



### 1.1 INTRODUCTION

Make sure this manual is carefully read and understood by the welder, and by the maintenance and technical workers.



### 1.2 PERSONAL PROTECTION

Welding processes of any kind can be dangerous not only to the operator but to any person situated near the equipment, if safety and operating rules are not strictly observed.



**Arc rays can injure your eyes and burn your skin. The welding arc produces very bright ultra violet and infra red light. These arc rays will damage your eyes and burn your skin if you are not properly protected.**

- Wear closed, non-flammable protective clothing, without pockets or turned up trousers, gloves and shoes with insulating sole and steel toe. Avoid oily greasy clothing.
- Wear a non-flammable welding helmet with appropriate filter lenses designed so as to shield the neck and the face, also on the sides. Keep protective lens clean and replace them when broken, cracked or spattered. Position a transparent glass between lens and welding area.
- Weld in a closed area that does not open into other working areas.
- Never look at the arc without correct protection to the eyes. Wear safety glasses with the side shields to protect from flying particles.



**Gases and fumes produced during the welding process can be dangerous and hazardous to your health.**

- Adequate local exhaust ventilation must be used in the area. It should be provided through a mobile hood or through a built-in system on the workbench that provides exhaust ventilation from the sides, the front and below, but not from above the bench so as to avoid raising dust and fumes. Local exhaust ventilation must be provided together with adequate general ventilation and air circulation, particularly when work is done in a confined space.
- Welding process must be performed on metal surfaces thoroughly cleaned from rust or paint, to avoid production of harmful fumes. The parts degreased with a solvent must be dried before welding.
- Be very carefull when welding any metals which may contain one or more of the follwing:  
Antimony    Beryllium    Cobalt    Manganese    Selenium    Arsenic    C    a    d    -  
mium    Copper    Mercury    Silver    Barium    Chromium    Lead    Nickel  
Vanadium
- Remove all chlorinated solvents from the welding area before welding. Certain chlorinated solvents decompose when exposed to ultraviolet radiation to form phosgene gas (nerve gas).



### 1.3 FIRE PREVENTION

**Fire and explosion can be caused by hot slag, sparks or the welding arc.**

- Keep an approved fire extinguisher of the proper size and type in the working area. Inspect it regularly to ensure that it is in proper working order;
- Remove all combustible materials from the working area. If you can not remove them, protect them with fire-proof covers;
- Ventilate welding work areas adequately. Maintain sufficient air flow to prevent accumulation of explosive or toxic concentrations of gases;
- Do not weld on containers that may have held combustibles;
- Always check welding area to make sure it is free of sparks, slag or glowing metal and flames;
- The work area must have a fireproof floor;



### 1.4 ELECTRIC SHOCK

**WARNING: ELECTRIC SHOCK CAN KILL!**

- A person qualified in First Aid techniques should always be present in the working area; If a person is found unconscious and electric shock is suspected, do not touch the person if she or he is in contact with cable or electric wires. Disconnect power from the machine, then use First Aid. Use dry

- wood or other insulating materials to move cables, if necessary away from the person.
- Wear dry gloves and clothing. Insulate yourself from the work piece or other parts of the welding circuit.
- Make sure the main line is properly grounded.
- Do not coil the torch or the ground cables around your body.
- Never touch or come in physical contact with any part of the input current circuit and welding current circuit.

**Electric warning:**

- Repair or replace all worn or damaged parts.
- Extra care must be taken when working in moist or damp areas.
- Install and maintain equipment according to local regulations.
- Disconnect power supply before performing any service or repair.
- Should you feel the slightest electrical shock, stop any welding immediately and do not use the welder until the fault has been found and corrected.



## **1.5 NOISE**

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Noise can cause permanent hearing loss. Welding processes can cause noise levels that exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.

## **1.6 ELECTROMAGNETIC COMPATIBILITY**

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Before installing your welder, carry out an inspection of the surrounding area, observing the following guidelines:

- Make sure that there are no other power supply cables, control lines, telephone leads or other equipment near the unit.
- Make sure that there are no radio receivers, television appliances, computers or other control systems near the unit.
- People with pace-maker or hearing-prosthesis should keep far from the power source.

**! In particular cases special protection measures may be required.**

Interference can be reduced by following these suggestions:

- If there is interference in the power source line, an E.M.T. filter can be mounted between the power supply and the power source;
- The output cables of the power source should be not too uch long, kept together and connected to ground;
- After the maintenance all the panels of the power source must be securely fastened in place.

## 2.0 INSTALLATION RECOMMENDATIONS



### 2.1 LOCATION

**Be sure to locate the welder according to the following guidelines:**

- In areas, free from moisture and dust;
- Ambient temperature between 0° to 40°C;
- In areas, free from oil, steam and corrosive gases;
- In areas, not subjected to abnormal vibration or shock;
- In areas, not exposed to direct sunlight or rain;
- Place at a distance of 300mm or more from walls or similar that could restrict natural air flow for cooling.

### 2.2 VENTILATION

Since the inhalation of welding fumes can be harmful, ensure that the welding area is effectively ventilated.

### 2.3 MAIN SUPPLY VOLTAGE REQUIREMENTS

Before you make any electrical connection, check that supply voltage and frequency available at site are those stated in the ratings label of your generator.

The main supply voltage should be within  $\pm 10\%$  of the rated main supply voltage. Too low a voltage may cause poor welding performance. Too high a supply voltage will cause components to overheat and possibly fail. The welder Power Source must be:

- Correctly installed, if necessary, by a qualified electrician;
- Correctly grounded (electrically) in accordance with local regulations;
- Connected to the correct size electric circuit.

In case the supply cable is not fitted with a plug, connect a standardized plug (2P+T) to the supply cable (in some models the supply cable is supplied with plug).

To connect the plug to the supply cable, follow these instructions:

- the brown (phase) wire must be connected to the terminal identified by the letter L
- the blue (neutral) wire must be connected to the terminal identified by the letter N
- the yellow/green (ground) wire must be connected to the terminal identified by the letter PE or by the symbol  $\perp$ .

In any case, the connection of the yellow/green wire to the PE terminal  $\perp$  must be done in order that in the event of tearing of the power supply cable from the plug, the yellow/green wire should be the last one to be disconnected.

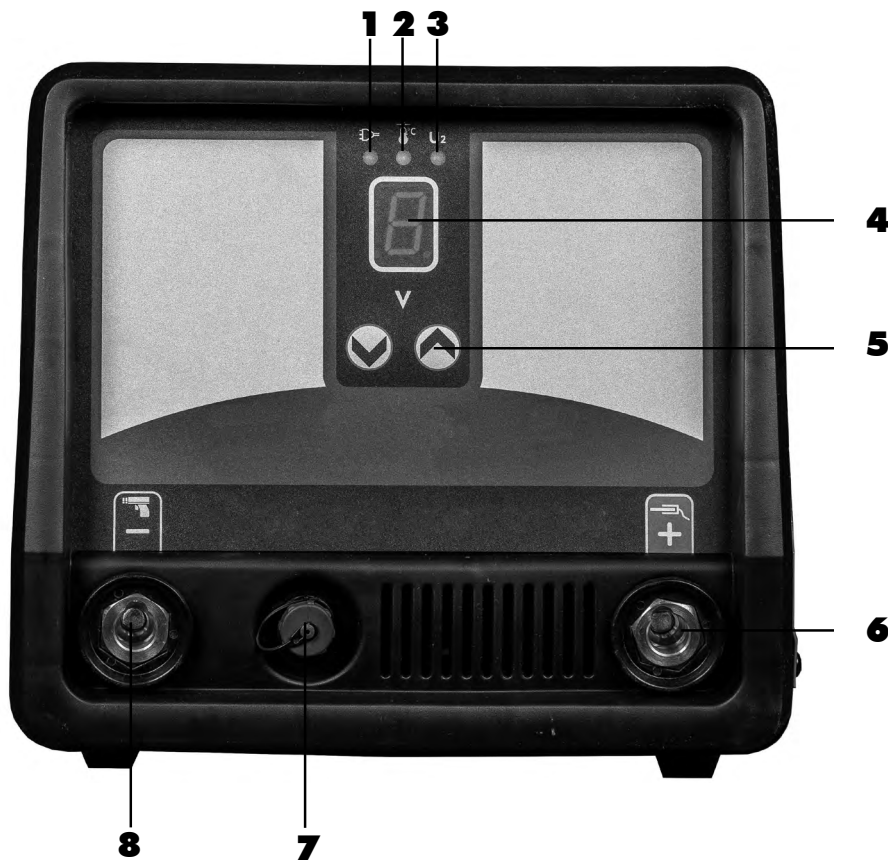
**The outlet should be protected by the proper protection fuses or automatic switches.**

- Notes:
- Periodically inspect supply cable for any cracks or exposed wires. If it is not in good conditions, have it repaired by a Service Centre.
  - Do not pull violently the input power cable to disconnect it from supply.
  - Do not squash the supply cable with other machines, it could be damaged and cause electric shock.
  - Keep the supply cable away from heat sources, oils, solvents or sharp edges.
  - In case you are using an extension cord, try to keep it well straight and avoid its heating up.

### 2.4 SAFETY INSTRUCTIONS

For your safety, before connecting the power source to the line, closely follow these instructions:

- An adequate two-pole switch must be inserted before the main outlet; this switch must be equipped with time-delay fuses;
- The connection with ground must be made with a two-pole plug compatible with the above mentioned socket;
- When working in a confined space, the power source must be kept outside the welding area and the ground cable should be fixed to the workpiece. Never work in a damp or wet area, in these conditions.
- Do not use damaged input or welding cables
- The welding torch should never be pointed at the operator's or at other persons' body;
- The power source must never be operated without its panels; this could cause serious injury to the operator and could damage the equipment.



- 1 - Power Led
- 2 - Overtemperature Led
- 3 - Output Voltage Led
- 4 - Power Level Display
- 5 - Spot Power Level Selection Keys
- 6 - Ground Cable Socket
- 7 - Spot Gun Connector
- 8 - Spot Gun Socket

**1 - Power Led**

It shows the correct power to the unit

**2 - Over-temperature Led**

The yellow led lights when the thermostat of over-temperature acts by deactivating the unit. The led will automatically extinguish when unit will be sufficiently cooled.

**3 - Output Voltage Led**

**4 - Power Level Display**

It shown the power level of the spot welding on a scale from 1 to 9.

**5 - Spot Power Level Selection Keys**

The left key allows to decrease the spot power, the right key increases it. Selection will be viewed on the display (4).

**6 - Ground Cable Socket**

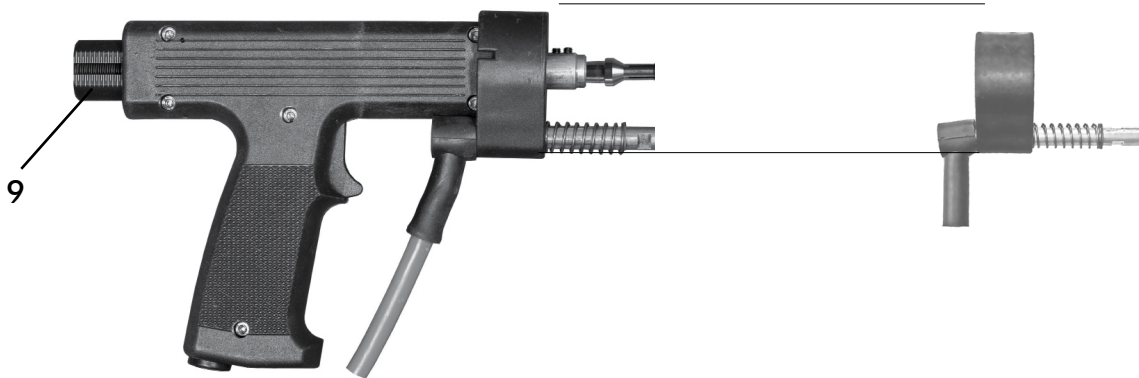
**7 - Spot Gun Connector**

**8 - Spot Gun Socket**

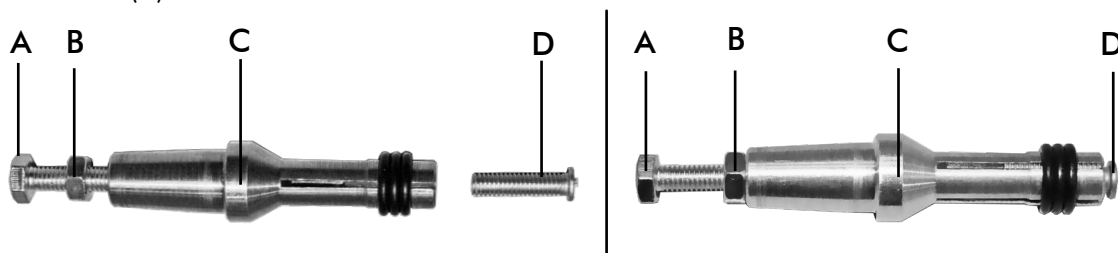
- Connect the gun for stud bolts welding to the generator socket placed on the front bottom left corner and marked with the "torch". On the bottom of the gun is located a switch for "constant thrust" (Rif.9), adjustable by a knob. The main function of the switch is to prevent the discharge until the unit reaches the pressure established between the stud bolts and the workpiece.

### Spot Car Alu 33

- Connect the plug of the earth cable to the power generator socket located on the lower right side of the front panel and marked with the symbol "earth". Connect the contact mass on the other end of the gun cable as shown in the figure. The contact mass eliminates the problems of the traditional positioning of the masses that suffer from the various conformations of car bodies, of oxidation and of the distance from the point of welding.



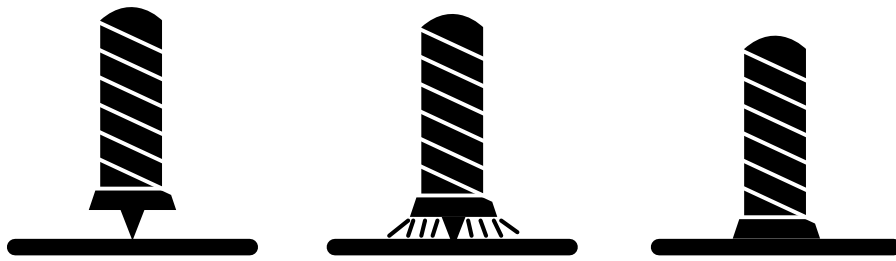
- Pay attention to the preparation of the electrode. To get the best quality of welding is essential that all components are in perfect contact. Select the electrode of size appropriate to the stud bolt to be used. Insert the stud bolt (D) on the electrode (C), leaving 1 mm of space between the head of the stud bolt and the electrode. Rotate the bolt (A) until it comes into contact with the stud bolt (D) and fix the set nut (B).



- Insert the electrode into the head of the gun by inserting it on the set nut side (A). Make sure that the electrode is fully inserted and in contact with the gun in order to avoid damage to the outer surface of the electrode itself.
- Connect the unit to a suitable power socket.

The spot welding procedure uses the fusion of a cylindrical appendix formed under each pin, cast by the passage of an appropriate current. Variables of this type of welding are:

- The appendix size and the stud bolt material (it depends on the material to be welded and the processing to be obtained)
- The discharge power (given by the generator program, power from 1 to 9)
- The trigger pressure on the spot gun (selectable on the base of the table at the previous page or by the operator experience)



Being sure that you have complied with all safety standards, the recommendations for the installation and that you have properly followed the preparation procedure, you can proceed to spot weld by following these steps:

1 - Make sure the metal to be welded is: free from oil and paint (stripped), isolated from electrical outlets and contacts with conductive material.

2 - Power the generator on.

3 - Select the proper power on the generator front panel (Refer to the table on the cover panel).

4 - **Spot Car Alu 66:** Connect the earth clamp to metal to be welded (pay attention to connect the clamp on material clean from oils and paints). For complicated, long or oblique, spot welding connect also the second earth clamp supplied.

5 - Bring the gun perpendicular to the workpiece and the appendix in touch with the desired point by avoiding too much pressure that may damage the appendix itself.

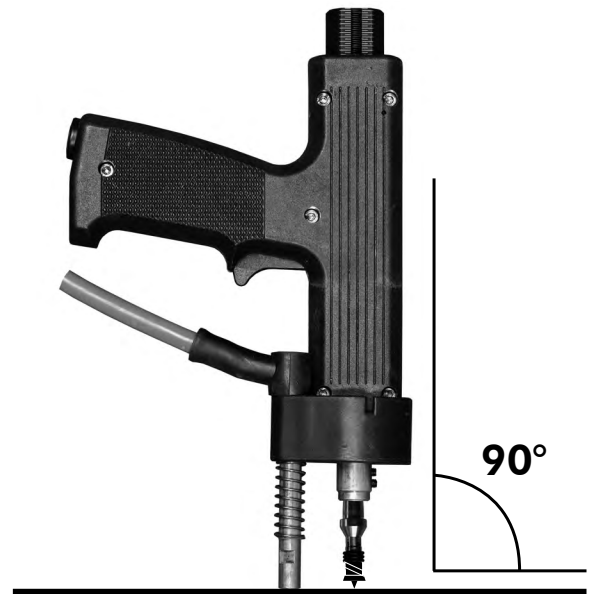
6 - Apply a pressure perpendicular to the workpiece on the gun until the point of closure of the constant thrust switch is reached.

7 - Press the button of the gun releasing the current from the capacitor, the welding time is about 2-3 milliseconds.

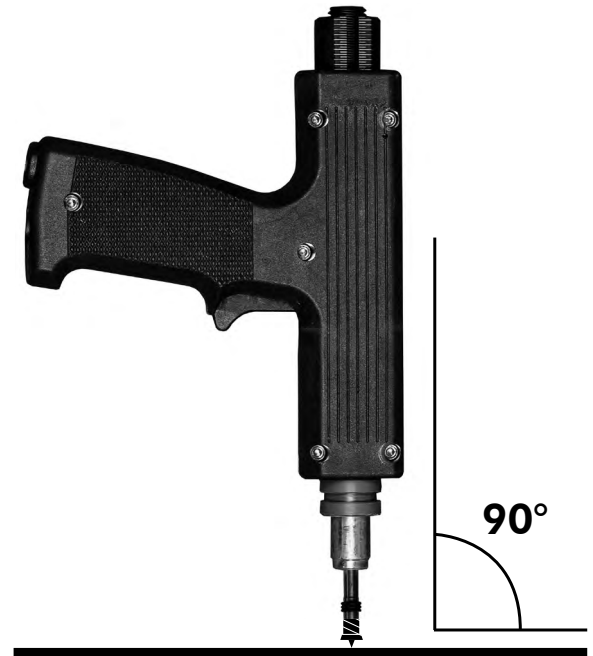
8 - Slowly pull the gun from the welded stud bolt in a vertical direction. Note: any lateral movement can damage the electrode, the stud bolt and the metal plate.

9 - Power the generator off before extracting the electrode. In the case that the electrode can not be pulled easily, use a 19 wrench to unscrew the extracting nut, until the electrode fully comes out (see picture).

**Spot Car Alu 33**



**Spot Car Alu 66**



**Spot Car Alu 33**

Aluminium				
Power	1:3	4:5	6:7	8:9
Ø	3 mm	4 mm	5 mm	6 mm

**Spot Car Alu 66**

Aluminium					
Power	1:3	4:5	6:7	8:9	
Ø	3-4 mm	5 mm	6 mm	-	
Fe					
Power	1:2	3:4	5:6	7:8	9
Ø	3 mm	4 mm	5 mm	6 mm	8 mm



## 6.0 MAINTENANCE AND TROUBLESHOOTING

The generator is equipped with a safety device able to completely empty the residual energy of the capacitor, therefore it is forbidden to intervene on the equipment to at least 5 seconds after the unplug.

PROBLEM	CAUSE	REMEDY
The stud bolt can not be properly welded to the metal plate	Spring release pressure too slow	Increase the pressure
	Dirty working surface	Clean the surface
	Charge voltage too low	Increase the spot welding power
	Spot gun is not perpendicular to the workpiece	Try the spot welding again by keeping the gun perfectly perpendicular to the workpiece
Bad quality spot weldings	Damaged electrode	Replace the electrode
	Charge voltage too high	Decrease the spot welding power
	Bad contact of the earth clamp	Check for proper contact
	Dirty working surface	Clean the surface
No welding	Cables not well fixed or interrupted	Check for proper contact between unit and cables
	Over-temperature	Check the control Leds
	No current	Check for proper connection
	Mechanical failure/problem on the software	Contact the service centre