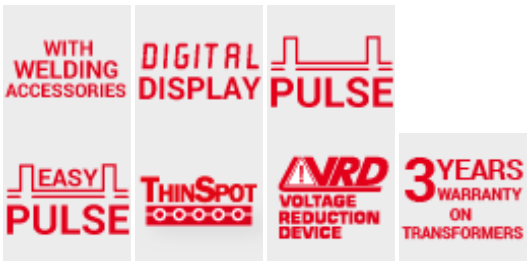
Сварочный аппарат SUPERIOR TIG 311 DC-HF/LIFT 400V +ACC



Сварочный аппарат SUPERIOR TIG 311 DC-HF/LIFT 400V +ACC – предназначен для аргоно-дуговой сварки (TIG, PULSE TIG) с бесконтактным (HF) и контактным (LIFT) поджигом дуги на постоянном токе (DC) и ручной дуговой сварки (MMA).

Аппарат применяют для сварки различных материалов, таких как: сталь, нержавеющая сталь, титан, медь, никель и их сплавы. Укомплектован принадлежностями для сварки TIG.

Преимущества:

- Передовая, высокопроизводительная инверторная технология
- Поддерживает сварочный ток даже при нестабильном напряжении сети (колебания напряжения сети ±15%);
- Возможность импульсной сварки
- Большое количество настроек режимов для TIG сварки.
- Регулируемые функции arc force (форсаж дуги) и hot start (горячий старт) для сварки MMA.
- Устройство VRD
- Термическая защита, защита от перенапряжения, низкого напряжения, перегрузки по току;
- Возможность работы от генератора.
- Укомплектован сварочными аксессуарами
- Родина бренда, страна-изготовитель: Италия

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Технические характеристики

Параметр	Ед. изм.	Значение
Сварочный ток	А	10-300
ПН (на 40°С) при максимальном сварочном токе	%	30
Напряжение холостого хода	В	64
Потребляемая мощность	кВт	6,3 - 9,2
Напряжение питания	В	400
Диаметр электродов	мм	1,6-5,0
Масса	кг	18
Габаритные размеры ДхШхВ	мм	470х190х355
Степень защиты		IP23
Тип		профессиональный

В комплекте:

- Горелка ST26, 4м, код 742614
- Регулятор расхода газа код 722119
- Массовый зажим DX50 3 м

precise adjustment, result in excellent quality welds.
The inverter system of regulation at the power supply input (primary) also leads to a drastic decrease in the volume of both the transformer and the levelling reactance so that it is possible to build a considerably smaller, lighter welding machine, highlighting its advantages of easy handling and transport.

2.2 OPTIONAL ACCESSORIES
- Argon bottle adapter.
- Welding current return cable complete with earth clamp.
- Manual remote control with 1 potentiometer.
- Manual remote control with 2 potentiometers.
- Pedal remote control.
- MMA welding kit.
- TIG welding kit.
- Self-darkening mask: with fixed or adjustable filter.
- Gas connector and pipe for hook-up with Argon bottle.
- Pressure reducing valve with gauge.
- Torch for TIG welding.
- TIG torch with potentiometer.
- G.R.A. 4500 water cooling unit.
- ARCTIC Trolley.

3. TECHNICAL DATA
3.1 DATA PLATE (FIG. A)
The most important data regarding use and performance of the welding machine are summarised on the rating plate and have the following meaning:
1- Protection rating of the covering.
2- Symbol for power supply line:
   1~: single phase alternating voltage;
   3~: three phase alternating voltage.
3- Symbol **S** : indicates that welding operations may be carried out in environments with heightened risk of electric shock (e.g. very close to large metallic volumes).
4- Symbol for welding procedure provided.
5- Symbol for internal structure of the welding machine.
6- EUROPEAN standard of reference, for safety and construction of arc welding machines.
7- Manufacturer's serial number for welding machine identification (indispensable for technical assistance, requesting spare parts, discovering product origin).
8- Performance of the welding circuit:
   - **U_0 :** maximum no-load voltage (open welding circuit).
   - **I_2/U_2 :** current and corresponding normalised voltage that the welding machine can supply during welding.
   - **X :** Duty cycle: indicates the time for which the welding machine can supply the corresponding current (same column). It is expressed as %, based on a 10 minutes cycle (e.g. 60% = 6 minutes working, 4 minutes pause, and so on).
     If the usage factors (on the plate, referring to a 40°C environment) are exceeded, the thermal safeguard will trigger (the welding machine will remain in standby until its temperature returns within the allowed limits).
   - **A/V-A/V :** shows the range of adjustment for the welding current (minimum maximum) at the corresponding arc voltage.
9- Technical specifications for power supply line:
   - **U_1 :** Alternating voltage and power supply frequency of welding machine (allowed limit ±10%).
   - **$I_{1\,max}$:** Maximum current absorbed by the line.
   - **$I_{1\,eff}$:** Effective current supplied.
10- ⎓ : Size of delayed action fuses to be used to protect the power line.
11- Symbols referring to safety regulations, whose meaning is given in chapter 1 "General safety considerations for arc welding".

Note: The data plate shown above is an example to give the meaning of the symbols and numbers; the exact values of technical data for the welding machine in your possession must be checked directly on the data plate of the welding machine itself.

3.2 OTHER TECHNICAL DATA
- WELDING MACHINE: see table 1 (TAB.1).
- TORCH: see table 2 (TAB.2).
The welding machine weight is shown in table 1 (TAB. 1).

4. DESCRIPTION OF THE WELDING MACHINE
4.1 BLOCK DIAGRAM
The welding machine consists basically of power and control modules made on PCB's and optimised to achieve perfect reliability and reduced maintenance.
This welding machine is controlled by a microprocessor that allows a large number of parameter settings so as to achieve perfect welding in any condition and with any material. However, to make the best use of its properties it is necessary to be fully aware of its possibilities.

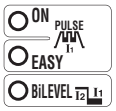
Description (FIG. B)
1- Three-phase power supply input, rectifier unit and levelling capacitors.
2- Transistor (IGBT) switching bridge and drivers; commutes the rectified power supply voltage to high frequency alternating voltage and adjusts the power according to the required welding current/voltage.
3- High frequency transformer; the voltage converted by block 2 powers the primary winding; its function is to adjust the voltage and current to the values needed for the arc welding procedure and at the same time to form galvanic separation of the welding circuit from the power supply line.
4- Secondary rectifier bridge with levelling inductance; commutes the alternating voltage / current supplied by the secondary winding into very low ripple direct current / voltage.
5- Transistor (IGBT) switching bridge and drivers; transforms the secondary output current from DC to AC for TIG AC welding (if present).
6- Control and adjustment electronics; controls the welding current value instantaneously and compares it with the operator's setting; modulates the control impulses from the IGBT drivers that make the adjustment.
7- Welding machine operation control logic; sets the welding cycles, controls the actuators, supervises the safety systems.
8- Settings panel and display of parameters and operating modes.
9- HF strike generator (if present).
10- Protective gas solenoid valve EV (if present).
11- Welding machine cooling fan.
12- Remote control.

4.2 CONTROL, ADJUSTMENT AND CONNECTING DEVICES
4.2.1 Rear panel (FIG. C)
1- Main switch O/OFF - I/ON.
2- Power cable (2 P + T (Single-phase)), (3 P + T (Three-phase)).
3- Coupler for connecting the gas hose (bottle - welding machine pressure reducer) (if present).
4- Fuse (if present).
5- Connector for water cooling unit (if present).
6- Connector for remote control:
   Three different types of remote control can be connected to the welding machine using the relative 14-pole connector at the back. Each device is recognised automatically and can be used to adjust these parameters:
   - **Remote control with one potentiometer:**
     rotating the potentiometer knob varies the main current from minimum to maximum. The main current can only be adjusted with the remote control.
   - **Pedal remote control:**
     the current value is determined by the position of the pedal. When in the TIG 2 STROKE mode, pressing the pedal starts the machine instead of pressing the torch push-button (if present).
   - **Remote control with two potentiometers:**
     the first potentiometer adjusts the main current. the second potentiometer adjusts another parameter that depends on the welding mode being used. Rotating this potentiometer displays the parameter being varied (which can no longer be controlled using the panel knob). The meaning of the second potentiometer is: ARC FORCE if in the MMA mode and END SLOPE if in the TIG mode.
   - **TIG torch with potentiometer.**

⚠ **It is obligatory to use a 5-pole torch adapter for any TIG TORCH with an on-board adjustment potentiometer in order to protect the welding machine from internal breakage.**

4.2.2 Front panel FIG. D
1- Positive (+) fast coupling for connecting the welding cable.
2- Negative (-) fast coupling for connecting the welding cable.
3- Connector for connecting the torch push-button.
4- Coupler for connecting the TIG torch gas hose.
5- Control panel.
6- Welding mode selection push-buttons:

6a PULSE - PULSE EASY - BiLEVEL

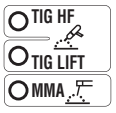


When in the TIG mode, you can choose between pulsed (ON PULSE), automatic pulse (EASY PULSE), and Bi-LEVEL. None of these processes is active if the LED is off.
PULSE: manual pulse mode where the following parameters can be set: MAIN CURRENT (I_2), BASE CURRENT (I_1), PULSE FREQUENCY AND BALANCE.
EASY PULSE automatic pulsed mode where only the MAIN CURRENT (I_2) needs to be set. The other parameters, BASE CURRENT (I_1), PULSE FREQUENCY and BALANCE, are adjusted automatically according to the preset values (I_1 = 70% I_2, FREQUENCY = 2Hz, BALANCE = 0). These values can be modified.
The PULSE and EASY PULSE modes are indicated for welding thin material.
Note: "G.R.A. SETTING":
G.R.A. ON: Operation with G.R.A. management enabled.
G.R.A. OFF: Operation with G.R.A. management disabled, DEFAULT setting.
This specific machine setting can be accessed by holding the right push-button (6a) down during the switching on and initial test phase (phase that follows the switching off of the main switch).

6b 2T - 4T - SPOT

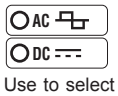
When in the TIG mode, use to select either 2 stroke, 4 stroke or timed spot welding.

6c TIG - MMA



Operation mode: welding with coated electrode (MMA), TIG welding with high frequency arc striking (TIG HF) and TIG welding with arc striking upon contact (TIG LIFT).

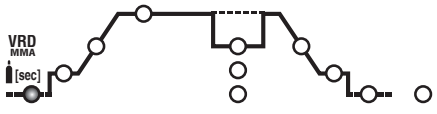
6d AC/DC



Use to select between direct current welding and alternate current welding when in the TIG mode (only present in AC/DC models).

7- Welding parameters that can be adjusted using the encoder knob (9), associated with the previous setting of 6a, 6b, 6c, 6d.
To set each parameter:
a) select the parameter to be adjusted (by pressing the knob (9)), which is indicated by the corresponding lit LED;
b) rotate the knob (9) and set the required value;
c) press the knob (9) again to adjust the next parameter.
N.B.: The parameters can be set as desired by the operator. There are, however, value combinations that do not have a practical meaning for welding; in this case the welding machine may not operate correctly.

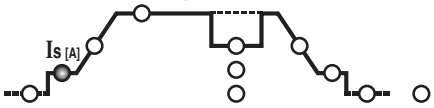
7a PRE-GAS / VRD MMA



This is the PRE-GAS time in seconds (adjustment from 0 - 5 seconds) when

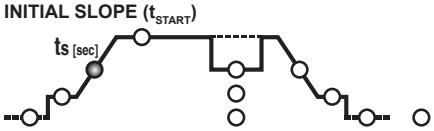
in the TIG/HF mode. Improves welding starting.
When in the MMA mode, use to insert the Voltage Reduction Device "VRD" .

7b INITIAL CURRENT (I_{START})



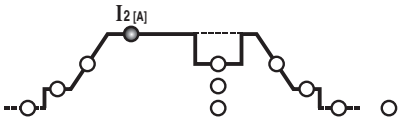
When in the TIG 2 stroke and SPOT modes it represents the initial current I_S that is maintained for a fixed time with the torch push-button pressed (adjustment in Amperes).
When in the TIG 4 stroke mode, it represents the initial current I_S that is maintained for the whole time during which the torch push-button is pressed (adjustment in Amperes).
When in the MMA mode, it represents the "HOT START" dynamic overcurrent (adjustment 0 ÷ 100%). With indication on the display of the percentage increase as to the pre-selected welding current value. This adjustment improves welding fluidity.

7c INITIAL SLOPE (t_{START})



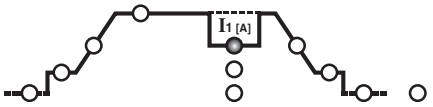
When in the TIG mode this is the initial slope time of the current (from I_S to I_2) (adjustment 0.1 ÷ 10 s). When at OFF there is no ramp.
The I_{START} and t_{START} parameters can be used even with remote commands given from the pedal, but the adjustment must be made before activating the command.

7d MAIN CURRENT (I_2)



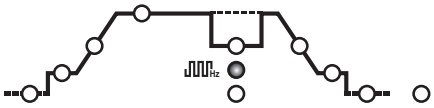
In the TIG AC/DC or in the MMA mode, I_2 is the output current; in the PULSED and BI-LEVEL mode I_2 is the maximum current. The parameter is measured in Amperes.

7e BASE CURRENT - ARC FORCE



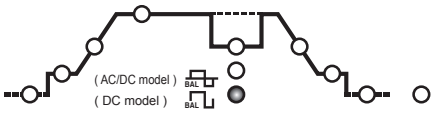
When in the TIG 4 stroke, Bi-LEVEL and PULSED mode, I_1 is the current value that can be alternated with the main one, I_2, during welding. The value is measured in Amperes.
When in the MMA mode, this is the dynamic "ARC-FORCE" overcurrent (adjustment 0 ÷ 100%); the display shows the percentage increase as to the value of the pre-selected welding current. This adjustment improves welding fluidity and stops the electrode from sticking to the workpiece.

7f FREQUENCY



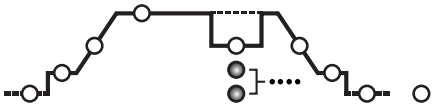
This is the pulse frequency when in the TIG PULSED mode. For AC/DC models in the TIG AC mode (with pulsing disabled), it is the frequency of the welding current.

7g BALANCE



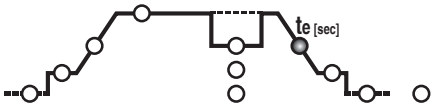
When in the TIG PULSED mode, this is the ratio (as a percentage) between the time during which the current is at its highest level (main welding current) and the total pulse period. In addition, when the AC/DC models are in the TIG AC mode (with pulsation disabled), the parameter represents a ratio between the time with positive current and the time with negative current: if the parameter value is negative heating and workpiece penetration increase, if the parameter value is positive surface cleaning is greater and electrode heat increases, while if the parameter value is null there is balance between the negative and positive currents during the AC frequency period. **(TAB. 4)**.

7h SPOT TIME



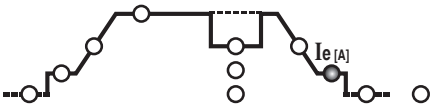
When in the TIG (SPOT) mode it represents the welding duration (adjustment 0.1 ÷ 10 s).

7k END SLOPE (t_{END})



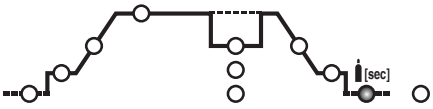
When in the TIG mode it represents the end slope time of the current (from I_S to I_2) (adjustment 0.1 ÷ 10 s). When at OFF there is no ramp.

7l END CURRENT (I_{END})



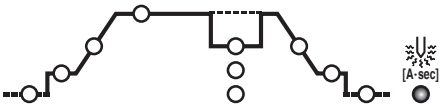
When in the TIG 2 stroke mode it represents the end current I_S but only if the END RAMP (7k) has been set at a value higher than zero (> 0.1 s).
When in the TIG 4 stroke mode it represents the end current I_e for the whole time during which the torch push-button is pressed.
The sizes are expressed in Amperes.

7m POSTGAS



When in the TIG mode, it represents the POSTGAS time in seconds (adjustment 0.1 - 10 s), and protects electrodes and pool welding from oxidation.

7n ELECTRODE PREHEATING



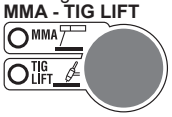
When in the TIG AC mode, this adjusts electrode preheating to make welding starting easier (adjustment 2.6 ÷ 53 A·sec.). The higher the value set, the higher the preheating energy. When at OFF there is no preheating.

8- REMOTE CONTROL LED. Used to transfer control of the welding parameters to the remote control.
9- Parameter setting (7) encoder knob and parameter selection key (7).
10- Alphanumeric display.
11- Green LED, power on.
12- ALARM signalling LED (the machine is blocked).
Resetting is automatic when the reason for alarm activation stops.
Alarm messages shown on the display (10) FIG. D:
- "**AL.1**" : the primary circuit safety thermal switch has been triggered (if installed).
- "**AL.2**" : general protection has been triggered (thermal switch or network overvoltage or network undervoltage).
- "**AL.9**" : protection triggered due to malfunction of the torch water cooling circuit. Resetting is not automatic.

When the welding machine is switched off, the signal "**AL.2**" may appear for a few seconds.

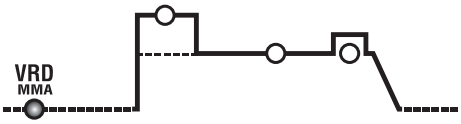
4.2.3 Front panel (FIG. D1)

1- Positive (+) fast coupling for connecting the welding cable.
2- Negative (-) fast coupling for connecting the welding cable.
3- Control panel.
4- Welding mode selection push-button:
MMA - TIG LIFT



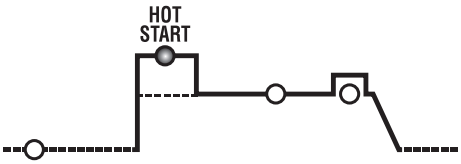
Operation mode: welding with coated electrode (MMA), TIG welding with arc strike upon contact (TIG LIFT).
5- Welding parameters that can be adjusted using the encoder knob (6), associated with the previous setting of 4.
To set each parameter:
a) select the parameter to be adjusted (by pressing the knob (6)), which is indicated by the corresponding lit LED.
b) rotate the knob (6) and set the required value.
c) press the knob (6) again to adjust the next parameter.
NB: The parameters can be set as desired by the operator. There are, however, value combinations that do not have a practical meaning for welding; in this case the welding machine may not operate correctly.

5a VRD MMA



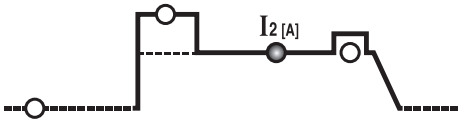
When in the MMA mode, it allows to insert the Voltage Reduction Device "VRD".

5b HOT START



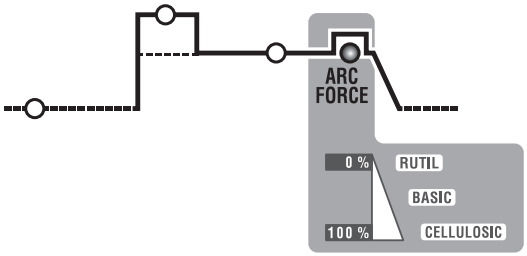
When in the MMA mode, it represents the "HOT START" dynamic overcurrent (adjustment 0 ÷ 100%). With indication on the display of the percentage increase as to the pre-selected welding current value. This adjustment improves welding fluidity.

5c MAIN CURRENT (I_2)



When in TIG mode, MMA represents the output current I_2. The parameter is measured in Amperes.

5d ARC FORCE



When in the MMA mode, this is the dynamic "ARC-FORCE" overcurrent (adjustment 0 ÷ 100%); the display shows the percentage increase as to the value of the pre-selected welding current. This setting improves welding fluidity and prevents the electrode from sticking to the metal piece.

6- Parameter setting (5) encoder knob and parameter selection key (5).
7- Alphanumeric display.
8- REMOTE CONTROL LED. Used to transfer control of the welding parameters to the remote control.
9- ALARM signalling LED (the machine is blocked).
Resetting is automatic when the reason for alarm activation stops.
Alarm messages shown on the display (7) FIG. D1:
- "**AL. 1**" : the primary circuit protection thermal switch has been triggered (if installed).
- "**AL. 2**" : the secondary circuit protection thermal switch has been triggered
- "**AL. 3**" : power line overvoltage protection has been triggered
- "**AL. 4**" : power line undervoltage protection has been triggered
- "**AL. 8**" : auxiliary voltage out of range

10- Green LED, power ON.

4.3 G.R.A. water cooling unit ENABLING and DISABLING instructions (where applicable)
Enabling procedure:
1- Press the main switch (1) simultaneously with the right button on the front panel (6a) to turn the machine on.
2- The code "G.r.a - OFF" will appear on the display after the machine is turned on (factory settings: cooling unit disabled).
3- Turn the encoder knob (9) until the code "G.r.a - on" appears on the display.
4- Press the encoder button (9) once to confirm the selection.
The cooling unit is now enabled.

Disabling procedure:
Repeat the same sequence confirming the code "G.r.a. - OFF" to disable the unit.

NB: If the welding machine is set to "G.r.a. - on" mode, but no cooling unit has been connected, the cooling circuit malfunction protection will be triggered after a couple of seconds of operation (code "AL.9").

5. INSTALLATION

WARNING! CARRY OUT ALL INSTALLATION OPERATIONS AND ELECTRICAL CONNECTIONS WITH THE WELDING MACHINE COMPLETELY SWITCHED OFF AND DISCONNECTED FROM THE POWER SUPPLY OUTLET. THE ELECTRICAL CONNECTIONS MUST BE MADE ONLY AND EXCLUSIVELY BY AUTHORISED OR QUALIFIED PERSONNEL.

5.1 PREPARATION
Unpack the welding machine, assemble the separate parts contained in the package.

5.1.1 Assembling the return cable-clamp (FIG. E)

5.1.2 Assembling the welding cable-electrode holder clamp (FIG. E)

5.2 POSITION OF THE WELDING MACHINE
Choose the place to install the welding machine so that the cooling air inlets and outlets are not obstructed (forced circulation by fan, if present); at the same time make sure that conductive dusts, corrosive vapours, humidity etc. will not be sucked into the machine.
Leave at least 250mm free space around the welding machine.

WARNING! Position the welding machine on a flat surface with sufficient carrying capacity for its weight, to prevent it from tipping or moving hazardously.

5.3 CONNECTION TO THE MAIN POWER SUPPLY
- Before making any electrical connection, make sure the rating data of the welding machine correspond to the mains voltage and frequency available at the place of installation.
- The welding machine should only be connected to a power supply system with the neutral conductor connected to earth.
- To ensure protection against indirect contact use residual current devices of the following types:
  - Type A ( ) for single phase machines;
  - Type B ( ) for 3-phase machines.
- In order to satisfy the requirements of the EN 61000-3-11 (Flicker) standard we recommend connecting the welding machine to the interface points of the main power supply that have an impedance of less than:
  Zmax = 0.234 Ohm (3P+T 230V)
  Zmax = 0.286 Ohm (3P+T 400V)
  Zmax = 0.234 Ohm (1/N/PE 230V) 200A AC/DC
  Zmax = 0.218 Ohm (1/N/PE 230V) 220A DC
- The IEC/EN 61000-3-12 Standard does not apply to the welding machine.
  If the welding machine is connected to an electrical grid, the installer or user must make sure that the machine can indeed be connected (if necessary, consult the company that manages the electrical grid).

5.3.1 Plug and outlet
Connect a normalised plug (2P + P.E) (1~); (3P + P.E) (3~) - having sufficient capacity- to the power cable and prepare a mains outlet fitted with fuses or an automatic circuit-breaker; the special earth terminal should be connected to the earth conductor (yellow-green) of the power supply line. Table **(TAB.1)** shows the recommended delayed fuse sizes in amps, chosen according to the max. nominal current supplied by the welding machine, and the nominal voltage of the main power supply.

WARNING! Failure to observe the above rules will make the (Class 1) safety system installed by the manufacturer ineffective with consequent serious risks to persons (e.g. electric shock) and objects (e.g. fire).

5.4 CONNECTION OF THE WELDING CABLES

WARNING! BEFORE MAKING THE FOLLOWING CONNECTIONS MAKE SURE THE WELDING MACHINE IS SWITCHED OFF AND DISCONNECTED FROM THE POWER SUPPLY OUTLET.
Table **(TAB. 1)** gives the recommended values for the welding cables (in mm^2) depending on the maximum current supplied by the welding machine.

5.4.1 TIG welding
Connecting the torch
- Insert the torch current cable into the appropriate quick terminal (-)/~. Connect the three-pin connector (torch button) to the appropriate socket. Connect the torch gas pipe to the appropriate connector.

Connecting the welding current return cable
- This is connected to the piece to be welded or to the metal bench on which it rests, as close as possible to the joint being made.
  This cable is connected to the terminal with the (+) symbol (~ for TIG machines designed for AC welding).

Connecting the gas bottle
- Screw the pressure reducing valve to the gas bottle valve, first inserting the special reduction accessory supplied when argon gas is used.
- Connect the gas inflow hose to the pressure reducing valve and tighten the hose clamp supplied.
- Loosen the ringnut for adjusting the pressure reducing valve before opening the valve on the bottle.
- Open the valve on the bottle and adjust the quantity of gas (l/min) according to the suggestions for use given in the table **(TAB. 4)**; if it is necessary to adjust the gas flow during welding this should always be done by adjusting the ring nut on the pressure reduction valve. Make sure there are no leaks in the piping and connectors.
  WARNING! Always close the gas bottle valve at the end of the job.

5.4.2 MMA WELDING
Almost all coated electrodes are connected to the positive pole (+) of the power source; as an exception to the negative pole (-) for acid coated electrodes.
Connecting the electrode-holder clamp welding cable
On the end take a special terminal that is used to close the uncovered part of the electrode.
This cable is connected to the terminal with the symbol (+)
Connecting the welding current return cable
This is connected to the piece being welded or to the metal bench supporting it, as close as possible to the join being made.
This cable is connected to the terminal with the symbol (-)
Warnings:
- Turn the welding cable connectors right down into the quick connections (if present), to ensure a perfect electrical contact; otherwise the connectors themselves will overheat, resulting in their rapid deterioration and loss of efficiency.
- The welding cables should be as short as possible.
- Do not use metal structures which are not part of the workpiece to substitute the return cable of the welding current: this could jeopardise safety and result in poor welding.

6. WELDING: DESCRIPTION OF THE PROCEDURE
6.1 TIG WELDING
TIG welding is a welding procedure that exploits the heat produced by the electric arc that is struck, and maintained, between a non-consumable electrode (tungsten) and the piece to be welded. The tungsten electrode is supported by a torch suitable for transmitting the welding current to it and protecting the electrode itself and the weld pool from atmospheric oxidation, by the flow of an inert gas (usually argon: Ar 99.5) which flows out of the ceramic nozzle **(FIG. G)**.
To achieve a good weld it is absolutely necessary to use the exact electrode diameter with the exact current, see the table **(TAB. 3).**
The electrode usually protrudes from the ceramic nozzle by 2-3mm, but this may reach 8mm for corner welding.
Welding is achieved by fusion of the edges of the joint. For properly prepared thin pieces (up to about 1mm) weld material is not needed **(FIG. H)**.
For thicker pieces it is necessary to use filler rods of the same composition as the base material and with an appropriate diameter, preparing the edges correctly **(FIG. I)**. To achieve a good weld the pieces should be carefully cleaned and free of oxidation, oil, grease, solvents etc.

6.1.1 HF and LIFT strike
HF strike:
The electric arc is struck without contact between the tungsten electrode and the piece being welded, by means of a spark generated by a high frequency device. This strike mode does not entail either tungsten inclusions in the weld pool or electrode wear and gives an easy start in all welding positions.
Procedure:
Press the torch button, bringing the tip of the electrode close to the piece (2 -3mm), wait for the arc strike transferred by the HF pulses and, when the arch has struck, form the weld pool on the piece and proceed along the joint.
If there are difficulties in striking the arc even though the presence of gas is confirmed and the HF discharges are visible, do not insist for long in subjecting the electrode to HF action, but check the integrity of the surface and the shape of the tip, dressing it on the grinding wheel if necessary. At the end of the cycle the current will fall at the slope down setting.
LIFT strike:
The electric arc is struck by moving the tungsten electrode away from the piece to be welded. This strike mode causes less electrical-radiation disturbance and reduces

tungsten inclusions and electrode wear to a minimum.
Procedure:
Place the tip of the electrode on the piece, using gentle pressure. Press the torch button right down and lift the electrode 2-3mm with a few moments' delay, thus striking the arc. Initially the welding machine supplies a current I_{LIFT} , after a few moments the welding current setting will be supplied. At the end of the cycle the current will fall to zero at the slope down setting.

6.1.2 TIG DC welding
TIG DC welding is suitable for all low- and high-carbon steels and the heavy metals, copper, nickel, titanium and their alloys.
For TIG DC welding with the electrode to the (-) terminal the electrode with 2% thorium (red band) is usually used or else the electrode with 2% cerium (grey band).
It is necessary to sharpen the tungsten electrode axially on the grinding wheel, as shown in **FIG. L**, making sure that the tip is perfectly concentric to prevent arc deviation. It is important to carry out the grinding along the length of the electrode. This operation should be repeated periodically, depending on the amount of use and wear of the electrode, or when the electrode has been accidentally contaminated, oxidised or used incorrectly. In TIG DC mode 2-stroke (2T) and 4-stroke(4T) operation are possible.

6.1.3 TIG AC welding
This type of welding can be used to weld metals such as aluminium and magnesium, which form a protective, insulating oxide on their surface. By reversing the welding current polarity it is possible to "break" the surface layer of oxide by means of a mechanism called "ionic sandblasting". The voltage on the tungsten electrode alternates between positive (EP) and negative (EN). During the EP period the oxide is removed from the surface ("cleaning"or "pickling") allowing formation of the pool. During the EN period there is maximum heat transfer to the piece, allowing welding. The possibility of varying the balance parameter in AC means that it is possible to reduce the EP current period to a minimum, allowing quicker welding.
Higher balance values give quicker welding, greater penetration, a more concentrated arc, a narrower weld pool and limited heating of the electrode. Lower values give a cleaner piece. If the balance value is too low this will widen the arc and the de-oxidised part, overheat the electrode with consequent formation of a sphere on the tip making it more difficult to strike the arc and control its direction. If the balance value is too high this will create a "dirty" weld pool with dark inclusions.
The table **(TAB. 4)** summarises the effects of parameter changes in AC welding.
In TIG AC mode 2-stroke (2T) and 4-stroke (4T) operation are possible.
The instructions for this welding procedure are also valid.
The table **(TAB. 3)** shows suggested values for welding on aluminium; the most suitable electrode is a pure tungsten electrode (green band).

6.1.4 Procedure
- Use the knob to adjust the welding current to the desired value; if necessary adjust during welding to the actual required heat transfer.
- Press the torch button and make sure the gas flow from the torch is correct; if necessary, adjust pre-gas and postgas times; these times should be adjusted according to operating conditions, the postgas delay in particular should be long enough to allow the electrode and weld pool to cool at the end of welding without coming into contact with the atmosphere (oxidation and contamination).

TIG mode with 2T sequence:
- Press the torch button (P.T.) right down to strike the arc with a current of I_{START}. The current will increase according to the START SLOPE UP setting to the welding current value.
- To interrupt welding, release the torch button so that either the current gradually decreases (if the FINAL SLOPE DOWN parameter has been enabled) or the arc is extinguished immediately, followed by postgas.

TIG mode with 4T sequence:
- The first time the button is pressed it will strike the arc with a current equal to I_{START}. When the button is released the current will increase according to the START SLOPE UP setting to the welding current value; this value is maintained even with the button is released. When the button is pressed again the current will decrease according to the FINAL SLOPE DOWN setting, until it reaches I_{END}. The I_{END} current will be maintained until the button is released to terminate the welding cycle and start the postgas phase. If, on the other hand, the button is released while the FINAL SLOPE DOWN function is proceeding, the welding cycle will terminate immediately and the postgas phase will start.

TIG mode with 4T and BI-LEVEL sequence:
- The first time the button is pressed it will strike the arc with a current equal to I_{START}. When the button is released the current will increase according to the START SLOPE UP setting to the welding current value; this value is maintained even when the button is released. Now, every time the button is pressed (the time between pressure and release should be short) the current will change between the setting for the BI-LEVEL I_1 parameter and the main current value I_2.
- When the button is kept pressed down for a longer space of time the current will decrease according to the FINAL SLOPE DOWN setting, until it reaches I_{END}. The I_{END} current will be maintained until the button is released to terminate the welding cycle and start the postgas phase. If, on the other hand, the button is released while the FINAL SLOPE DOWN function is proceeding, the welding cycle will terminate immediately and the postgas phase will start (**FIG. M**).

TIG SPOT mode:
- Welding is carried out by keeping the torch push-button pressed until the pre-set time has been reached (spot time).

6.2 MMA WELDING
- It is most important that the user refers to the maker's instructions indicated on the stick electrode packaging. This will indicate the correct polarity of the stick electrode and the most suitable current.
- The welding current must be regulated according to the diameter of the electrode in use and the type of the joint to be carried out: see below the currents corresponding to various electrode diameters:

Ø Electrode (mm)	Welding current (A)	
	Min.	Max.
1.6	25	50
2	40	80
2.5	60	110
3.2	80	160
4	120	200
5	150	280
6	200	350

- The user must consider that, according to the electrode diameter, higher current values must be used for flat welding, whereas for vertical or overhead welds lower current values are necessary.
- As well as being determined by the chosen current intensity, the mechanical characteristics of the welded join are also determined by the other welding parameters i.e. arc length, working rate and position, electrode diameter and quality (to store the electrodes correctly, keep them in a dry place protected by their packaging or containers).
- The properties of the weld also depend on the ARC-FORCE value (dynamic behaviour) of the welding machine. The setting for this parameter can be made either on the panel or using the remote control with 2 potentiometers.
- It should be noted that high ARC-FORCE values achieve better penetration and allow welding in any position typically with basic electrodes, low ARC-FORCE values give a softer, spray-free arc typically with rutile electrodes.
  The welding machine is also equipped with HOT START and ANTI STICK devices to guarantee easy starts and to prevent the electrode from sticking to the piece.

6.2.1 Procedure
- Holding the mask IN FRONT OF THE FACE, strike the electrode tip on the workpiece as if you were striking a match. This is the correct strike-up method.
  WARNING: do not hit the electrode on the workpiece, this could damage the electrode and make strike-up difficult.
- As soon as arc is ignited, try to maintain a distance from the workpiece equal to the diameter of the electrode in use. Keep this distance as much constant as possible for the duration of the weld. Remember that the angle of the electrode as it advances should be of 20-30 grades.
- At the end of the weld bead, bring the end of the electrode backward, in order to fill the weld crater, quickly lift the electrode from the weld pool to extinguish the arc **(CHARACTERISTICS OF THE WELD BEAD - FIG. N)**.

7. MAINTENANCE

⚠ WARNING! BEFORE CARRYING OUT MAINTENANCE OPERATIONS MAKE SURE THE WELDING MACHINE IS SWITCHED OFF AND DISCONNECTED FROM THE MAIN POWER SUPPLY.

7.1 ROUTINE MAINTENANCE
ROUTINE MAINTENANCE OPERATIONS CAN BE CARRIED OUT BY THE OPERATOR.

7.1.1 Torch
- Do not put the torch or its cable on hot pieces; this would cause the insulating materials to melt, making the torch unusable after a very short time.
- Make regular checks on the gas pipe and connector seals.
- Accurately match collet and collet body with the selected electrode diameter in order to avoid overheating, bad gas diffusion and poor performance.
- At least once a day check the terminal parts of the torch for wear and make sure they are assembled correctly: nozzle, electrode, electrode-holder clamp, gas diffuser.

7.2 EXTRAORDINARY MAINTENANCE
EXTRAORDINARY MAINTENANCE MUST ONLY BE CARRIED OUT BY TECHNICIANS WHO ARE EXPERT OR QUALIFIED IN THE ELECTRIC-MECHANICAL FIELD, AND IN FULL RESPECT OF THE IEC/EN 60974-4 TECHNICAL DIRECTIVE.

⚠ WARNING! BEFORE REMOVING THE WELDING MACHINE PANELS AND WORKING INSIDE THE MACHINE MAKE SURE THE WELDING MACHINE IS SWITCHED OFF AND DISCONNECTED FROM THE MAIN POWER SUPPLY OUTLET.
If checks are made inside the welding machine while it is live, this may cause serious electric shock due to direct contact with live parts and/or injury due to direct contact with moving parts.

- Periodically, and in any case with a frequency in keeping with the utilisation and with the environment's dust conditions, inspect the inside of the welding machine and remove the dust deposited on the electronic boards with a very soft brush or with appropriate solvents.
- At the same time make sure the electrical connections are tight and check the wiring for damage to the insulation.
- At the end of these operations re-assemble the panels of the welding machine and screw the fastening screws right down.
- Never, ever carry out welding operations while the welding machine is open.
- After having carried out maintenance or repairs, restore the connections and wiring as they were before, making sure they do not come into contact with moving parts or parts that can reach high temperatures. Tie all the wires as they were before, being careful to keep the high voltage connections of the primary transformer separate from the low voltage ones of the secondary transformer.
  Use all the original washers and screws when closing the casing.

8. TROUBLESHOOTING
IN CASE OF UNSATISFACTORY FUNCTIONING, BEFORE SERVICING MACHINE OR REQUESTING ASSISTANCE, CARRY OUT THE FOLLOWING CHECK:
- Check that the welding current is correct for the diamter and electrode type in use.
- Check that when general switch is ON the relative lamp is ON. If this is not the case then the problem is located on the mains (cables, plugs, outlets, fuses, etc.).
- Check that the yellow led (ie. thermal protection interruption- either over or undervoltage or short circuit) is not lit.
- Check that the nominal intermittance ratio is correct. In case there is a thermal protection interruption, wait for the machine to cool down, check that the fan is working properly.
- Check the mains voltage: if the value is too high or too low the welding machine will be stopped.
- Check that there is no short-circuit at the output of the machine: if this is the case eliminate the incovenience.
- Check that all connections of the welding circuit are correct, particularly that the work clamp is well attached to the workpiece, with no interferring material or surface-coverings (ie. Paint).
- Protective gas must be of appropriate type (Argon 99.5%) and quantity.

FIG. A

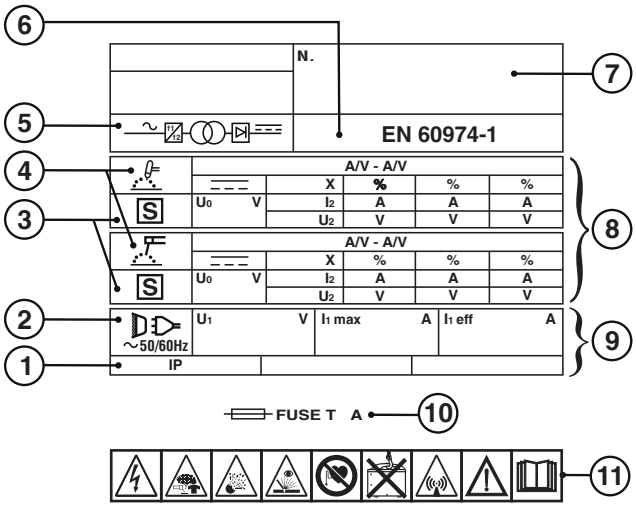
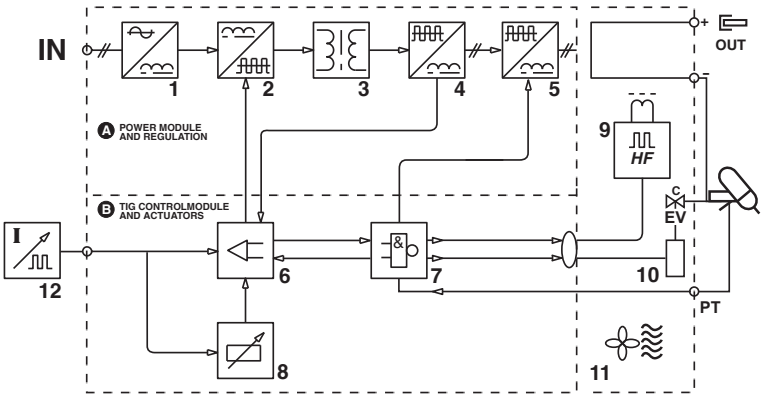


FIG. B



TAB. 1

DATI TECNICI SALDATRICE - *WELDING MACHINE TECHNICAL DATA*

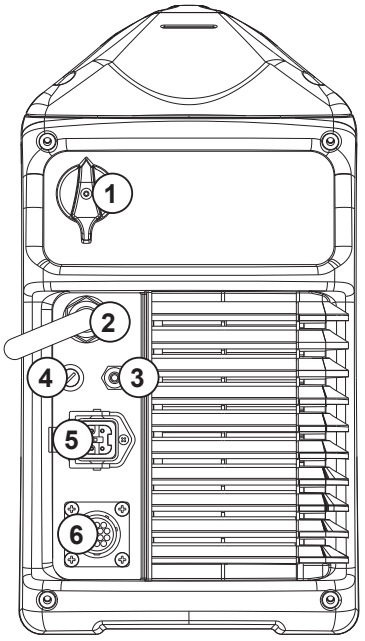
MODEL							
I_2 max (A)	230V	400V	230V	400V	mm²	kg	dB(A)
200 (AC/DC)	T20A	-	32A	-	25	11.3	<85
220 (DC)	T20A	-	32A	-	25	9.8	<85
220 (DC) 270 (DC)	T16A -	- T16A	16A -	- 16A	25 35	10.2	<85
250 (DC)	-	T10A	-	16A	25	11.3	<85
250 (AC/DC)	-	T10A	-	16A	25	14.5	<85
220 (DC) 300 (DC)	T16A -	- T16A	16A -	- 16A	25 35	13.1	<85

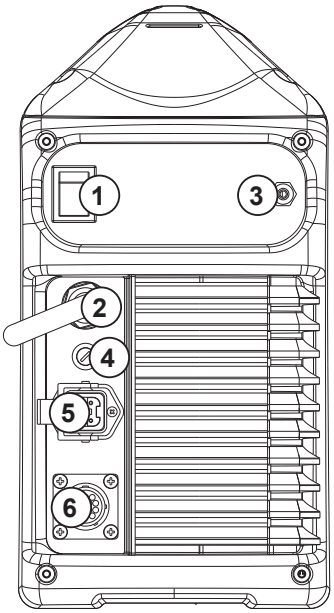
TAB. 2

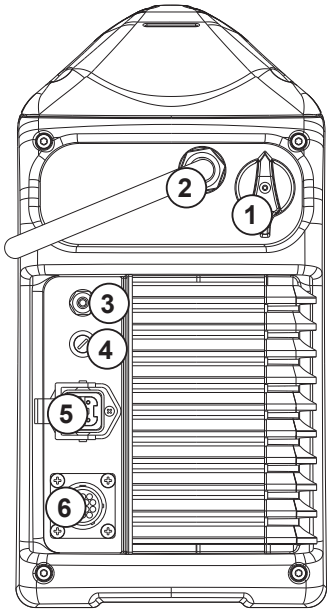
DATI TECNICI TORCIA - *TECHNICAL SPECIFICATIONS FOR THE TORCH*

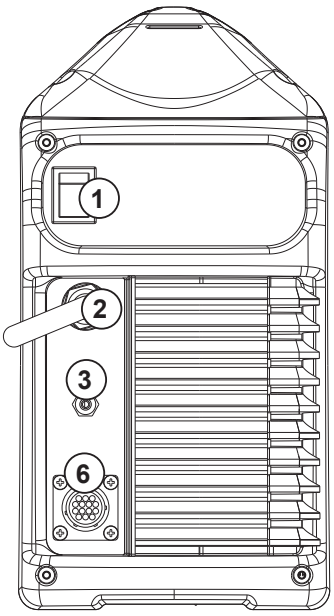
VOLTAGE CLASS: 113V			
I max (A)	X (%)		Ø mm
140	35	Argon	1 ÷ 1.6
100	35		
180	35	Argon	1 ÷ 2.4
125	35		
320 R.A.	100	Argon	1 ÷ 2.4
225 R.A.	100		

FIG. C









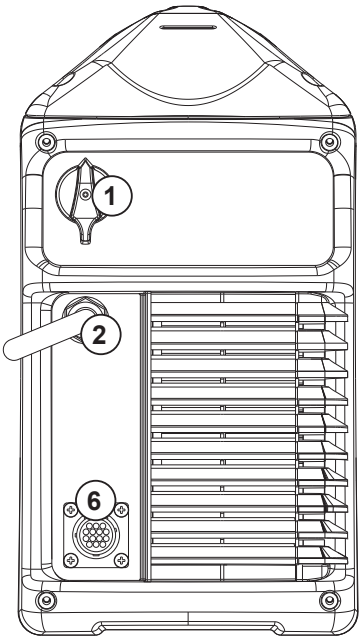
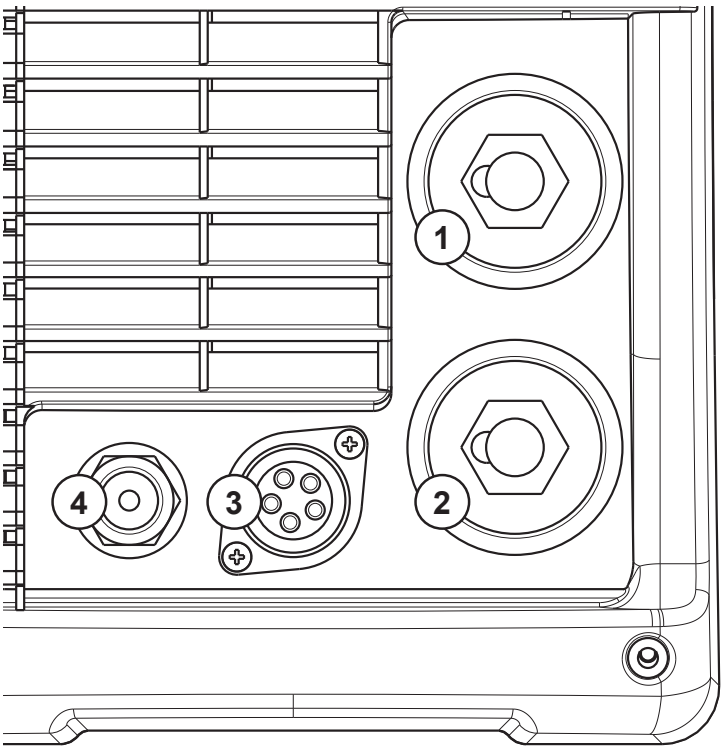
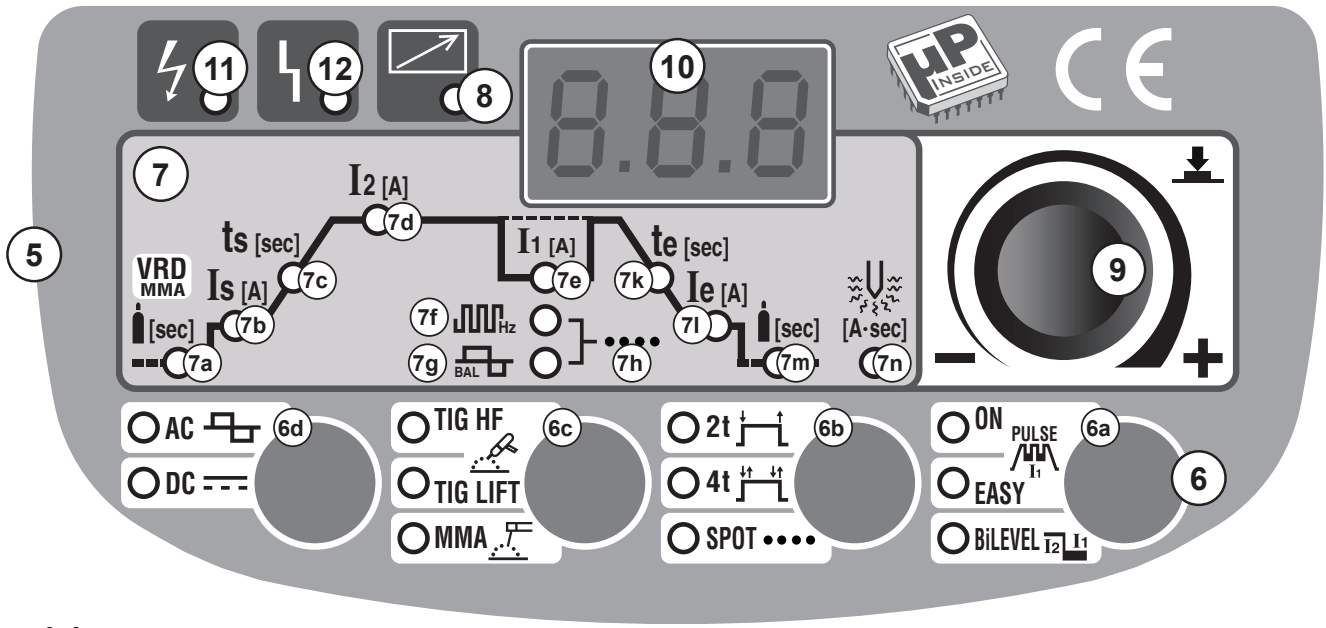


FIG. D



AC/DC model



DC model

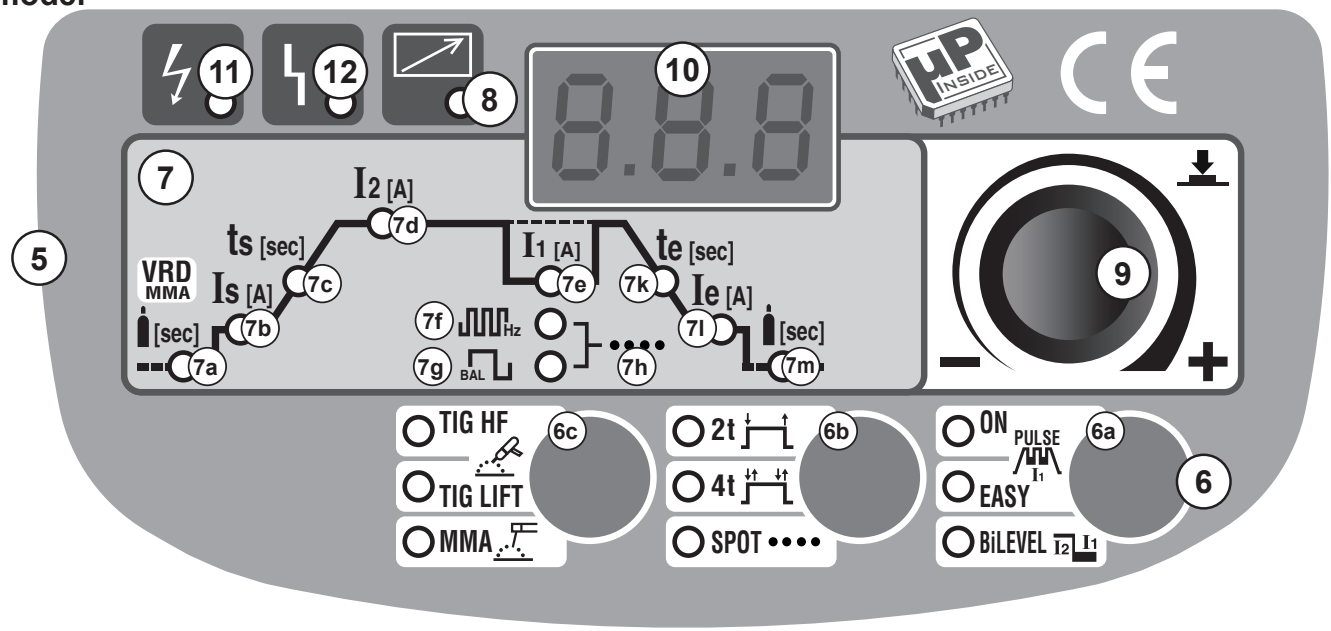
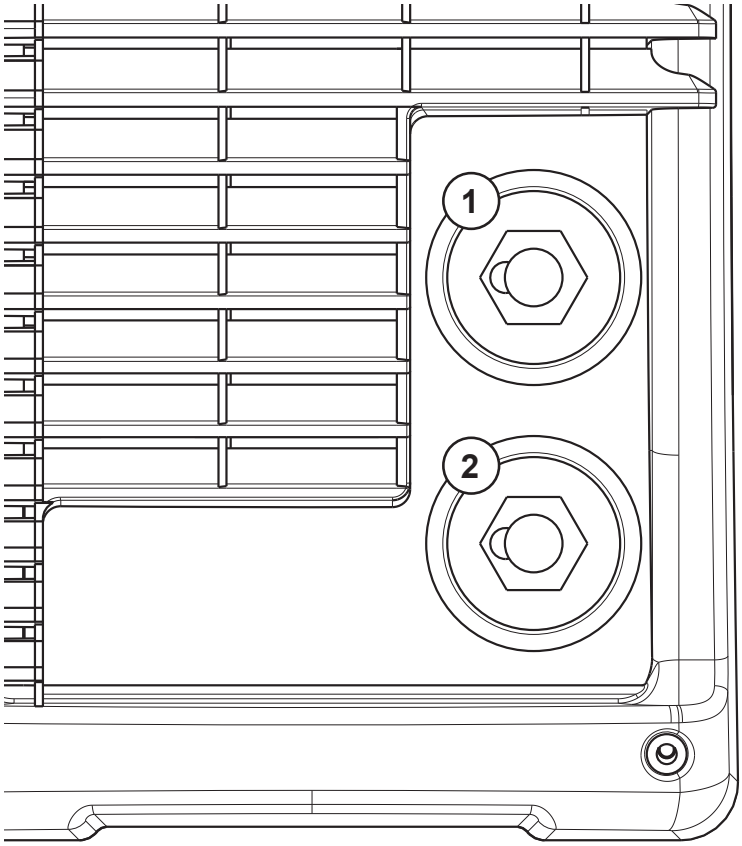


FIG. D1


1
2

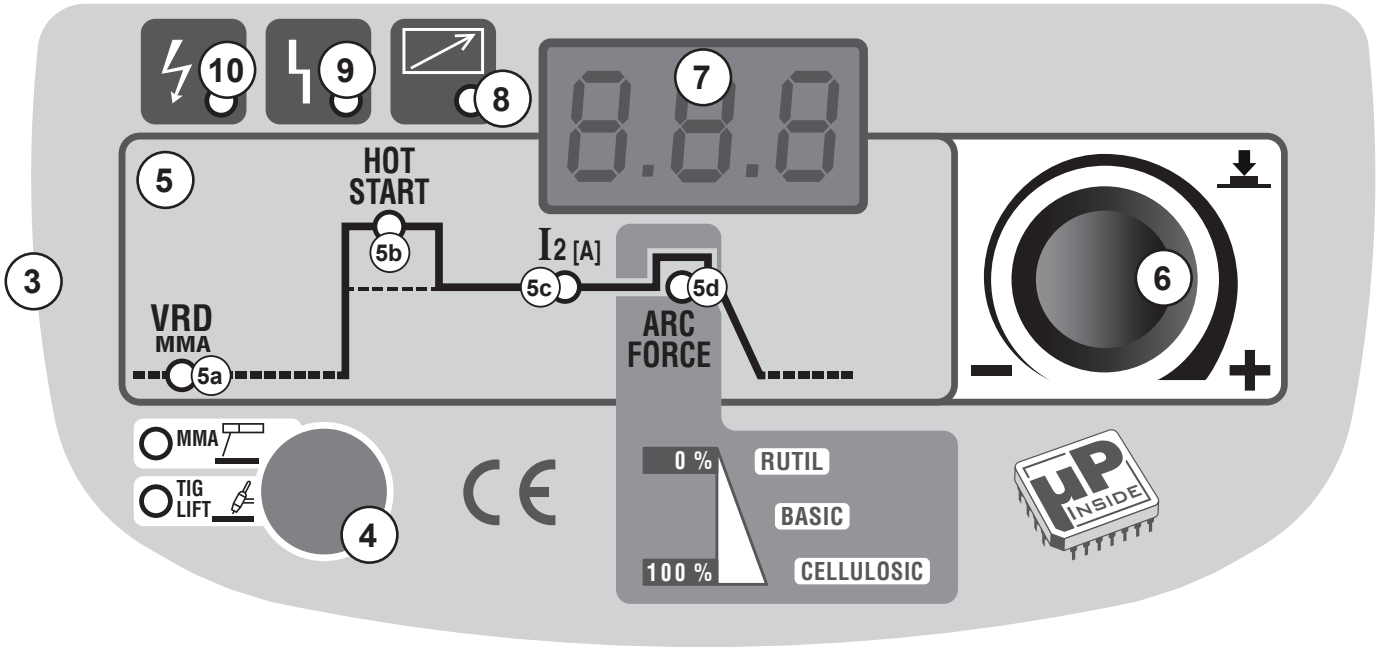

10
9
8
7
8.8.8
5
HOT
START
5b
I2 [A]
5c
5d
3
VRD
MMA
5a
ARC
FORCE
6
MMA
TIG
LIFT
4
0 %
RUTIL
BASIC
100 %
CELLULOSIC
INSIDE

FIG. E

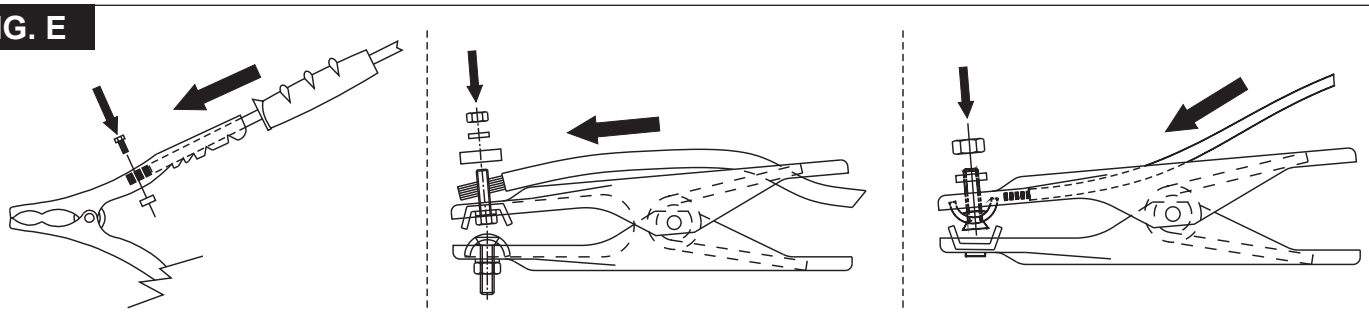
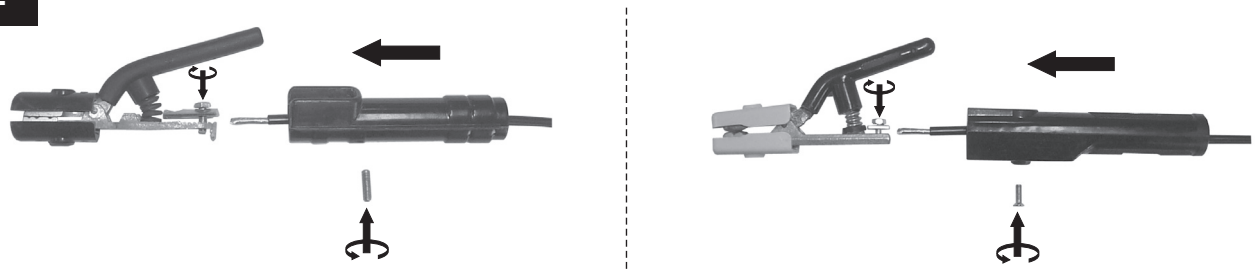


FIG. F



TAB. 3

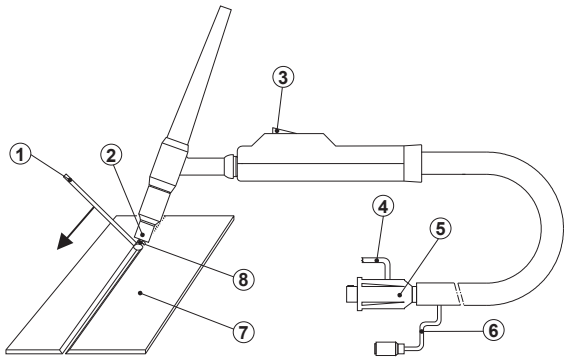
SUGGESTED VALUES FOR WELDING - *DATI ORIENTATIVI PER SALDATURA*

		mm	I_2	Ømm	Ømm	Ar	Ømm
		(mm)	(A)	(mm)	(mm)	(l/min)	(mm)
TIG DC	Ss	0.3 - 0.5	5 - 20	0.5	6.5	3	-
		0.5 -0.8	15 - 30	1	6.5	3	-
		1	30 - 60	1	6.5	3 - 4	1
		1.5	70 - 100	1.6	9.5	3 - 4	1.5
		2	90 - 110	1.6	9.5	4	1.5 - 2.0
		3	120 - 150	2.4	9.5	5	2 - 3
		4	140 - 190	2.4	9.5 - 11	5 - 6	3
		5	190 - 250	3.2	11 - 12.5	6 - 7	3 - 4
	Cu	0.3 - 0.8	20 - 30	0.5 - 1	6.5	4	-
		1	80 - 100	1	9.5	6	1.5
		1.5	100 - 140	1.6	9.5	8	1.5
		2	130 - 160	1.6	9.5	8	1.5
TIG AC	Al	1	30 - 45	1 - 1.6	6.5	4 - 6	1.2 - 2
		1.5	60 - 85	1.6	9.5	4 - 6	2
		2	70 - 90	1.6	9.5	4 - 6	2
		3	110 - 160	2.4	11	5 - 6	2

FIG. G

TORCH
TORCIA
TORCHE
BRENNER
SOPLETE
TOCHA
TOORTS

BRÆNDER
POLTIN
SVEISEBRENNER
SKÄRBRÄNNARE
ΛΑΜΠΑ
ГОРЕЛКА



1- FILLER ROD IF NEEDED - EVENTUALE BACCHETTA D'APPORTO - BAGUETTE D'APPORT ÉVENTUELLE - BEDARFSWEISE EINGESETZTER SCHWEISSSTAB MIT ZUSATZWERKSTOFF - EVENTUAL VARILLA DE APORTE - EVENTUAL VARETA DE ENCHIMENTO - EVENTUEEL STAAFJE VAN TOEVOER - EVENTUEL TILSATSSTAV - MAHDOLLINEN LISÄAINESAUVA - STØTTEPINNE - EVENTUELL STAV FÖR PÅSVETSNING - ΕΝΔΕΧΟΜΕΝΗ ΡΑΒΔΟΣ ΕΙΣΑΓΩΓΗΣ - ВОЗМОЖНАЯ ПАЛОЧКА ДЛЯ ПРИПОЯ.

2- NOZZLE - UGELLO - TUYÈRE - DÜSE - BOQUILLA - BICO - SPROEIER - DYSE - SUUTIN - SMØRENIPPEL - MUNSTYCKE - ΜΠΕΚ - СОПЛО.

3- PUSHBUTTON - PULSANTE - BOUTON - DRUCKKNOPF - PULSADOR - BOTÃO - DRUKKNOP - TRYKKNAP - PAINIKE - TAST - KNAPP - ΠΛΗΚΤΡΟ - КНОПКА.

4- GAS - GAS - GAZ - GAS - GAS - GÁS - GAS - GAS - GAS - GASS - GASEN - ΑΔΡΑΝΕΣ ΑΕΡΙΟ - ГАЗ.

5- CURRENT - CORRENTE - COURANT - STROM - CORRIENTE - CORRENTE - STROOM - STRØM - STRØM - STRÖM - PEYMA - ТОК.

6- TORCH BUTTON CABLES - CAVI PULSANTE TORCIA - CÂBLES POUSSOIR TORCHE - KABEL BRENNERKNOPF - CABLES DEL PULSADOR SOPLETE - CABOS BOTÃO TOCHA - KABELS DRUKKNOP TOORTS - BRÆNDERKNAPKABEL - PURISTIMEN PAINONAPIN KAAPELIT - KABLER TIL SVEISEBRENNERENS TAST - KABEL KNAPP PÅ SKÄRBRÄNNARE - ΚΑΛΩΔΙΑ ΠΛΗΚΤΡΟΥ ΛΑΜΠΑΣ - КАБЕЛИ КНОПКИ ГОРЕЛКИ.

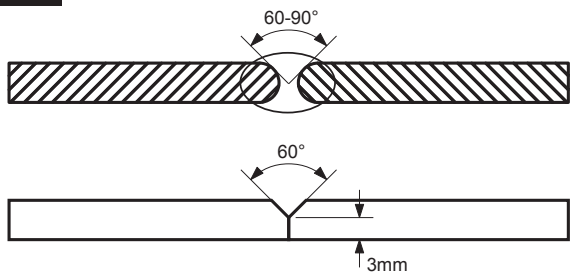
7- PIECE TO BE WELDED - PEZZO DA SALDARE - PIÈCE À SOUDER - WERKSTÜCK - PIEZA A SOLDAR - PEÇA A SOLDAR - TE LASSEN STUK - EMNE, DER SKAL SVEJSES PÅ - HITSATTAVA KAPPALE - STYKKE SOM SKAL SVEISES - STYCKE SOM SKA SVETSAS - ΜΕΤΑΛΛΟ ΠΡΟΣ ΣΥΓΚΟΛΛΗΣΗ - СВАРИВАЕМАЯ ДЕТАЛЬ.

8- ELECTRODE - ELETTRODO - ELECTRODE - ELEKTRODE - ELECTRODO - ELÉCTRODO - ELEKTRODE - ELEKTRODE - ELEKTRODI - ELEKTROD - ELEKTROD - ΗΛΕΚΤΡΟΔΙΟ - ЭЛЕКТРОД.

FIG. H

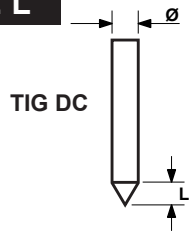
- Preparation of the folded edges for welding without weld material.
- Preparazione dei lembi rivoltati da saldare senza materiale d'apporto.
- Préparation des bords relevés pour soudage sans matériau d'apport.
- Herrichtung der gerichteten Kanten, die ohne Zusatzwerkstoff geschweißt werden.
- Preparación de los extremos rebordeados a soldar sin material de aporte.
- Preparação das abas viradas a soldar sem material de entrada.
- Voorbereiding van de te lassen omgekeerde randen zonder lasmateriaal.
- Forberedelse af de foldede klapper, der skal svejses uden tilført materiale.
- Hitsattavien käännettyjen reunojen valmistelu ilman lisämateriaalia.
- Forberedelse av de vendte flikene som skal sveises uten ekstra materialer.
- Förberedelse av de vikta kanterna som ska svetsas utan påsvetsat material.
- Προετοιμασία των γυρισμένων χειλών που θα συγκολληθούν χωρίς υλικό τροφοδοσίας.
- Подготовка подвернутых свариваемых краев без материала припоя.

FIG. I



- Preparation of the edges for butt weld joints to be welded with weld material.
- Preparazione dei lembi per giunti di testa da saldare con materiale d'apporto.
- Préparation des bords pour joints de tête pour soudage avec matériau d'apport.
- Herrichtung der Kanten für Stumpfstöße, die mit Zusatzwerkstoff geschweißt werden.
- Preparación de los extremos para juntas de cabeza a soldar con material de aporte.
- Preparação das abas para juntas de cabeça a soldar com material de entrada.
- Voorbereiding van de te lassen randen x kopverbindingen met lasmateria.
- Forberedelse af klapperne til stumpsømme, der skal svejses med tilført materiale.
- Hitsattavien liitospäiden reunojen valmistelu lisämateriaalia käyttämällä.
- Forberedelse av flikene for hodeskjøyter som skal sveises med ekstra materialer.
- Förberedelse av kanter för stumsvetsning med påsvetsat material.
- Προετοιμασία των χειλών για συνδέσεις κεφαλής που θα συγκολληθούν με υλικό τροφοδοσίας.
- Подготовка свариваемых краев для торцевых соединений с материалом припоя.

FIG. L



- CHECK OF THE ELECTRODE TIP
- CONTROLLO DELLA PUNTA DELL'ELETTRODO
- CONTROLE DE LA POINTE DE L'ÉLECTRODE
- KONTROLLE DER ELEKTRODENSPITZE
- CONTROL DE LA PUNTA DEL ELECTRODO
- CONTROLO DA PONTA DO ELÉCTRODO
- CONTROLE VAN DE PUNT VAN DE ELEKTRODE
- KONTROL AF ELEKTRODENS SPIDS
- ELEKTRODIN PÄÄN TARKISTUS
- KONTROLL AV ELEKTRODENS SPISS
- KONTROLL AV ELEKTRODENS SPETS
- ΕΛΕΓΧΟΣ ΑΙΧΜΗΣ ΗΛΕΚΤΡΟΔΙΟΥ
- КОНТРОЛЬ НАКОНЕЧНИКА ЭЛЕКТРОДА

- CORRECT	- INSUFFICIENT CURRENT	- EXCESSIVE CURRENT	**L= Ø** IN DIRECT CURRENT
- CORRETTO	- CORRENTE SCARSA	- CORRENTE ECCESIVA	IN CORRENTE CONTINUA
- COURANT	- COURANT INSUFFISIANT	- COURANT EXCESSIF	EN COURANT CONTINU
- EXACT	- ZU WENIG STROM	- ZU VIEL STROM	BEI GLEICHSTROM
- KORREKT	- CORRIENTE ESCASA	- CORRIENTE EXCESIVA	EN CORRIENTE CONTINUA
- CORRECTO	- CORRENTE INSUFICIENTE	- CORRENTE EXCESSIVA	EM CORRENTE CONTÍNUA
- CORRECTO	- WEINIG STROOM	- EXCESSIEVE STROOM	IN CONTINUE STROOM
- CORRECT	- FOR LAV STRØMSTYRKE	- FOR HØJ STRØMSTYRKE	VED JÆVNSTRØM
- KORREKT	- LIIAN VÄHÄN VIRTAA	- LIIKAA VIRTAA	TASAVIRRASSA
- OIKEIN	- DÅRLIG STRØM	- ALTFOR HØY STRØ	MED LIKSTRØM
- KORREKT	- FÖR LÅG STRÖM	- FÖR HÖG STRÖM	I LIKSTRÖM
- ΣΩΣΤΟ	- ΑΝΕΠΑΡΚΕΣ ΡΕΥΜΑ	- ΥΠΕΡΒΟΛΙΚΟ ΡΕΥΜΑ	ΣΕ ΣΥΝΕΧΟΜΕΝΟ ΡΕΥΜΑ
- ПРАВИЛЬНО	- НЕДОСТАТОЧНЫЙ ТОК	- ИЗБЫТОЧНЫЙ ТОК	ПРИ ПОСТОЯННОМ ТОКЕ

TAB. 4

TIG AC

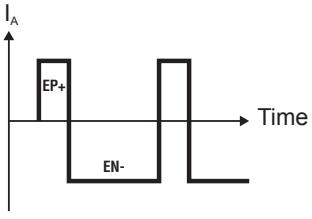
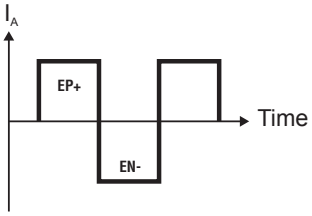
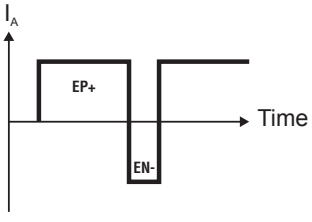
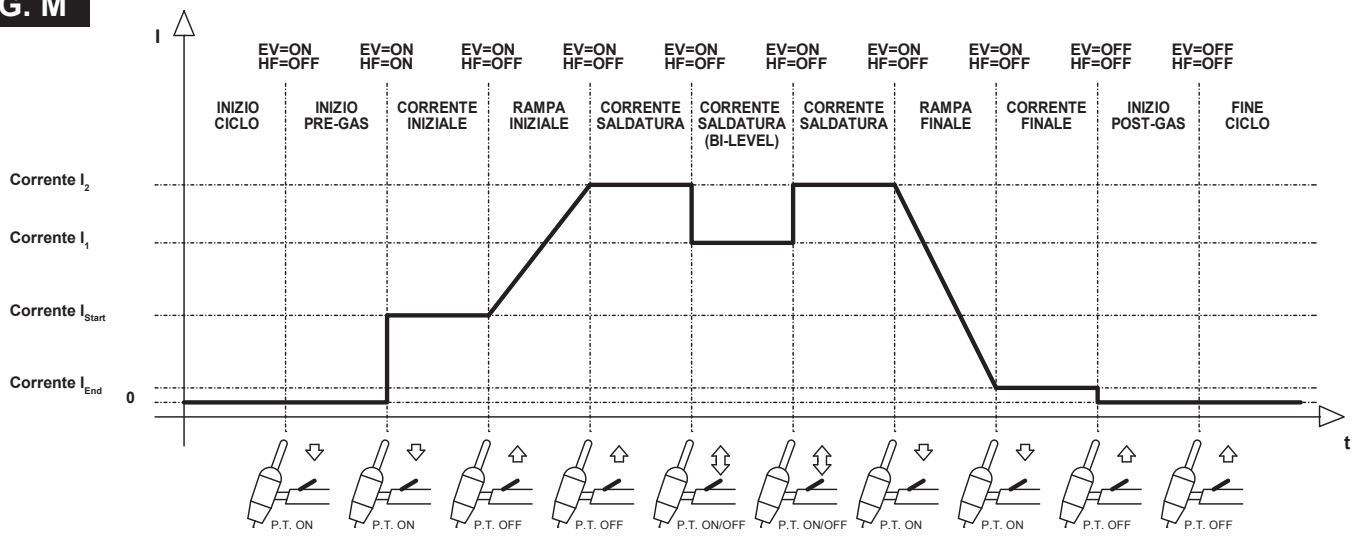
NEGATIVE BALANCE'S VALUE **VALORE BALANCE NEGATIVO** **VALEUR BALANCE NEGATIVE** **VALOR DE BALANCE NEGATIVO** **BALANCE-WERT NEGATIV** **БАЛАНС ОТРИЦАТЕЛЬНЫЙ**		- MAX PENETRATION - MIN CLEANESS - MIN CONSUPTION OF TUNGSTEN ELECTRODE - MAX EFFICIENCY (FAST WELDING) - MAX PENETRAZIONE - MIN PULIZIA - MIN CONSUMO ELETTRODO TUNGSTENO - MAX RENDIMENTO (SALDATURA VELOCE) - MAX PENETRATION - MIN NETTOYAGE - MIN CONSOMMATION D'ELECTRODE DE TUNGSTENE - MAX RENDEMENT (SOUDAGE RAPID)	- MAX PENETRACIÓN - MIN LIMPIEZA - MIN CONSUMO ELECTRODO DE TUNGSTENO - MÁXIMO RENDIMIENTO (SOLDADURA RÁPIDA) - HÖCHSTES DURCHDRINGEN - GERINGSTE REINIGUNG - GERINGSTER VERBRAUCH VON WOLFRAM ELEKTRODE - HÖCHSTE LEISTUNG (SCHNELLES SCHWEISSEN) - МАКС. ПРОНИКНОВЕНИЕ - МИН. ЧИСТОТА - МИН. ПОТРЕБЛЕНИЕ ВОЛЬФРАМОВОГО ЭЛЕКТРОДА - МАКС. ПРОИЗВОДИТЕЛЬНОСТЬ (БЫСТРАЯ СВАРКА)
VALORE BALANCE 0 **Standard**		- STANDARD VALUE (RECOMMENDED) - BEST BALANCE BETWEEN **EP+** AND **EN-** (50-50) - VALORE STANDARD (RACCOMANDATO) - OTTIMO BILANCIAMENTO TRA **EP+** E **EN-** (50-50) - VALEUR STANDARD (RECOMMANDE) - EQUILIBRE OPTIMAL ENTRE LE **EP+** ET **EN-** (50-50) - VALOR ESTÁNDAR (RECOMENDADO) - SALDO ÓPTIMO ENTRE EL **EP +** Y **EN-** (50-50)	- STANDARD WERT (EMPFOHLEN) - SEHR GUTE AUSGLEICH ZWISCHEN **EP +** UND **EN-** (50-50) - СТАНДАРТНОЕ ЗНАЧЕНИЕ (РЕКОМЕНДУЕМОЕ) - ВЕЛИКОЛЕПНАЯ БАЛАНСИРОВКА МЕЖДУ **EP+** И **EN-** (50/50)
POSITIVE BALANCE'S VALUE **VALORE BALANCE POSITIVO** **VALEUR BALANCE POSITIVE** **VALOR DE BALANCE POSITIVO** **BALANCE-WERT POSITIV** **БАЛАНС ПОЛОЖИТЕЛЬНЫЙ**		- MAX CLEANESS - MIN PENETRATION - MAX CONSUPTION OF TUNGSTEN ELECTRODE - MIN EFFICIENCY (SLOW WELDING) - MAX PULIZIA - MIN PENETRAZIONE - MAX CONSUMO ELETTRODO TUNGSTENO - MIN RENDIMENTO (SALDATURA LENTA) - MAX NETTOYAGE - MIN PENETRATION - MAX CONSOMMATION D'ELECTRODE DE TUNGSTENE - MIN RENDEMENT (SOUDAGE LENT)	- MAX LIMPIEZA - MIN DE PENETRACIÓN - MAX CONSUMO ELECTRODO DE TUNGSTENO - MIN RENDIMIENTO (SOLDADURA) - HÖCHSTE REINIGUNG - GERINGSTES DURCHDRINGEN - HÖCHSTER VERBRAUCH VON WOLFRAM ELEKTRODE - GERINGSTE LEISTUNG (LANGSAMES SCHWEISSEN - МАКС. ЧИСТОТА - МИН. ПРОНИКНОВЕНИЕ - МАКС. ПОТРЕБЛЕНИЕ ВОЛЬФРАМОВОГО ЭЛЕКТРОДА - МИН. ПРОИЗВОДИТЕЛЬНОСТЬ (МЕДЛЕННАЯ СВАРКА)

FIG. M



LEGENDA: EV = Elettrovalvola
PT = Pulsante torcia
HF = Alta frequenza (se attiva)