

# INSTRUCTION MANUAL FOR TIG WELDING MACHINE

## IMPORTANT SAFETY INFORMATION!!!

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE INSTALLATION, USE, OR SERVICING OF THIS UNIT. PAY CLOSE ATTENTION TO THE SAFETY RULES AND CONTACT YOUR DISTRIBUTOR IF YOU DO NOT UNDERSTAND SOME OR ALL OF THE POINTS COVERED IN THESE INSTRUCTIONS.

### 1 SAFETY RULES CONCERNING THE USE OF THIS WELDING MACHINE

#### 1.1 INTRODUCTION

All people authorized to use this machine should read the following instructions manual before using or servicing this unit.

**A REMINDER: YOUR SAFETY DEPENDS ON YOU!!!**

Always follow all safety regulations and instructions when using this machine. It is your responsibility to protect yourself and others against the risks related to the operation of this welding machine. The operator must be familiar with and observe all the safety rules regarding the safe operation and maintenance of this welding machine.

**NOTHING REPLACES GOOD COMMON SENSE !!!**

#### 1.2 GENERAL PRECAUTIONS

##### 1.2.1 Fire



- Avoid causing fires due to sparks, slag, hot metal and spatter which are produced during normal welding operations.
- Make sure that a suitable fire-extinguisher is located near the welding sight.

Remove all flammable material within 30 feet of the welding area.

- Do not weld containers (tanks or drums) containing flammable material, even when empty.
- Allow the welded metal to cool down before touching it or putting it into contact with flammable material.
- Do not weld structures with hollow spaces containing flammable substances.
- Do not work in conditions where there are 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 flammable material such as lighters or matches in your pockets while using this equipment.

##### 1.2.2 Burns

- Protect your entire body by wearing fire-proof clothing. This will protect your skin against burns caused by: ultra-violet radiation given off by the arc, sparks and molten slag.
- The protective clothing should include: gloves, a hat, and high shoes. Your shirt collar and pocket flaps should be buttoned, and cuff-less trousers should be worn to prevent contact with sparks and molten slag.
- Wear a helmet equipped with the appropriate lens shade and a clear glass cover plate. This is imperative when welding, cutting, and chipping to protect your eyes from ultra-violet arc rays and molten spatter. Replace the glass cover plate when cracked or covered with spatter etc.
- Do not wear clothing spotted with oil or grease as a spark may set them on fire.
- Hot metal, electrode stubs and workpieces, should never be handled without gloves.
- First-aid equipment and a qualified first-aid person should

always be available when welding, unless medical facilities are in the immediate vicinity, to treat flash burns of the eyes and skin burns.

- Ear plugs should be worn when working in the overhead position or in confined spaces. A hard hat should be worn when others are working overhead.
- Flammable hair sprays and gels should not be used by those persons intending to weld.

##### 1.2.3 Fumes



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

- Work in well-ventilated areas.
- Keep your head out of the fumes.
- In closed areas, use a fume exhaust system, preferably placed under the welding area if possible.
- If ventilation is inadequate, use an approved respirator set.
- Clean the metal to be welded of any solvents or halogen degreasers which give rise to toxic gases. During some welding operations chlorine solvents may be decomposed by arc radiation thus creating phosgene gas.
- Do not weld coated metals or those containing lead, graphite, cadmium, zinc, chrome, quicksilver, or mercury unless you have an approved respirator set.
- The electric arc creates ozone. Long exposures to high ozone concentrations may cause headaches; nasal, throat and eye irritation; as well as congestion and chest pains.

**WARNING: NEVER USE OXYGEN FOR VENTILATION.**

- Gas leaks in confined spaces should be avoided. Leaked gas in large quantities can dangerously alter oxygen levels in the air surrounding the weld sight. Do not place gas cylinders in confined spaces.
- **DO NOT WELD** where solvent vapors can be drawn into the welding shield atmosphere or where arc rays can come into contact with even minute quantities 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 when used for TIG welding uses ARGON gas to shield the arc. Special precautions must be taken when transporting, handling, and connecting gas cylinders.

##### A) GAS CYLINDERS

- **NEVER DEFACE** or alter the name, number, or other markings on a cylinder. It is illegal and dangerous!
- Do not use cylinders whose contents are not clearly identified.
- Do not directly connect cylinder to the unit without using a pressure regulator.
- Handle and use pressure cylinders with care and in conformity with existing safety standards.
- Do not use leaking or damaged cylinders.
- Do not use cylinders which are not well secured.
- Do not transport or move cylinders without the protection of the installed valve and protective valve cap.
- Do not lift cylinders off the ground by: their valves or caps, by chains, by slings, or by magnets.
- Never try to mix gases in a cylinder.
- Never refill a cylinder!

- Never lubricate the cylinder valve with oil or grease.
- Never allow an electrode to touch a cylinder!
- Do not expose cylinders to excessive heat, sparks, molten slag or flames.
- Do not tamper with the cylinder valve.
- Do not try to loosen tight valves by means of a hammer, a wrench, or any other object.


### B) PRESSURE REGULATORS

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

### C) HOSES

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

#### 1.2.5 Radiation

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

- Wear proper clothing and helmet.
- **Do not use contact lenses!!** The intense heat created by the arc may cause them to stick to the cornea.
- Use a mask or helmet equipped with lens shades that have a minimum DIN rating of 10
- Warn people in the area surrounding the welding sight that you are going to be welding.

**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 an arc with the naked eye.**

- Prepare the welding area so as to reduce the reflection and transmission of ultra-violet radiation: paint walls and exposed surfaces in black to reduce reflection, install shielding systems or curtains to reduce the transmission of ultra-violet rays.
- Replace protective lenses whenever damaged or broken.

#### 1.2.6 Electric shock

 Electric shocks are hazardous and potentially fatal!!!

- Do not touch live electrical parts.
- Insulate yourself from the workpiece and 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.
- If you are welding near a body of water take precautions to ensure that the machine cannot fall into the water.
- Avoid touching or holding the workpiece by hand.
- Should you work in a dangerous area or close to one, use all possible precautions.
- Stop welding immediately if you should feel even the slightest sensation of electric shock. Do not use the machine until the problem is identified and corrected.
- Often inspect the mains input cable.
- Disconnect the power input cable from the mains supply before replacing cables or before removing the unit covers.
- Do not use the unit without protection covers.
- Always replace any damaged parts with GENUINECEBORA SPARE PARTS.

- Never disconnect any of the unit's safety devices.
- Make sure that the mains power supply line is equipped with a good electrical ground.
- Servicing of the machine must be done by qualified personnel who aware of the risks involved with the high voltage levels necessary to make the machine operate.

#### 1.2.7 Pacemaker

Magnetic fields created by the high currents in the weld circuit can affect pacemaker operation. Persons wearing electronic life support equipment (pacemakers) should consult their doctor before going near any arc welding, gouging, cutting, or spot welding equipment in operation.

#### 1.2.8 Noise

These power sources alone do not produce noise levels exceeding 80 dB. The AC TIG welding procedure, 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 TECHNICAL DESCRIPTIONS

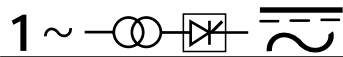






### 2.1 SPECIFICATIONS

These machine are constant current power sources, suitable for both the TIG and Manual Metal Arc welding procedures. These technologically advanced, high quality power sources incorporate, single current adjustment range, square wave technology and total central of the welding current.


Upon receiving and unpacking the machine, make a careful inspection to ensure that there are no damaged parts. Should there be a claim for losses or damages it must be made by the purchaser directly to the shipper who handled the goods.

**When requesting information about this welding machine please state the machine's part number and serial number to ensure receiving accurate information relating to your machine.**

### 2.2 DESCRIPTION OF TECHNICAL SPECIFICATIONS


		N°			
1 ~ 		EN 60 974-1			
 	U <sub>0</sub> V	- / - - - / -			
		X	-	-	-
		I <sub>2</sub>	-	-	-
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 	U <sub>0</sub> V	- / - - - / -			
		X	-	-	-
		I <sub>2</sub>	-	-	-
U <sub>2</sub>	-	-	-	-	
	U <sub>1</sub> V	I <sub>1</sub>	I <sub>1</sub> A	I <sub>1</sub> A	I <sub>1</sub> A
	-		-	-	-
	1 ~ 50/60 Hz		-	-	-
	-		-	-	-
	I. Cl. H		-	-	-
IP 21	-	-	-	-	
	-	-	-	-	
PROTEZIONE TERMICA THERMAL PROTECTION PROTECTION THERMIQUE TERMISCH GESCHÜTZ PROTECCION TERMICA		 MADE IN ITALY		VENTILAZIONE FORZATA FORCED VENTILATION VENTILE KÜHLART F VENTILACION	

IEC 974.1 This machine is manufactured according to the EN 60947.1 IEC 974 international standard.

N° ..... Machine Serial Number which must appear on requests or inquiries concerning the machine.  
 1~ Single-phase transformer-rectifier.

 Drooping characteristic.

 Shielded Metal Arc Welding. (Stick Welding)

 TIG (Tungsten Inert Gas) welding.

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

X ..... Duty-Cycle Percentage  
 The duty-cycle is the number of minutes the machine can operate (arc on) within a ten minute period without overheating. The duty cycle varies according to the output current.

I<sub>2</sub> ..... Output welding current


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

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

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

I<sub>1</sub> ..... Input Amps absorbed corresponding to different output levels (I<sub>2</sub>).

IP21 ..... Protection class of the machine's case  
 The 1 in the singles digit place means that this unit is not fit to work outdoors in the rain.

 ..... Fit to work in hazardous areas (ept. item 235).

NOTE: .... This machine has also been designed to work in class 3 pollution areas (see IEC 664)

### 3 INSTALLATION

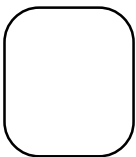
#### 3.1 SET UP AND INSTALLATION

Upon receiving the machine, unpack it from its carton. Install the handle and the wheels.

Place the machine in a ventilated area.

Dust, dirt, or any other foreign material that might enter the machine may restrict the ventilation which could affect the machine's performance. Keep the machine as clean as possible.

#### 3.2 INPUT POWER CONNECTIONS



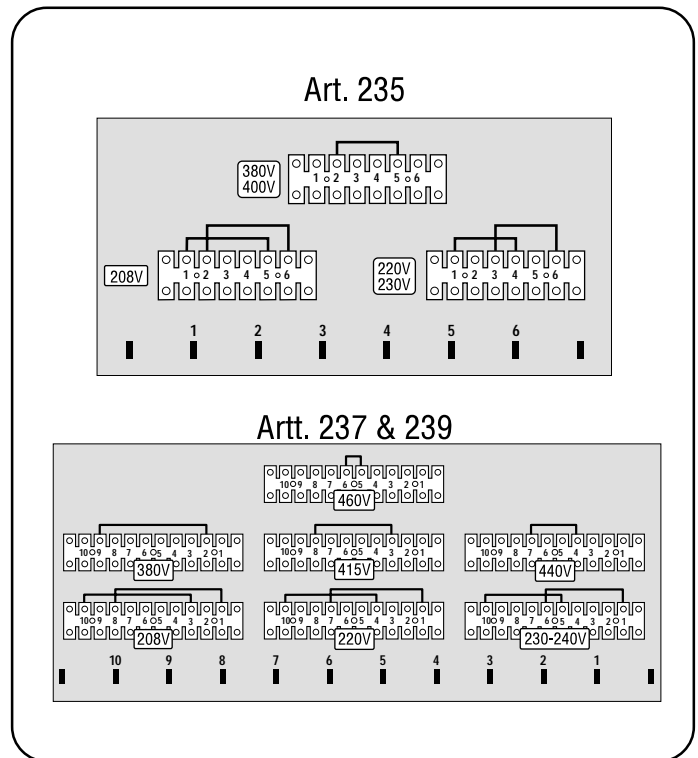
WARNING!!

ELECTRIC SHOCK CAN KILL

- This machine must be installed by skilled personnel.
- Make sure that the input power plug has been disconnected before inspecting, maintaining, or servicing.
- Connect the yellow-green lead of the machines power/ supply cable to a good electrical ground.
- After a final inspection, the machine should be connected to the input supply voltage marked on the input power cord.
- If you wish to change the input supply voltage, remove the upper cover of the case, locate the voltage-changing terminal board and arrange the connections as shown in figure 1.

#### 3.3 PRECAUTIONS

The fan is activated by generator heat. Before opening the machine for any reason, it is extremely important to turn the machine off!



### 3.4 PROTECTION AGAINST HIGH FREQUENCY INTERFERENCE

The circuit generating high frequency inside the machine can be compared to a radio transmitter. Incorrect installation of the machine may cause radio and TV disturbance.

There are 4 sources of High Frequency Interference:

- 1) Interferences irradiated by the welding machine
- 2) Interferences irradiated by the welding cables
- 3) Interferences irradiated on the supply line
- 4) Interferences intercepted and irradiated by ungrounded metal objects.

TO REDUCE THE RISK OF HF INTERFERENCE, INSTALL THE MACHINE ACCORDING TO THESE INSTRUCTIONS.

- Keep the line connections between the machine and the power input source as short as you can, possibly housing the input cable inside a metal tube which is connected to an electrical ground, buried in the ground.
- Keep the welding cables as short as possible. Their length should not exceed 7/8 meters (25 feet). If possible wind them together with tape.
- Make sure that there are no cuts, burns, or tears in the rubber insulation of the welding cables. Wires with high natural-rubber content can better withstand high-frequency losses.
- Make sure that all the connections are snug and that the welding torch is in good condition. These steps will help to reduce High Frequency losses.

- Keep the machine case panels and covers closed during operation.
- All wires within a 15 meter range must be enclosed in metal tubes and these tubes have to be grounded. Helicoidal-type hoses are not suitable.
- When the machine is used inside a metal structure, several groundings are recommended. NEVER USE WATER PIPES AS GROUND CONDUCTORS

### 4 DESCRIPTION OF THE MACHINE'S FEATURES

#### A -Receptacle for remote control plugs

Various accessories for regulating the welding current are

connected to this receptacle for both T.I.G. and coated electrode welding.

**B - Device for regulating the welding current**

It gets connected to receptacle A

**C - Procedure selector**

You can select either the T.I.G. or the coated electrode (SMAW) welding process.

**D - ON/OFF light or Led for article 235**

It remains lit while the machine is on.

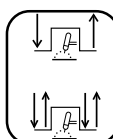
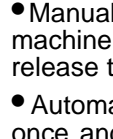
**E - Yellow led**

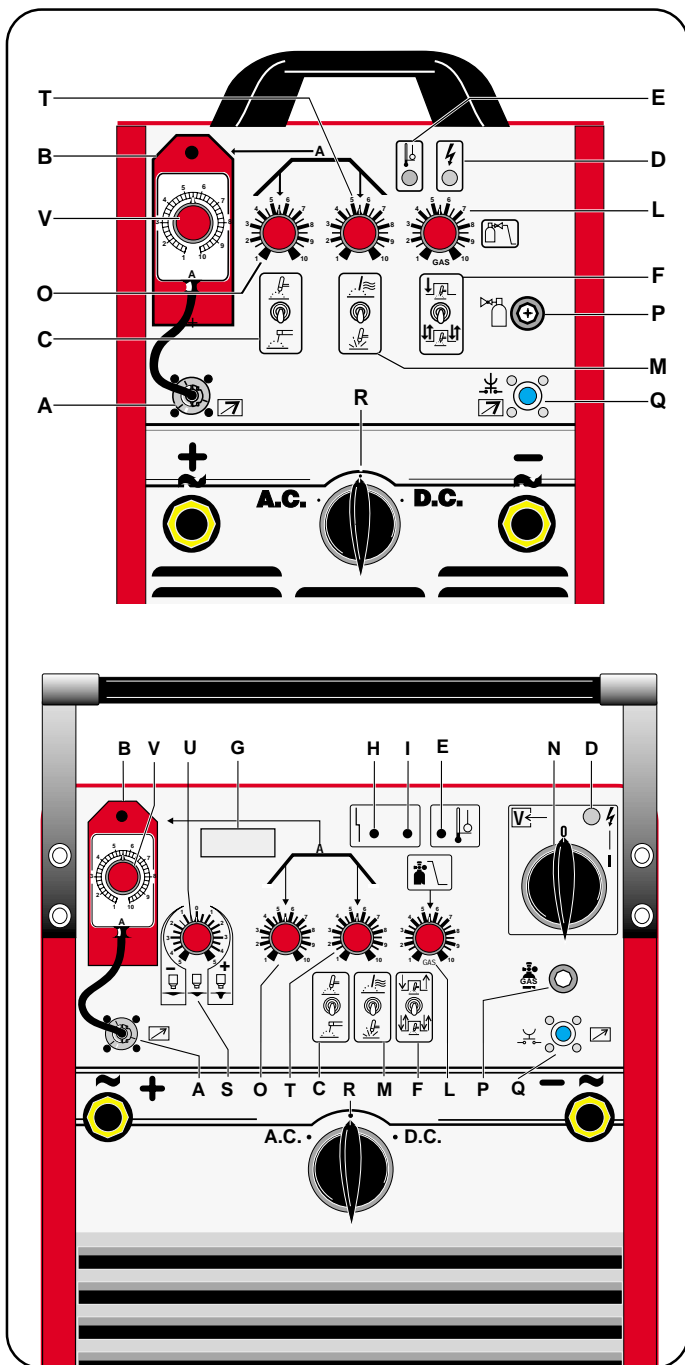
It lights up when the thermostat trips.

The thermostat trips if the machine's rated duty cycle is exceeded (see 2.2).

The machine shuts down until it cools down.

**F - Manual/ Automatic Selector :**

- Manual position : press the button and the machine delivers current to the torch, when you release the button, the current flow is cut off.
- Automatic position : push the torch button once and release it and the machine supplies current to the torch. To stop welding, press the button once



and release it and the current flow is cut off.

**G - Digital Amperometer (optional) (except item 235)**

It indicates the welding current in Amperes.

**NOTE:** The welding current can be preset and displayed on this instrument (see 4.1).

**H - Red Shut Down Led.**

When this led lights up, it means that the machine automatically shuts down because the safety device which reduces the risk of electric shock is not functioning. (except item 235)

**I - Green Protection Led (except item 235)**

This led indicates that the device which reduces the risk of electric shock is functioning normally and it should remain lit while the machine is in operation. If it is not lit, there might be a problem.

**L - Post-Gas Regulation**

This knob regulates the period of time in seconds that the shielding gas will continue to flow after a welding operation is terminated. The range runs from 0.3 to 30 sec.

**M - High Frequency Arc Start Selector**

In the coated-electrode(SMAW) mode it is automatically excluded. When A.C. T.I.G. welding it must be connected all of the time and when D.C. T.I.G. welding it can be disconnected if you want to "scratch start" the arc.

**N - Main Power Switch**

This switch turns the machine ON and OFF. (Note: The ON/OFF power switch on Article 235 is located on the back panel of the machine.)

**O - Up Slope Time Regulation**

This knob regulates the time it takes the current to climb from 0 to the amp value set by the amp potentiometer (Knob B). The regulation range runs from 2.2 to 10 sec.

**P - Gas Fitting (1/4 gas)**

To connect the T.I.G. torch gas hose to the machine.

**Q - Torch Control Receptacle**

Insert the torch control plug in this receptacle.

It functions only when T.I.G. welding is selected.

**R - Alternate Current (A.C.)-Direct Current (D.C.) Selector**

• Select to A.C.: to weld aluminum, brass and magnesium In T.I.G.

• Select to D.C.: to weld all other materials in TIG and to weld coated electrodes (SMAW).

**S - Balance Control (except item 235)**

Using this knob, the semiperiods of the A.C. square wave can be modified. This is especially handy when you are TIG welding aluminium. The point at which the two semi-waves are balanced is the zero position. At the 0 position less current is absorbed, the electrode is consumed less, and there is an optimal ratio between bead width and depth.


When you want to increase penetration, rotate knob S clockwise towards the (+); viceversa, when you want to increase cleaning action rotate knob S anticlockwise towards (-).


This feature functions only when A.C. TIG welding is selected.

**T - Regulation of the Current Down Slope Time**

This knob regulates the time it takes the welding current to pass from Amp value set by knob B to 0 at which point the arc extinguishes. The regulation range runs from 0.2 seconds to 10 seconds and it is activated whenever the command to stop the welding operation is given. The down slope feature allows the crater at the end of weld seam to be filled. This feature functions only when TIG welding is selected.

**4.1 PRESETTING OPERATING CURRENTS**

**4.1.1 Welding with electrode:** Set selector (C) to  then regulate the current using knob (V).

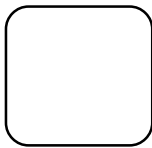
**4.1.2 TIG welding:** Set selector (C) to  then push the torch button and regulate the current using knob (V).

## 5 OUTPUT WELDING CONNECTIONS

- The welding circuit should not deliberately be in direct or indirect contact with the ground conductor if not in the workpiece.
- If grounding is deliberately done with the workpiece by means of a ground wire, the connection must be as direct as possible and it must be made with a wire having a section at least equal to the ground lead. The connection must be made to the workpiece and it must be in the same place as the ground lead either by using the ground lead clamp or a second ground clamp placed close by.

### 5.1 Connecting the TIG torch.

Based on your work requirements, always use the shortest torch (the length of the torch cable is intended) possible in order to reduce the risk of HF interference to a minimum.



WARNING!!

ELECTRIC SHOCK CAN KILL

- Do not touch uninsulated live electric parts
  - Do not touch the hot electrode either with your hands or with your clothes.
  - Insulate yourself both from the ground and the workpiece.
  - To avoid receiving high-frequency discharges, keep the torch in good condition.
  - Before connecting the torch turn the machine off.
  - Insert the male plug of the torch cable into the negative terminal and turn to the right until the connector locks. Make sure that the fit is tight.
- Select the diameter and type of electrode on the basis of the metal to be welded and its thickness. The number of output Amps needed and DC or AC welding will also condition the selection of the proper electrode.
- Connect the gas hose which comes out from the torch to the 1/4 gas fitting (**letter P**) on the machine's front panel. Insert the torch control plug into receptacle (**Q**) also located on the machine's front panel.

### 5.2 Connecting the ground clamp

- Connect the male plug of the work lead (ground cable) to the + or - terminal in accordance with the procedure used. Insert and turn clockwise until the connector is snug.
- Connect clamp end of the work lead to the workpiece.

## 5.3 Connecting the gas hose.



WARNING!!

CYLINDERS CAN EXPLODE IF DAMAGED



- Keep the cylinders in an upright position by chaining them to their support.
- Keep the cylinders in a place where they cannot be damaged.
- Do not lift the machine with the cylinder on its support.
- Never touch the cylinder with an electrode.
- Keep the cylinder away from the welding area and uninsulated electric circuits.
- Cylinders containing inert gas have to be equipped with a pressure reducer and a flowmeter.
- After having positioned the cylinder, connect the gas hose that comes out from the rear of machine to the pressure reducer output.

## 6 WELDING PARAMETER GUIDELINES

### 6.1 SHIELDING GAS

- 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.
- 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.

### 6.2 AC TIG WELDING is used for welding: Aluminium, Magnesium, and Bronze

- To achieve the best welding results, you must become familiar with all of the machine's functions
- Position selector (R) on A.C., selector (M) on  and selector (C) on  (TIG). All other settings depend on the

## ELECTRODE AND CURRENT SELECTION GUIDE

Electrode. Type ∅	D.C. Tungsten 2% Thorium	A.C.					
		Max. Penetration pos.		Zero balanced pos.		Max. Cleaness pos.	
		Tungsten pure	Tungsten 0.8 % ZR	Tungsten pure	Tungsten 0.8 % ZR	Tungsten pure	tungsteno 0.8 % ZR
0.5mm - 0.02"	15A ÷ 40A	-	-	10A ÷ 20A	5A ÷ 20A	-	-
1mm - 0.04"	25A ÷ 85A	-	-	20A ÷ 30A	20A ÷ 60A	-	-
1.6mm - 1/16"	70A ÷ 150A	50A ÷ 100A	70A ÷ 150A	30A ÷ 60A	50A ÷ 80A	20A ÷ 40A	30A ÷ 60A
2.4mm - 3/32"	150A ÷ 250A	100A ÷ 160A	140A ÷ 235A	60A ÷ 120A	80A ÷ 140A	40A ÷ 100A	60A ÷ 120A
3.2mm - 1/8"	200A ÷ 350A	150A ÷ 210A	225A ÷ 325A	80A ÷ 160A	100A ÷ 180A	60A ÷ 140A	80A ÷ 160A
4mm - 5/32"	300A ÷ 400A	200A ÷ 275A	300A ÷ 400A	100A ÷ 240A	150A ÷ 280A	80A ÷ 200A	150A ÷ 250A

diameter of the electrode fitted to the torch and the number amps needed to perform a certain job. When welding aluminum, pure tungsten ( D.I.N. color GREEN ) or zirconium tungsten ( D.I.N. color WHITE ) electrodes must be used.

- When welding, the electrode tip will tend to become spherical. If the "ball" at the tip of the electrode is bigger than the diameter of the electrode itself, it means that the current you are using is too high for that electrode; the electrode should be replaced with one of a larger diameter.

Proper electrode preparation is extremely important. Carefully follow the steps shown.

- The post-gas time in seconds (**REGULATED BY KNOB L**) must be sufficient enough for the electrode to cool down. The electrode should have a bright, glowing tip during the cool down period.

- To adjust the balance of the square wave, see letter (**S**), section 4. (except item 235)

- To preset working currents, see section 4.1.

- The diameter of the filler material must be less than or equal to the thickness of the workpiece to be welded.

- The ratio between the current to be used and the workpiece thickness is 40 Amp/mm. E.g.: a thickness of 2 mm x 40 = 80 Amperes.

ATTENTION: THIS RATIO MAY VARY ACCORDING TO WORKPIECE SIZE AND IS ONLY MEANT TO BE AN APPROXIMATE GUIDELINE.

- The alumina (aluminium oxide) must be removed from the weld area to avoid aluminum oxide contamination and the risk of pile up, both typical weld defects when welding aluminum.

- The removal of the alumina layer can be done with mechanical brushes. The brush disc should consist of stainless steel wires. The alumina must be removed from at least a 5 cm. area surrounding the weld area.

- Use protection lenses with shades of at least D.I.N. 11.

- Use pure ARGON to shield the arc.

#### ELECTRODE PREPARATION FOR A.C. TIG WELDING

D	d1	L
1/16"	1/32"	0.08"
3/32"	3/64"	0.12"
1/8"	1/16"	5/32"
5/32"	0.08"	0.20"

$\alpha = 20^\circ - 25^\circ$

#### 6.3 D.C. TIG WELDING is used for welding: Steel, Stainless, Steel and Copper

- Position selector (**R**) on D.C.

- Position selector (**C**) on

The TIG torch must be connected to the neg. terminal (-) and the ground cable to the positive terminal (+).

- Position selector (**M**) on if you wish to start the arc

without touching the workpiece and on if you wish to touch start the arc.

When scratch starting without High Frequency, it is recommended that you use the max. up slope time 8 sec.

- To preset the welding current, see section 4.1.

- To select the welding program, see letter (**S**), section 4.

- The diameter of the filler material must be equal to or less than the thickness of the workpiece.

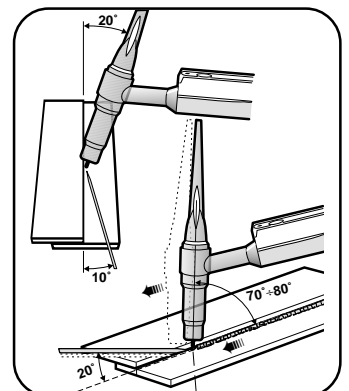
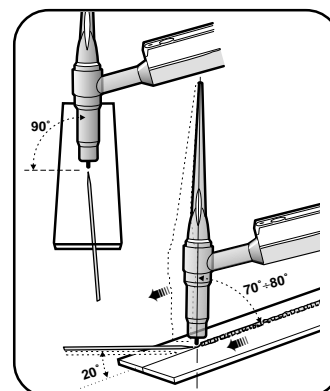
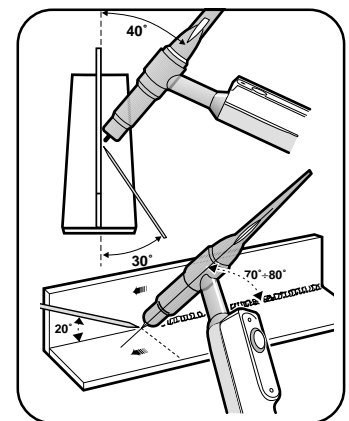
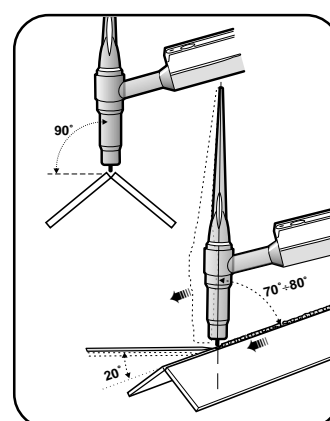
- The ratio between the current to be used and the workpiece thickness is: 20/30 Amp. per millimeter for carbon and stainless steels; 80 Amp. per millimeter for copper.

ATTENTION! THIS RATIO MAY VARY ACCORDING TO WORKPIECE SIZE AND IT IS ONLY MEANT TO BE AN APPROXIMATE GUIDELINE.


#### ELECTRODE PREPARATION FOR D.C. TIG WELDING

D	L
1/16"	0.12"
3/32"	0.20"
1/8"	0.28"
5/32"	0.39"

$\alpha = 30^\circ - 60^\circ$

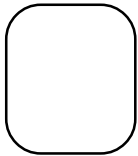


## 6.4 WELDING WITH COATED ELECTRODES (SMAW)

- This machine can weld any type of coated electrode.
- Position selector (C) on 
- When led (N) lights up, you are ready to weld.
- Connect the electrode holder and the ground cable in accordance with the polarity indicated by the electrode manufacturer (normally the electrode goes to the + terminal).

## 7 MAINTENANCE

### WARNING:

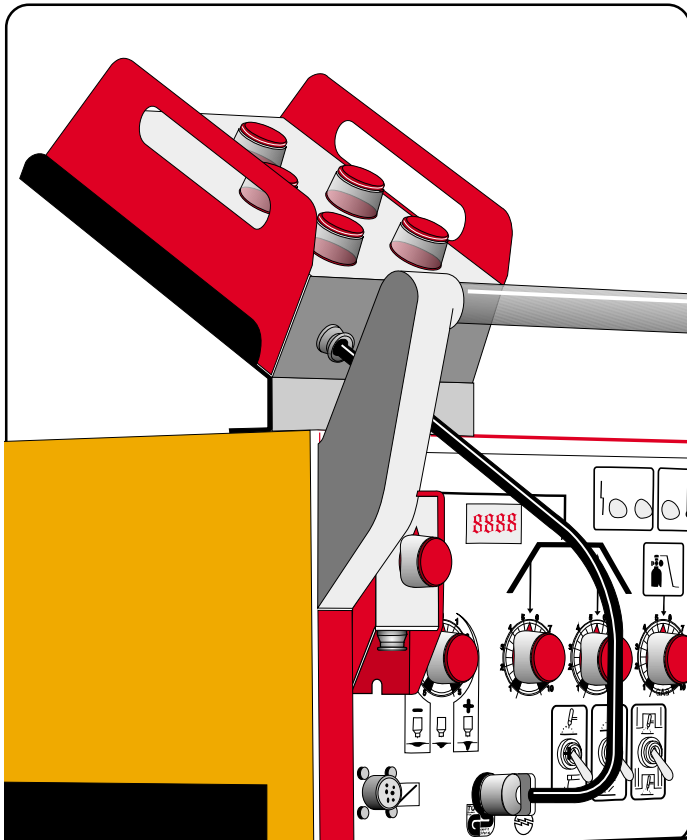


ALL SERVICING AND REPAIR MUST BE DONE BY QUALIFIED PERSONNEL

- Before opening the machine case to service or repair, turn off the machine and disconnect the plug from the power source.
- As part of general maintenance keep the TIG torch and the welding wires in good condition.
- Periodically clean the inside of the machine by blowing dust and particles away with a light jet of dry air.

## 8 ACCESSORIES

### PART N° 180 PULSED REMOTE CONTROL



Essential for TIG welding on thin sheet metal. It is connected to receptacle (A) on the front panel.  
 PART N° 132 DIGITAL AMMETER (for article 239)  
 PART N° 134 DIGITAL AMMETER (for article 237)  
 This item indicates the welding current. The welding current can be preset and displayed, see section 4.1.

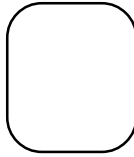
### PART N° 1326 5-meter EXTENSION CORD FOR THE REMOTE CONTROL UNIT

The pulsed remote control unit ITEM 180 and the remote current control device (B), may be brought to welding sight by means of this extension cord.

### PART N°182 FOOT CONTROL PEDAL

The foot pedal allows you to regulate the welding current without having to stop welding.

## 9 TROUBLESHOOTING GUIDE




Turn the machine off and disconnect the power input plug from the wall outlet before opening the machine case to inspect or work on the inside of the machine.,  
 Read the information in the following section carefully. Problems are frequently caused by improper positioning of the selectors on the front panel of the machine. After having checked to be sure that all the selectors are in the correct position, check: the line fuses to make sure they are not blown, check that all the wires are properly connected, and check that all the connections are snug.

### 9.1 TROUBLE IN THE MACHINE CONNECTIONS

- 1- TROUBLE-**The machine does not turn on**  
 CAUSES-Input power cord not plugged in  
 -One power supply phase missing  
 -Machine not connected to the right supply voltage
- 2- TROUBLE-**The machine switches on but does not supply current**  
 CAUSES-Current regulating knob(B) is not inserted into receptacle (A).  
 -Potentiometer (V) is damaged.  
 -Welding accessories not connected.
- 3-TROUBLE-**The machine switches on but the yellow warning light (E) remains lit and the machine does not supply current.**  
 CAUSES-The thermostat has tripped. Allow the machine to cool down and then turn it on again.
- 4- TROUBLE-**The red stop led (H) lights up**  
 CAUSES- S.C.R. diode in short circuit.  
 -Damage to the control card. (except item 235)
- 5- TROUBLE-**The line fuses trip.**  
 CAUSES -Installed power not sufficient  
 -Machine not connected to the right supply voltage.  
 -Short circuit in the power transformer  
 -S.C.R. diodes in short circuit.

### 9.2 TROUBLE WITH THE T.I.G. PROCEDURE

- 1- TROUBLE-**High-frequency failure.**  
 CAUSES -Check that the welding cables are not damaged.  
 - Shielding gas is inadequate  
 -Position selector (M) on   
 -Position selector (C) on electrode
- 2- TROUBLE-**Difficulties in starting the arc in TIG**  
 CAUSES -Shielding gas is inadequate  
 - Welding current too low  
 -Tungsten electrode contaminated. Restore the tip  
 -Electrode used was incorrect. A pure tungsten electrode is used for AC TIG welding and a Thoriated Tungsten electrode is for DC TIG welding.  
 -Defect in the torch push button  
 -Torch connector not connected to receptacle (Q)

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-Electrode diameter too large for the preselected current level.

Note: If the machine is connected to an automatic system, the ceramic nozzle should be connected to the work-piece ground with a piece of flexible copper wire.

**3- TROUBLE-The tungsten electrode wears rapidly or contaminates the weld pool.**

CAUSES -The current is too high for the electrode diameter.

-In A.C. welding, knob (U) is positioned to the left i.e. max. cleaning action. (except item 235)

- If you want to maintain the position selected with knob (U), increase the electrode diameter. (except item 235)

**4- TROUBLE-The arc deviates from the weld pool.**

CAUSES -in A.C. the electrode is too large for the preset current.

-During the down slope phase, this happens when the current is lower than the electrode ampere capacity

-Ground clamp not correctly connected

-Using the pulse accessory, the base current is lower than the electrode Ampere capacity

**5- TROUBLE-The machine supplies the maximum output current but the current cannot be adjusted.**

CAUSES -A short circuit in the inductance.


**6- TROUBLE-The fan does not work.**

CAUSES -Faulty thermostat.

-Faulty fan motor.

### 9.3 TROUBLE WITH THE ELECTRODE PROCEDURE

**1- TROUBLE-The machine does not supply current.**

CAUSES -Position selector (C) on 

-Device (B) not connected to receptacle (A).

-The thermostat has tripped, light (E) ON

-Welding cables not connected.

**2- TROUBLE-The arc starts, then it switches off.**

CAUSES Using basic electrodes:

-Position selector (R) on A.C.

-The electrode holder is connected to the wrong polarity.