INSTRUCTION MANUAL FOR PLASMA CUTTER

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 instructions 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

This machine is a constant direct current power source, designed for cutting electrically conductive materials (metals and alloys) using the plasma arc procedure. The plasma gas may be air or nitrogen.

2.1 UNPACKING AND ASSEMBLY

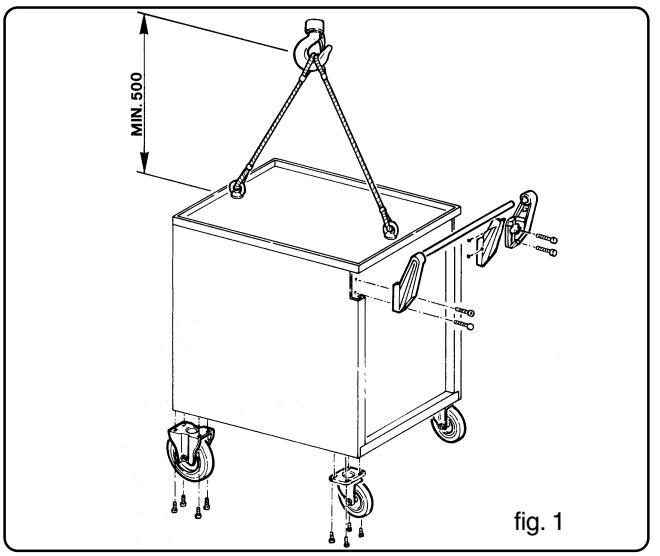


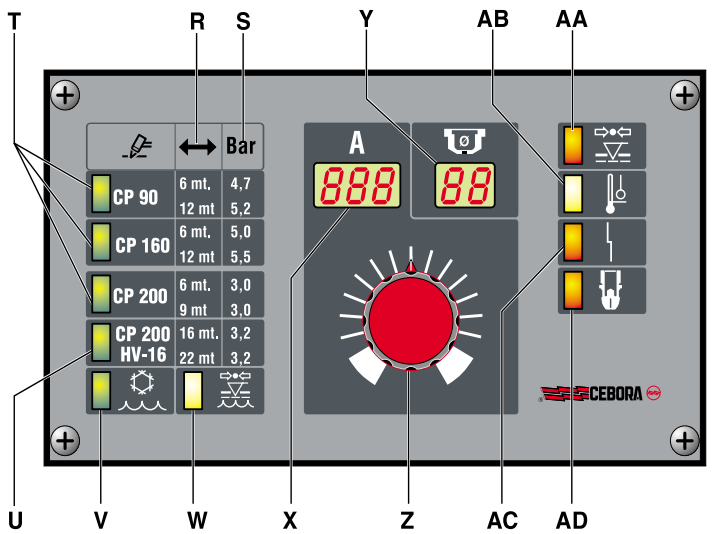
fig. 1

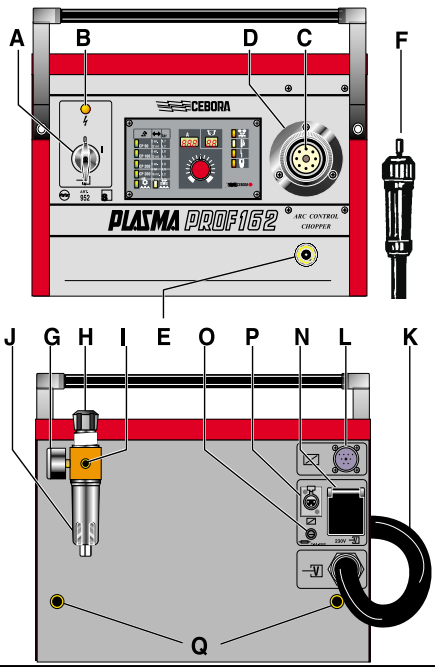
Open the upper part of the packing. Screw the two eyebolts, with the two Belleville washers, onto the machine. Use a lift to remove the machine from the packing. Mount the two pivoting casters on the front and the two fixed wheels on the back. Mount the handle, following the instructions shown in fig. 1. This handle must not be used to lift the machine.

2.2 DESCRIPTION OF THE EQUIPMENT (FIG. 2)

A) Function switch 0-1.
B) Mains power lamp.
C) Fixed torch fitting.
D) Torch fitting guard.
E) Grounding cable socket.
F) Mobile fitting.
G) Pressure gauge.
H) Knob to adjust the gas pressure.
I) Gas supply fitting (1/4" female gas threading).
J) Water trap.
K) Power cord.
L) Interface connector. (Upon request).
N) 230V socket to power the cooling unit.
O) Fuse (5A-250V-T).
P) Cooling unit connector.
Q) Cooling unit fastening points.
R) Max. distance between the power source and cutting point.

fig. 2





S) Gas intake pressure.
T) LED. Indicate the type of torch connected.
U) LED. Indicates that connection art. 1194 or art. 1194.10 is connected, plus the unit HV-16 art. 482, plus the torch CP200 art. 1235.
V) LED. Indicates that there is voltage at socket **N**.
W) LED. Indicates that the cooling unit is off, the water circuit pressure is too low, or that the connector **P** is not connected properly.
X) Display. Indicates the cutting current or error codes. (see par. 6).
Y) Display. Indicates the recommended nozzle hole diameter (not valid for a ø3 deseaming nozzle).
Z) Knob to adjust the cutting current.
AA) LED. Indicates that the gas pressure is too low.
AB) LED. Indicates that the thermostat is tripped.
AC) LED. Indicates that the machine is blocked for safety reasons.
AD) LED. Indicates that the electrode has run out.

2.3 EXPLANATION OF THE TECHNICAL SPECIFICATIONS LISTED ON THE MACHINE PLATE.

N°. Serial number; must be indicated on any type of request regarding the welding machine.
Downslope.
Suitable for plasma cutting.
TORCH TYPE Type of torch that may be used with this machine.
U0. Secondary open-circuit voltage (peak value)
X. Duty cycle percentage.
Expresses the percentage of 10 minutes during which the welding machine may run at a certain current without overheating.
I2. Cutting current
U2. Secondary voltage with welding current I2
U1. Rated supply voltage
3~ 50/60HZ 50- or 60-Hz three-phase power supply
I1. Absorbed current at the corresponding cutting current I2.
IP21. Protection rating for the housing
Grade 1 as the second digit means that this equipment is not suitable for use outdoors in the rain.
S Suitable for use in high-risk environments.
NOTES: The machine has also been designed for use in environments with a pollution rating of 3. (See IEC 664).

3 INSTALLATION

3.1 TORCH ASSEMBLY

This system is supplied without a torch, and is suitable for use only with CEBORA torches CP90, CP160 and CP200, both manual and automatic (straight).
After inserting the mobile fitting **F** in the guard **D**, insert it on the fixed fitting **C**, fully tightening the ring-nut of the fitting **F** to avoid air leaks that could interfere with smooth operation.
Be careful not to dent the contact pin, and not to bend the pins of the mobile fitting **F** .
Screw the guard **D** onto the panel.

3.2 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.
Connect the gas intake to the fitting I, making sure that the system is capable of providing the throughput and pressure required by the torch used.
If air is supplied by a compressed air cylinder, it must be equipped with a pressure regulator; **never connect a compressed air cylinder directly to the machine regulator. The pressure could exceed the regulator capacity, causing it to explode.**
Make sure that the supply voltage matches the one shown on the label applied to the power supply cable. Otherwise,

use the voltage change terminal board **AE** inside the machine (fig.3).

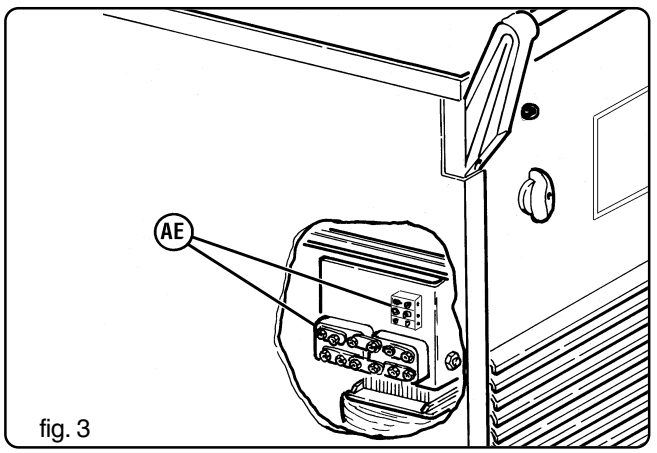


fig. 3

The machine is equipped with a function switch, thus:
A) If the machine is permanently connected to the power mains (without a plug), you must install a main switch of appropriate capacity in accordance with the rating plate.
B) If the machine is plugged in, use a plug with a capacity in accordance with the rating plate. In this case the plug must be used to disconnect the machine entirely from the mains, after first setting the switch **A** (fig. 2) to "O".
The yellow-green wire of the power supply cord must be connected to the earth terminal.
Any extension cords must be sized appropriately for the absorbed current **I1**, indicated on the rating plate.

3.3 DESCRIPTION OF PROTECTIVE DEVICES

Thermal cut-out:
Prevents overloads; located on the windings of the power transformer, and indicated by the LED **AB** (see fig.2).

Torch recognition:
Predisposes the power source to work with parameters suited to the type of torch connected.

Pneumatic:
Prevents the machine from working when the gas pressure is too low. Located on the torch power supply, and indicated by the LED **AA** (see fig.2). If the led flashes for 60', this means that the pressure was low for a brief time.

Hydraulic (for torch CP200 only).
Prevents the machine from working when the pressure of the coolant is too low.

Electrical:
1) located on the torch body, prevents hazardous voltages from being present on the torch when replacing the nozzle, diffuser, electrode or gas nozzle holder;
2) prevents the machine from running when the electrode is so worn that it must be replaced. The LED **AD** (fig.2) lights to indicate this function.
3) prevents the machine from running in hazardous conditions. The LED **AC** lights to indicate this function.
To ensure the efficiency of these safety devices:
- **Do not remove or short-circuit the safety devices.**
- **Use only original spare parts.**
- **Always replace any damaged parts of the machine or torch with original materials.**
- **Use only CEBORA torches type CP90, CP160 and CP200.**

4 USE

Before using the equipment, read the standards CEI 26/9 - CENELEC HD 407 and CEI 26.11 - CENELEC HD 433 carefully, and make sure all cable insulation is intact.

4.1 CUTTING

Turn on the machine using the knob **A**. This step will be confirmed when the pilot lamp **B** lights.
If the torch CP200 is connected, the LED **V** will flash for 15 seconds, during which time the machine will not work, to ensure that coolant is circulating in the pipes.
Press the torch trigger very briefly to open the gas flow.
Make sure that, in these conditions, the pressure reading on the pressure gauge **G** matches the values shown on the control panel; if not, adjust using the knob **H** of the pressure regulator, then lock the knob by pressing it downward.
Connect the grounding cable clamp to the workpiece, making sure that the clamp and workpiece have a good electrical contact, especially when using painted, oxidized, or insulated metal.
Do not connect the clamp to the part of the material that must be removed.
Use the knob **Z** to select the cutting current based on the thickness to be cut, following the guidelines below:

Aluminum:	3 ÷ 4 mm	40 ÷ 50A
	8 ÷ 10 mm	80 ÷ 90A
	15 ÷ 18 mm	110 ÷ 120A
	22 ÷ 25 mm	160A

Soft and stainless steel:

up to 5 mm	40 ÷ 50A
up to 20 mm	80 ÷ 90A
up to 30 mm	110 ÷ 120A
up to 40 mm	160A

The machine is equipped with constant cutting current regulation, thus the user may seek out the correct value based on the cutting conditions.
Current values higher than those indicated will not jeopardize smooth operation of the machine or torch, and at times may improve the cutting quality because they reduce dross along the edges of the workpiece.
With cutting currents from 20 to 50A and a ø 1 or 1.1 mm nozzle, you may rest the nozzle directly on the material to be cut.
In other conditions, you must use a dual-tip or spring spacer to avoid placing the nozzle in direct contact with the workpiece.
With a torch to be used in automatic mode, maintain a distance of approximately 4/5 mm between the nozzle and the workpiece.
Press the torch trigger to light the pilot arc.
If cutting does not begin after 2 seconds, the pilot arc will go out; press the trigger again to re-light it.
Hold the torch upright while cutting.
Once cutting is complete and you have released the trig-

ger, air will continue to escape from the torch to cool it.
It is recommended not to shut the machine off until this process is completed.
When cutting holes or beginning a cut in the center of the workpiece, you must hold the torch at an angle and straighten it slowly, so that molten metal is not sprayed onto the nozzle (see fig.4). This should be carried out when cutting holes in workpieces more than 3 mm thick.

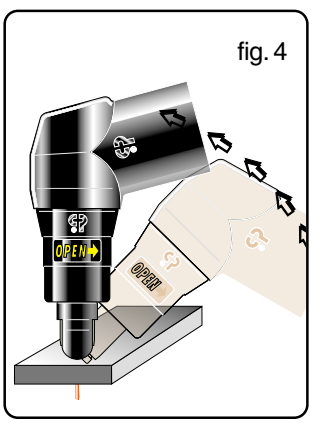


fig. 4

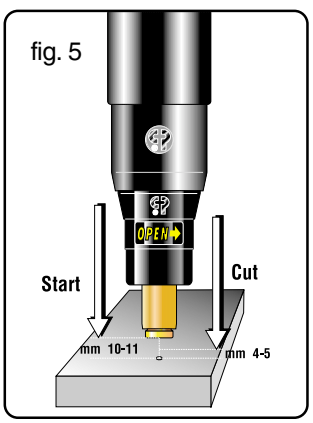


fig. 5

When working in automatic mode (see fig. 5), keep the nozzle 10-11 mm from the piece; if possible, move it to approximately 4-5 mm after making the hole. Do not cut holes in pieces more than 10-12 mm thick. For greater thicknesses, the material must be perforated before cutting.
When making large, circular cuts, we recommend using the special compass supplied upon request. It is important to remember that you must follow the starting technique described above when using the compass.
Do not keep the pilot arc lit in the air unnecessarily, to avoid unnecessary consumption of the electrode, diffuser and nozzle.
Shut off the machine when you have finished working.

4.2 GOUGING

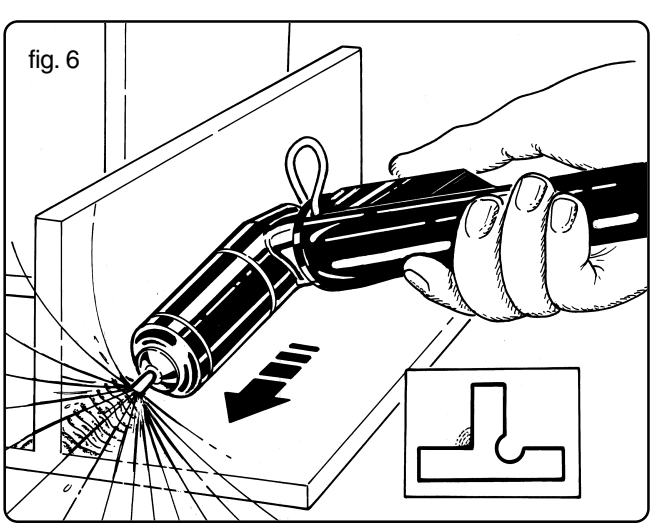


fig. 6

This operation allows you to remove defective welds, separate welded parts, prepare edges, etc.
To proceed, you must use the ø 3 mm nozzle.
The current value to be used ranges from 70 to 110A, based on the thickness and amount of material to be removed.
It must be carried out by holding the torch at an angle (fig.6), and moving towards the molten material so that the gas escaping from the torch pushes it away.
The torch angle in relation to the workpiece depends on the desired level of penetration. Since the molten dross produced by this procedure tends to stick to the gas nozzle holder and nozzle, clean them frequently to avoid problems (dual arc) that can destroy the nozzle in the space of a few seconds.
Considering the high level of radiation (infrared and ultraviolet) emitted during this procedure, we recommend that the operator and anyone else in the vicinity of the workplace follow adequate, careful protective measures.
Shut off the machine when you have finished working.

5 CUTTING ERRORS

5.1 INSUFFICIENT PENETRATION

This problem may be caused by:
• high speed:
Always make sure that the arc fully penetrates the workpiece, and is never angled forward by more than 10° - 15°. This will avoid incorrect consumption of the nozzle and burns on the gas nozzle holder.
• Workpiece too thick (see cutting speed/thickness diagram).
• Mass clip not in good electrical contact with the workpiece.
• Worn nozzle and electrode.
• Nozzle hole too large for the current value set on the knob F.
• Cutting current too low.
NOTE: When the arc does not penetrate, scraps of molten metal may damage the nozzle hole.

5.2 THE CUTTING ARC GOES OUT

This problem may be caused by:
• worn nozzle, electrode or diffuser
• air pressure too high
• supply voltage too low
• advancement speed too low.
• cutting current too high for the thickness of the workpiece.

5.3 SLANTED CUT

If the cut is slanted, shut off the machine and replace the nozzle.
Prevent the nozzle from coming into electrical contact with the workpiece (including via scraps of molten metal).
This will cause rapid at times instantaneous destruction of the nozzle hole, leading to very poor quality cutting.

5.4 EXCESSIVE WEAR ON CONSUMER PARTS

This problem may be caused by:
- gas pressure too low compared to the recommended value.
- gas supply circuit damaged.

6 ERROR CODES

In the event of a malfunction, the letter **E** may appear on the display **X**, followed by a number with the following meaning:

code	ERROR	SOLUTION
1	Hardware lockup.	Contact the technical service department.
2	Hardware lockup.	Contact the technical service department.
12	Transfer reed sensor closed during start-up.	Replace the reed.
13	Hazardous voltage on the torch.	Shut the machine off and turn it back on. If the error recurs, contact the technical service department.
51	Torch not recognized.	Check the type of torch. Use only original torches.
52	Start button pressed during start-up.	Open the start command,shut the machine off and turn it back on.
53	Start button pressed while resetting the pressure switch, which shows insufficient pressure, or thermal reset.	Open the start command, shut the machine off and turn it back on.
54	Short-circuit between electrode and nozzle.	Shut off the machine, check the electrode and the nozzle.
55	Electrode finished.	Shut off the machine, replace the electrode and the nozzle.

7 HELPFUL HINTS

• If the system air contains a considerable amount of moisture and oil, it is best to use a drying filter to avoid excessive oxidation and wear of the consumer parts, damaging the torch and reducing the cutting speed and quality.
• The impurities in the air may make it difficult to light the pilot arc. If this occurs, clean the end portion of the electrode and the interior of the nozzle using very fine-grained sandpaper.

8 ACCESSORIES

8.1 COOLING UNIT

When using the torch CP200, which requires water cooling, you must apply the cooling unit art. 1339 together with the kit art. 138.

8.2 INTERFACE ART. 197

This circuit allows the following functions on the 14-pin connector **L**:
A - Start.
B - Arc transferred signal.
C - Signal in proportion to the cutting voltage.
D - Cutting current adjustment.

8.3 UNIT HV - 16 ART. 482

When you need to cut at distances of more than 9 m from the power source, use the unit HV-16 with connection Art. 1194 (12 m) or Art. 1194.10 (18 m), plus the torch Art. 1235 (4 m).