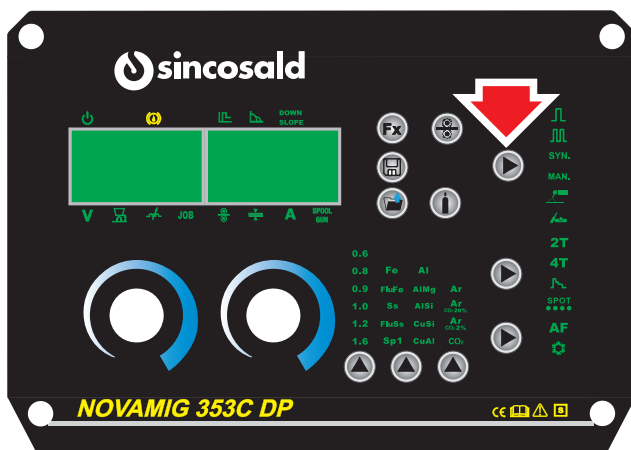
16. Carefully open the gas cylinder valve and set the required gas flow rate.



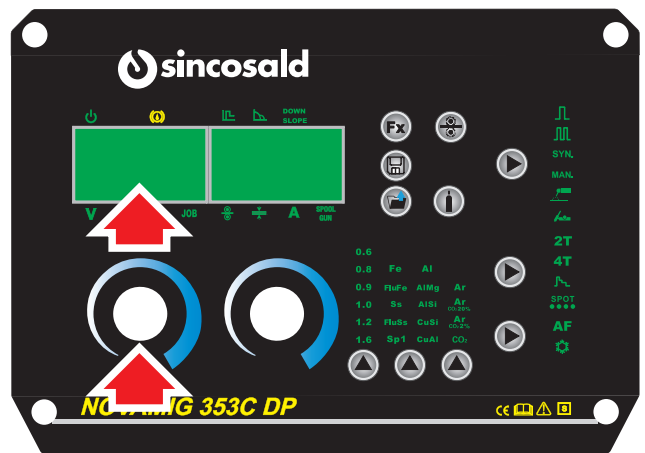
17. Select 2T/4T/S4T/Spot Weld trigger function.



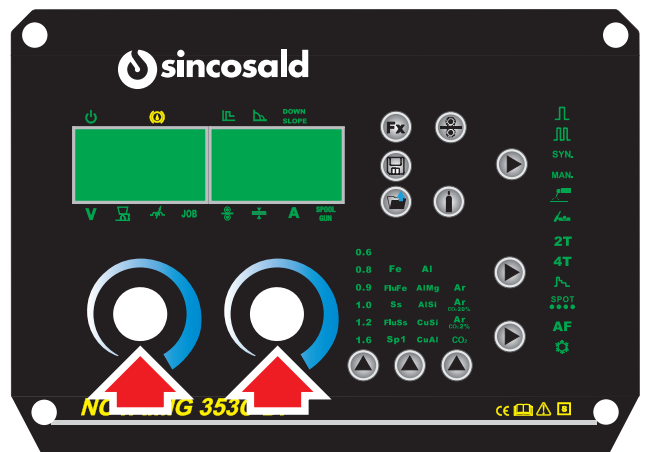
18. Press button for select required MIG MAG function.



19. Select program number to suit the wire diameter and gas type being used, it will show on the digital meter.



20. Set the required welding parameters to suit the material thickness being welded, it will show on the digital meter.



### 6.5.2. Set up installation for MIG Welding Gas-less wire

1. Insert the earth cable plug into the negative socket on the front of the machine and tighten it.
2. Plug the welding torch into the MIG torch connection socket on the front panel, and tighten it.

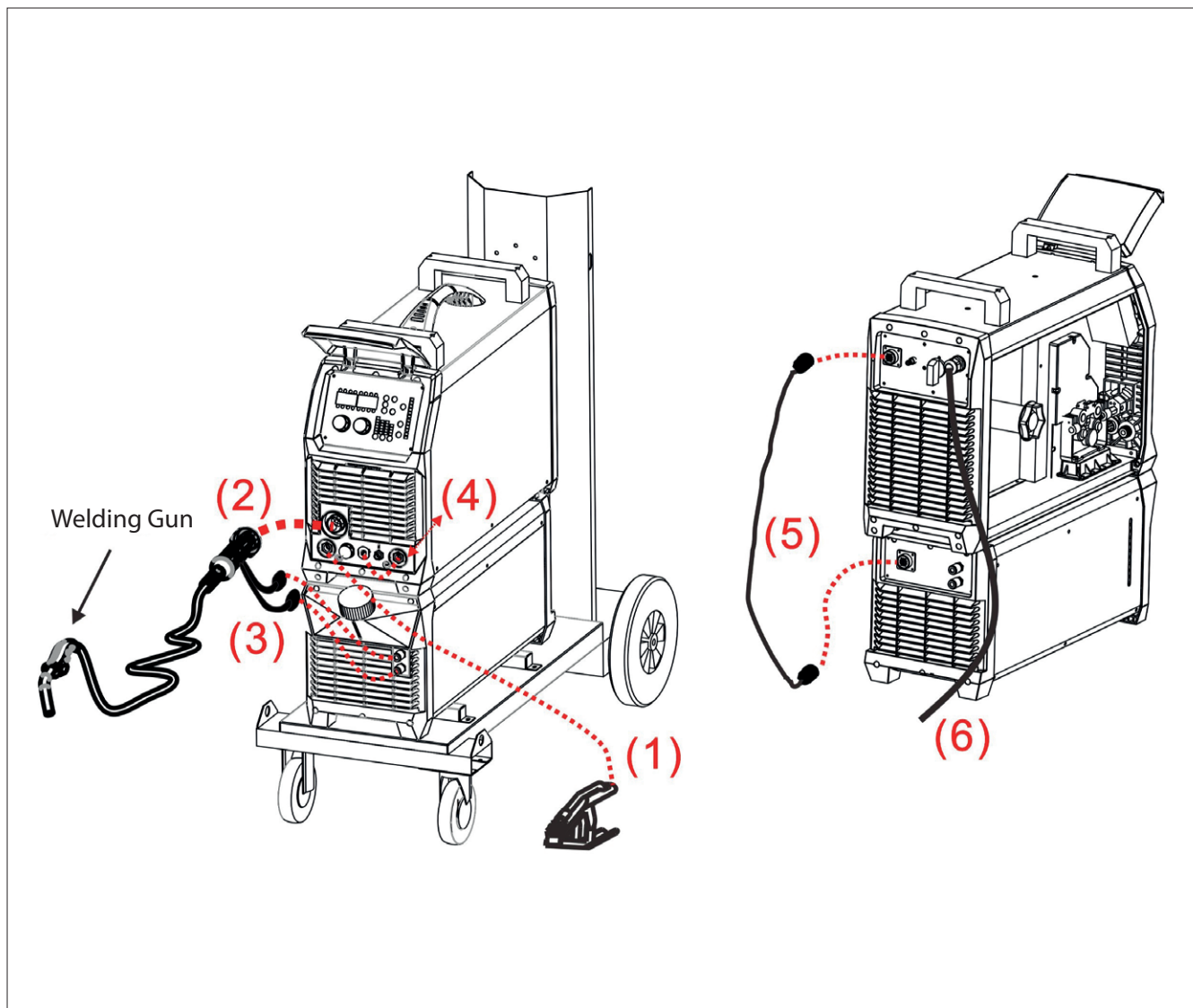
**IMPORTANT: When connecting the torch be sure to tighten the connection. A loose connection can result in the connector arcing and damaging the machine and gun connector.**

3. Connect the water inlet and outlet pipe of MIG Gun to the water inlet and outlet connectors on

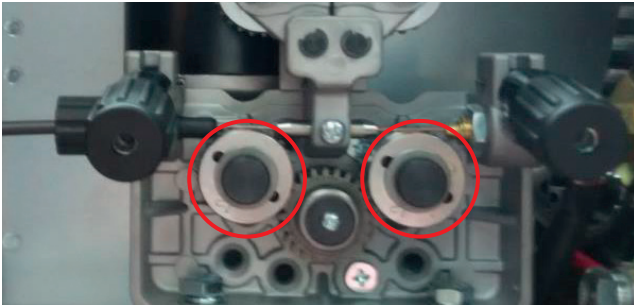
the front of the cooling water.

4. Connect the MIG power connection lead to the negative welding power output socket. Note if this connection is not made, there will be no electrical connection to the welding torch!
5. Connect the control cable of cooling water with the aero socket on the rear panel.
6. Connect the power cable of welding machine with the output switch in electric box on site.

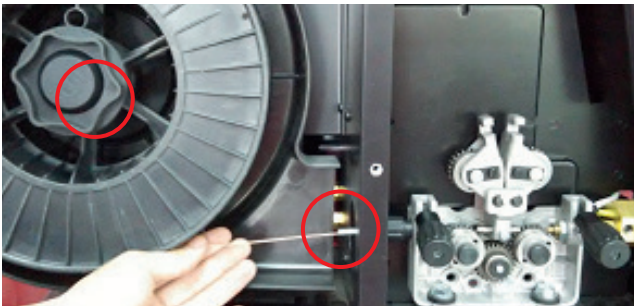
**NOTE: Air cooling mode without cooling device and the water pipe is not needed for the air cooling mode.**



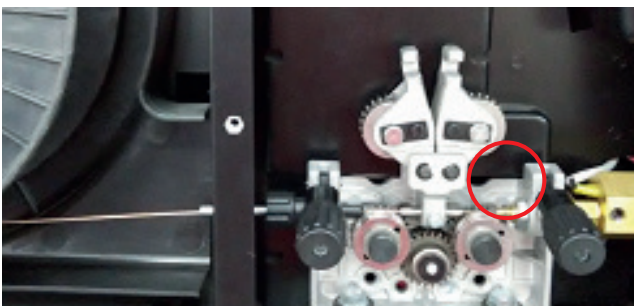
7. Fit the correct size Knurled drive roller for Gas Less Flux Core wire.



8. Place the Wire Spool onto the Spool Holder. Snip the wire from the spool being sure to hold the wire to prevent rapid uncoiling. Feed the wire into the wire feeder inlet guide tube through to the drive roller.

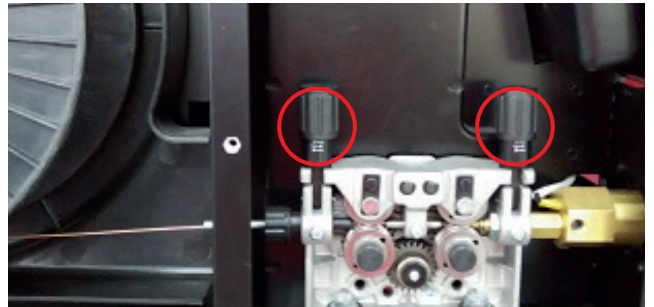


9. Carefully feed the wire over the drive roller into the outlet guide tube, feed through about 150mm into the torch receptacle. Check that the drive roller size is compatible with the wire diameter, replace the roller if necessary.



10. Align the wire into the groove of the drive roller and close down the top roller making sure the wire is in the groove of the bottom drive roller, lock the pressure arm into place.

11. Apply a light amount of pressure to the drive roller. Too much pressure will crush the cored wire.



12. Remove the gas nozzle and contact tip from the torch neck.



13. Press and hold the manual wire key to feed the wire through to the torch neck, release the inch button when the wire exits the torch neck.



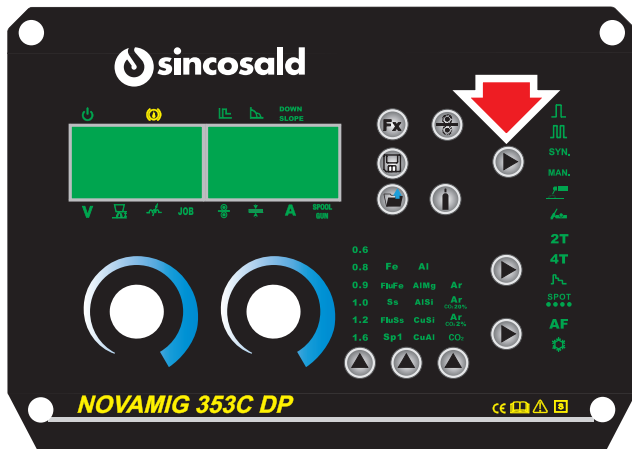
14. Fit the correct sized contact tip and feed the wire through it, screw the contact tip into the tip holder of the torch head and nip it up tightly.



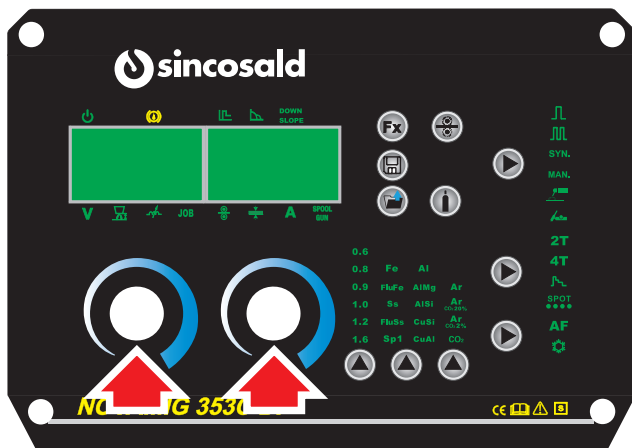
15. Fit the gas nozzle to the torch head.



16. Press button for select your preferred MIG-MAG function.



17. Set the welding parameters using the control knobs.



## 6.6. 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.

## 6.7. 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**.

## 6.8. 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 to be followed 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) Repair measures

- 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

Error Type	Error code	Description	Lamp status
Thermal relay	E01	Over-heating (1st thermal relay)	Yellow lamp (thermal protection) always on
	E02	Over-heating (2nd thermal relay)	Yellow lamp (thermal protection) always on
	E03	Over-heating (3rd thermal relay)	Yellow lamp (thermal protection) always on
	E04	Over-heating (4th thermal relay)	Yellow lamp (thermal protection) always on
	E09	Over-heating (Program in default)	Yellow lamp (thermal protection) always on
Welding machine	E10	Phase loss	Yellow lamp (thermal protection) always on
	E11	No water	Yellow lamp (lack water) always on
	E12	No gas	Red lamp always on
	E13	Under voltage	Yellow lamp (thermal protection) always on
	E14	Over voltage	Yellow lamp (thermal protection) always on
	E15	Over current	Yellow lamp (thermal protection) always on
	E16	Wire feeder over load	
Switch	E20	Button fault on operating panel when switch on the machine	Yellow lamp (thermal protection) always on
	E21	Other faults on operating panel when switch on the machine	Yellow lamp (thermal protection) always on
	E22	Torch fault when switch on the machine	Yellow lamp (thermal protection) always on
	E23	Torch fault during normal working process	Yellow lamp (thermal protection) always on
Accessory	E30	Cutting torch disconnection	Red lamp blink
	E31	Water cooler disconnection	Yellow lamp (lack water) always on
Communication	E40	Connection problem between wire feeder and power source	
	E41	Communication error	

## 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"**

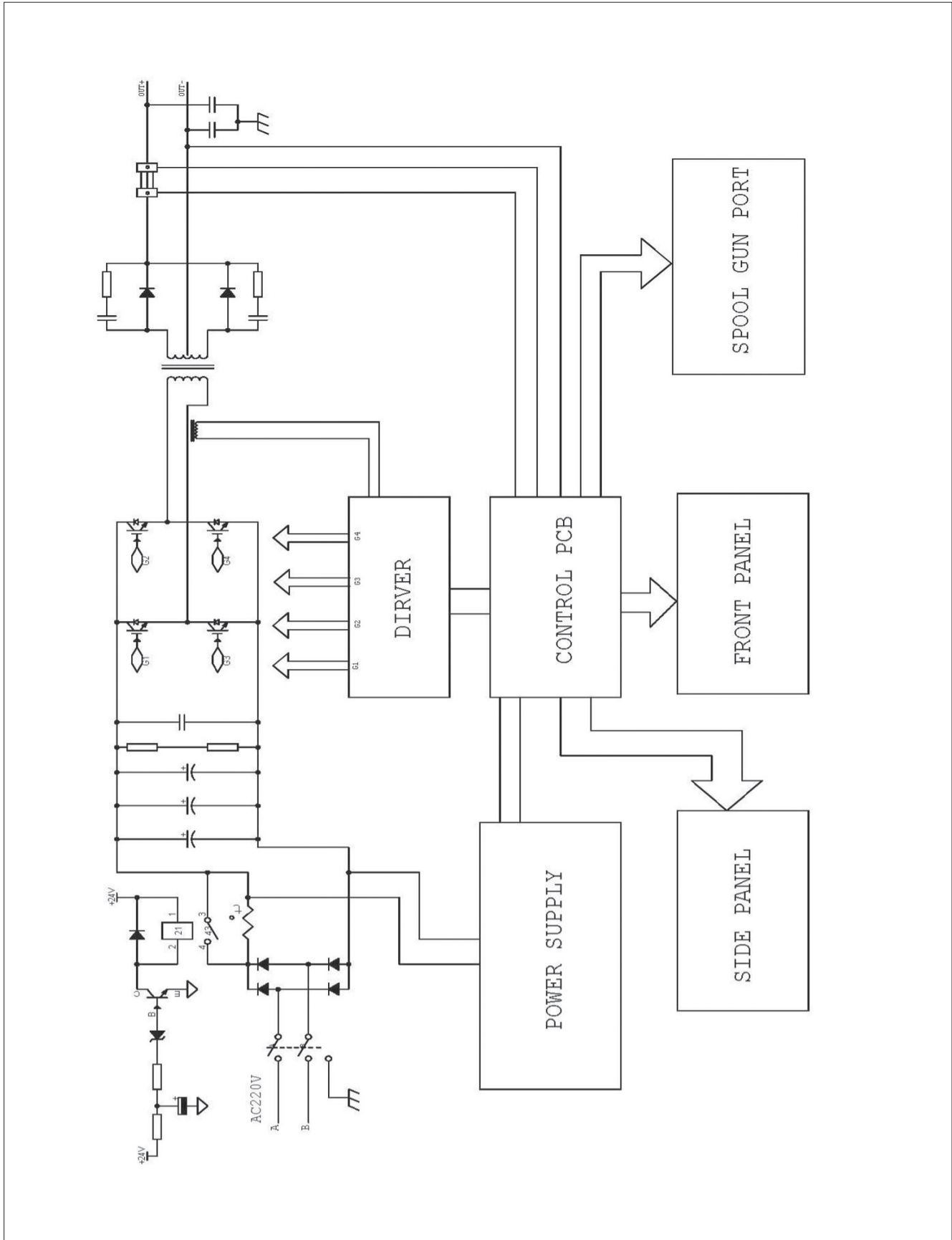
**For the management of "WEEE", SINCOSALD relies on Erion Consortium.**



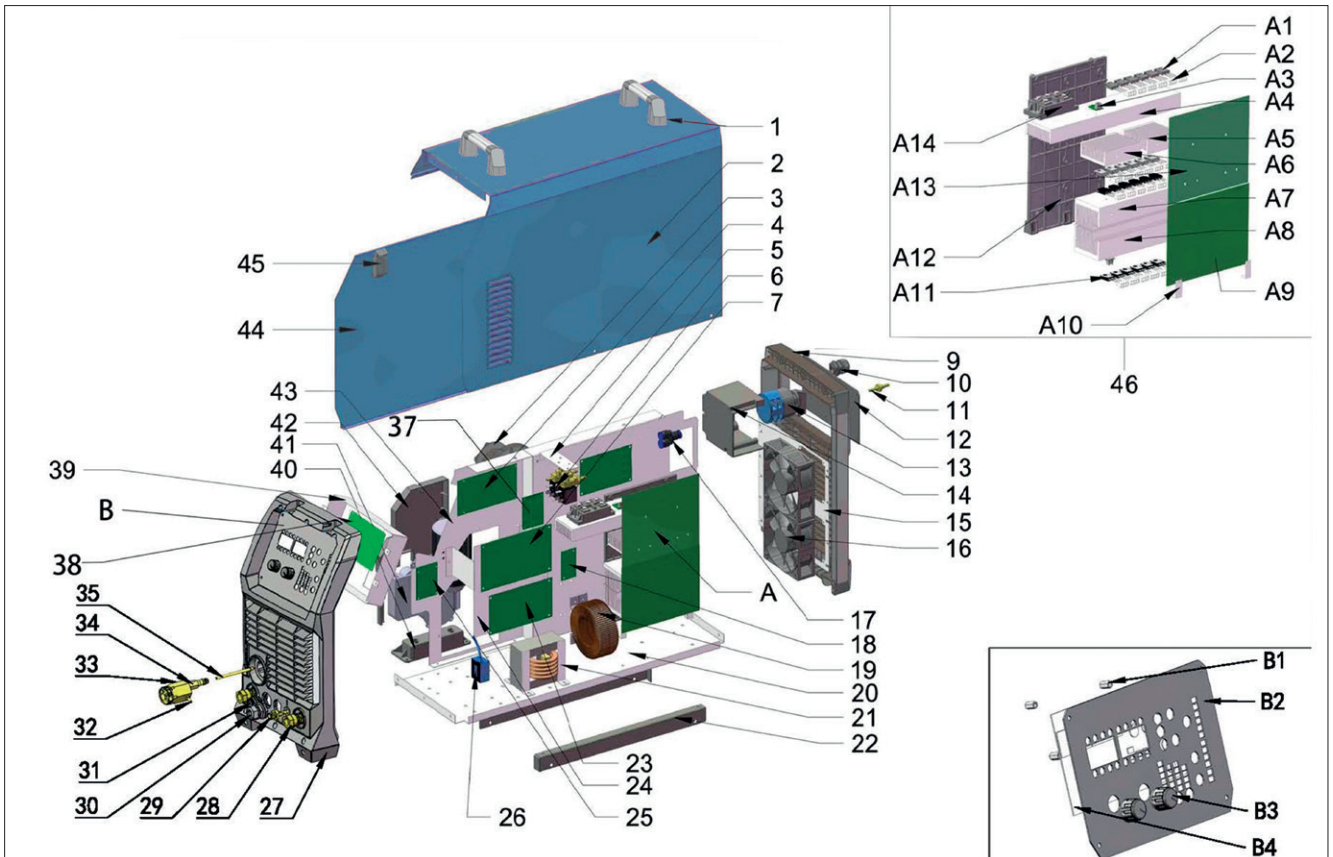
**AS OF THE DATE OF THE PREPARATION OF THIS INSTRUCTION MANUAL THIS INFORMATION SHOULD BE CONSIDERED TO BE NON-DEFINITIVE AS SUBJECT TO POSSIBLE CHANGES ACCORDING TO THE OBLIGATIONS LINKED TO LEGISLATIVE DECREE N ° 151/2005 THAT WILL COMPLETE DIRECTIVE 2002/96/EC.**

## 10. ANNEXES

### 10.1. WIRING DIAGRAMS



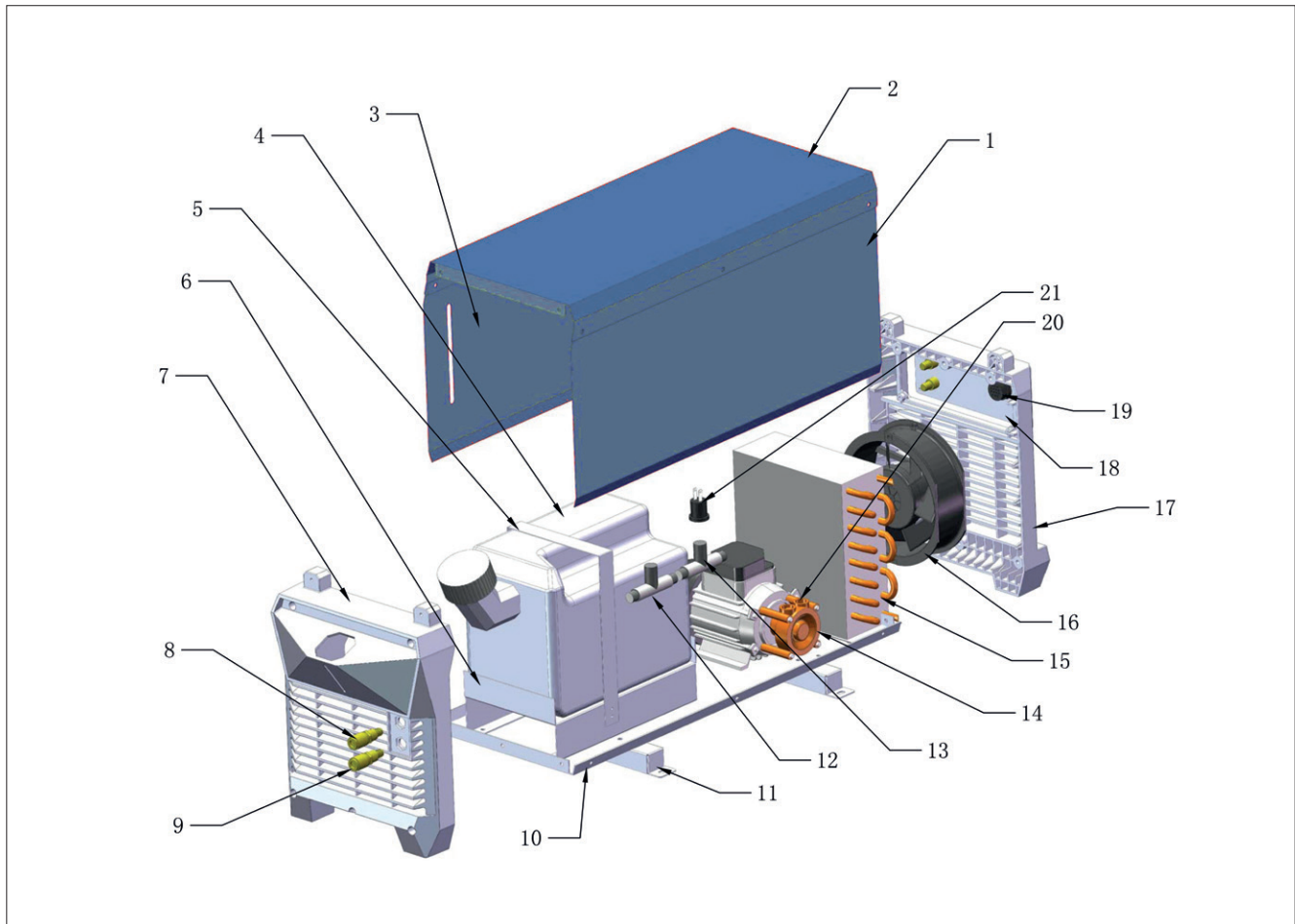
## 10.2. SPARE PARTS



Pos.	Code	Description	Qt.
1	8.215.218	NVM 353C HANDLE	1
2	8.211.137	RIGHT SIDE PANEL NVM 353C	1
3	8.215.210	SPOOL HOLDER NVM 353C	1
4	8.253.002	WIRE FEED DRIVE BOARD	1
5	8.211.109	PLATE SOLENOID VALVE NVM 205 DP	1
6	8.295.079	GAS SOLENOID VALVE	2
7	8.293.010	POWER BOARD	1
9	8.210.011	REAR PLASTIC NVM 353C	1
10	8.215.211	CABLE GUIDE NVM 353C	2
11	8.215.203	GAS CONNECTION NVM 205 DP	1
12	8.211.138	NVM 353C CONNECTION PANEL	1
13	8.215.204	NVM 320 SWITCH	1
14	8.211.124	NVM 320 SWITCH COVER	1
15	8.211.126	NVM 320 FAN PANEL	1
16	8.215.164	FAN	2
17	8.215.201	3-WAY CONNECTION NVM 205 DP	1
18	8.213.083	NVM 353C DOUBLE PULSED PCB BOARD	1
19	8.212.027	MAIN TRANSFORMER NVM 353C	1
20	8.211.139	FRAME BOTTOM NVM 353C	1
21	8.212.028	NVM 353C INDUCTANCE	1

Pos.	Code	Description	Qt.
22	8.211.145	NVM 353C CONNECTION BRACKET	2
23	8.213.084	NVM 353C DP CONTROL BOARD	1
24	8.215.212	NVM 353C PARTITION PANEL	1
25	8.213.085	NVM 353C TORCH ADAPTER BOARD	1
26	8.292.010	HALL TRANSFORMER	1
27	8.210.009	FRONT PLASTIC NVM 320	1
28	8.295.070	CONNECTION 35-70 M2 NOT INSULATED	2
29	8.291.054	FRONT PANEL CONNECTORS	1
30	8.295.072	CABLE HOLDER	1
31	8.255.000	9 PIN CONNECTOR	1
32	8.255.011	GAS CONNECTION	1
33	8.255.002	CENTRAL ATTACK	1
34	8.215.208	SHANK NVM 320	1
35	8.295.096	TUBE	1
37	8.213.086	CONTROL BOARD G.R. NVM 353C	1
38	8.253.001	CONTROL BOARD	1
39	8.211.129	NVM 320 CARD COVER	1
40	8.251.021	BASEMENT	1
41	8.255.006	WIRE FEEDER	1
42	8.251.025	ENGINE COVER	1
43	8.211.140	PARTITION PANEL 1 NVM 353C	1
44	8.211.130	LEFT PANEL NVM 320 - 353C	1

Pos.	Code	Description	Qt.
45	8.255.004	CLOSURE WITH GUIDE	2
46	8.216.006	MODULE INVERTER	1
A1	8.235.036	IGBT NVC 106	12
A2	8.295.103	INSULATING PLATE	24
A3	8.293.013	THERMISTOR	2
A4	8.211.141	NVM 353C SINK	1
A5	8.211.142	NVM 353C SINK	1
A6	8.211.143	NVM 353C SINK	1
A7	8.211.133	HEAT SINK FRD	1
A8	8.211.134	HEAT SINK FRD	1
A9	8.213.081	FRD NVM 320 BOARD	1
A10	8.215.205	SUPPORT NVM 320	2
A11	8.215.216	NVM 353C DIODE	12
A12	8.211.135	INVERTER SHIELD NVM 320	1
A13	8.213.088	DV NVM 353C INVERTER BOARD	1
A14	8.292.012	BRIDGE RECTIFIER	1
B1	8.215.217	HEXAGONAL SPACERS	4
B2	8.211.144	FRONT SHEET PANEL NVM 353C	1
B3	8.295.088	KNOB	2
B4	8.210.008	FRONT CONTROL NVM 205 DP 353C	1

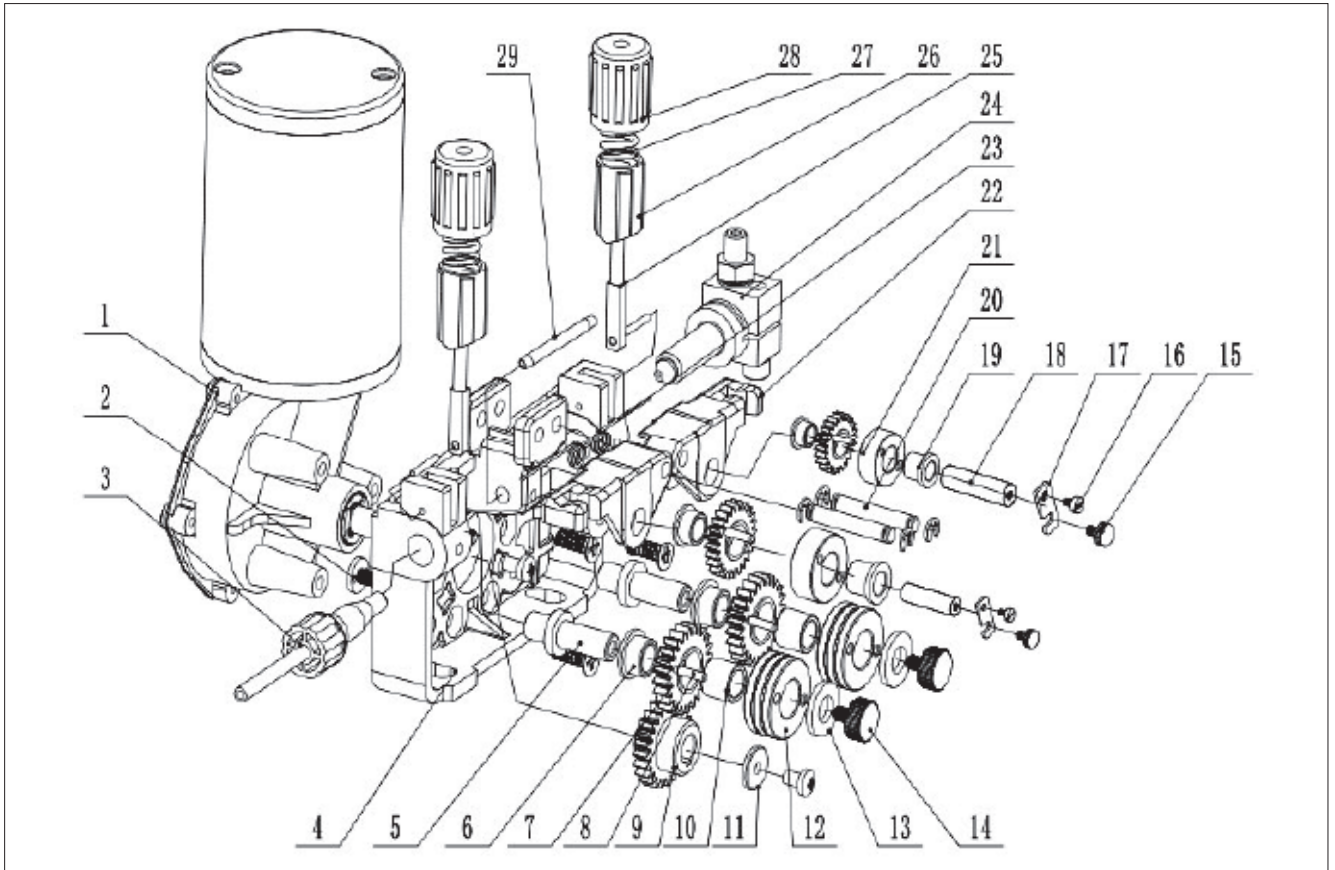


Pos.	Code	Description	Qt.
1	8.261.009	RIGHT PANEL	1
2	8.261.010	MACHINE COVER	1
3	8.261.011	LEFT PANEL	1
4	8.215.225	WATER TANK	1
5	8.261.012	FIXING CLAMP FOR WATER TANK	1
6	8.261.013	FIXING PLATE FOR WATER TANK	1
7	8.261.014	FRONT PANEL	1

Pos.	Code	Description	Qt.
8	8.255.013	SOCKET (RED)	2
9	8.255.014	SOCKET (BLUE)	2
10	8.261.015	BOTTOM PLATE	1
11	8.261.016	CONNECTOR	2
12	8.265.006	3-WAY CONNECTOR	1
13	8.265.007	4-WAY CONNECTOR	1
14	8.263.001	WATER PUMP	1
15	8.261.017	HEAT SINK	1

Pos.	Code	Description	Qt.
16	8.235.046	FAN	1
17	8.251.027	REAR PANEL	1
18	8.261.018	SEALING PLATE FOR REAR PANEL	1
19	8.295.068	14 PIN SOCKET	1
20	8.265.008	GAS FITTING	2
21	8.265.001	SWITCH	1





Pos.	Code	Description	Qt.
1	8.217.000	MOTOR	1
2	8.217.001	LOCK SCREW	2
3	8.217.002	INTO THE GUIDE WIRE NOZZLE	1
4	8.217.003	DUAL DRIVE BRACKET	1
5	8.217.004	DUAL DRIVE WIRE FEED AXLE	2
6	8.217.005	OIL BEARING FOR WIRE FEEDING GEAR	4
7	8.217.006	DOUBLE DRIVE WIRE FEED GEAR	4
8	8.217.007	STRAIGHT PIN	8
9	8.217.008	DOUBLE DRIVE DRIVE GEAR	1
10	8.217.009	OIL BEARING FOR WIRE FEED WHEEL	2
11	8.217.010	FIXED DRIVE GEAR GASKET	1

Pos.	Code	Description	Qt.
12	*	ROLL	2
	8.215.226	ROLL Fe 0.8 – 1.0	2
	8.215.227	ROLL Fe 1.0 – 1.2	2
	8.215.228	ROLL Fe 1.2 – 1.6	2
	8.215.229	ROLL Al 0.8 – 1.0	2
	8.215.230	ROLL Al 1.0 – 1.2	2
	8.215.231	ROLL Al 1.2 – 1.6	2
	8.215.232	ROLL FLUX-CORED 0.8 – 1.0	2
	8.215.233	ROLL FLUX-CORED 1.0 – 1.2	2
	8.215.234	ROLL FLUX-CORED 1.2 – 1.6	2
13	8.217.012	DOUBLE DRIVE WIRE FEED WHEEL WASHER	2
14	8.217.013	MILLED SCREW	2
15	8.217.014	PRESS SHAFT LOCKING SCREW	2
16	8.217.015	PLATE SHOULDER SCREW	2
17	8.217.016	PRESSURE PLATE	2
18	8.217.017	BOX TYPE WIRE FEEDER FOUR DRIVE BRACKET. PRESS WHEEL AXLE	2

Pos.	Code	Description	Qt.
19	8.217.020	OIL BEARING $\Phi 10 \times \Phi 14 \times \Phi 18 \times 10.4$	2
20	8.217.018	DOUBLE DRIVE PRESS WHEEL FRAME SHAFT	2
21	8.217.020	PRESSING WHEEL	2
22	8.217.019	DOUBLE DRIVE PRESS WHEEL HOLDER	1DX+1SX
23	8.217.021	PRESS WHEEL RACK TORSION SPRING	1
24	8.217.022	PANASONIC COPPER HEAD COMBINATION	1
25	8.217.023	PRESS WHEEL HOLDER HANDLE BOLT	2
26	8.217.024	PRESSURE HANDLE SLEEVE	2
27	8.217.025	HANDLE SPRING	2
28	8.217.026	PRESSURE HANDLE KNOB	2
29	8.217.027	MIDDLE GUIDE WIRE NOZZLE	1

\* Different models available







**SINCOSALD S.r.l**

Headquarters - Offices

via della Fisica, 26/28

20864 Agrate Brianza (MB) Italy

Tel: +39 039 641171

Fax: +39 039 6057122

[export@sincosald.it](mailto:export@sincosald.it)

[www.sincosald.it](http://www.sincosald.it)