

# INSTRUCTION MANUAL FOR TIG WELDING MACHINE

## IMPORTANT!!!

BEFORE USING THIS UNIT ALL PEOPLE AUTHORIZED TO ITS USE, REPAIR OR INSPECTION, SHOULD READ THE FOLLOWING INSTRUCTIONS, PAYING SPECIAL ATTENTION TO THE SAFETY RULES. CONTACT YOUR DISTRIBUTOR IF YOU HAVE NOT UNDERSTOOD THESE INSTRUCTIONS.

## 1 SAFETY RULES FOR USING WELDING MACHINE

### 1.1 INTRODUCTION

Before using this unit all people authorized to use, repair or control should read the following use and safety instructions. Remember: **YOUR SAFETY DEPENDS ON YOU!!!** Follow all safety rules and instructions.

It is your job to protect yourselves and others against the risks related to welding.

The operator is responsible for his own safety and the safety of others in the work area. He must therefore know and obey all safety rules.

**NOTHING CAN REPLACE GOOD COMMON SENSE !!!**

### 1.2 GENERAL PRECAUTIONS

#### 1.2.1 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.
- 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.

#### 1.2.2 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.

#### 1.2.3 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.

#### 1.2.4 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.

### 1.2.5 Radiation



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

- Wear proper clothing and helmet.
- 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.

### 1.2.6 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 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.
- Make sure that bench and the workpiece are connected to efficient earth point.

- 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.

### 1.2.7 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.

### 1.2.8 Noise



These power sources alone do not produce noise levels exceeding 80 dB. The Welding process, however, may produce noise levels in excess of 80 dB in which case the machine take operator must take the necessary safety precautions as prescribed by the national take safety regulations.

## 2 GENERAL DESCRIPTIONS

### 2.1 SPECIFICATIONS

This welding machine uses INVERTER technology to generate constant direct current and is designed to weld with coated electrodes (excluding the cellulosic type) or using the TIG process with both scratch and high frequency starting.

### 2.2 EXPLANATION OF TECHNICAL SPECIFICATION

N°:			
3~		EN 60974-1 CEI 26-13	
A / V - A - V / V			
MMA	U <sub>0</sub>	I <sub>2</sub>	A
	V	U <sub>2</sub>	V
U <sub>1</sub>		I <sub>1</sub>	A
3x380/415V		I <sub>1</sub>	A
50/60Hz		I <sub>1</sub>	A
IP 23		CLASSE DI ISOLAMENTO CLASSE OF INSULATION CLASSE DES ISOLANTS INSOLIERSTOFFKLASSE CLASE DE AISLAMIENTO	
VENTILAZIONE FORZATA FORCED VENTILATION VENTILE KUHLART F VENTILACION FORZADA		PROTEZIONE TERMICA THERMAL PROTECTION PROTECTION THERMIQUE THERMISCH GESCHUTZT PROTECCION TERMICA	

fig. 1

IEC 974.1 The welder is manufactured according to this EN 60974.1 international standard.

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

3~ ..... Three-phase static frequency converter-transformer-rectifier.

..... Drooping characteristic.



MMA Suitable for welding with coated electrodes.



TIG Suitable for TIG welding.

U<sub>0</sub> ..... Secondary no-load voltage

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.  
 3~50/60Hz Three-phase supply 50 or 60 Hz  
 I<sub>1</sub> MMA ..... Current absorbed at corresponding I<sub>2</sub> current during coated electrode welding.  
 I<sub>1</sub> TIG ..... Current absorbed at corresponding I<sub>2</sub> current during TIG welding.  
 IP23 ..... Grade of protection of frame.  
           Grade 3 as a second digit means that this unit is fit to work outside under the rain.  
 [S] ..... 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 PROTECTION DEVICES

#### 2.3.1 Thermal protection

This machine is thermostat-protected.  
 When the thermostat trips, the machine stops generating current but the fan continues to function. Thermostat activation is signalled by LED (H) lighting up.

#### 2.3.2. Cut-out protection

Activation of this protection is signalled by LED (G), which has three possible colours:  
 green: the welding machine is functioning correctly  
 orange: there is a control card malfunction  
 red: 1) there is an overload on the two transformers connected in series with mosfets  
       2) the microprocessor is not performing the set procedure  
       3) there has been an excessive drop in the mains supply.

## 3 INSTALLATION

### 3.1 LAYOUT

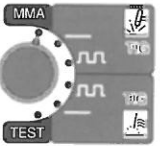
Unpack unit and place it in a properly ventilated, possibly undusty room, making sure that air flow on cooling slots is not obstructed.  
**WARNING: RESTRICTED AIR FLOW** causes overheating and possible damage of internal parts.  
 • Maintain at least 8 inches (200 mm) of unrestricted space on all sides of unit.  
 • Do not place any filtering device over the intake air passages of this welding power source.  
 Warranty is void if any type of filtering device is used.

### 3.2 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).

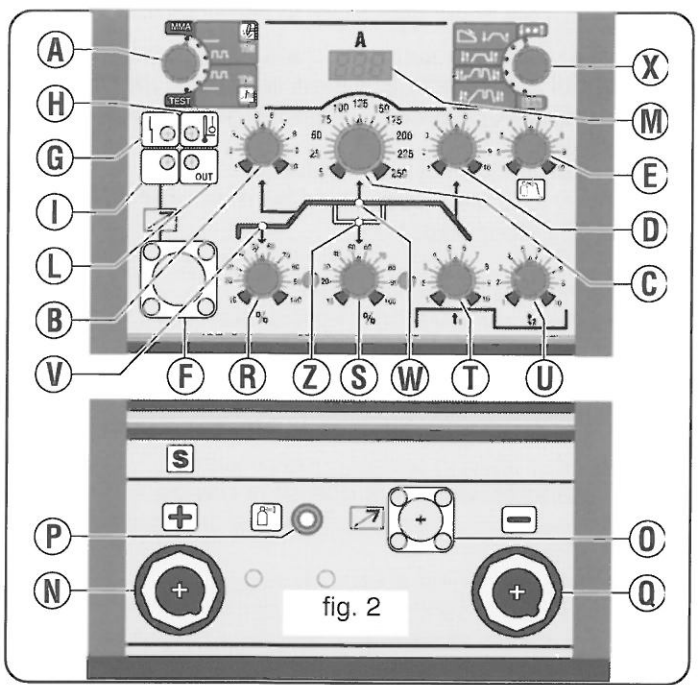
### 3.3 UNIT DESCRIPTION

#### A) Mode selector



This selector must be set according to the type of work to be performed, in conjunction with selector X. Follow these indications:

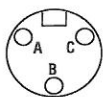
- 1) MMA Welding with all coated electrodes, except the cellulosic type. In this position only knob C is enabled to set welding current.



- 2) — [Symbol] CONTINUOUS TIG welding with scratch start.  
 3) [Symbol] [Symbol] PULSED TIG welding with scratch start.  
 4) [Symbol] [Symbol] PULSED TIG welding with high tension/frequency start.  
 5) — [Symbol] CONTINUOUS TIG welding with high tension/frequency start.  
 6) TEST Position for testing the machine after repair work.
- B) Knob for setting up-slope current time (0-10sec)  
 C) Knob for setting main or peak welding current.  
 D) Knob for setting down-slope current time (0-10sec)  
 E) Gas delay knob.  
    Adjusts gas output time at the end of welding. The field of variation is from 0.3sec to 30 sec.
- F) Remote control connector. [Symbol]  
 G) Cut-out Led (See 2.3.2) [Symbol]  
 H) Thermostat Led.  
    Lights up when the operator exceeds the service or intermittence percentage allowed for the machine. The power supply is cut off simultaneously.  
    N.B.: With the machine in this state, the fan continues to cool the generator.
- I) Remote control Led.  
    Lights up when the remote control connector is inserted.
- L) Led out.  
    This Led **MUST** light up (Green) when you strike the arc, either in TIG or electrode welding (MMA).
- M) Display.  
    1) Indicates the current selected using knob C.  
    2) Flashes a 3 digit code. The meaning of each code is shown on the following table.  
    Important: except for code 0.1.0, the power source is automatically cut off.
- N) Positive output terminal (+).  
 O) Connector for the TIG torch pushbutton or for the cooling unit (see 3.6.2.)



COD.	FAULT	REMEDY
0.0.1.	Fault i.c. DAC on micro-processor printed circuit	Contact service personnel
0.0.2.	Hardware stoppage	Switch off, then switch on again after 15 seconds. If the fault persists, contact service personnel
0.0.3.	No current impulses at capacitors	It is possible that the capacitors are already charged, the machine having been switched off and switched on again before the capacitors have had time to discharge. Wait 15 seconds then switch on again.
0.0.4.	Current impulses are reaching the capacitors when they should already be charged.	There could be a short circuit on the rectifier or on the power capacitors. Do not switch on again and wait for service personnel.
0.0.6.	Microprocessor memory fault.	Try to switch on again under no-load conditions. If the fault persists, contact service personnel.
0.0.7.	Faulty current sensor	Try to switch on again under no-load conditions. If the fault persists, contact service personnel.
0.0.8.	Fault on the relay actuation section of the power supply card.	Try to switch on again under no-load conditions. If the fault persists, contact service personnel.
0.0.9.	Short circuit at output when switching on.	Try to switch on again under no-load conditions. If the fault persists, contact service personnel.
0.1.0.	The machine is in test mode. Testing must only be effected by service personnel.	The machine is ready to use. Select the welding mode desired and proceed.



The torch pushbutton wires must be connected to pins A and C.

**P) Fitting (1/4 gas).**

Used to connect the gas hose of the TIG welding torch.

**Q) Negative output terminal (-).**

**R) Knob for setting initial welding current.**

This current is a percentage of the value set with knob C.

**S) Knob for setting pause or background current.**

This knob sets the pause current when the machine is set to CONTINUOUS TIG welding or sets the background current if the machine is set to PULSED TIG welding.

**T) Knob for setting peak or spot welding time**

This knob sets the peak time from 1 millisecond to 3.1 seconds when the machine is set for PULSED TIG welding or sets the spot welding time from 3 milliseconds to 3 seconds if the machine is set for TIG SPOT welding.

**U) Knob for setting background time**

This knob sets the background time from 1 millisecond to 3.1 seconds when the machine is set for PULSED TIG welding.

**V) Weld start current LED**

This LED signals that the welding machine is delivering or is ready to deliver the current set with knob R.

**W) Maximum welding current LED**

This LED signals that the welding machine is delivering or is ready to deliver the current set with knob C.

**X) Program selector**



This selector must be positioned, in conjunction with selector A, according to the type of work to be performed. Follow these indications:

1) **MANUAL TIG SPOT WELDING.** In this position the operator presses the torch pushbutton, the arc starts, and after a time span which can be varied between 3 milliseconds and 3 seconds with knob T, the arc is turned off automatically. The arc is turned off before the set time if the operator releases the pushbutton. In any case, after having completed the spot weld, to effect another, the operator must release the pushbutton and then press it again. The value of the current is set with knob C.

2) **TIG welding using the footpedal to set current.** This footpedal has two leads.  
a) The first must be connected to connector F.  
b) If the operator wants to control starting by means of the pedal microswitch, the other lead, indicated by plate must be connected to connector O.

If however the operator wishes to control starting by means of the torch pushbutton, this second lead must not be connected.

Press the torch pushbutton. The current will start to increase. Use knob B to set the time to be taken to reach the value previously set with knob C (from 0 to 10 seconds). Release the torch pushbutton. The current will start to decrease. Use knob D to set the time it will take to return to zero (from 0 to 10 seconds).

3) This program differs from the previous one since switching the torch on and off is controlled by pressing and releasing the torch pushbutton.

4) This welding cycle is performed in the following manner:

Press and release the torch pushbutton. The welding current will reach the value set with knob R and LED V will light up. You can maintain this current as long as you wish (for example until the workpiece has heated up). **Press and release immediately the torch pushbutton** to change the current to the value

set with knob **C**, in the time set with knob **B**. When the maximum welding temperature has been reached, LED **W** lights up. If you need to reduce the current while welding without extinguishing the arc (for example to change weld material, to change work position, to pass from a vertical to a horizontal position etc.) press and immediately release the torch pushbutton. The current will change to the value set with knob **S**, LED **Z** will light up and **W** will switch off. To return to the previous maximum current, press and release immediately the torch pushbutton, LED **W** will light up while LED **Z** will switch off. To interrupt welding at any time keep the torch pushbutton pressed for **more than 0.7 seconds**, then release it. The current will start to slope down to zero in the time span set with knob **D**.

**N.B.** "Press and release immediately" refers to a period of less than 0.5 seconds".



This cycle differs from the previous one since there is no weld start current set on knob **R**.



In this position you can preset welding current values and times with knobs **C, R, S, T, U** and read off the values on ammeter **M**. In this position the torch is not live.

**N.B.** Since the values of **R** and **S** are percentages of the value of **C**, each time **C** is varied, currents **R** and **S** are also automatically varied.

Each time you press the torch pushbutton you enable, one after the other, knobs **C, R, S, T** and **U**. Activation is signalled by LEDs **W, V** and **Z** for knobs **C, R** and **S** respectively, and by the simultaneous lighting up of LEDs **V-W** for knob **T**, and of **V-Z** for knob **U**.

#### Z) Pause current LED.

This LED shows that the welding machine is supplying or is ready to supply the current set with knob **S**.

### 3.4 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.

WELDING CABLE-SECTION MEASURED IN mm<sup>2</sup>

WELDING CURRENT IN AMPERES	DISTANCE FROM THE MACHINE IN METRES						
	15	20	30	40	45	50	60
100	35	35	35	35	50	50	50
150	35	35	50	50	70	70	90
200	35	50	50	70	70	95	100
250	35	50	70	70	95	100	150

### 3.5 COATED ELECTRODE WELDING

- Use electrode holder clamps in compliance with the safety

standards and without projecting tightening screws.

- Make sure that the main switch is in 0 position or that the mains plug is not inserted in supply socket then connect welding cables in accordance with polarity demanded by the electrode manufacturer which you will be using.

- 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 workpiece, 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 welding currents.

- Check to see that power supply voltage corresponds to voltage indicated on the welding machine technical data plate.

- **When taking voltage from a three-phase line, be very careful when connecting supply cable earth wire to the socket earth pole.**

- Connect supply cable: 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 more than or equal to current  $I_1$  absorbed by the unit.

- Absorbed 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 absorbed current  $I_1$ .

- Turn machine on with the main switch.

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.

- Select (MMA) by means of the knob **A** and adjusting the welding current with knob **C**.

- **When finished welding, always remember to turn unit off, and to remove electrode from electrode holder.**

### 3.6 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 workpiece as close as possible to welding machine, making sure there is a good electrical contact.

- 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 welding currents.


- Use TIG torch suitable for the welding current and connect power wire to negative pole (-) of welding machine.

- Connect torch connector to welding machine connector **O**.

- Connect the torch gas tube fitting to the welder fitting **P**, and

the gas hose from the cylinder pressure reducer to the gas fitting located on the rear panel.

Using knob **A** select scratch start  or high frequency start  and CONTINUOUS TIG or PULSED TIG.

Use knob **X** to select the work program desired and use knobs **B, C, D, E, R, S, T** and **U** to select welding parameters. **N.B.** If the program is set for PULSED TIG welding with program , since knob **S** is used to adjust the background pulsed current, the pause current will be the same as the current set with knob **R**.

When performing PULSED TIG welding, set peak current using knob **C**, background current using knob **S**, peak time using knob **T** and background time using knob **U**.

- Inert gas flow must be regulated to a value (l/min.) approximately 6 times the diameter of the electrode.
- If accessories such as gas lenses are used, the gas flow can be reduced to approx. 3 times the diameter of the electrode.
- The diameter of the ceramic nozzle must be 4 to 6 times larger than diameter of the electrode.
- The most commonly used shielding gas is ARGON, however, ARGON mixtures with a max. of 2% HYDROGEN can also be used for welding stainless steel, and HELIUM or ARGON/HELIUM mixtures can be used for welding copper. These mixtures increase the heat generated by the arc. If you are using helium gas, increase the flow rate (l/min) so as to obtain a ratio 10 times the size of the electrode (example: diam. 1.6x10 = 16 l/min. helium).
- Use protection lenses with shades D.I.N. 10 for up to 75A and D.I.N. 11 for 75A and above.
- Use a 2% thoriated tungsten electrode chosen according to table 2 and prepared according to that indicated in point 3.6.1.

electrode ø 2% thoriated tungsten ( red band )	direct current negative electrode ( Argon )
0.5mm (0.020")	15  40 A
1mm (0.040")	25  85 A
1,6mm (0.060")	70  150 A
2.4mm (0.095")	150  250 A
3.2mm (0.130")	200  350 A

• Check to see that power supply voltage corresponds to voltage indicated on the welding machine technical specification tag.

• **When taking voltage from a three-phase line, be very careful when connecting supply cable earth wire to the socket earth pole.**

• Connect supply cable: 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 more than or equal to current  $I_1$  absorbed by the unit.

• Any extensions should have adequate sections for absorbed current  $I_1$ .

• Turn machine on with the main switch.

**WARNING: ELECTRIC SHOCK CAN KILL!**

• Do not touch live electric parts.

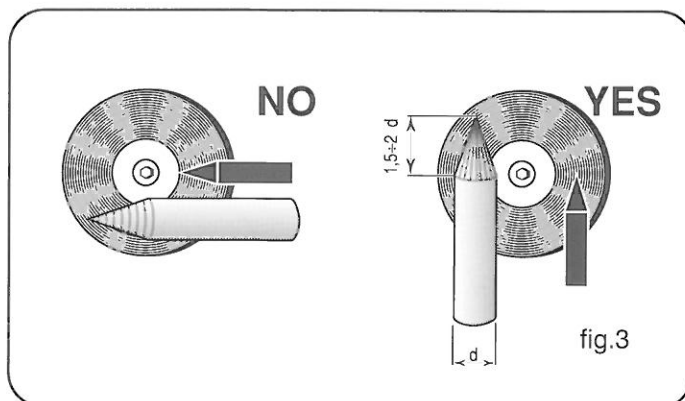
• Do not touch weld output terminals when unit is energized.

• Do not touch torch and earth clamp at the same time.

• **Once welding is finished, remember to turn machine off and to close the gas cylinder valve.**

### 3.6.1 Electrode preparation

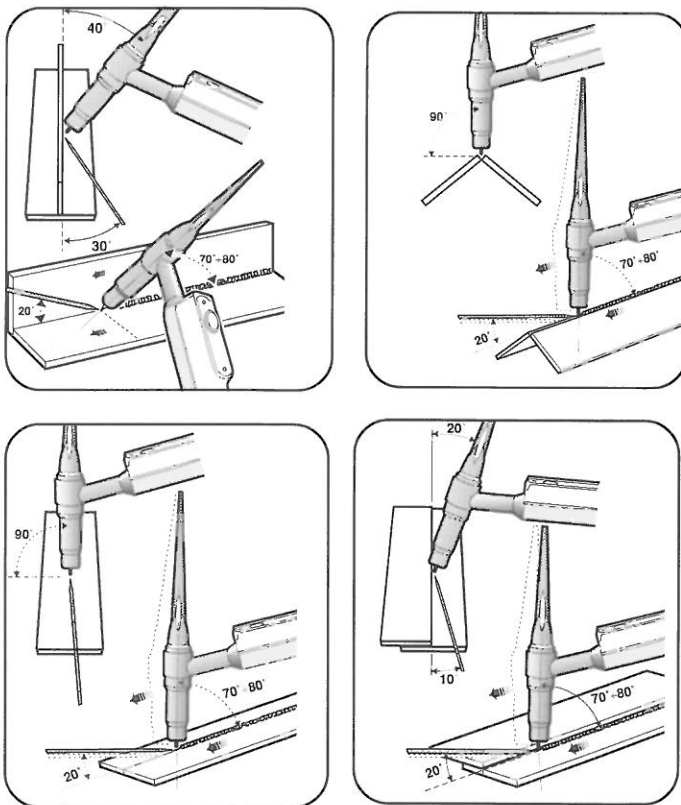
It is necessary to pay special attention to the preparation of the electrode point, grinding it so as to obtain vertical markings as shown in fig. 3.



**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 as shown in fig. 3.

### 3.6.2 Recommended welding positions.



## 4 ACCESSORIES

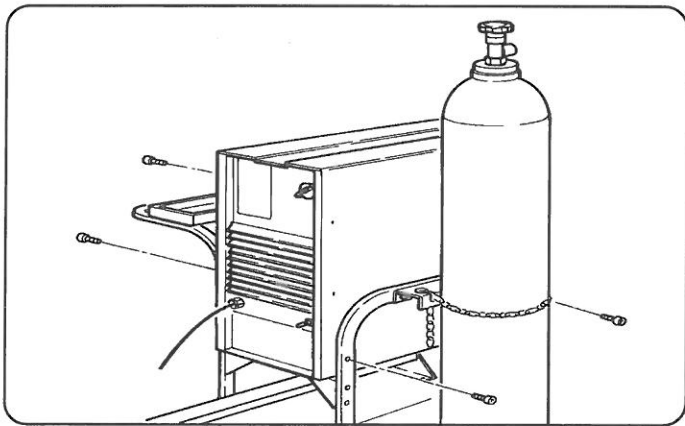
### 4.1 ASSEMBLING THE CARRIAGE AND CONNECTING IT TO THE COOLING UNIT



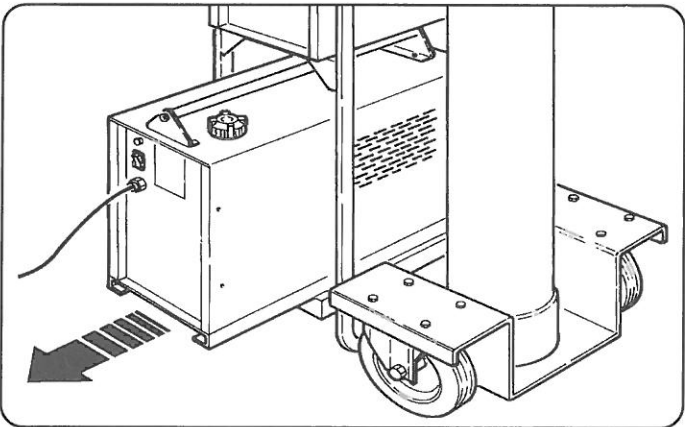
This welding machine may be used together with the cooling unit Art. 1336. We recommend that you purchase the carriage Art. 1424, which will provide you with all parts and create a system that is easy to transport together with the cylinders.

After arranging all parts, connect the adapter of wire Y to the connector O and the water hoses of the torch to the fittings J1 and J2, matching the hose colors.

For these references, refer to the cooling unit manual.



NOTE: If the cooling unit is turned off, or if the water does not circulate, a safety device prevents the welding machine from running.



## 4.2 REMOTE CONTROLS

This device may be used with the remote control unit Art. 185, and with the pedal control Art. 183.

### IMPORTANT!!

In order to be used with these two controls, the machine must have an EPROM with a metal label reading "Art. 280 + remote + date" on board 5.600.915 (fig. 4). All machines manufactured with serial numbers greater than or equal to 631382 are already equipped with this item; for machines with lower serial numbers, it must be ordered from your dealer, indicating the exact serial number of the machines on which the new EPROM is to be mounted.

#### 4.2.1 Connections Art. 185

Insert the 6-pole male adapter in the female adapter (F) located on the machine panel, then turn the machine on.

#### 4.2.2 Connections Art. 183

Insert the 6-pole male adapter in the female adapter (F)

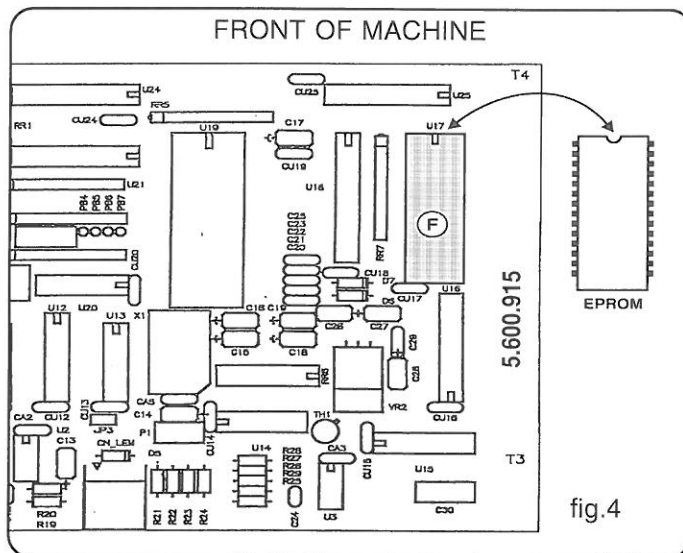


fig.4

located on the machine panel.

To turn the machine on, insert the 3-pole male adapter in the female adapter (O) located on the machine panel.

NOTE: The machine may also be turned on through the torch trigger, by connecting the relative 3-pole male adapter to the female adapter (O) located on the machine panel.

Set the selector (X), located on the machine panel, to



Turn the machine on.

CAUTION! These steps must be performed in the order described above for the machine to recognize the remote control commands.

The operating specifications and potential of the two remote controls are described in the corresponding manuals.

## 5 MAINTENANCE AND CHECK UP

### 5.1 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.

### 5.2 WELDING MACHINE MAINTENANCE

Experience has shown that many fatal accidents originate 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.

- If the servicing is not done by the manufacturer, the repaired welding machines which underwent replacements or modifications of any component, should be labelled in a way such that the identity of the person having serviced it is clear.