

INSTRUCTION MANUAL FOR WIRE 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 WELDING 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 flammable 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 non-industrial environments.**

IN CASE OF MALFUNCTIONS, REQUEST ASSISTANCE FROM QUALIFIED PERSONNEL.

2 GENERAL DESCRIPTION

2.1 SPECIFICATIONS

This manual has been prepared for the purpose of educating personnel assigned to install, operate and service the welding machine.

This equipment is a constant-voltage power source, suitable for MIG/MAG and OPEN-ARC welding.

Upon receiving the machine, make sure there are no broken or damaged parts.

The purchaser should address any complaints for losses or damage to the vector. Please indicate the article and serial number whenever requesting information about the welding machine.

2.2 EXPLANATION OF TECHNICAL SPECIFICATIONS

EN 50199	The welding machine is manufactured according to these international standards.
EN60974.1	
N°	serial number, which must always be indicated on any type of request regarding the welding machine.
	three-phase transformer-rectifier.
	Flat characteristic.
MIG/MAG.	Suitable for continuous electrode welding.
I2 max	Unconventional welding current. This value represents the max. limit attainable in welding.
U0.	Secondary open-circuit voltage (peak V)
X.	Duty cycle percentage. The duty cycle expresses the percentage of 10 minutes during which the welding machine may run at a certain current without overheating.
I2.	Welding current
U2.	Secondary voltage with welding current I2.
U1.	Rated supply voltage
3~ 50/60Hz	50- or 60-Hz three-phase power supply.
I1 max	Maximum absorbed current value.
I1 eff	This is the maximum value of the actual current absorbed, considering the duty cycle.
IP21	Protection rating for the housing. Grade 1 as the second digit means that this equipment is suitable for use outdoors in the rain.
	Suitable for use in high-risk environments.

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

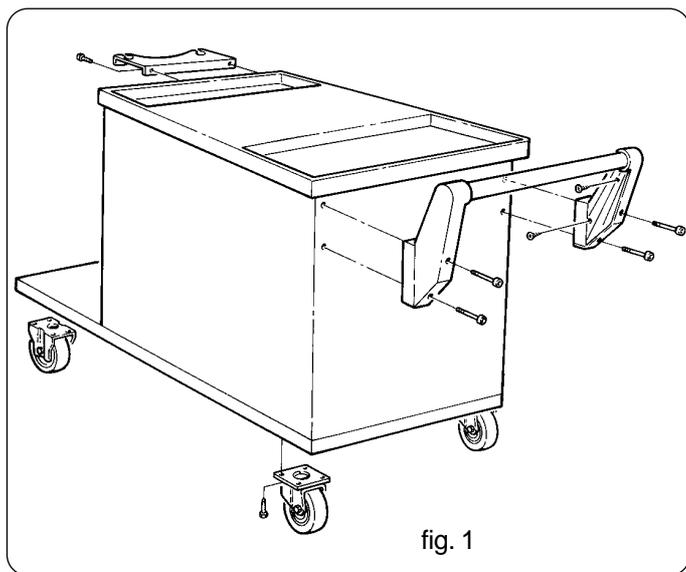
3 INSTALLATION

- Only skilled personnel should install the machine .
- All connections must be carried out according to current regulations, and in full observance of safety laws.

3.1 PLACEMENT

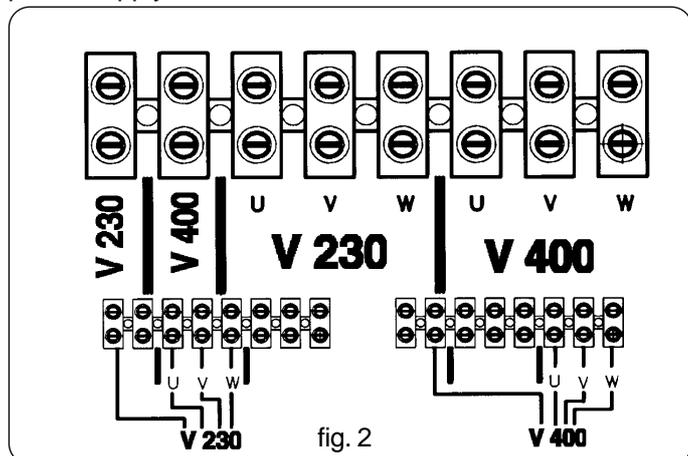
Place the welding machine in a ventilated area. Dust, dirt, and any other foreign matter entering the welding machine can interfere with ventilation and thus with smooth operation.

Mount the handle, wheels, and cylinder support.



3.2 INTERNAL CONNECTIONS

- Before working inside the welding machine, make sure that the plug is disconnected from the power mains.
- After final inspection, the welding machine is connected to the voltage indicated on the power supply cable.
- To change the supply voltage, remove the right side panel and arrange the voltage change terminal board connections as shown in the figure.
- Do not use the welding machine without its cover or side panels for obvious safety reasons, and to avoid altering the cooling conditions for internal components.
- Connect a plug suitable for the absorbed current to the power supply cable.



- Connect the yellow-green wire of the machine mains to an efficient grounding socket.

3.3 EXTERNAL CONNECTIONS

3.3.1 Connecting the mass clip.

- - Connect the earth cable terminal to the socket of the welding machine, and connect the earth clamp to the workpiece.

3.3.2 Connecting the gas hose.

- The gas cylinder must be equipped with a pressure regulator and flow gauge.
- Connect the gas hose leaving the rear of the machine, only after positioning the cylinder.
- Adjust the flow gauge to 8-10 liters/minute.

4 DESCRIPTION OF CONTROLS

4.1 CONTROLS ON THE FRONT PANEL OF THE MACHINE

A - Selector switch

Turns the machine on and off, and serves to adjust the welding voltage range.

B - Selector switch

Fine-tunes the welding voltage within the range selected via the selector switch A.

C - - Earth socket

Socket for connecting the mass terminal of the machine.

D - Central fitting

This is where the welding torch is to be connected.

E - Mode key.

When the key E is pressed, the LEDs F-G-H-I-L light in sequence

F - LED - 2-stage continuous manual mode

The machine begins welding when the trigger is pressed, and stops when it is released.

G - LED - 4 -stage continuous automatic mode

To begin welding, press the torch trigger; you may release the trigger once the procedure has begun.

Press and release the trigger again to stop welding. This setting is suitable for long-term welding, where the welder may tire of holding down the torch trigger.

H - LED - Signals that spot welding mode is activated

The machine begins welding when the trigger is pressed. The spot execution time is adjusted by means of the knob R; when this time has elapsed, the machine interrupts its cycle even if the trigger is pressed. To restart the cycle you must release the torch trigger, reposition the torch and press the trigger again.

I - LED. Indicates that 2-stage manual dash welding mode is activated

The machine begins welding when the torch trigger is pressed, and continues for the welding time set on the knob R, with a pause time set on the knob T. You must release the trigger to stop welding.

L - LED. Indicates that 4-stage automatic dash welding mode is activated

The machine begins welding when the torch trigger is pressed; you may release the trigger once welding has begun. The welding time and pause time are adjusted by the knobs R and T, respectively.

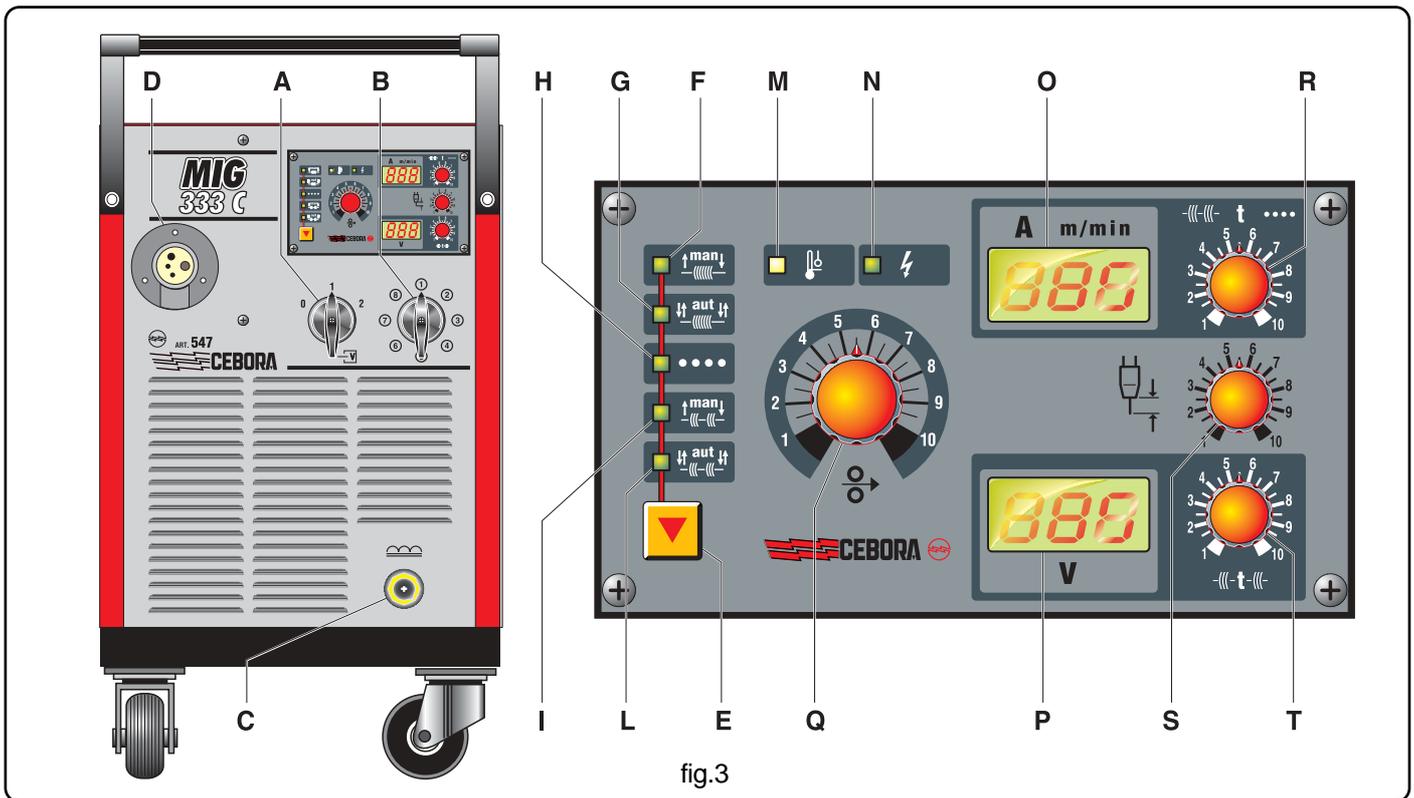


fig.3

To finish welding, press and release the torch trigger;

M - Yellow LED

Lights when the thermostat or safety button interrupt operation of the welding machine.

N - Green LED

Indicates that the welding machine is on.

O - Display

This instrument displays the welding current, the welding electrode speed in meters per minute, and the welding time for 2-stage manual and 4-stage automatic spot and dash welding functions.

The welding current remains in memory when you have finished welding.

P - Display

This instrument displays the welding voltage and pause time in the manual 2-stage and automatic 4-stage dash welding function. The welding voltage remains in the instrument's memory when you have finished welding.

Q - Setting knob

Adjusting this knob changes the welding wire speed. The value in meters per minute is shown on the display O, and remains saved there until welding begins.

R - Setting knob

This function is activated in the following modes: spot welding, 2-stage manual and 4-stage automatic dash welding.

This knob adjusts the spot welding time. The duration of the spot welding time is displayed on the instrument O, and may range from a minimum of 0.3 seconds to a maximum of 5 seconds. Once this time has been adjusted, the instrument O continues to display it for 5 seconds.

S - Setting knob

This knob adjusts the length of the wire protruding from the torch after welding ends : "BURN BACK".

T - Setting knob

This function is activated in the following modes: 2-stage manual and 4-stage automatic dash welding. This knob

adjusts the pause time between spot welds.

The duration of the spot welding time is displayed on the instrument P, and may range from a minimum of 0.3 seconds to a maximum of 5 seconds. Once this time has been adjusted, the instrument P continues to display it for 5 seconds.

5 WELDING

5.1 START-UP

- Make sure the wire diameter matches the diameter marked on the roller, and mount the wire coil.

5.2 THE MACHINE IS READY TO WELD.

- Connect the mass cable clip to the workpiece.
- Set the switch A to 1.
- Remove the tapered gas nozzle by turning it clockwise.
- Unscrew the contact tip.
- Press the torch trigger to move the wire forward until it comes out of the torch.

CAUTION: Keep your face away from the gun tube assembly while the wire is coming out.

- Screw the contact tip back on, making sure that the hole diameter is the same as that of the wire used.

Slide the tapered gas nozzle back on, again turning it clockwise.

- Open the gas cylinder and adjust the flow gauge to approximately 8/10 lt./min.

- Make sure that the gas used is compatible with the material to be welded.

5.3 WELDING CARBON STEEL.

In order to weld these materials you must:

- 1) Use a welding gas with a binary composition, usually AR/CO2 with percentages ranging from 75 to 80 % Argon

and 25 to 20 % CO₂, or ternary compositions such as AR/CO₂ /O₂ .

These gases create heat during welding, and the bead will be firmly embedded and attractive, while penetration will be relatively low.

Using carbon dioxide as a protection gas will give a narrow, penetrated bead, but the ionization of the gas will affect the stability of the arc.

2) Use a welding wire of the same quality as the steel to be welded.

It is best to always use good quality wires, avoiding welding with rusted wires that could cause welding defects.

Generally, wires may be used within the following current range: wire Ø x 100 = minimum Amp - wire Ø x 200 = maximum Amp

example: wire Ø 1.2 = minimum Amp 120/maximum Amp 240. This with AR/CO₂ binary blends and short-circuited transfer.

3) Avoid welding rusted parts, or those with oil or grease stains.

4) Use torches appropriate for the current being used.

5) Periodically check that the flaps of the mass clip have not been damaged, and that the welding cables (torch and mass) do not have any cuts or burns that would create a safety hazard.

5.4 WELDING STAINLESS STEEL

Series 300 stainless steels must be welded using a protection gas with a high Argon content, containing a small percentage of O₂ to stabilize the arc. The most widely used blend is AR/O₂ 98/2.

Do not touch the wire with your hands.

The welding materials must be better quality than the base material, and the welding area must be clean.

5.5 WELDING ALUMINUM

In order to weld aluminum you must use:

1) 100% Argon as the protection gas.

2) A welding wire with a composition suitable for the base material to be welded.

To weld ALUMAN and ANTICORODAL, use wire with a Silicon content of 3 to 5%.

To weld PERALUMAN and ERGAL, use wire containing 5% Magnesium.

3) A torch prepared for welding aluminum.

NOTE: If you only have a torch for steel wires, modify it as follows:

- Make sure that the cable is not longer than 3 meters (it is not recommended that you use longer torches).

-Remove the brass liner nut, the gas nozzle, and the contact tip, then remove the liner.

- Insert the Teflon liner for aluminum, making sure that it protrudes from both ends.

- Screw the contact tip back on so that the liner adheres tightly.

- In the free end of the liner, insert the liner nipples and the OR gasket, and fasten in place with the nut; do not fasten too tightly.

- Slide the brass tube onto the liner, and insert the entire assembly into the adapter (after first removing the iron tube inside the adapter).

- Cut the liner diagonally so that it is as close as possible

to the wire feeder roller.

The rollers must not be fully tightened.

5) Use contact tips suitable for aluminum, with the hole corresponding to the wire diameter to be used for welding.

6) Use mills and brushing machines specifically designed for aluminum, and never use them on other materials.

REMEMBER that clean equals quality

The wire coils must be stored in nylon bags containing a dehumidifying agent.

6 WELDING DEFECTS

- 1- DEFECT-CAUSES
Porosity (within or outside the bead)
 - Electrode defective (rusted surface)
 - Missing safety gas due to:
 - low gas flow
 - flow gauge defective
 - regulator frosted due to no preheating of the CO₂ protection gas
 - defective solenoid valve
 - contact tip clogged with sprays
 - gas outlet holes clogged
 - air drafts in welding area.
- 2- DEFECT-CAUSES
Shrinkage cracks
 - Wire or workpiece dirty or rusted.
 - Bead too small.
 - Bead too concave.
 - Bead too deeply penetrated.
- 3- DEFECT-CAUSES
Side cuts
 - Welding pass done too quickly
 - Low current and high arc voltages.
- 4- DEFECT-CAUSES
Excessive spraying
 - Voltage too high.
 - Insufficient inductance.
 - No preheating of the CO₂ protection gas

7 MAINTAINING THE SYSTEM

Safety gas nozzle . This nozzle must be periodically cleaned to remove sprayed metal. Replace if distorted or squashed.

Contact tip. Only a good contact between this contact tip and the wire can ensure a stable arc and optimum current output; you must therefore observe the following precautions:

A) The contact tip hole must be kept free of grime and oxidation (rust).

B) Sprayed metal sticks more easily after long welding sessions, blocking the wire flow. The tip must therefore be cleaned more often, and replaced if necessary.

C) The contact tip must always be firmly screwed onto the torch body. The thermal cycles to which the torch is subjected can cause it to loosen, thus heating the torch body and tip and causing the wire to advance unevenly.

Wire liner. This is an important part that must be checked often, because the wire may deposit copper dust or tiny shavings. Clean it periodically along with the gas lines, using dry compressed air.

The liners are subjected to constant wear and tear, and therefore must be replaced after a certain amount of time.

Gearmotor group. Periodically clean the set of feeder rollers, to remove any rust or metal residue left by the coils. You must periodically check the entire wire feeder group: hasp, wire guide rollers, liner and contact tip.

8 ERRORS DURING USE

MALFUNCTION	PROBABLE CAUSE	SOLUTION
Limited current delivery	Phase missing	Check the three phases of the line and/or the remote switch contacts
	Line fuse burnt	Replace the fuse
	Incorrect connection on the voltage change terminal board	Check the terminal board connections following the plate diagram
	Rectifier diode(s) burnt	Replace the rectifier
	Loose electrical torch power or mass connections	Tighten all connections
	Uneven contact in the voltage regulator selector switch	Change the selector switch
	Transformer wire broken on the selector switch	Unscrew the selector switch contact and peel the wire, being careful to remove only the insulation; then return it under the contact.
Welding metal splatters while welding	Welding parameters incorrectly set	Use the welding voltage and wire speed potentiometers to adjust
	Insufficient grounding connections	Check their efficiency
	Wire moves forward irregularly	Incorrect liner diameter
The wire does not advance, or advance jerkily	Wire feeder roller groove too wide	Replace the roller
	Liner jammed or clogged	Remove and clean
	Wire press roller is not tight	Tighten
	Coil support clutch too tight	Loosen the clutch by adjusting the setting screw
The wire jams and twists around the rollers and torch wire intake guide	Contact tip clogged	Replace
	Incorrect contact tip diameter	Replace
	Roller groove incorrectly aligned	Align
	Liner jammed or clogged	Remove and clean

NOTE: All tasks should be carried out only by skilled personnel.

Disconnect the power supply cable from the mains before working on the cables or opening the machine.

The machine is equipped with a safety thermostat that trips in case of overload. You must wait a few minutes after this intervention to allow the source to cool.

The table below lists the most common errors, causes and solutions.

9 REPAIRING THE WELDING MACHINES

Experience has shown that many fatal accidents are caused by poor repairs. That is why it is just as important to fully check a repaired welding machine as a new one.

This also protects manufacturers from being held liable for defects for which others are to blame.

9.1 Rules to follow for repairs

- After rewinding the transformer or inductances, the welding machine must pass the applied voltage tests described in table 2 of paragraph 6.1.3 of the standard EN 60974.1 (CEI 26.13). Compliance must be verified as specified in 6.1.3.
- If no rewinding has been carried out, a welding machine that has been cleaned and/or refurbished must pass an applied voltage test with test voltage values at 50% of those given in table 2 of 6.1.3. Compliance must be verified as specified in 6.1.3.
- After rewinding and/or replacing parts, the open-circuit voltage must not exceed the values listed in 10.1 of EN 60974.1.
- If the repairs are not performed by the manufacturer,

repaired welding machine in which any components have been replaced or altered must be marked in such a way as to identify who carried out the repairs.

- After making a repair, make sure to rearrange the wiring so that there is secure insulation between the primary and secondary sides of the machine. Do not allow wires to come into contact with moving parts or those that heat up during operation. Reassemble all of the clamps as they were on the original machine, to prevent an accidental connection between the primary and secondary circuits if a conductor should break or disconnect.