

INSTRUCTION MANUAL



**WARNING:
BEFORE USING THE MACHINE READ THE
INSTRUCTION MANUAL CAREFULLY!**

SAFETY



ELECTRIC SHOCKS CAN BE FATAL.

- Electrical installation of the plasma cutting unit must be carried out by "EXPERT" personnel in accordance with ACCIDENT PREVENTION LAWS and STANDARDS.
- The plasma cutting unit should be connected only and exclusively to a power source with the neutral lead connected to earth.
- Ensure that the power outlet is correctly connected to the "EARTH PROTECTION".
- Avoid "DIRECT" contact with NON insulated parts of the "CUTTING CIRCUIT" (1).
- Always wear protective clothing and accessories e.g. gloves and insulated footwear.
- Keep protective clothing in good condition, free of dirt and tears.
- DO NOT use cables and torch with damaged insulation or loosened electrical connections.
- DO NOT use the unit in damp or wet environments, or in the rain.
- Disconnect power source before disassembly of the torch.
- Disconnect the machine from the power outlet during installation and when carrying out checks and maintenance.

NOTE (1)

The electrical circuit, which includes ALL CONDUCTING materials through which the cutting current passes.



THE RADIATION PRODUCED BY THE PLASMA ARC CAN DAMAGE THE EYES AND CAUSE SKIN BURNS.

- Always protect the eyes with adiabatic welding lenses, mounted on masks or helmets, shade: DIN 4-10, depending on the cutting method: contact or distance, and on the strength of the current.
- Wear protective clothing and avoid exposing the skin to the ultraviolet rays produced by the arc.
- Ensure that other personnel nearby are protected from the dangerous effects of the arc.



FUMES AND GASES CAN ENDANGER YOUR HEALTH.

- Ensure adequate circulation of the air by removing the fumes "near" the cutting arc; e.g. water surface or extraction benches.
- If the ventilation is insufficient to capture all the fumes and gases use individual respirators.

- Do not cut materials cleaned with chlorinated solvents or near such solvents; the action of the ultraviolet rays from the arc can cause the fumes to form toxic gases.
- Avoid cutting painted parts or parts with galvanised coatings or dirtied by lubricants; make sure the workpiece is properly cleaned before cutting.



NOISE CAN DAMAGE YOUR HEARING.

- The noise level produced by the cutting arc can exceed 85 dB(A).
- Check personal DAILY EXPOSURE to noise.
- Use appropriate personal protection devices if the allowed limits are exceeded.



FIRE AND EXPLOSIONS CAN BE STARTED BY SPARKS AND HOT SLAG.

- Do not cut on containers, receptacles or tubing that contain or have contained inflammable or combustible liquid or gaseous products.
- Within a radius of at least 10m of the cutting area, remove all combustible material including waste products (rags, cardboard etc.).
- Ensure that appropriate fire-fighting equipment is accessible in the cutting area.

GENERAL INFORMATION

PLASMA ARC AND BASIC PRINCIPLES FOR THE PERFORMANCE OF PLASMA CUTTING.

- Plasma is a gas that is heated to an extremely high temperature and ionised so that it becomes a conductor of electricity.
- This cutting procedure utilises the plasma to transfer the electric arc to the metal workpiece, which is melted by the heat and then separated.
- The torch uses compressed air from a single source, for both the plasma and cooling and protective gas.
- The start of the cycle is determined by an arc, called the pilot arc, which is struck between the mobile electrode (-ve polarity) and the torch nozzle (+ve polarity) due to the short circuit between these two elements.
- When the torch is brought into direct contact with the workpiece to be cut (connected to the +ve polarity of the power source) the pilot arc is transferred between the electrode and the workpiece itself thus striking a plasma arc, also called cutting arc.
- The duration of the pilot arc is set in the factory at 2 sec; if the transfer has not been made within this time, the cycle is automatically stopped except for the cooling air which is kept on.
- To recommence the cycle, the torch button must be released and pressed again.

UNIT COMPOSITION.

The plasma cutting system includes:

- POWER SOURCE PLASMA complete with:
 - Mains cable
 - Kit of connectors for compressed air
 - Earth cable with clamp
 - Plasma cutting torch

PLASMA CUTTING POWER SOURCE PLASMA

- Electric protection	:	Class I
- Case protection degree	:	IP 23
- Insulation class	:	H
- Dimensions (mm)	:	475x170x340

INPUT

POWER VOLTAGE 1ph+PE - 50/60 Hz / 115±15%		
Duty Cycle	%	35
Absorbed current RMS	A	22
Power	kW	2
Power factor	cosφ	0,79
Delayed fuses	A	15

OUTPUT

NO LOAD VOLTAGE: 460V		
Duty Cycle	%	35
Rated cutting voltage	V	86
Rated cutting current	A	15
Cutting capacity (carbon steel)	mm	4

MASS OF MACHINE (Table 1)

MANUAL TORCH FOR PLASMA CUTTING (supplied as standard)

- Gas used : dry compressed air
- Compressed air pressure : 2,5 bar
- Total air flow rate (for Plasma and cooling): 30 litres / min
- Arc striking system : contact between mobile electrode and nozzle
- Cutting current : 7 ÷ 25 A
- Weight (kg) : 1kg

WARNING !

SAFETY OF PLASMA CUTTING SYSTEM.

Only the type of torch and its relative connection to the power source indicated in the "TECHNICAL DATA" ensure the efficacy of the safety measures adopted by the manufacturer (interlocking system).

- **DO NOT USE** torches and relative consumables different from original ones.
- **DO NOT TRY TO FIT** torches for cutting or welding procedures to this power source, if they are not described in these instructions.
- **IF THESE RULES ARE NOT OBSERVED** serious dangers may occur both to the user and to the machine.

INSTALLATION

POWER SUPPLY CONNECTION

The machine must be connected to a Line-Neutral system with a "PE" protected grounding wire.

Check that the relevant socket terminal is actually connected to the distribution system grounding.

TAB.1

CONNECTION TO GROUND CABLE

Connect the work cable clamp to the piece to be cut or to the metallic workbench. Take following precautions:

- verify that there is a good electric contact particularly if insulated or oxidated coated sheets are cut.
- make ground connection as close as possible to cutting area.
- the use of metallic structures which are not part of the workpiece, such as the return cable of the cutting current, may endanger the safety system and give poor cutting results.
- do not make a ground connection on the piece which has to be removed.

WARNING !

Before starting with cutting operations verify that the parts are properly assembled by inspecting the head of the torch as

shown on paragraph "TORCH MAINTENANCE".

LOCATION AND HANDLING OF POWER SOURCE

- Choose location verifying that there is a good air flow and no dust, smoke or gas is present.
- Make sure that obstacles do not prevent the cooling air flow out of front and rear openings of the machine.
- Arrange on a level surface an open space of at least 500 mm. around the machine.
- In case the machine has to be moved always disconnect the plug from the outlet and gather the cables and pipes so as not to damage them.
- Check for the belt to be set in the correct position for lifting the machine (Fig. L).

WARNING !

Air with considerable quantities of humidity or oil may cause an excessive wear of the parts or even damage the torch.

CONTROL, WARNING AND SAFETY DEVICES.

POWER SOURCE

Figure (B-C) See drawing of back and front panel

1. GENERAL SWITCH O - I. (Fig.C-1)

In position **I** (ON) the machine is ready for functioning green signal light and green led (Fig.B-6) indicating mains ON are lit.

Control and duty circuits are fed but there is **no voltage in the torch (STANDBY)**.

In position **0** (OFF) any functioning is inhibited, control devices and warnings light are off.

2. CUTTING CURRENT POTENTIOMETER (Fig. B-D)

It allows to set the intensity of cutting current supplied by the machine according to the use (thickness of material/speed). See TECHNICAL DATA for proper relation of intermittence on/stand by to be adopted according to selected range. (period = 10 min.).

Tab.2 shows the cutting rate as a function of thickness for materials in aluminium, iron and steel at a maximum current of 25A.

3. ENERGIZED TORCH (YELLOW SIGNAL LIGHT). (Fig.B-3)

- **When lit it shows that cutting circuit has been activated: Pilot arc or cutting arc "ON"**.
- It is usually off (disengaged cutting circuit) with non activated torch button (stand by).
- It is off, **with torch button pushed**, under following conditions:
 - During POSTGAS (>30s) phases.
 - If the pilot arc is not moved to the part within max. 2 seconds.
 - If the cutting arc interrupts because it is too far from the torch-part, or the electrode is worn out, or the torch has been forced away from the part.
 - In presence of a SECURITY system.

4. THERMAL CUTOFF AND ABNORMAL VOLTAGE

(YELLOW LED for general warning) (Fig.B-4)

- When lit, it signals overheating of some component in the power circuit, or abnormal input voltage of the power supply (undervoltage or voltage surge)
- During this phase machine operation is disabled.
- Reset is automatic (the YELLOW led goes off) 4 sec after the abnormal value (as described above) returns within the permitted limits.

5. COMPRESSOR THERMAL SAFETY (RED warning LED - Fig. B-5)

When lit, it signals overheating of electric motor wiring inside arc compressor

6. RATING PLATE (Fig. I)

a Utilisation data (cutting circuit).

- 1- No load voltage (U_1).
- 2- Cutting current-voltage (I_c/U_2)
- 3- Duty cycle (X) in use.

b Main power supply data.

- 4- Number of phases and mains frequency 50/60 Hz.
- 5- Mains voltage (U_1).
- 6- Maximum RMS current absorbed I_{1max} and nominal RMS current absorbed I_{1nom} .

c General information

- 7- Level of protection for sheathing

- 8- Symbol for apparatus suitable for environments with increased risk of electric shock
- 9- Symbol for type of process
- 10- Energy conversion chart
- 11- Standards of reference
- 12- Apparatus identification
- 13- Name of manufacturer
- 14- Range of cutting current (min/max) and corresponding conventional arc voltage.
- 15- Manufacturer's serial number
- 16- Value of delayed action fuses to be used to protect the power line.
- 17- Symbols referring to safety standards

TORCH

- The torch button is the only control device which can start and stop cutting operations.
- When button is released the cycle is immediately and always stopped with the exception of cooling air (post-air).
- **Accidental manoeuvres:** in order to start cycle button must be pushed at least 2s .

CUTTING OPERATIONS PRELIMINARIES.

- **Check and follow instructions as foreseen in the paragraphs 1 SAFETY and 2 INSTALLATION** of the present instruction manual.
- Close (bring to position I) automatic mains switch and general machine switch in sequence.
- Choose, by turning the cutting current potentiometer, the most suitable position to the work to be performed.
- Push and release torch button causing air outflow ($\geq 20s$ post air).
- Let air outflow terminate spontaneously to facilitate removal of condense which settled on the torch.

CUTTING

Cutting mode:
WITH THE TORCH it is necessary to work with the NOZZLE IN CONTACT.

WARNING!

Making an unprepared contact cut will cause rapid wear of the torch nozzle. Bring the torch nozzle near the edge of the workpiece (= 3 mm.), press the torch button; after approx. 2 seconds (pre-air) the pilot arc is struck (max duration 2 seconds). If the distance is correct, the pilot arc immediately transfers to the workpiece causing the cutting arc to be struck. Move the torch on the surface of the workpiece making steady progress along the ideal cutting line. Adjust the cutting speed according to the thickness and the selected current, and check that the arc coming out of the lower surface of the workpiece has an inclination of 5-10° to the vertical in the opposite direction to the cutting direction.

Figure (E) the drawing shows torch position on part moving forward, arc tilting

- The removal of the torch from the piece or the absence of material (end cut) causes the immediate interruption of the arc.
- Interruption of arc (cutting or pilot) is obtained by releasing torch button.
- Piercing: If you have to make this operation or if you have to start from the center of the piece, ignite keeping the torch tilted and bring it to an upright position with a smooth movement.
- This procedure avoids that returns of arc or melted parts spoil the hole of the nozzle reducing its functionality.

Figure (F) the drawing shows the starting with tilted torch

- This procedure prevents arc or melted particles to come back thus spoiling the nozzle hole and reducing its functionality quickly.
- Piercing of parts with a thickness of 25 % of max. usable foreseen, may be carried out directly.

COMMONEST CUTTING FAULTS

During cutting operations performance faults may arise which are not caused by plant malfunctioning but by other operational faults such as:

- a Insufficient penetration or excessive scoria settlement:
 - too high cutting speed,
 - torch is too tilted,
 - piece is too thick,
 - electrode and nozzle are worn out.
- b Interruption of cutting arc:

- cutting speed too low.
- excessive distance between torch and piece,
- electrode is worn out,
- intervention of the protections
- c Tilted cutting (not perpendicular)
 - torch position not correct
 - asymmetric wear of nozzle hole and/or wrong assemblage of torch parts.
- d Excessive wear of nozzle and electrode:
 - air pressure too low,
 - contaminated air (humidity-oil),
 - nozzle holder damaged,
 - excessive pilot arc ignitions in the air.

MAINTENANCE

WARNING!

NEVER ACCESS INSIDE THE MACHINE (PANEL REMOVAL) OR TOUCH THE TORCH (DISASSEMBLAGE) WITHOUT HAVING DISCONNECTED POWER PLUG. ANY INSPECTION PERFORMED UNDER VOLTAGE INSIDE THE MACHINE OR INSIDE THE TORCH MAY CAUSE SEVERE ELECTRIC SHOCKS CAUSED BY DIRECT CONTACT WITH PARTS UNDER VOLTAGE:

TORCH

Periodically, according to its use or to cutting faults (see Paragraph 5) verify wear of the parts connected to plasma arc:

1. NOZZLE HOLDER (Figure G-1)

Unscrew manually from head of the torch. Clean thoroughly and replace if damaged (burns, distortions or cracks). Verify integrity of superior metal sector (actuator torch safety).

2. NOZZLE (Figure G-2)

Check wear of plasma arc hole and of inner and outer surfaces.

If the hole is widened compared to its original width or if it is damaged, replace nozzle. If surfaces are particularly oxidated clean them with extra fine abrasive paper.

3. AIR DISTRIBUTION RING (Figure G-3)

Verify there are no burns or cracks or that airflow holes are not obstructed. If damaged, replace immediately.

4. ELECTRODE (Figure G-4)

Replace electrode when crater settling on emitting surface is about 1,5 mm.

Figure (G) drawing shows exploded view of torch

Figure (H) drawing shows electrode with crater

WARNING!

- Before making any operation to the torch let it cool at least all along the "postgas" period.
- Except for particular cases it is advisable to replace electrode and nozzle AT THE SAME TIME.
- Respect assembly order of torch parts (reserved compared to disassemblage) Fig.G.
- Be careful that distributing is assembled properly.
- Reassemble nozzle holders screwing tightly and manually.
- Never assemble nozzle holder without having assembled electrode distributing ring and nozzle beforehand.
- **Timely and appropriate control procedures on torch parts are essential for safety and functionality of the cutting system.**

TORCH BODY, HANDLE AND CABLE.

- These parts usually need no particular maintenance with the exception of a periodic inspection and an accurate cleaning to be made WITHOUT THE USE OF SOLVENTS. In case of damages to the insulation such as breaks, cracks and burns or even a loosening of electric conductors, the torch CANNOT BE USED FURTHER SINCE SAFETY CONDITIONS HAVE NOT BEEN RESPECTED. IN THIS CASE, REPAIRING (EXTRAORDINARY MAINTENANCE) CANNOT BE MADE ON SITE BUT NEEDS TO BE DELEGATED TO AN AUTHORIZED SERVICE CENTER TO MAKE SPECIAL TEST TRIALS AFTER REPAIRING HAS BEEN EXECUTED.
- In order to keep the torch and cable efficient it is necessary to follow these precautions:
 - DO NOT touch torch and cable with warm or hot parts.
 - DO NOT strain the cable.
 - DO NOT move the cable on sharp edges or abrasive surfaces.
 - Gather the cable in regular coils if it is too long.
 - DO NOT step on the cable.

FIG. A

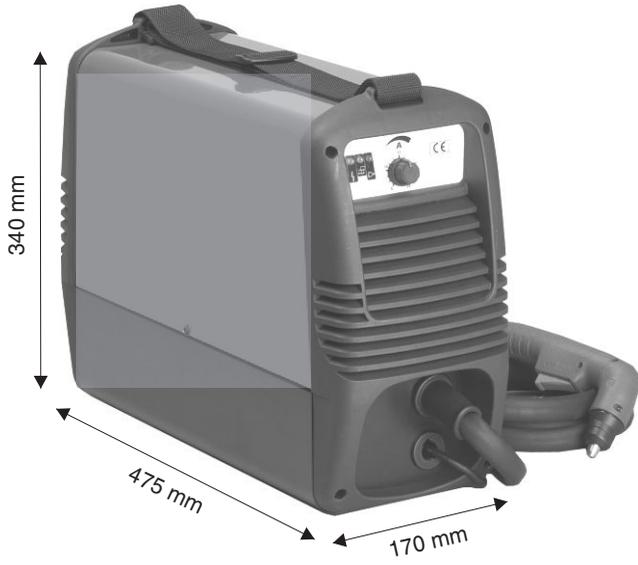


FIG.B



FIG.C



FIG.D

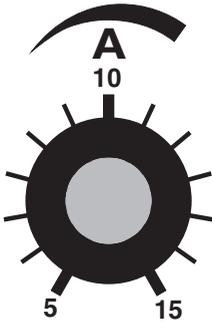


FIG.E

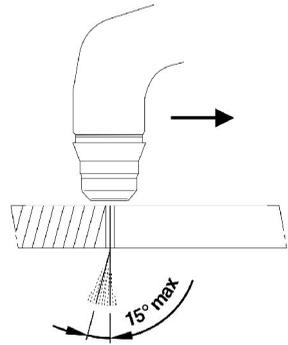


FIG.F

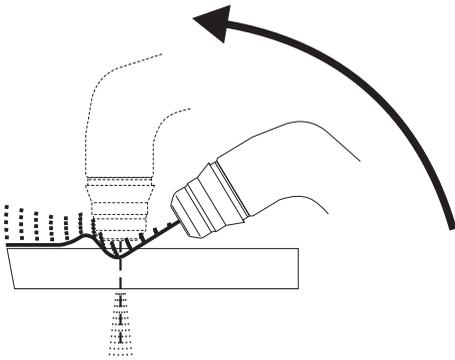


FIG.G

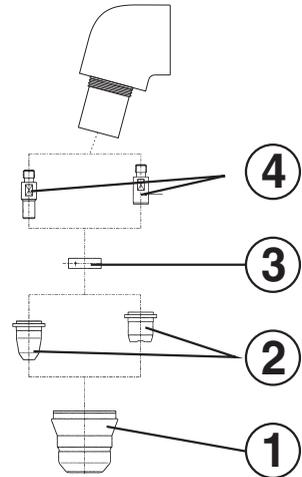


FIG.H

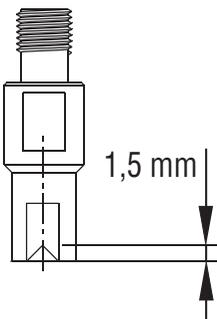


FIG.I

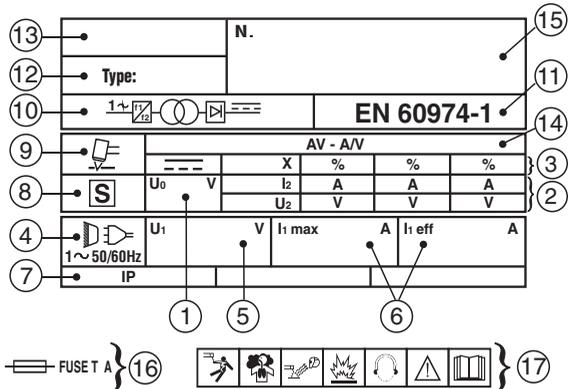
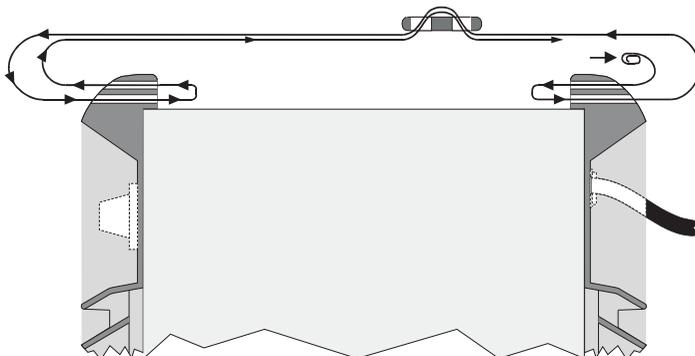


FIG.L

ATTENTION

: Please make sure that the connection between the belt and the hook follows this scheme.

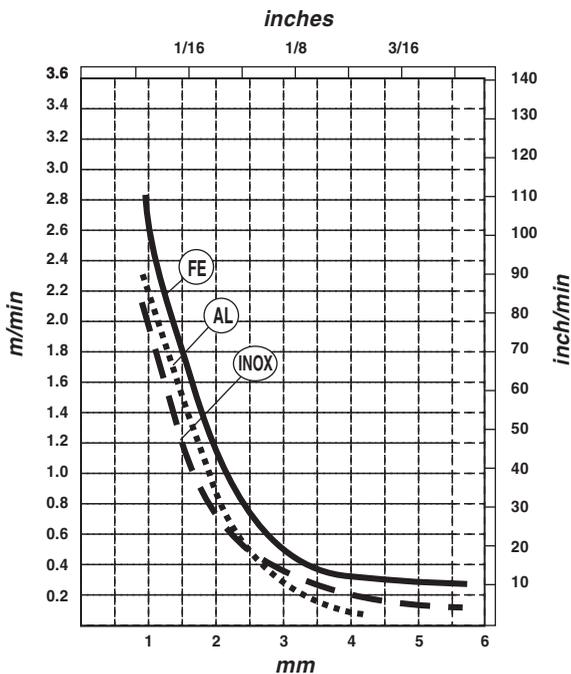


TAB.1

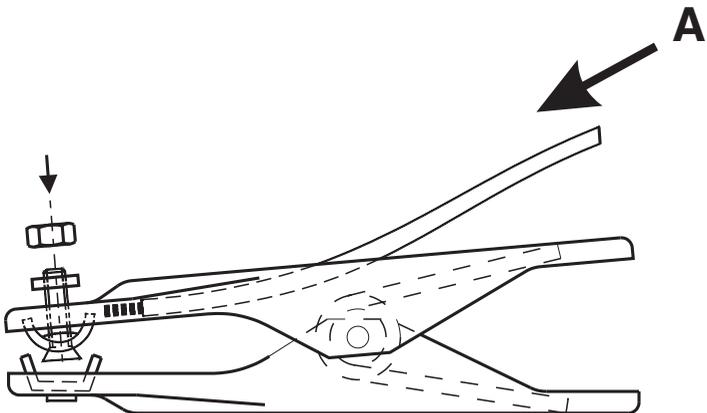
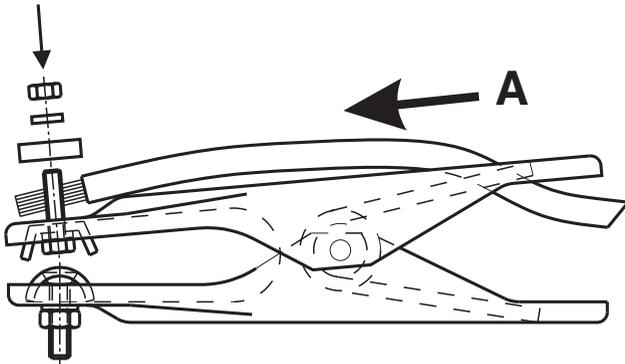
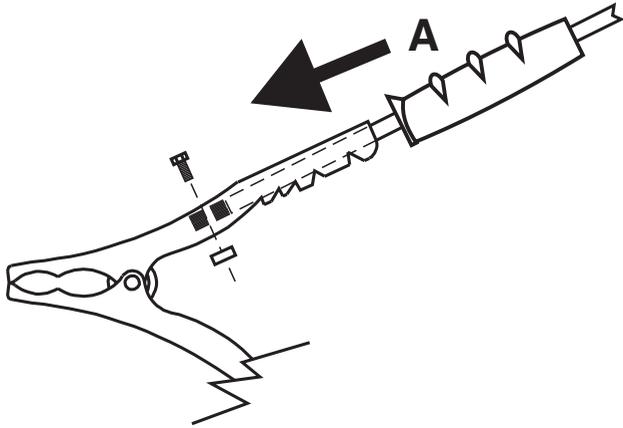
				
I_2 max	230V	230V	mm ²	Kg
15A	T15A	15A	6	12,5

TAB.2

Cutting rate diagram
($I_2 = 15A$)



ASSEMBLING CLAMPS



GUARANTEE

The Manufacturer warrants the good working of the machines and takes the engagement to perform free of charge the replacement of the pieces which should result faulty for bad quality of the material or of defects of construction within 12 MONTHS from the date of starting of the machine, proved on the certificate. The inconvenients coming from bad utilization, tamperings or carelessness are excluded from the guarantee, while all responsibility is refused for all direct or indirect damages. Certificate of guarantee is valid only if a fiscal bill or a delivery note go with it.

CERTIFICATE OF GUARANTEE

Date of buying:

MOD.:

.....

NR.:

.....

.....

Sales company

(Name and Signature)



CERTIFICATE OF CONFORMITY

We hereby state that the product is in compliance with:

DIRECTIVE

LDV 73/23 EEC + Amdt

STANDARD

EN 60974-1 + Amdt.

DIRECTIVE

EMC 89/336 + Amdt

STANDARD

EN 50199 + Amdt.
