

# INSTRUCTION MANUAL FOR ARC WELDING MACHINE

IMPORTANT!!!

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, USING, OR SERVICING THE WELDING MACHINE, PAYING SPECIAL ATTENTION TO SAFETY RULES. CONTACT YOUR DISTRIBUTOR IF YOU DO NOT FULLY UNDERSTAND THESE INSTRUCTIONS.

## 1 INSTALLATION

This machine must be used for welding only. In any case, it is essential to pay special attention to the chapter on SAFETY PRECAUTIONS.

The symbols next to certain paragraphs indicate points requiring extra attention, practical advice or simple information.

This manual must be kept carefully in a place familiar to everyone involved in using the machine. It must be consulted whenever doubts arise and be kept for the entire life-span of the machine; it will also be used for ordering spare parts.

### 1.1 PLACEMENT

Unpack the machine and place it in an adequately ventilated area, dust-free if possible, taking care not to block the air intake and outlet from the cooling slots.

CAUTION: REDUCED AIR CIRCULATION causes overheating and could damage internal parts.

Keep at least 500 mm of free space around the device.

Never place any filtering device over the air intake points of this welding machine.

The warranty shall become void if any type of filtering device is used.

## 2 GENERAL DESCRIPTIONS

### 2.1 SPECIFICATIONS

This welding machine is a constant direct current power source, created by the INVERTER technology, designed for welding with coated electrodes and with the TIG procedure.

### 2.2 EXPLANATION OF TECHNICAL SPECIFICATIONS

N°:					
			IEC 974-1 EN 60974-1		
A / V - A / V					
 SMAW	U <sub>0</sub>	X	%	%	%
	V PEAK	I <sub>2</sub>	A	A	A
	U <sub>2</sub>	V	V	V	V
U <sub>1</sub>	I <sub>1</sub>	A	A	A	
1x220V-50/60Hz					
IP 21	CLASSE DI ISOLAMENTO CLASS OF INSULATION CLASSE DES ISOLANTS ISOLIERSTOFFKLASSE CLASE DE AISLAMIENTO			H	
	VENTILAZIONE FORZATA FORCED VENTILATION VENTILE KUHLART F VENTILACION FORZADA		PROTEZIONE TERMICA THERMAL PROTECTION PROTECTION THERMIQUE THERMISCH GESCHUTZT PROTECCION TERMICA		

IEC 974.1. The welder is manufactured according to this EN 60947.1 international standard.

N° ..... Serial number which must be stated for any demands relating to the welding machine.

Single-phase static frequency converter-transformer-rectifier.

Drooping characteristic.

SMAW. ... Suitable for welding with coated electrodes.

U<sub>0</sub> ..... Secondary no-load voltage (Peak value)

X ..... Duty cycle percentage

The duty cycle expresses the percentage of 10 minutes in which the welding machine can operate at a determined current, without over heating.

I<sub>2</sub> ..... Welding current

U<sub>2</sub> ..... Secondary voltage with welding current I<sub>2</sub>

U<sub>1</sub> ..... Rated supply voltage

1~50/60Hz Single-phase supply 50 or 60 Hz

I<sub>1</sub> ..... Input current at the corresponding welding current I<sub>2</sub>.

IP23 ..... Grade of protection of frame

Grade 3 as a second digit means that this unit is fit to work outside under the rain.

..... Fit to work in high-risk areas.

NOTES: ... In addition, the welding machine has been designed to work in areas with grade 3 of pollution. (see IEC 664)

### 2.3 DESCRIPTION OF PROTECTIONS

#### 2.3.1 Thermic protection

This unit is protected by a usually closed thermostat (25) placed on the dissipator.

When the thermostat intervenes, the machine stops supplying current, but the ventilator continues to work.

The intervention of the thermostat is indicated by the led turning on (B) fig.2.

Do not switch the machine off before the led has turned off.

#### 2.3.2 Blocking protection

This protection is located on the transformer primary and turns on in the event of anomalies in the electronic power section.

The intervention of this protection is indicated by the led lighting up (C) fig.2.

If the light should turn on, turn welding machine off and try turning it on again. If led should light up again, take it to the nearest service center.

**When you turn the machine off, the led (C) flashes for a few seconds. Wait at least 10 seconds before opening the machine or turning it on again.**

## 3 INSTALLATION

### 3.1 STARTUP

This unit must be installed by skilled personnel. All fittings must be in conformity with the existing rules and in full compliance with safety regulations. (CENELEC HD 427).

### 3.2 UNIT DESCRIPTION

- A) Current regulating knob
- B) Led thermostat intervention
- C) Led block
- D) Negative output terminal
- E) Positive output terminal
- F) Switch
- G) Mains cable

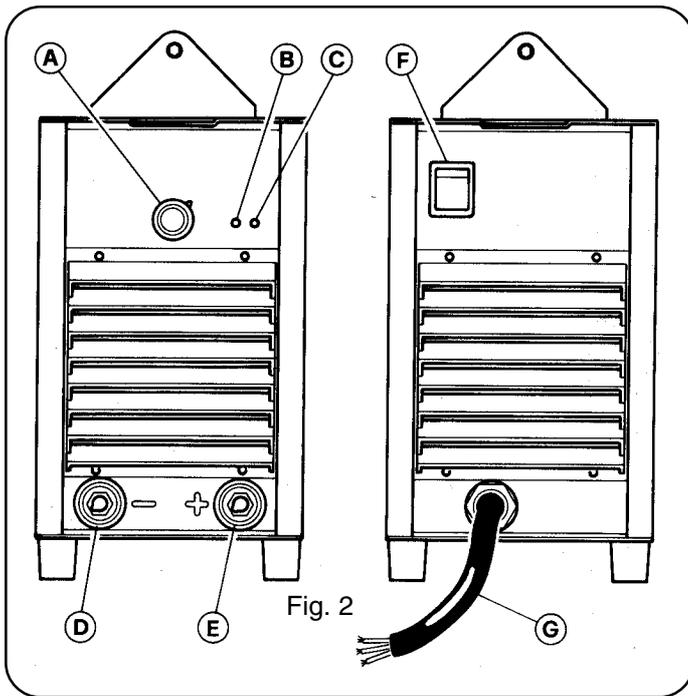


Fig. 2

### 3.3 GENERAL NOTES

Before using this welding machine, carefully read the CENELEC standards HD 407 and HD 433 also check insulation of cables, electrode holder clamp, sockets and plugs and that the section and length of welding cables are compatible with current used.

Up to 5 mt. use 16 mm<sup>2</sup>  
 From 5 to 20 mt, use 25 mm<sup>2</sup>  
 From 20 to 30 mt. use 35 mm<sup>2</sup>

### 3.4 COATED ELECTRODE WELDING

- This welding machine is fit to weld all types of electrodes except the cellulose type (AWS 6010)
- Use electrode holder clamps in compliance with the safety standards and without projecting tightening screws.
- Make sure that switch (F) fig. 2 is in 0 position or not inserted in supply socket then connect welding cables in accordance with polarity demanded by the electrode manufacturer which you will be using.

Connect the earth cable clamp to the workpiece.

**VERY IMPORTANT:** To secure a proper working of this machine and to avoid current drops make sure that the clamp seals with the workpiece.

- Welding circuit should not be deliberately placed in direct or indirect contact with protection wire if not in the workpiece.
- If earthing is deliberately made on the workpiece by means of protection wire, the connection must be as direct as possible, with the wire having a section at least equal to the welding return current wire and connected to the piece being worked on, in the same place as the return wire, using the return wire terminal or a second earth terminal closeby.
- All possible precautions must be taken in order to avoid stray currents.
- Check to see that power supply voltage corresponds to voltage indicated on the welding machine technical specification tag.
- Connect supply cable (G) fig.2: When mounting a plug, make sure that its capacity is adequate and that the yellow-

green wire of the mains cable is connected to the earth plug pin.

- The capacity of magnetothermic switch or fuses in series with mains supply should be equal to current  $I_1$  absorbed by the unit.
- Input current  $I_1$  is determined by reading the technical specifications on unit i.e. power supply voltage  $U_1$  available.
- Any extensions should have adequate sections for input current  $I_1$ .
- Turn machine on with switch (8) fig.2.

**WARNING: ELECTRIC SHOCK CAN KILL.**

- Do not touch live electric parts.
- Do not touch weld output terminals when unit is energized.
- Do not touch torch or electrode holder and earth clamp at the same time.
- Regulate current based on the diameter of the electrode, welding position and type of joint to be carried out. When finished welding, always remember to turn unit off, and to remove electrode from electrode holder.

### 3.5 TIG WELDING

- This welding machine is fit for welding with TIG procedure: stainless steel, iron, and copper.
- Connect earth cable wire to positive (+) pole of welding machine and terminal to working piece as close as possible to welding machine, making sure there is a good electrical contact.
- Use T150 torch (item 1567.01) and connect power wire (2) fig.3 to negative pole (-) of welding machine.

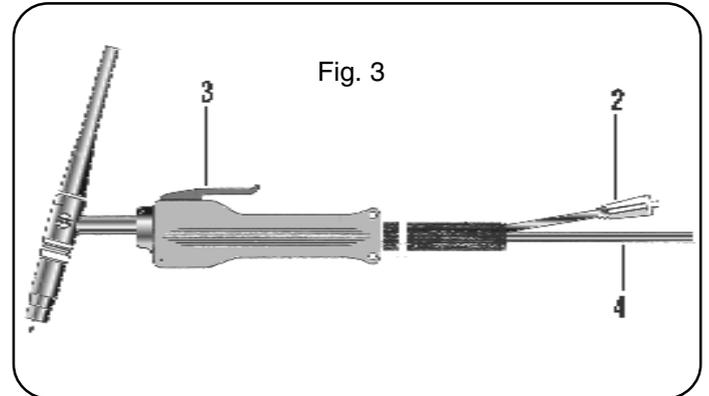


Fig. 3

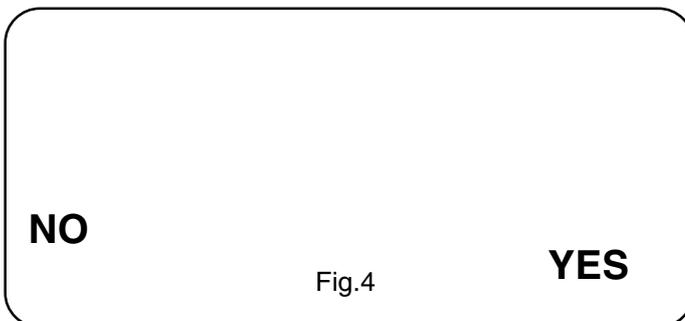
- The welding machine circuit should not be deliberately in direct or indirect contact with protection conductor if not in the workpiece.
- If earthing is deliberately made on the workpiece by means of protection wire, the connection must be as direct as possible, with the wire having a section at least equal to the welding return current wire and connected to the piece being worked on, in the same place as the return wire, using the return wire terminal or a second earth terminal closeby.
- All possible precautions must be taken in order to avoid stray currents.
- Connect gas pipe (4) to pressure reducer output connected to an ARGON cylinder.
- Press torch push-button and regulate gas capacity.
- There is a valve inside the torch handle which blocks the gas, upon releasing the push-button.
- Use a 2% thoriated tungsten electrode chosen according to table 2 and prepared according to that indicated in point 3.5.1.

electrode $\varnothing$ 2% thoriated tungsten ( red band )	direct current negative electrode ( Argon )
$\varnothing$ 1mm (0.040") $\varnothing$ 1,6mm (1/16")	up to 60 A 60÷160 A

- Check to see that power supply voltage corresponds to voltage indicated on the welding machine technical specification tag.
  - Connect supply cable (G) fig.2: When mounting a plug, make sure that its capacity is adequate and that the yellow-green wire of the mains cable is connected to the earth plug pin.
  - The capacity of magnetothermic switch or fuses in series with mains supply should be equal to current  $I_1$  absorbed by the unit.
  - Input current  $I_1$  is determined by dividing by 1,6 the value stated on the table.
  - Any extensions should have adequate sections for input current  $I_1$ .
- WARNING: ELECTRIC SHOCK CAN KILL!**
- Do not touch live electric parts.
  - Do not touch weld output terminals when unit is energized.
  - Do not touch torch and earth clamp at the same time.
  - Turn machine on with switch (F) fig.2
  - Regulate current based on work to be carried out, then press torch push-button to allow flow of gas.
  - Start the arc, by contact, with a determined rapid movement.
  - Once welding is finished, remember to turn machine off and to close the gas cylinder valve.

### 3.5.1 Electrode preparation

It is necessary to pay special attention to the preparation of the electrode point, grinding it so as to obtain vertical markings as shown in fig. 4.



- CAUTION. HOT FLYING METAL PARTICLES** can injure personnel, start fires, and damage equipment: **TUNGSTEN CONTAMINATION** can lower weld quality.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
  - Shape tungsten electrodes on a fine grit, hard abrasive wheel used only for tungsten shaping.
  - Grind the end of the tungsten electrode to a taper for a length of 1,5÷2 electrode diameters.

## 4 MAINTENANCE AND CHECK UP

### 4.1 GENERAL NOTES

- Do not touch live electrical parts.
- Turn off welding power source and remove input power

plug from receptacle before, maintenance, servicing. **MOVING PARTS** can cause serious injury.

- Keep away from moving parts.
- HOT SURFACES** can cause severe burns
- Allow cooling the unit before servicing.

### 4.2 WELDING MACHINE MAINTENANCE

Experience has shown that many fatal accidents originated from servicing which had not been perfectly executed. For this reason, a careful and thorough inspection on a serviced welding machine is just as important as one carried out on a new welding machine.

Furthermore, in this way manufacturer can be protected from being held responsible for defects when the fault is someone else.

#### 4.2.1 Precautions to take while servicing:

- **EXCESSIVE PRESSURE** can break circuit board.
- Use only minimal pressure and gentle movements when disconnecting or connecting board plugs and removing or installing board.
- **INCORRECT INSTALLATION OR MISALIGNED PLUGS CAN DAMAGE CIRCUIT BOARD.**
- Be sure that plugs are properly installed and aligned before reinstalling cover.

### 4.3 TROUBLESHOOTING

DEFECT	PROBABLE CAUSE	REMEDY
The welding machine does not supply current; completely unoperative	Switch in 0 position	Switch to I position
	Burnt fuses	Replace fuses
	Plug not perfectly inserted in power supply socket	Insert plug
The welding machine does not supply voltage but the ventilator functions	Block pilot on	Turn machine off and on again (see 2.3.2)
	Thermostat open	Wait approx. 5-6 min.

## 5 GENERAL PRECAUTIONS

### 5.1 Fire



- Avoid causing fire because of sparks, slag, hot metal or pieces.
- Make sure that suitable fire-proof devices are available close to welding area.
- Remove all flammable and combustible material from welding area and its surrounding (min. 30 feet).
- Do not weld containers of combustible or flammable material, even when empty. These must be carefully cleaned before being welded.
- Allow the welded material to cool down before touching it or putting it in contact with combustible or flammable material.
- Do not weld parts with hollow spaces, containing flammables.
- Do not work under conditions with high concentrations of combustible vapours, gases, or flammable dust.

- Always check the work area half an hour after welding so as to make sure that no fire has started.
- Do not keep any combustible material such as lighters or matches in your pockets.

## 5.2 Burns

- Wear fire-proof clothing all over your body in order to protect your skin against burns caused by ultra-violet radiation given off by the arc, and from weld metal sparks and slag.
- Wear protective clothing-gauntlet gloves designed for use in welding, hat and high safety-toe shoes. Button shirt collar and pocket flaps, and wear cuff-less trousers to avoid entry of sparks and slag.
- Wear helmet with safety goggles and glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a must for welding or cutting, (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered.
- Avoid oil or greasy clothing. A spark may ignite them. Hot metal such as electrode stubs and workpieces should never be handled without gloves.
- First-aid facilities and a qualified first-aid person should be available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns.
- Ear plugs should be worn when working on overhead or in a confined space. A hard hat should be worn when others work overhead.
- Flammable hair preparations should not be used by persons intending to weld.

## 5.3 Fumes

Welding operations give off harmful fumes and metal dusts which may be hazardous to your health, therefore:

- Work in a well-ventilated area.
  - Keep your head out of fumes.
  - In closed areas, use suitable exhaust fans, placed under the welding area if possible.
  - If ventilation is not enough, use breathing sets approved for this procedure.
  - Clean the material to be welded of any solvents or halogen degreasers giving rise to toxic gases. Some chlorine solvents may decompose with the radiation emitted by the arc, and create phosgene gas.
  - Do not weld plated metals or those containing lead, graphite, cadmium, zinc, chrome, quicksilver or mercury, unless you have the proper breathing set.
  - The electric arc creates ozone. A long exposure to high concentrations may cause headaches, nasal, throat and eye irritation as well as serious congestions and chest pains.
- IMPORTANT: DO NOT USE OXYGEN FOR VENTILATION.**
- Gas leaks in a confined space should be avoided. Leaked gas in large quantities can change oxygen concentration dangerously. Do not bring gas cylinders into a confined space.
  - **DO NOT WELD** where solvent vapors can be drawn into the welding atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

## 5.4 Explosions

- Do not weld above or near containers under pressure.
- Do not weld in environments containing

explosive dusts, gases or vapours.

This welding machine is used for TIG welding and uses ARGON gas for the protection of the arc, thus you should take special precautions:

### A) CYLINDERS

- **NEVER DEFACE** or alter name, number, or other markings on a cylinder. It is illegal and hazardous.
- Do not use cylinders whose contents have not been clearly identified.
- Do not directly connect cylinder to reducing unit without a pressure regulator.
- Handle or use pressure cylinders in conformity with the existing rules.
- Do not use leaking or damaged cylinders.
- Do not use cylinders which are not well secured.
- Do not carry cylinders without the protection of the installed valve.
- Do not lift cylinders off the ground by their valves or caps, or by chains, slings or magnets.
- Never try to mix any gases in the cylinder.
- Never refill any cylinder.
- Never lubricate cylinder valves with oil or grease.
- Do not put the cylinder in electrical contact with the arc.
- Do not expose cylinders to excessive heat, sparks, molten slags or flames.
- Do not tamper with cylinder valves.
- Do not try to loosen tight valves by means of hammers, keys, or any other object.

### B) PRESSURE REGULATORS

- Keep pressure regulators in good condition. Damaged regulators may cause damages or accidents, they should only be repaired by skilled personnel.
- Do not use regulators for gases other than those for which they are manufactured.
- Never use a leaking or damaged regulator.
- Never lubricate regulators with oil or grease.

### C) HOSES

- Replace hoses which appear damaged.
- Keep hoses unwound in order to avoid bending.
- Keep the excess hose wound and out of the working area in order to avoid any damage.
- Cylinder fittings should never be modified or exchanged.

## 5.5 Radiation

Ultra-violet radiation created by the arc may damage your eyes and burn your skin. Therefore:

- Wear proper clothing and helmet.
  - Do not use contact lenses!! The intense heat coming from the arc may cause them to stick to the cornea.
  - Use masks with grade DIN 10 safety lenses at the least.
  - Protect people in the surrounding welding area.
- Remember: the arc may dazzle or damage the eyes. It is considered dangerous up to a distance of 15 meters (50 feet). Never look at the arc with the naked eye.**
- Prepare the welding area so as to reduce reflection and transmission of ultra-violet radiation: paint walls and exposed surfaces in black to reduce reflection, install sheathings or curtains to reduce ultra-violet transmissions.
  - Replace mask lenses whenever damaged or broken.

## 5.6 Electric shock

Electric shock can kill. All electric shocks are potentially fatal.

- Do not touch live parts.
- Insulate yourself from the piece to be welded and

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from the ground by wearing insulated gloves and clothing.

- Keep garments (gloves, shoes, hats, clothing) and body dry.
- Do not work in humid or wet areas.
- Avoid that the unit can fall into water.
- Avoid touching or holding the piece to be welded by hand.
- Should you work close to or in a dangerous area, use all possible precautions.
- If you should feel even the slightest electric shock sensation, stop welding immediately. Do not use the machine until the problem is identified and solved.
- Often inspect the mains cable.
- Disconnect power supply cable from mains before replacing cables or before removing unit covers.
- Do not use the unit without protection covers.
- Always replace any damaged parts of the unit, with original material.
- Never remove unit safety devices.
- Make sure that the power supply line is equipped with an efficient earth plug.
- Any maintenance should only be carried out by qualified personnel aware of the risks due to dangerous voltages necessary for the operation of the unit.

### **5.7 Pacemaker**

Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult with their doctor before going near arc welding, gouging, cutting or spot welding operations.