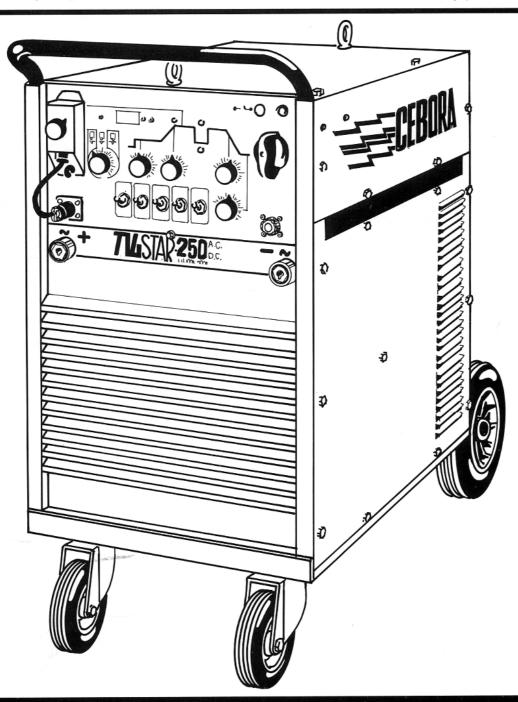
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INSTRUCTION MANUAL FOR TIG WELDING MACHINE

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 fireextinguisher 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. These must be first carefully cleaned before being welded.
- 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: ultraviolet 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 hazardess to your health, therefore:

- Work in well-ventilated areas.
- Keep your head out of the fumes.
- In closed areas, use a fume exhaust system, preferrably 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 clorine solvents may be decomposed by arc radiation thus creating phosgene gas.
- Do not weld coated metals or those containing lead, graphite, cadmium, zink, 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 fatall!!



- 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 GENUINE 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.
- Make sure that the workbench and the workpiece are connected to 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



The noise emitted by the arc may damage your hearing. Always wear ear muffs.

2 GENERAL TECHNICAL DESCRIPTIONS

2.1 SPECIFICATIONS

The TIG STAR 250 AC/DC is a constant current generator suitable for both TIG and coated electrode welding. The unique electronic current regulation range (5/250A), and square-wave technology, make this a hi-tech, quality power source you can rely on.

2.2 DESCRIPTION OF TECHNICAL SPECIFICATIONS

N°:						
1 ~ - @ EN 60 974-1						
. h	50	- 60 Hz	5 A / 20 V - 250 A		250 A	/ 30 V
\sim \Box	U 0	٧	Х	30%	60%	100%
.5—	97 DC		l 2	250 A	175A	137 A
<u>:'':</u>			U 2	30 V	27∨	25.5∨
_	50	- 60 Hz	5 A	/ 20V - 250A / 30V		
	U0 V 97DC		Х	30%	60%	100%
.F			l 2	250 A	175 A	137 A
<u>:'':</u>	,	, DC	U 2	30 ∨	27 ∨	25.5∨
~ h	50	- 60 Hz	5A / 10V - 250A /		20 ∨	
	U0 V 97DC		X	30%	60%	100%
$/\!$			l 2	250 A	175 A	137 A
<u>9.</u>			U 2	20 ∨	17 V	15.5∨
<u> </u>	50	- 60 Hz	5 A	/ 10 V -	250 A	20 ∨
🗠	U 0	V	Х	30%	60%	100%
	97DC	l 2	250 A	175 A	137 A	
<u>?</u>	97DC		U 2	20 V	17∨	15.5∨
~@ ■	U ₁	٧		I 1 A	I1 A	I 1 A
	208		11	85	58	44
1∼ 50/60 Hz	220-230			78	53.5	40
I. Cl. H		380	- 11	36.5	22	14.5
IP 21 S	415 440-460			33.5	19.5	13.5
" 21 3				30.5	18	13.5
PROTEZIONE TERMIC THERMAL PROTECTION	PROTEZIONE TERMICA VENTILAZIONE FORZATA THERMAL PROTECTION FORCED VENTILATION					
PROTECTION THERMI	QUE			VENT	ILE	TION
TERMISCH GESCHÜTZ PROTECCION TERMIC		MADE IN ITALY		KUHLART F VENTILACION		

IEC 974...This machine is manufactured according to the EN 60947 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. SMAW Shielded Metal Arc Welding. (Stick Welding) TIGTIG (Tungsten Inert Gas) welding. U₀.....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. I2.....Output welding current U2.....Secondary voltage, welding current= I2 U₁......Nominal supply voltage 1~50/60Hz Single-phase input supply at 50 or 60 Hz 11Input Amps absorbed corresponding to different

output levels (l2).

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. S.....Fit to work in hazardous areas.

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

3 INSTALLATION

3.1 PRECAUTIONS

 All sections concerning the installation of this machine must be read carefully.



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 vellow-green wire to a good electrical ground.

3.2 SETUP

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.

3.3 PROTECTION AGAINST HIGH FREQUENCY INTERFERENCE

The circuit generating high frequency inside the machine can be compared to a radiotransmitter.

Incorrect installation of the machine can cause radio and TV disturbances.

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 ABOVE PROBLEMS, INSTALL THE MACHINE ACCORDING TO THE 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 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.
- The ground clamp must be connected both to the workpiece and to a grounding within a 3 meter range. This grounding shall be obtained with a copper or galvanizedsteel cored bar of at least 16 mm. in diameter.

N.B.: A cable having a cross section area as big as or bigger than the welding cables must be used for this connection which has to be as short as possible.

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

3.4 INPUT POWER CONNECTIONS



WARNING!!

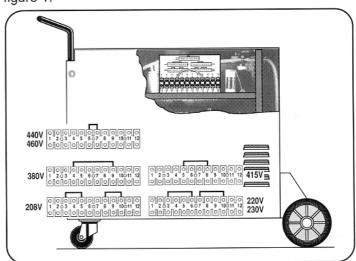
ELECTRIC SHOCK CAN KILL

- 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 wire to a good electrical ground.

WARNING!!

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN MECHANICAL FAILURE OR DAMAGE OF THE COMPONENTS INSIDE THE MACHINE.

- 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.



 After having changed the supply voltage, re-place the upper cover.

3.5 **OUTPUT WELDING CONNECTIONS**

3.5.1 Connecting the TIG torch.

Based on your work requirements, always use the shortest torch (the length of the torch cable is intended) possilbe 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 work-

piece.

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 1/4 gas fitting (H) on the machine's front panel.

Insert the torch control plug into socket (I) on the machine front panel.

 The torch could also be of the water-cooled type, in which case connect the two hoses coming out from the torch as described in paragraph 7.

3.5.2 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.

3.5.3 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 damaded.

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.

3.5.4 Connecting the electrode holder.



WARNING!!

ELECTRIC SHOCK CAN KILL

Do not touch uninsulated electric parts.

 Do not touch the electrode either with your hands or skin or greased clothes.

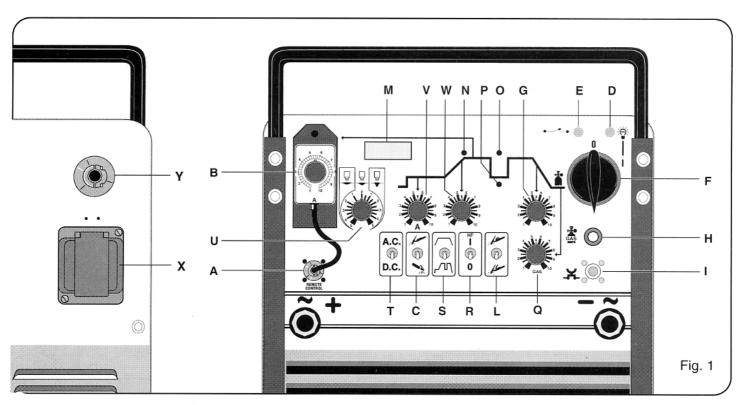
Insulate yourselves from the workpiece or the ground.

 The electrode holder must be connected to the machine so as to comply with the polarity indicated on the box containing the electrodes that you are going to use. When you connect the electrode holder cable and the earth cable, make sure that the power cable terminals are well tightened.

4 DESCRIPTION OF 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

It remains lit while the machine is on.

E - Yellow led

It lights up when the thermostat trips.

F - Main switch

It turns the machine ON and OFF.

G - Regulation of the down-slope current time (0.2-10 sec.)

It regulates the time it takes the welding current to pass from the preset value until the arc extinguishes.

It is activated whenever the control to stop welding is given: it allows the crater to be filled at the end of the weldment. It functions only when the TIG procedure is selected.

H - Fitting

(1/4 gas) which is for connecting the gas hose of the T.I.G. welding torch to the machine.

I - Receptacle

The torch control plug is inserted here.

It functions only when the TIG procedure is selected.

selector:



Manual

Automatic

It functions only when the TIG procedure is selected except for the function $\angle \Box \Box$

• In automatic position: once the torch push button has been pressed, it can be released without causing the arc to turn off; to stop welding, press and release the push button once

• In manual position: when the operator presses the button, the machine delivers current, when he releases it, the arc extinguishes.

M - Digital amperometer

It indicates the welding current.

N.B.: The welding current can be preset and displayed on this instrument. For this function, see the section on preselcting of working currents.

N - Led

It lights up when, in the T.I.G. procedure, the current reaches the preset welding current. It is always ON in the electrode procedure.

lights up when the maximum welding preselected by knob (B), has been reached in the program mode ¬ЛЛ

P - Led

It lights up when the background current, preselected by knob (V), is in operation in the program mode \square

Q - Post Gas

It regulates the gas output time once welding has been terminated. The regulation range includes a min. of 0.3 sec. and a max. of 30 sec.

R - High frequency arc starting selector.

In coated-electrode welding it is automatically excluded

In A.C. T.I.G. welding it must always be in

In D.C. T.I.G. welding it can be disconnected if you wish to scratch start the arc.

S - Welding-programme selector

The machine performs this programme / by setting the

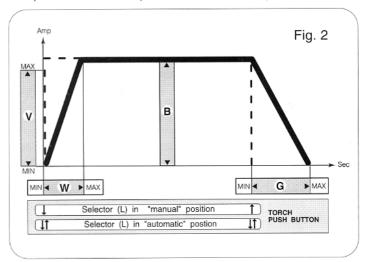
following knobs:

V - (Welding-start current or background current).

W - (Up-slope time, from the background current to the welding current).

B - (Welding current).

G - (Current down-slope time- "crater filler").



The welding cycle follows the steps listed herebelow:

Example: manual position selected with (L):

Press the torch push button, welding starts at the current

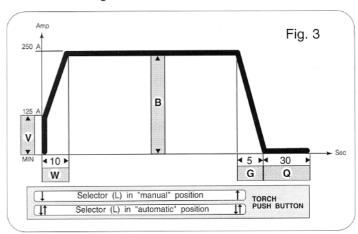
preset by knob $(\dot{\mathbf{V}})$.

It takes the time set by knob (W) to reach the welding current preset by (B); welding continues until the button is released, at this point the current goes down to the minimum according to the time set by knob (G), lastly the post-gas, regulated by knob (**Q**) follows.

Example: WELDING CURRENT 250A (knob **B**)

BACKGROUND CURRENT 125A (knób V) Pos 5 Up-slope - time needed to go from the background current to the MAX. welding current (knob W) Down-slope time of the welding current, Pos 5 = 5 seconds (knob G)

Post-gas flow time, Pos. 10 = 30 sec. (knob Q)



N.B.: If the torch push button is pressed again during the down-slope period (G), the cycle starts again.

PROGRAMME ______

The machine performs this programme by adjusting these knobs:

V - background current or pause current.

W - Up-slope time, from the background current to the welding current.

B - welding current.

G - Current down-slope time- "crater filler"

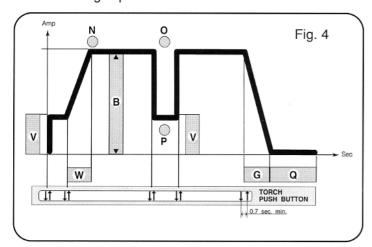
Q - Post-gas flow time.

This programme has been conceived for applications that require two welding-current levels.

The foot control, part no. 182, cannot be used.

With this programme, the current preset by knob (V), in addition to being the starting weld current, is also the background current within the cycle.

The leds N - O - P signal the points in the programme in which welding is performed.



The welding cycle described above is achieved in the following way:

PRESS AND IMMEDIATELY RELEASE THE TORCH PUSH BUTTON. ONLY UPON RELEASING THE BUT-TON, WILL THE ARC START.

The welding current will rise to the value set by knob (V); the operator can keep this current as long as he desires (for instance until the workpiece is pre-heated).

By pressing and immediately releasing the torch button again, the current passes from the value preset by knob (V) to the value preset by knob (B) within the time set by knob (W). When the welding current is reached, led (N) lights up. Should you need to decrease the current during welding without extinguishing the arc (e.g. to change the weld material, to change the work position, to pass from a horizontal to a vertical position etc...), press and immediately release the torch button: the current will decrease to the value set by (V) and led (P) will light up. To return to the previous current, repeat the operation by pressing and releasing the torch button; led (O) will light up while led (P)

Any time you wish to interrupt welding, press the torch button for more than (0.7 sec.) then release it; the current starts to slop down until it reaches zero within a time span preset by knob (G).

The POST GAS follows and is preset by knob (Q).

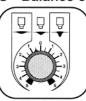
N.B.: The wording "PRESSING AND RELESING IMME-DIATELY" refers to a max, time of 0.5 sec.

T - Selector:

Alternating current (A.C.)-Direct current (D.C.)

- Position to A.C.: In TIG to weld aluminium, brass and magnesium.
- Position to D.C.. In TIG for all other materials and in MMA for all types of coated electrodes.

U - Balance control



With this knob, the semiperiods of the square wave can be modified when you work in A.C. TIG (when you weld aluminium).

The point where the two semi-waves are balanced is zero.

At this position there is less current draw, less electrode consumption, as well as an optimum ratio between width and depth of the weld bead.

If you want to increase penetration, rotate the knob clockwise; viceversa, when you want more a cleaning action and less penetration, rotate the knob anticlockwise. THIS FEATURE FUNCTIONS ONLY WHEN A.C. T.I.G. WELDING HAS BEEN SELECTED.

V - Regulation of the background current

It functions only when TIG welding (A.C. or D.C.)

It is the current from which any programme has to be started and it is always a percentage of the welding current preset by knob (B) in the programme _/1/1.

The current preset by this knob is also the pause current that can be selected within the programme itself.

W - Up-slope current rise time regulation from the value set by knob (V) to the value set by knob (B).

X - 220V Socket for the Cooling Unit (DO NOT CON-NECT OTHER POWER TOOLS) Max. Power 440 W.

Y - Socket for connecting the safety device of the Cooling Unit Part no. 1332.

N.B.: THE MACHINE COMES EQUIPPED WITH A CONNECTOR WHICH, IN THE ABSENCE OF THE COO-LING UNIT, MUST BE INSERTED INTO SOCKET (Y).

4.1 PRESELECTION OF WORKING CURRENTS

4.1.1 With coated electrodes:

After having positioned selector (C) on wait until led (N) lights up.

Then rotate potentiometer (B), the welding current will be displayed on amperometer (M).

4.1.2 In TIG: (Selecting a single welding current)

Selector (R) pos. zero

Selector (S) pos. /

Selector (L) pos. Press the torch button; when led (N) lights up rotate knob (B)to adjust the welding current which will be displayed on amperometer (M).

4.1.3 In TIG: (Selecting two current levels)

Selector (R) pos. zero

Selector (S) pos. _/I/\

Press and release the torch button twice. When led (N) lights up, regulate the max. welding current displayed on amperometer (M) by means of knob (B). To set the background current, press and release the torch button and led (P) lights up.

Regulate the current value with knob (V).

Once these operations have been carried out, press and keep the torch button pressed for at least 0.7 sec.

All of the leds will turn off.

WELDING PARAMETER GUIDELINES

- The inert gas flow must be regulated to a value in liters per minute approx. 6 times the diameter of the electrode. (E.g. diameter. 2.4x6 = 15 lt./min.
- 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 the electrode diameter.

5.1 TIG ELECTRODE AND CURRENT SELECTION GUIDE

equal to the thickness of the workpiece to be welded.

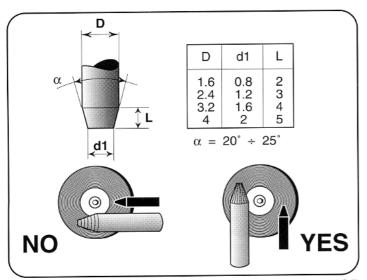
• The ratio between the current to be used and the

	- 0	A.C.					
	D.C.	Max. Penetration pos.		Zero balanced pos.		Max. Cleanness pos.	
Electrode. Type	Tungsten 2% Thorium	Tungsten pure	Tungsten 0.8 % ZR	Tungsten pure	Tungsten 0.8 % ZR	Tungsten pure	tungsteno 0.8 % ZR
1.6	70A ÷ 150A	50A ÷ 100A	70A ÷ 150A	30A ÷ 60A	50A ÷ 80A	20A ÷ 40A	30A ÷ 60A
2.4	150A ÷ 250A	100A ÷ 160A	140A ÷ 235A	60A ÷ 120A	80A ÷ 140A	40A ÷ 100A	60A ÷ 120A
3.2	200A ÷ 350A	150A ÷ 210A	225A ÷ 325A	80A ÷ 160A	100A ÷ 180A	60A - 140A	80A ÷ 160A
4	300A ÷ 400A	200A ÷ 275A	300A ÷ 400Å	100A ÷ 240A	150A ÷ 280A	80A ÷ 200A	150A ÷ 250A

5.2 ALUMINIUM TIG WELDING

- To achieve the best welding results, you must become familiar with all of the machine's functions
- Position selector (T) on A.C., selector (R) on (I) and selector (C) on (TIG). All other settings depend on the 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.

ELECTRODE PREPARATION FOR A.C. TIG WELDING



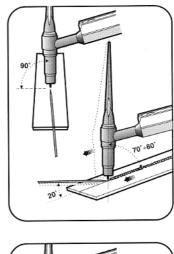
- The post-gas time in seconds (**REGULATED BY KNOB Q**) must be sufficient enough for the electrode to cool down. The electrode should have a bright, glowing tip during the cool down period.
- To adjust the balance of the square wave ,see letter (**U**), section 4.
- To preset working currents, see section 4.1.
- To select the welding programme, read letter (S) in section 4.
- The diameter of the filler material must be less than or

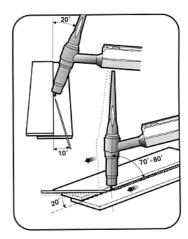
workpiece thickness is 40 Amp/mm. E.g.: a thickness of 2 mmx40 = 80 Amperes.

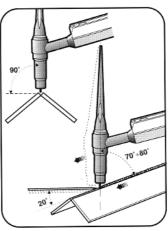
ATTENTION: THIS RATIO MAY VARY ACCORDING TO WORKPIECE SIZE AND IS ONLY MEANT TO BE AN APPROXIMATE GUIDELINE.

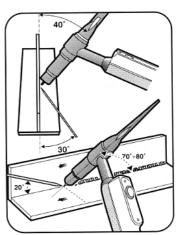
- The alumina (aluminium oxide) must be removed from the weld area to avoid aluminum oxide contamination and the risk of pile up, both typical weld defects when welding aluminum.
- The removal of the alumina layer can be done with mechanical brushes. The brush disc should consist of stainless steel wires. 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.

RECOMMENDED WELDING POSITIONS









5.3 D.C. TIG WELDING

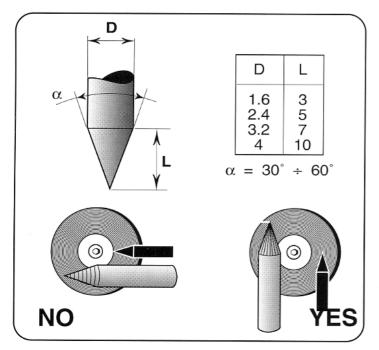
- Position Selector (T) on D.C.
- Position Selector (C) on
- The TIG torch must be connected to the neg. terminal(-).
- The ground cable must be connected to the positive terminal (+).
- Position Selector (R) on (I) if you wish to start the arc without touching the workpiece and on (0) if you wish to touch start the arc.
- To preset the welding current, read section 4.1.
- To select the welding programme, read letter (S) in section 4.
- The diameter of the filler material must be same as 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 steel; 80 Amp. per millimeter for copper.

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

5.3.1 Shielding gas

- •The most commonly used shieling 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.
- As regards weld currents that can be used with different sized electrodes, see table 1, section 5. The indications in this table also apply to D.C. TIG welding.
- If you are using helium gas, increase the flow rate (I/min) so as to obtain a ratio 10 times the size of the electrode (example: diam. 1.6x10 = 16 I./min. helium).
- Use protection lenses with shades D.I.N. 10 for up to 75A and D.I.N. 11 for 75A and above.
- •Proper elecotrode preparation is very important.

ELECTRODE PREPARATION FOR D.C. TIG WELDING



 2% thorium tungsten electrodes, D.I.N. color RED are recommened when D.C. TIG welding.

5.4 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).

6 MAINTENANCE

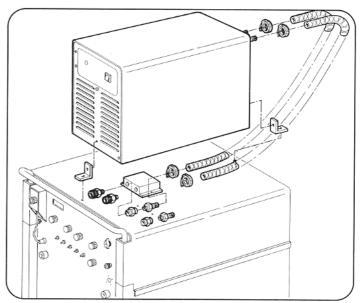
WARNING:

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 supply.
- 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.

7 ACCESSORIES

PART NO. 1332 COOLING UNIT



- This unit has to be secured and connected to the machine as shown in the figure. The input power cable is to be iserted into socket (X) on the rear of the machine.
- The safety cable has to be inserted into socket (Y) as well as to the socket on the cooling unit.
- Should any problems occur with the cooling unit, the machine stops welding and warning light (E) lights up on the machine's front panel.

PART NO. 1326 5-meter EXTENSION FOR REMOTE CONTROL

• The pulsed remote control Part no. 180 and remote control (B) may be detached from the machine and brought near the welding sight by means of this part.

PART NO. 180 PULSED REMOTE CONTROL

This is absolutely necessary when welding thin sheet metal with the TIG procedure. It is inserted into receptacle (A). When this accessory is used, knob (V) shall be positioned on the minimum value (anticlockwise).

PART NO. 182 FOOT CONTROL

This allows to regulate the current during welding. It cannot be used with the programme.

8 TROUBLESHOOTING GUIDE

Read this paragraph carefully.

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.,

REMEMBER Many problems are caused by improper positioning of the selectors on the machine's front panel. If you are sure that the selectors are in the correct position, then check 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.

8.1 ERRORS 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 (B) 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 line fuse blows.

CAUSES -Installed line power insufficient

-Machine not connected to the right supply voltage.

-Power transformer in short circuit

-S.C.R. diodes in short circuit

8.2 ERRORS IN THE TIG PROCEDURE

1- TROUBLE-High-frequency failure.

CAUSES - Check that the welding cables are not damaged

- Shielding gas missing

-Position selector (R) on (O)

-Position selector (C) on electrode

2- TROUBLE-The amperometer does not displayed the preselected current

CAUSES -Read the section on the preselection of working currents

-Defective amperometer

-Current regulation device (**B**) not inserted into receptacle (**A**)

-With Part no. 182 (foot control), the pedal should be pressed all the way down and the current should be regulated with the pedal MIN and MAX knobs.

3- TROUBLE-Difficulties in starting the arc in TIG

CAUSES -Shielding gas missing

-Regulation of the welding current too low

-Tungsten electrode contaminated. Restore

-Wrong selection of the tungsten electrode. Zirconium tungsten is suitable for A.C. and thorium tungsten is suitable for D.C.

-Defect in the torch push button

-Torch connector not inserted into receptacle(I)

-Electrode diameter too large for the current you are going to use for welding.

N.B. If the welder is connected to an automatic system, the ceramic nozzle should be connected to the work-piece ground by means of a 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. If you want to maintain the position selected with knob (**U**), increase the electrode diameter.

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

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

8.3 TROUBLE WITH THE ELECTRODE PROCEDURE

1- TROUBLE-The machine does not supply current.

CAUSES -Position selector (C) on

-Device (B) not inserted into receptacle (A).

-The thermostat has tripped, light (E) ON

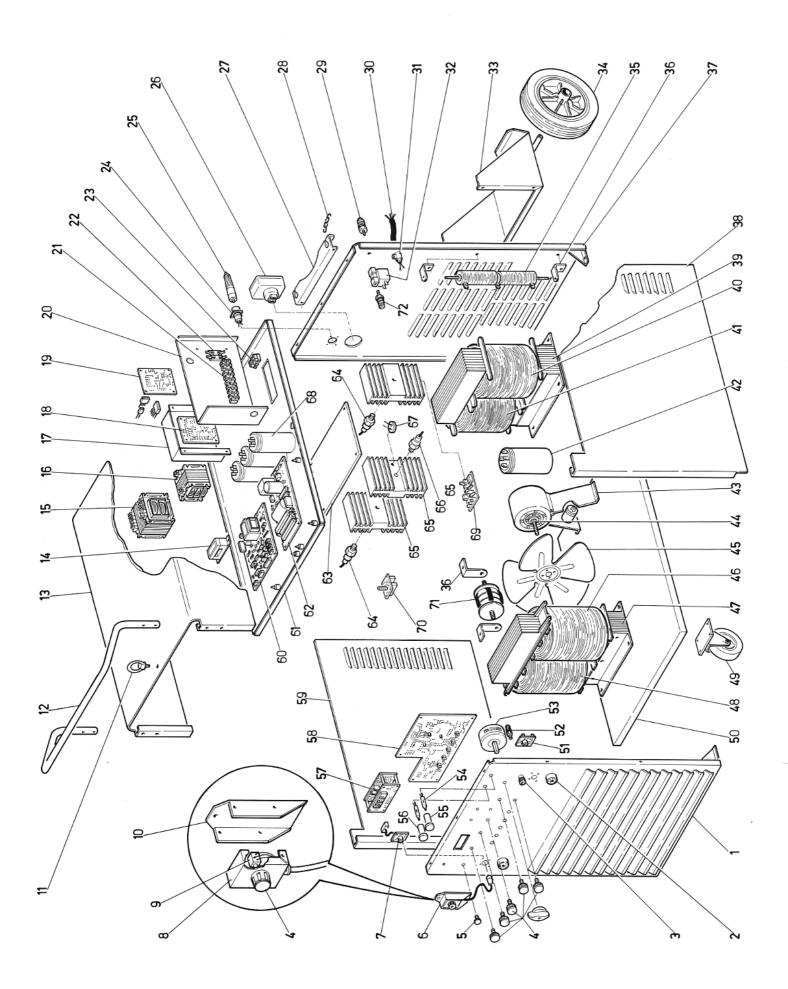
-Welding cables not connected.

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

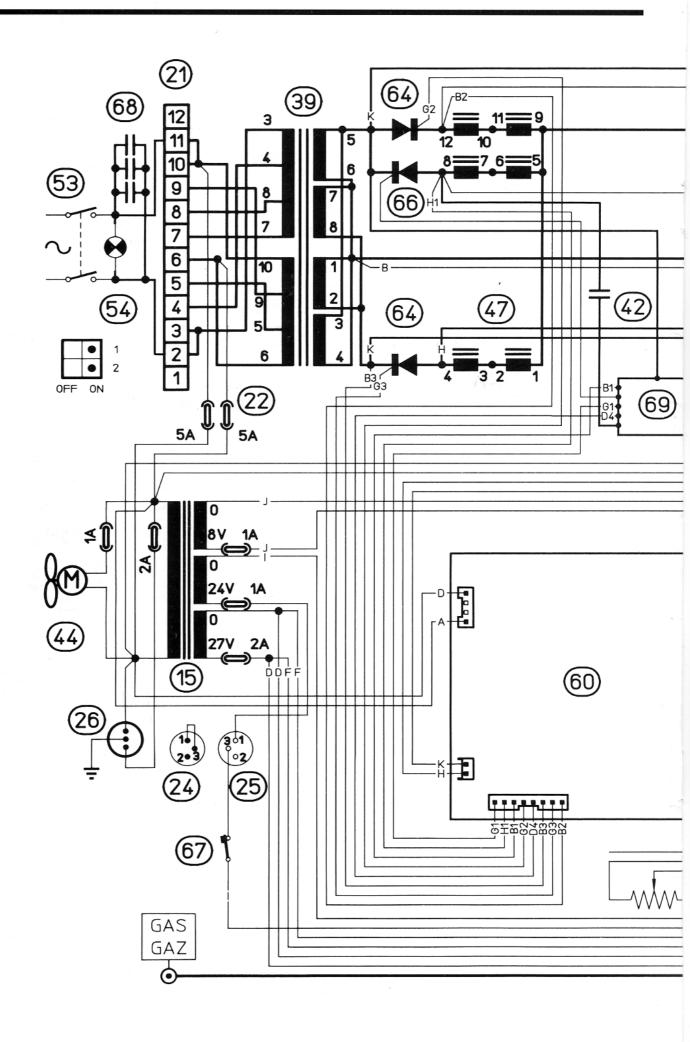
CAUSES Using basic electrodes:

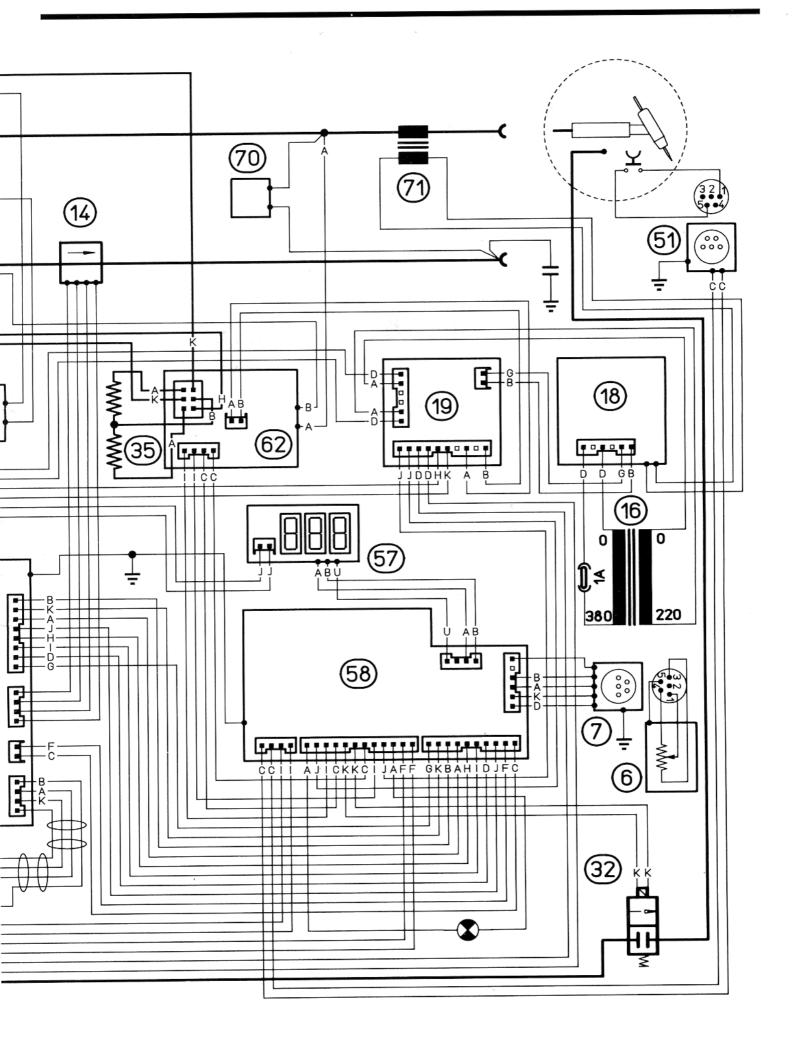
-Position selector (T) on A.C.

-The electrode holder is connected to the wrong polarity.



po	CODICE	DESCRIZIONE	DESCRIPTION	DESIGNATION	BESCHREIBUNG 6	DENOMINACION (
1		PANNELLO	PANEL	PANNEAU	PLATTE	PANEL
2		PRESA GIFAS	PLUG TYPE-GIFAS	BONDE DE TIPE GIFAS	GIFAS STECKER	TAPADOR GIFAS
3		RACCORDO	FITTING	RACCORD	VERBINDUNGSSTÜCK	ENPALME
4		MANOPOLA	KNOB	BOUTON	GRIFF	MANOPLA
5		VOLANTINO	HAND WHEEL	VOLANT	HAND RAD	VOLANTILLO
6		COMANDO A DISTANZA	REMOTE CONTROL	COMMANDE A DIST.	FERNSTEUERUNG STROMKREIS	MANDO DE DISTANCIA CIRCUITO DE CORRIEN.
7 8		CIRCUITO DI CORREN. FONDO	CURRENT CIRCUIT BOTTOM	CIRCUIT DE COURANT FOND	BODEN	FONDO
9		POTENZIOMETRO	POTENTIOMETER	POTENTIOMETER	POTENTIOMETER	POTENCIOMETRO
10		FASCIONE	HOUSING	CARCASSE	GEHÄUSE	ALOJAMENTO
11		GOLFARE	EYEBOLT	ANNEAU	OESENSCHRAUBE	BULÓN DE OJO
12		MANICO	HANDLE	POIGNEE	GRIFF	MANIJA
13		COPERCHIO	COVER	COVERCLE	DECKEL	TAPA
14		TRASDUTTORE	TRANSDUCER	TRANSDUCTEUR	GEBER	TRANSDUCTOR
15		TRASF. DI SERVIZIO	SERVICE TRANSFORM.	TRANSF. DE SERVICE	BEDIENUNGSTRASFOR.	TRANF. DE SERVICIO
16		TRASF. DI COMANDO	CONTROL TRANSFORM.	TRANS. DE COMMANDE	SEUERTRAFO	TRANF. DE MANDO
17 18		COPERCHIO CIRCUITO H.F.	COVER HIGH-FREQ. CIRCUIT	COVERCLE CIRCUIT HAUTE FREQU.	DECKEL HOCH-FREQ KREISLAUF	TAPA CIRCUITO H.F.
19		CIRC. COMANDO H.F.	HFREQ. CONT.CIRCUIT	CIRC, COM HFREQ.	HFREQ. STEUERKREIS	CIRC. MANDO H.F.
20		SUPPORTO	SUPPORT	SUPPORT	HALTERUNG	SOPORTE
21		MORSETTIERA	TERMINAL BOARD	BORNIER	KLEMMBRETT	CAJA DE BORNES
22		PORTA FUSIBILE	FUSE HOLDER	PORTE-FUSIBLE	SICHERUNGS SOCK	PORTA-FUSIBLE
23		MORSETTIERA	TERMINAL BOARD	BORNIER	KLEMMBRETT	CAJA DE BORNES
24		CONNETTORE FISSO	CONNECTOR	CONNECTEUR	VERBINDER	CONECTOR
25		CONNETTORE VOLANTE	CONNECTOR	CONNECTEUR	VERBINDER	CONECTOR
26		PRESA	CURRENT TAP	PRISE	STECKDOSE	TOMA
27		APPOGGIO BOMBOLA	BOTTLE SUPPORT	APPUI-BOUTEILLE	FLASCHENCALER	APOYO BOTELLA CADENA
28		CATENA	CHAIN	CHAINE RACCORD	KETTE VERBINDUNGSSTÜCK	ENPALME
29		RACCORDO CAVO RETE	FITTING MAINS CABLE	CABLE RESEAU	NETZ CABLE	CABLE RED
30		PRESSACAVO	STRAIN RELIEF	PRESSE-ETOUPE	KABELBEFESTIGUNG	PRENSA-CABLE
32		ELETTROVALVOLA	SOLENOID VALVE	SOUPAPE ELECTRI.	MAGNETVENTIL	ELECTROVALVULA
33		SUPPORTO BOMBOLA	BOTTLE HOLDER	SUPPORT	FLASCHENHALTER	SOPORTE BOTELLA
34		RUOTA	WHEEL	ROUE	RAD	RUEDA
35		RESISTENZA	RESISTANCE	RESISTANCE	WIDERSTAND	RESISTENCIA
36		SUPPORTO	SUPPORT	SUPPORT	HALTERUNG	SOPORTE
37		PANNELLO	PANEL	PANNEAU	PLATTE	PANEL
38		PANNELLO	PANEL	PANNEAU	PLATTE	PANEL
39		TRASFORMATORE	TRANSFORMER	TRANSFORMATEUR ENROULEMENT	TRANSFORMATOR WICKLUNG	TRANSFORMADOR . ENROLLAMIENTO
40		AVVOLGIMENTO AVVOLGIMENTO	WINDING	ENROULEMENT	WICKLUNG	ENROLLAMIENTO
41		CONDENSATORE	CAPACITOR	CONDENSATEUR	KONDENSATOR	CONDENSADOR
43		SUPPORTO	SUPPORT	SUPPORT	HALTERUNG	SOPORTE
44		MOTORE	MOTOR	MOTEUR	MOTOR	MOTOR
45		VENTOLA	FAN	VENTILATEUR	LÜFTERRAD	VENTILADOR
46		AVVOLGIMENTO	WINDING	ENROULEMENT	WICKLUNG	ENROLLAMIENTO
47		IMPEDENZA	IMPEDANCE	IMPEDANCE	IMPEDANZ	IMPEDANCIA
48		AVVOLGIMENTO	WINDING	ENROULEMENT	WICKLUNG	ENROLLAMIENTO RUEDA PIVOTANTE
49		RUOTA PIROETTANTE	SWIVELING WHEEL	ROUE PIVOTANTE	LENKRAD BODEN	FONDO
50		FONDO	BOTTOM	FOND CIRCUIT TORCHE	BRENNERKREIS	CIRCUITO ANTORCHA
51		CIRCUITO TORCIA RACCORDO	TORCH CIRCUIT FITTING	RACCORD	VERBINDUNGSSTÜCK	ENPALME
52 53		INTERRUTTORE	SWITCH	INTERRUPTEUR	SCHALTER	INTERRUPTOR
54		LAMPADA	LAMP	LAMPE	LAMPE	LAMPARA
55		PORTALAMPADA	LAMP HOLDER	PORTE LAMPE	LAMPEN FASSUNG	PORTA LAMPARE
56		PORTALAMPADA	LAMP HOLDER	PORTE LAMPE	LAMPEN FASSUNG	PORTA LAMPARE
57		AMPEROMETRO	AMMETÉR	AMPEREMETRE	AMPEREMETER	AMPERIMETRO
58		CIRCUITO SERVIZI	SERVICE CIRCUIT	CIRCUIT SERVICES	STEUERPLATINE	CIRCUITO SERVICIO
59		PANNELLO	PANEL	PANNEAU	PLATTE	PANEL
60		CIRC. DI CONTROLLO	CONTROL CIRCUIT	CIRCUIT DE CONTRÔLE	KONTROLLKREISLUF	CIRCUITO CONTROL
61		PIANO INTERMEDIO	INTERMED. PLANE	PLAN INTERMEDIAIRE	MITTLE PLATTE GRUNDSTROMKREIS	PLANO INTERMEDIO CIRC. CORR. DE BASE
62		CIRC. CORR. DI BASE SUPPORTO	BASE CURR. CIRCUIT SUPPORT	CIRC. COUR. DE BASE SUPPORT	HALTERUNG	SOPORTE
64		S.C.R.	S.C.R.	S.C.R.	S.C.R.	S.C.R.
-65		RADIATORE	RADIATOR	RADIATEUR	RADIATOR	RADIADOR
66		S.C.R.	S.C.R.	S.C.R.	S.C.R.	S.C.R.
67		TERMOSTATO	THERMOSTAT	THERMOSTAT	THERMOWÄCHTER	TERMOSTATO
68		CONDENSATORE	CAPACITOR	CONDENSATEUR	KONDENSATOR	CONDENSADOR
69		CIRCUITO SPEGNIMENT.	FILTER CIRCUIT	CIRCUITO	KREIS	CIRCUITO
70		CIRCUITO FILTRO	CIRCUIT	CIRCUIT FILTRE	FILTERZYCLUS	CIRCUITO FILTRO
71		TRAS. ALTA TENSIONE	HIGH-VOLTAGE TRANS.	TRANS. HAUTE TENS.	HOCH-SPANN.TRANS.	TRANS. ALTA TENSION
72		RACCORDO	FITTING	RACCORD	VERBINDUNGSSTÜCK	ENPALME El pedido de las piezas de
		La richiesta dei pezzi di ricambio deve indicare sempre il numero di articolo, la posizione, la quantità e la data di acquisto.	When ordering spare parts, alwais state the following: machine part number, item position number, the quantity and the machine serial number.	La demande de pièces de rechange doit toujours indiquer le numéro de l'article, la position ,la quantité et la date d'achat.	Bei Bestellungen von Ersatzteilen geben Sie bitte immer: die Artikel die Ersatzteilpositinnummer diebenoetigte Anzahl der Ersatzteille und Kaufdatum des Gerates an.	El pedido de las piezas de repuesto debe indicar siempre el número de articulo, la posiciòn, la cantidad y la fecha de la adquisiciòn.





	CODIFICA COLORI CABLAGGIO ELETTRICO	COLOURS CODING WIRING DIAGRAM	FARBEN- CODIERUNG ELEKTRISCHE SCHALTPLAN	CODIFICATION COULEURS SCHEMA ELECTRIQUE	CODIFICACION COLORES CABLAJE ELECTRICO
Α	NERO	BLACK	SCHWARZ	NOIR	NEGRO
В	ROSSO	RED	ROT	ROUGE	ROJO
C	GRIGIO	GREY	GRAU	GRIS	GRIS
D	BIANCO	WHITE	WEISS	BLANC	BLANCO
E	VERDE	GREEN	GRUEN	VERT	VERDE
_F	VIOLA	VIOLET	VIOLETT	VIOLET	VIOLA
G	GIALLO	YELLOW	GELB	JAUNE	AMARILLO
H	BLU	BLUE	BLAU	BLEU	AZUL
LK_	MARRONE	BROWN	BRAUN	MARRON	BRUNO
J	ARANCIO	ORANGE	ORANGE	ORANGE	NARANJO
	ROSA	PINK	ROSA	ROSE	ROSA
L	ROSA-NERO	PINK-BLACK	ROSA-SCHWARZ	ROSE-NOIR	ROSA-NEGRO
M	GRIGIO-VIOLA	GREY-VIOLET	GRAU-VIOLETT	GRIS-VIOLET	GRIS-VIOLA
N	BIANCO-VIOLA	WHITE-VIOLET	WEISS-VIOLETT	BLANC-VIOLET	BLANCO-VIOLA
0	BIANCO-NERO	WHITE-BLACK	WEISS-SCHWARZ	BLANC-NOIR	BLANCO-NEGRO
P	GRIGIO-BLU	GREI-BLUE	GRAU-BLAU	GRIS-BLEU	GRIS-AZUL
Q	BIANCO-ROSSO	WHITE-RED	WEISS-ROT	BLANC-ROUGE	BLANCO-ROJO
R	GRIGIO-ROSSO	GREY-RED	GRAU-ROT	GRIS-ROUGE	GRIS-ROJO
S	BIANCO-BLU	WHITE-BLEU	WEISS-BLAU	BLANC-BLEU	BLANCO-AZUL
L_T	NERO-BLU	BLACK-BLUE	SCHWARZ-BLAU	NOIR-BLEU	NEGRO-AZUL