INSTRUCTION MANUAL FOR ARC WELDING MACHINE

IMPORTANT: BEFORE STARTING THE EQUIPMENT, READ THE CONTENTS OF THIS MANUAL, WHICH MUST BE STORED IN A PLACE FAMILIAR TO ALL USERS FOR THE ENTIRE OPERATIVE LIFE-SPAN OF THE MACHINE. THIS EQUIPMENT MUST BE USED SOLELY FOR WEL-**DING OPERATIONS.**

1 SAFETY PRECAUTIONS

WELDING AND ARC CUTTING CAN BE HARMFUL TO YOURSELF AND OTHERS. The user must therefore be educated against the hazards, summarized below, deriving from welding operations. For more detailed information, order the manual code 3.300.758

ELECTRIC SHOCK - May be fatal.



· Install and earth the welding machine according to the applicable regulations.

· Do not touch live electrical parts or electrodes with bare skin, gloves or wet clothing.

- · Isolate yourselves from both the earth and the workpiece.
- · Make sure your working position is safe.

FUMES AND GASES - May be hazardous to your health. · Keep your head away from fumes.

· Work in the presence of adequate ventilation, and use ventilators around the arc to prevent gases from forming in the work area.

ARC RAYS - May injure the eyes and burn the skin.

· Protect your eyes with welding masks fitted with filtered lenses, and protect your body with appropriate safety garments.

· Protect others by installing adequate shields or curtains.

RISK OF FIRE AND BURNS

 Sparks (sprays) may cause fires and burn the skin; you should therefore make sure there are no flam-100 mable materials in the area, and wear appropriate protective garments.

NOISE

This machine does not directly produce noise exceeding 80dB. The plasma cutting/welding procedure may produce noise levels beyond said limit; users must therefore implement all precautions required by law.

PACEMAKERS

 The magnetic fields created by high currents may affect the operation of pacemakers. Wearers of vital electronic equipment (pacemakers) should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.

EXPLOSIONS



· Do not weld in the vicinity of containers under pressure, or in the presence of explosive dust, gases or fumes. · All cylinders and pressure regulators used in welding operations should be handled with care.

ELECTROMAGNETIC COMPATIBILITY

This machine is manufactured in compliance with the instruc-

tions contained in the harmonized standard EN50199, and must be used solely for professional purposes in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in nonindustrial environments.

IN CASE OF MALFUNCTIONS, REQUEST ASSISTANCE FROM QUALIFIED PERSONNEL.

2 GENERAL DESCRIPTIONS

2.1 SPECIFICATIONS

This welding machine is a constant current power source built using INVERTER technology, designed to weld covered electrodes (not including cellulosic) and for TIG procedures, with contact starting and high frequency

2.2 **EXPLANATION OF THE TECHNICAL SPECIFI-**CATIONS LISTED ON THE MACHINE PLATE.

N°. Serial number, which must be indicated on any type of request regarding the welding machine.

Single-phase static transformer-rectifier frequency converter.

- Downslope.
- Suitable for TIG welding. TIG
- U0. Secondary open-circuit voltage (peak value)
- Duty cycle percentage. % of 10 minutes during Х. which the welding machine may run at a certain
- without overheating. current
- 12. Welding current
- U2. Secondary voltage with current I2
- U1. Rated supply voltage

The machine has an automatic supply voltage selector.

- 1~ 50/60Hz 50- or 60-Hz single-phase power supply
- 11. Absorbed current at the corresponding current I2. IP23 Protection grade of the housing, approving the
- equipment as suitable for use outdoors in the rain.
- S Suitable for hazardous environments.

NOTES: The welding machine has also been designed for use in environments with a pollution rating of 3. (See IEC 664).

2.3 DESCRIPTION OF PROTECTIVE DEVICES

2.3.1. Thermal protection

This machine is protected by a temperature probe, which prevents the machine from operating if the allowable temperatures are exceeded. Under these conditions the fan keeps running and the LED M lights.

Block protections (Art. 274) 2.3.2.

This welding machine is equipped with various safety devices that stop the machine before it can suffer damage.

The machine stop is signalled by the flashing red LED (N). When this occurs, it signals:

1) During the start-up phase, the power status of the machine.

2) After the start-up phase, incorrect supply voltage.

3) With the machine running, that the voltage has fallen below 118V.

4) With the machine running, that the supply voltage is above

280V.

5) During welding, that the voltage exceeds 300V.

To restore operation, check the voltage. Then shut off the **AC** switch, wait 5 seconds, and switch it on again. If the problem has been corrected, the welding machine will begin operating again.

NOTE: If the supply voltage is below 170V at start-up, no LED will light and the fan is powered.

If the message E2 appears on the display, the machine requires technical intervention.

2.3.3. Block protections (Art. 276)

THE WELDING MACHINE IS NOT PROTECTED FOR VOL-TAGES GREATER THAN 270V.

This welding machine is equipped with various safety devices that stop the machine before it can suffer damage.

The machine stop is signalled by the flashing red LED (\mathbf{N}). When this occurs, it signals:

During the start-up phase, the power status of the machine.
 After the start-up phase, incorrect supply voltage.

3) With the machine running, that the voltage has fallen below 70V ($U_1 = 115V$), 135V ($U_1 = 230V$).

4) With the machine running, that the supply voltage is above $130V (U_1 = 115V)$.

5) During welding, that the voltage exceeds 300V.

To restore operation, check the voltage. Then shut off the **AC** switch, wait 5 seconds, and switch it on again. If the problem has been corrected, the welding machine will begin operating again.

NOTE: If the supply voltage is below 95V ($U_1 = 115V$), 180V ($U_1 = 230V$) at start-up, no LED will light and the fan is powered.

If the message E2 appears on the display, the machine requires technical intervention.

3 INSTALLATION

Make sure that the supply voltage matches the voltage indicated on the specifications plate of the welding machine.

When mounting a plug, make sure it has an adequate capacity, and that the yellow/green conductor of the power supply cable is connected to the earth pin.

The capacity of the overload cutout switch or fuses installed in series with the power supply must be equivalent to the absorbed current I1 of the machine.

Any extension cords must be sized appropriately for the absorbed current I1.

3.1 START-UP

Only skilled personnel should install the machine. All connections must be carried out according to current regulations, and in full observance of safety laws (regulation CEI 26-10 -CENELEC HD 427).

3.2 DESCRIPTION OF THE EQUIPMENT



A - Procedure and mode selector switch

This push-button selects the welding procedure (MMA or TIG) and mode.

In TIG mode there will always be two LEDs lit: one indicating HF or striking start mode, and the other indicating continuous or pulse mode with 2- or 4-stage command. The selection



changes each time the button is pressed. The LEDs light alongside the various symbols to display your choice.

B - LED. MMA welding (Manual Metal Arc)

This machine can weld all types of covered electrodes* except for cellulosic.

In this position, only the knob $\ensuremath{\mathbf{O}}$ is enabled, to adjust the welding current.

LED. TIG welding with arc started without high frequency.

To light the arc, press the torch trigger and touch the tungsten electrode to the workpiece, then lift it. This move must be quick and decisive.

D - LED. TIG welding with arc started with high frequency.

To light the arc, press the torch trigger: a high voltage/frequency pilot spark will light the arc.

E - LED. Continuous 2-stage TIG welding (manual).

When the torch trigger is pressed, the current begins to increase over the previously set "slope up" time, until it reaches the value set by means of the knob **O**. When the trigger is released, the current begins to drop over the previously set "SLOPE DOWN" time, until it returns to zero.

In this position, you may connect the pedal control accessory ART. 193.

F - LED. Continuous 4-stage TIG welding (automatic).

This program differs from the previous one in that the arc is both started and shut off by pressing and releasing the torch trigger.

G - LED. Continuous TIG welding with dual current level - 4 stages (automatic).

Set the two current levels before lighting the arc:

First level: press the **R** key until the LED **X** lights, and adjust the main current using the knob O.

Second level: press the R key until the LED W lights, and adjust the main current using the knob O.

When the torch trigger is pressed, the current begins to increase over the previously set "slope up" time (led S lit), until it reaches the value set by means of the knob **O**. The LED X lights and appears on the display P.

Should it be necessary to reduce the current during welding, without shutting of the arc (for instance when changing the welding material or working position, moving from horizontal to upright, etc....), press and immediately release the torch trigger: the current will switch to the second value selected, the LED W will light and X will go off.

To return to the previous main current, press and release the torch trigger once again. The LED X will light, and the LED W will go off. To stop welding at any time, simply hold down the torch trigger for more than 0.7 seconds, then release. The current begins to fall to zero within the previously set "slope down" time interval (LED U lit).

If you press and immediately release the torch trigger during the "slope down" phase, you will return to "slope up" if it is set to greater than zero, or to the lesser current value of those set. NOTE: The expression "PRESS AND IMMEDIATELY RELEASE" refers to a maximum time of 0.5 seconds.

In the stage TIG welding (manual).

From a pulse frequency of 0.16 to 1.1Hz, the display P alternately shows the peak (main) current and the base current. The LEDs X and W light alternately; beyond 1.1Hz the display P shows the mean of the two currents, and the LEDs X and W both remain lit.

In this position, you may connect the pedal control accessory ART. 193.

I - LED. Pulsed 4-stage TIG welding (automatic).

This program differs from the previous one in that the arc is both started and shut off by pressing and releasing the torch trigger.

If / I I - LED. Pulsed TIG welding with dual current level - 4 stages (automatic).

The welding mode is the same as described for LED G. After adjusting the peak and base currents for the first level, the relationship between the two will also be upheld in the second level.

M - LED - THERMAL PROTECTION

Lights when the operator exceeds the duty cycle or percentage intermittence admissible for the machine, and simultaneously blocks the current output.

NOTE: In this condition the fan continues cooling the power source.

N - BLOCK LED (see 2.3.2)



O - KNOB Adjusts the welding current.

- adjust the second level of current W

-adjust the "slope up" S

may:

-adjust the "slope down" U

- adjust the pulse frequency T
- -adjust the post gas V

P - Display

Displays the welding current and the settings selected by means of the push-button R and adjusted via the knob O.

Q - SELECTOR

Selects and saves programs.

The welding machine can save nine welding programs P01.....P09, and call them up using this button. A working program PL is also available.

Selecting

When this push-button is pressed briefly, the display P shows the next program number after the one being worked on. If it has not been saved the message will flash, otherwise it will remain steady.

Saving

Once the program has been selected, hold for more than 3 seconds to save the data. In confirmation, the program number on the display P will stop flashing



R - SELECTOR

When this button is pressed, the LEDs light in succession:



S - LED

Slope up. This is the time in which the current, starting from the minimum, reaches the set current value. (0-10 sec.)

Warning: only those LEDs that refer to the chosen welding mode will light; i.e., in continuous TIG welding the LED T, representing the pulse frequency, will not light.

Each LED indicates the parameter that may be adjusted by means of the knob O while the LED itself is lit. Five seconds after the last variation, the LED involved will shut off; the main welding current will be displayed, and the corresponding LED X lights.



X - LED Main welding current.

W - LED

current.

Second level of welding or base current. This current is always a percentage of the main



T - LED



Pulse frequency (0.16-250 Hz) The peak and base times are equal



U - LED

Slope down. This is the time in which the current reaches the minimum value and the arc shuts off. (0-10 sec.)

V - LED

Post gas. Adjusts the time gas flows after welding ends. (0-30 sec.)



Y - 10-PIN CONNECTOR

The following remote controls are connected to this connector: a) foot control

b) torch with start button

c) torch with potentiometer

d) torch with up/down, etc...



Z - 1/4 GAS FITTING

This is where the gas hose of the TIG welding torch is to be connected.



AA - Negative output terminal (-)



AB -Positive output terminal (+)



AC - switch Turns the machine on and off

AD - gas intake fitting



3.3. **GENERAL NOTES**

Before using this welding machine, carefully read the standards CEI 26/9 - CENELEC HD 407 and CEI 26.11 - CENE-LEC HD 433. Also make sure the insulation of the cables, electrode clamps, sockets and plugs are intact, and that the size and length of the welding cables are compatible with the current used.

3.4 MMA WELDING (MANUAL METAL ARC)

- This welding machine is suitable for welding all types of electrodes, with the exception of cellulosic (AWS 6010)*.

- Make sure that the switch AC is in position 0, then connect the welding cables, observing the polarity required by the manufacturer of the electrodes you will be using; also connect the clamp of the ground cable to the workpiece, as close to the weld as possible, making sure that there is good electrical contact.

- Do NOT touch the torch or electrode clamp simultaneously with the earth clamp.

- Turn the machine on using the switch AC.

- Select the MMA procedure by pressing the button A: LED B lit.

- Adjust the current based on the diameter of the electrode, the welding position and the type of joint to be made.

- Always remember to shut off the machine and remove the electrode from the clamp after welding.

3.5 **TIG WELDING**

This welding machine is suitable for welding stainless steel, iron, or copper using the TIG procedure.

Connect the earth cable connector to the positive pole (+) of the welding machine, and the clamp to the workpiece as close as possible to the welding point, making sure there is good electrical contact.

Connect the power connector of the TIG torch to the negative pole (-) of the welding machine.

Connect the torch connector to the welding machine connector Y.

Connect the torch gas hose fitting to the fitting Z on the machine, and the gas hose from the cylinder pressure regulator to the gas fitting AD on the rear panel.

Turn on the machine.

Do not touch live parts and output terminals while the machine is powered.

The first time the machine is turned on, select the mode using the push-button A and the welding parameters by means of the key **R** and the knob **O** as described in paragraph 3.2.

The flow of inert gas must be set to a value (in liters per minute) approximately 6 times the diameter of the electrode.

If you are using gas-lens type accessories, the gas throughput may be reduced to approximately 3 times the diameter of the electrode. The diameter of the ceramic nozzle must be 4 to 6 times the diameter of the electrode.

The most commonly used gas is normally ARGON, because it is less costly than other inert gases, but you may also use blends of ARGON with a maximum of 2% HYDROGEN for welding stainless steel, and HELIUM or ARGON-HELIUM blends for welding copper. These blends increase the heat of the arc while welding, but are much more expensive.

If you are using HELIUM gas, increase the liters per minute

to 10 times the diameter of the electrode (Ex. diameter 1.6 x10= 16 lt./min of Helium).

Use D.I.N. 10 protective glasses for up to 75A, and D.I.N. 11 from 75A up.

3.6. SAVING

You may save parameters only after welding. Pressing the push-button Q briefly makes a selection; held down for more than 3 seconds, it saves the data. Each time it is turned on, the machine always shows the last welding condition used.

3.6.1. Saving data from the PL program Using the machine for the first time

When the machine is turned on, the display shows the symbol **PL**; this disappears after 5 seconds, and a working current is displayed. Follow the instructions in paragraphs 3.2 and 3.5, then proceed as follows to save the data in the program **P01**:

• Briefly press the push-button **Q** (mem+mem-) the message **P01** will appear flashing.

Press push-button Q for more than 3 seconds, until the symbol P01 stops flashing: at this point, the data have been saved.
Obviously, if you wish to save in a program other than P01, you should briefly press the push-button Q as many times as necessary to display the desired program. P01 will be displayed the next time the machine is turned on.

PRESSING THE Q PUSH-BUTTON BRIEFLY MAKES A SELECTION, WHILE HOLDING IT DOWN FOR MORE THAN 3 SECONDS SAVES THE DATA.

3.6.2. Save from a free program

The operator may edit and save a selected program by proceeding as follows:

 \cdot Press the push-button ${\bf Q}$ briefly and select the desired program number.

• The symbol of free programs is flashing.

 \cdot Press the push-button **A** and select the welding procedure and mode (paragraph 3.1).

· Turn the knob **O** and set the welding current.

· If the TIG procedure has been selected, activate the LED V (post gas) by means of the push-button R, and set the desired value via the knob O (paragraph 3.1.)

• If you wish to adjust the "slope" times or other parameters, after making these adjustments which are **necessary in order to weld**, follow the steps described in paragraph 3.1.

Weld, even briefly, and decide where to save

To save in the previously selected program, press the button Q for more than 3 seconds, until the number stops flashing.
To save in a different program, make your selection by briefly pressing the push-button Q, then hold down the push-button Q for more than 3 seconds.

3.6.3 Save from a saved program

Beginning with a previously saved program, the operator may edit the data in memory to update the program itself, or to find new parameters to save in another program.

3.6.3.1 Update

• After turning on the machine, select the parameters to be edited and edit them.

· Weld, even briefly.

 \cdot Hold down the ${\bf Q}$ button for more than 3 seconds, until the save is confirmed (program symbol changes from flashing to steady).

3.6.3.2 Save in a new program

• After turning on the machine, select the parameters to be edited and edit them.

· Weld, even briefly.

 \cdot Briefly press the selector ${\bf Q}$ until the desired program is displayed.

• Hold down the **Q** button until the save is confirmed (program symbol changes from flashing to steady).

4 REMOTE CONTROLS

The following remote controls may be connected to adjust the welding current for this welding machine:

Art. 193 Foot control (used in TIG welding)

Art (1268) TIG Torch with potentiometer.

Art (1266) TIG UP/DOWN Torch.

Art 1192+Art 187 (used in MMA welding)

ART. 1180 Connection to simultaneously connect the torch and the pedal control.

ART. 193 may be used in any TIG welding mode with this accessory.

Remote controls that include a potentiometer regulate the welding current from the minimum to the maximum current set via the knob O.

Remote controls with UP/DOWN logic regulate the welding current from the minimum to the maximum.

The remote control settings are always active in the **PL** program, while they are not active in a saved program.