

# INSTRUCTION MANUAL FOR WIRE WELDING MACHINE

## IMPORTANT:

BEFORE USING THIS DEVICE ALL PEOPLE AUTHORIZED TO USE, REPAIR OR INSPECT IT, SHOULD READ THE FOLLOWING INSTRUCTIONS ON ITS USE AND SAFETY. PLEASE CONTACT YOUR DISTRIBUTOR SHOULD YOU NOT UNDERSTAND THESE INSTRUCTIONS.

## 1 SAFETY RULES FOR USING WELDING MACHINE

### 1.1 INTRODUCTION

Before using this device all people authorized to use, repair or service it should read the following use and safety instructions.

Remember: YOUR SAFETY DEPENDS ON YOU!!!

Follow all safety rules and instructions.

It is your job to protect yourselves and others against the risks related to welding.

The operator is responsible for his own safety and the safety of others in the work area. He must therefore know and obey all safety rules.

NOTHING CAN REPLACE GOOD COMMON SENSE !!!

### 1.2 GENERAL PRECAUTIONS

#### 1.2.1 Fire



- Avoid causing fire because of sparks, slag, hot metal or pieces.

● Make sure that suitable fire-fighting equipment is available close to welding area.

● Remove all flammable and combustible material from the welding area and its surrounding (32 ft minimum).

● Do not weld containers of combustible or flammable material, even when empty. These must be carefully cleaned before being welded.

● Allow the welded material to cool down before touching it or putting it in contact with combustible or flammable material.

● Do not weld parts with hollow spaces, containing flammables.

● Do not work under conditions with high concentrations of combustible vapours, gases, or flammable dust.

● Always check the work area half an hour after welding so as to make sure that no fire has started.

● Do not keep any combustible material such as lighters or matches in your pockets.

#### 1.2.2 Burns

● Wear fire-proof clothing all over your body in order to protect your skin against burns caused by ultraviolet radiation given off by the arc, and from weld metal sparks and slag.

● Wear protective clothing-gauntlet gloves designed for use in welding, hat and high safety-toe shoes. Button shirt collar and pocket flaps, and wear cuff-less trousers to avoid entry of sparks and slag.

● Wear helmet with safety goggles and glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a MUST for welding to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered.

● Avoid oil or greasy clothing. A spark may ignite them.

Hot metal such as electrode stubs and workpieces should never be handled without gloves.

● First-aid facilities and a qualified first-aid person should be

available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns.

● Ear plugs should be worn when working on overhead or in a confined space. A hard hat should be worn when others work overhead.

● Flammable hair preparations should not be used by persons intending to weld or cut.

#### 1.2.3 Fumes



Welding operations give off harmful fumes and metal dusts which may be hazardous to your health, therefore:

● Work in a well-ventilated area.

● Keep your head out of fumes.

● In closed areas, use suitable exhaust fans.

● If ventilation is not enough, use breathing sets approved for this procedure.

● Clean the material to be welded of any solvents or halogen degreasers giving rise to toxic gases. Some chlorine solvents may decompose with the radiation emitted by the arc, and create phosgene gas.

● Do not weld plated metals or those containing lead, graphite, cadmium, zinc, chrome, mercury or beryllium, unless you have the proper breathing set.

● The electric arc creates ozone. A long exposure to high concentrations may cause headaches, nasal, throat and eye irritation as well as serious congestions and chest pains.

**IMPORTANT: DO NOT USE OXYGEN FOR VENTILATION.**

● Gas leaks in a confined space should be avoided. Leaked gas in large quantities can change oxygen concentration dangerously. Do not bring gas cylinders into a confined space.

● DO NOT WELD where solvent vapors can be drawn into the welding atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

#### 1.2.4 Explosions



Do not weld above or near containers under pressure.

● Do not weld in environments containing explosive dusts, gases or vapours.

This welding machine uses inert gases such as CO<sub>2</sub>, ARGON, or a mixture of ARGON + CO<sub>2</sub> for the protection of the arc, thus you should take special precautions:

##### A) CYLINDERS

● Do not directly connect cylinder to the machine gas hose without a pressure regulator.

● Handle or use pressure cylinders in conformity with the existing rules.

● Do not use leaking or damaged cylinders.

● Do not use cylinders which are not well secured.

● Do not carry cylinders without the protection of the installed valve.

● Do not use cylinders whose content has not been clearly identified.

● Never lubricate cylinder valves with oil or grease.

● Do not put the cylinder in electrical contact with the arc.

● Do not expose cylinders to excessive heat, sparks, molten slags or flame.

● Do not tamper with the cylinder valves.

● Do not try to loosen tight valves by means of hammers, keys, or any other object.

● NEVER DEFACE or alter name, number, or other markings on a cylinder. It is illegal and hazardous.

● Do not lift cylinders off the ground by their valves or caps,

or by chains, slings or magnets.

- Never try to mix any gases in a cylinder.
- Never refill any cylinder.
- Cylinder fittings should never be modified or exchanged.

#### B) PRESSURE REGULATORS

- Keep pressure regulators in good condition. Damaged regulators may cause damages or accidents, they should only be repaired by skilled personnel.
- Do not use regulators for gases other than those for which they are manufactured.
- Never use a leaking or damaged regulator.
- Never lubricate regulators with oil or grease.

#### C) HOSES

- Replace hoses which appear damaged.
- Keep hoses unwound in order to avoid bending.
- Keep the excess hose wound and out of the working area in order to avoid any damage.

#### 1.2.5 Radiations



Ultra-violet radiation created by the arc may damage your eyes and burn your skin. Therefore:

- Wear proper clothing and helmet.
- Do not use contact lenses!! The intense heat coming from the arc may cause them to stick to the cornea.
- Use masks with grade DIN 10 or DIN 11 safety lenses at the least.
- Protect people in the surrounding welding area. Remember: the arc may dazzle or damage the eyes. It is considered dangerous up to a distance of 15 meters (50 feet). Never look at the arc with the naked eye.
- Prepare the welding area so as to reduce reflection and transmission of ultra-violet radiation. Paint walls and exposed surfaces in black to reduce reflection, install sheathings or curtains to reduce ultra-violet transmissions.
- Replace mask lenses whenever damaged or broken.

#### 1.2.6 Electric shock



Electric shock can kill.

All electric shocks are potentially fatal.

- Do not touch live parts.
- Insulate yourself from the piece to be cut and from the ground by wearing insulated gloves and clothing.
- Keep garments (gloves, shoes, hats, clothing) and body dry.
- Do not work in humid or wet areas.
- Avoid touching the piece to be welded.
- Should you work close to or in a dangerous area, use all possible precautions.
- If you should feel even the slightest electric shock sensation, stop welding immediately. Do not use the machine until the problem is identified and solved.
- Always fit an automatic wall switch with adequate power, possibly close to the machine, allowing you to immediately switch the machine off in case of an emergency.
- Frequently inspect the power supply cable.
- Disconnect power supply cable from mains before replacing cables or before removing unit covers.
- Do not use the unit without protection covers.
- Always replace any damaged parts of the unit, with original material.
- Never disconnect unit safety devices.
- Make sure that the power supply line is equipped with an efficient earth plug.
- Any maintenance should only be carried out by qualified personnel aware of the risks due to dangerous voltages necessary for the operation of the unit.

#### 1.2.7 Pace maker

● Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult their doctor before going near arc welding, gouging or spot welding operations.

#### 1.2.8. Caution!

**Welding wire can cause puncture wounds.**

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

#### 1.2.9. Moving parts can cause injury.

Moving parts, such as fans, can cut fingers and hands and catch loose clothing.

- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall panels or guards and close doors when servicing is finished and before starting the machine.

#### 1.2.10 Noise



These power source alone do not produce noise levels exceeding 80 dB. The welding procedure, however, may produce noise levels in excess of 80 dB. In which case the machine operator must take the necessary safety precautions as prescribed by the national safety regulation.

## 2 GENERAL DESCRIPTION

### 2.1 SPECIFICATIONS

This welding machine is a semiautomatic, constant voltage generator. It is possible to weld mild steel, stainless steel, and aluminium.

### 2.2 EXPLANATION OF TECHNICAL SPECIFICATIONS

N° Serial number which must be stated when asking for information or servicing related to this machine.

$\sim$  Single-phase Transformer - Rectifier

$\sim$  Three-phase Transformer - Rectifier

External characteristics of the unit.

U<sub>0</sub> Secondary no-load voltage.

X The duty-cycle expresses the percentage of 10 minutes during which the welding machine can operate at a determined current level without overheating: e.g. X = 60% at I<sub>2</sub> = 100 A.

This means that the welding machine can weld with a current I<sub>2</sub> = 100A for 6 minutes out of 10, i.e. 60%.

I<sub>2</sub> Welding current

U<sub>2</sub> Secondary voltage with welding current I

U<sub>1</sub> Nominal supply voltage at the rated frequency.

I<sub>1</sub> Input current at the corresponding welding current I

Ip 21 Grade of protection of the case.

Grade 1 as a second digit means that this unit is not fit for working in the rain.

S Fit for working in high-risk areas.

|  |   |  |       |
|--|---|--|-------|
| ~ - - - - -  |   | N°   |       |
| I2 max: A  |   | EN 60974.1   |       |
| A / V - A / V  |   |  |       |
| X  | - | -  | -     |
| I2   | A | A  | A     |
| U2   | V | V  | V     |
| Hz   |   | U1   | I1    |
|  |   | V  | A A A |
| CLASSE DI ISOLAMENTO<br>CLASS OF INSULATION<br>CLASSE DES ISOLANTS<br>ISOLIERSTOFFKLASSE<br>CLASE DE AISLAMIENTO |   | VENTILAZIONE FORZATA<br>FORCED VENTILATION<br>VENTILE<br>KUHLLART F<br>VENTILACION |       |
| H  |   | IP 21  |       |
| PROTEZIONE TERMICA<br>THERMAL PROTECTION<br>PROTECTION THERMIQUE<br>TERMISCH GESCHÜTZT<br>PROTECCION TERMICA     |   | MADE IN ITALY  |       |
|  |   | S  |       |

### 2.3 DESCRIPTION OF PROTECTION

This unit is protected by a normally closed thermostat placed on the power transformer.

When the thermostat intervenes, the machine stops welding, while the motor-driven fan continues to work.

Wait a few minutes to allow the generator to cool down.

## 3 INSTALLATION

### 3.1 PRECAUTIONS



**WARNING!!**

**ELECTRIC SHOCK CAN KILL**

- This machine must be installed by skilled personnel.
- Make sure that the input power plug has been disconnected before inspecting, repairing, or servicing.
- Connect the yellow-green wire to a good electrical ground.

### 3.2 SETUP

Unpack the machine and place it in a properly ventilated area, possibly not dusty, making sure that air flow on the cooling vents is not obstructed.

**WARNING: RESTRICTED AIR FLOW** causes overheating and possible damage to internal parts.

- Maintain at least 20 inches (500 mm) of free space on all sides of the unit.
- Do not place any filtering device over the intake air vents of this power source. The warranty is void if any type of filtering device is used.

### 3.3 STARTUP

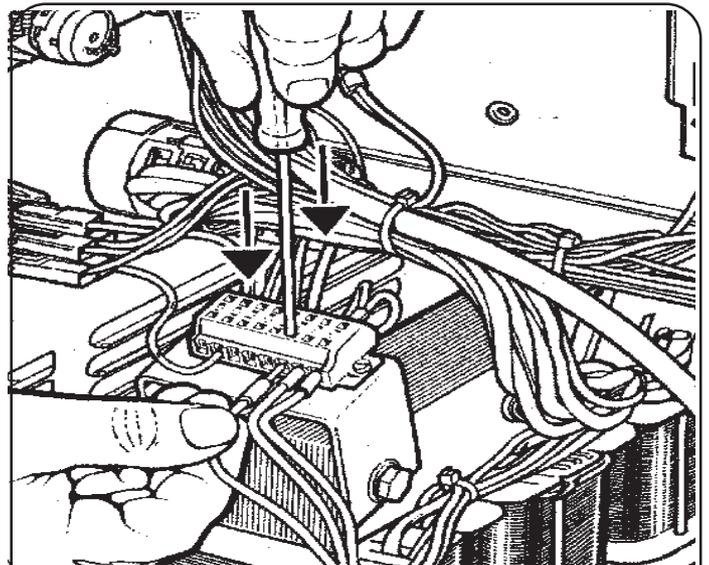
This unit must be installed by skilled personnel. All fittings must be in conformity with the existing safety standards. (See CEI standards 26-10 -CENELEC HD 427).

Install the components supplied with the welding machine. Check that the wire diameter corresponds to that shown on the drive roll and mount the wire spool.

Make sure that the wire goes into the groove of the drive roll (11). Before connecting the power supply cable (30) ensure that mains voltage corresponds to the machine voltage and that

the earth plug is efficient.

The connection voltage can be changed on the three-phase machine by following the instructions in figure.



**N.B. TO REACH THE VOLTAGE CHANGER REMOVE THE FIXED HOUSING (44).**

**IMPORTANT: BEFORE CHANGING VOLTAGE MAKE SURE THAT THE MACHINE IS NO MORE CONNECTED TO THE MAINS.**

Connect the ground clamp (42) to the workpiece.

Turn the machine on (1).

Remove the taper gas nozzle (51) by rotating it clockwise. Unscrew the contact tip (50).

Press the torch push button (46) and release it only when the wire comes out.

**Welding wire can cause puncture wounds.**

- Do not press gun trigger until instructed to do so.
  - Do not point gun toward any part of the body, other people, or any metal when threading welding wire.
- Tighten the contact tip (50) and make sure that the hole diameter corresponds to the wire being used. Reinstall the taper gas welding nozzle (51), rotating it clockwise.



**WARNING!!**

**ELECTRIC SHOCK CAN KILL.**

- Do not touch live electrical parts.
  - Do not touch the weld output terminals when the unit is energized.
  - Do not touch the torch or electrode holder and the work clamp at the same time.
- ATTENTION:** The green/yellow wire of the input power cable must always be connected to the protection lead (ground of the system). The yellow/green wire must NEVER be combined with another phase wire for drawing voltage.

### 3.4 CONNECTING THE GAS HOSE



**WARNING!!**

**CYLINDERS CAN EXPLODE IF DAMAGED**

- Keep the cylinders in an upright position by chaining them to their support.
- Keep the cylinders in a place where they cannot be damaged.
- Do not lift the machine with the cylinder on its support.
- Never touch the cylinder with the welding wire.
- Keep the cylinder away from the welding area and

uninsulated electric circuits.

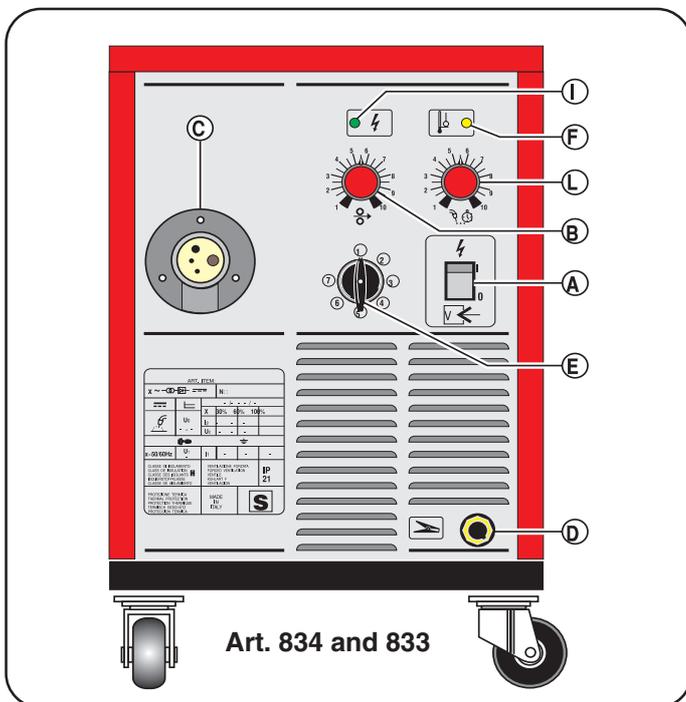
- Cylinders containing inert gas have to be equipped with a regulator and a flowmeter.
- After having positioned the cylinder, connect the gas hose that comes out from the rear of machine to the pressure regulator.

Turn the gas cylinder on and adjust the flowmeter to approx. 8-10 litre/min.

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

### 3.5 UNIT DESCRIPTION

- A) ON-OFF switch.
- B) Potentiometer for wire speed linear adjustment.
- C) Connection for connecting the welding torch.
- D) Earth cable connection.
- E) Voltage adjustment switch.
- F) Thermostat pilot light
- I) Main ON/OFF indicator lamp.
- L) Electronic spot weld time adjustment.



### 3.6 GENERAL NOTES

Before using this welding machine, carefully read the CEI Standards 26/9 or CENELEC HD 407 AND CEI 26/11 or CENELEC HD 433, also check for insulation of cables, torch and earth cable.

## 4 WELDING GUIDELINES

### 4.1 CONTINUOUS MILD-STEEL WELDING

75% ARGON + 25% CO<sub>2</sub> or 100% CO<sub>2</sub> can be used for mild steel welding.

Adjust the welding voltage with switch (57).

— Approach the point to be welded and press the torch push button (46).

— Adjust the potentiometer (2) until the welding noise is constant and continuous.

If the speed is too high, the wire tends to get stuck on the workpiece which makes the torch bounce back. If speed is too low, the wire melts irregularly or else the arc switches off.

### 4.2 ALUMINIUM WELDING

The machine will be set up as for mild steel except for the following changes:

1. 100% ARGON as welding protection gas.
2. Wire of composition suitable for the material to be welded.
  - For ALUMAN welding wire 3÷5% silicon.
  - For ANTICORODAL welding wire 3÷5% silicon.
  - For PERALUMAN welding wire 5% magnesium.
  - For ERGAL welding wire 5% magnesium.

For arts. 833 and 834 modify the welding torch too.

NOTE: If you only have a torch for steel wires, the same shall be modified in the following way:

- Make sure that length of torch cable does not exceed 118 inches (it is advisable not to use longer torches).
  - Remove the brass liner-holding nut, the gas and the current nozzles, then slip the sheath off.
  - Insert the teflon liner for aluminium and ensure it protrudes from both ends.
  - Screw the current nozzle so that the liner adheres to it.
  - Insert the liner holding nipple, the O-Ring in the free end of the liner and secure with the nut without tightening too much.
  - Slip the brass tube on the sheath and insert both into the adapter (after removing the iron tube which was fitted inside the adaptor).
  - Cut the liner diagonally so that it stays as close as possible to the wire drive roller.
  - Use drive rollers that are suitable for aluminium wire. The drive rollers, when being installed, must not be tightened too much.
  - Use contact tips that are suitable for aluminium wire and make sure that the diameter of the contact tip hole corresponds to the wire diameter that is going to be used.
  - Use abrasive grinders and tool brushes specifically designed for aluminium. Never use these tools on other materials.
- REMEMBER that cleanliness equals quality.  
The wire spools must be stored in plastic bags with a dehumidifier.

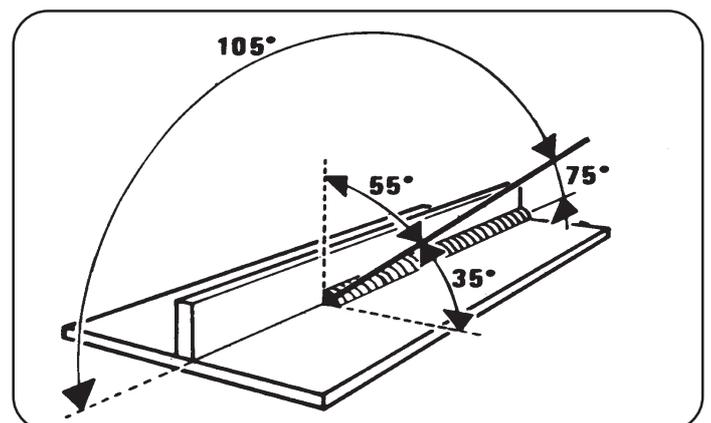
See figure for the correct torch inclination.

### 4.3 STAINLESS STEEL WELDING

The machine will be set-up as for mild-steel welding except for following changes:

- Stainless steel wire compatible with the composition of steel to be welded.
- Cylinder containing a mixture of 98% ARGON + 2% O<sub>2</sub> (recommended mixture).

NOTE: Recommended torch inclination and welding direction are shown in the figure.



## 5 MAINTENANCE AND CHECK UP

### 5.1 GENERAL NOTES



**WARNING: ELECTRIC SHOCK CAN KILL**

- Do not touch live electrical parts.
- Turn off the power source, and remove input power plug from receptacle before inspection, maintenance, or servicing.

MOVING PARTS can cause serious injury.

● Keep away from moving parts.

HOT SURFACES can cause severe burns.

● Allow cooling period before servicing.

Periodically clean the transformer or diodes from any dust or foreign bodies; for this purpose, use a dry and clean air jet. When reinstalling the drive roll, ensure that the groove is aligned with the wire and that it corresponds to the diameter of the wire used.

Keep the inside of the gas nozzle constantly clean so as to avoid metal bridges formed by welding spatter between the gas nozzle and the contact tip.

Make sure that the contact tip outlet has not widened, if so, replace it.

The torch must not be banged or violently knocked.

### 5.2 WELDING MACHINE SERVICING

Experience has shown that many fatal accidents originated from servicing improperly executed. For this reason, a careful and thorough inspection on a serviced welding machine is just as important as one carried out on a new welding machine.

Furthermore, in this way producers can be protected from being held responsible for defects stemming from repairs not carried out by the manufacturer.

### 5.2.1 Prescriptions to follow for servicing

● After rewinding the transformer or the inductance, the welding machine must pass the applied-voltage test in accordance with indications in table 2 of 6.1.3 of the EN 60974.1 standard (CEI 26.13).

Conformity must be checked as specified in 6.1.3.

● If no rewinding is done, a welding machine which has been cleaned and/or reconditioned must pass an applied-voltage test with voltage values equal to 50% of the values given in table 2 of 6.1.3. Conformity must be checked as specified in 6.1.3.

● After rewinding and/or the replacement the no-load voltage shall not exceed the values given given in 10.1 of EN 60974.1.

● If the servicing is not done by the manufacturers, the repaired welding machines which underwent replacements or modifications of any component, shall be marked in a way such that the identity of the person having serviced it is clear.

### 5.2.2 Instructions to be followed after all repair work.

Following any repair work, great care must be taken when refitting cables and wires to ensure safe and proper insulation between the primary and secondary sides of the machine. When refitting wires and cables, ensure that wires cannot come into contact with moving parts or those parts which heat up during operation. Refit clips and straps in their original position and in such a way that any accidental cable breakage or disconnection will not lead to a dangerous contact between the primary and secondary circuits.

### 5.3 TROUBLESHOOTING GUIDE

| TROUBLE  | PROBLABLE CAUSE   | REMEDY  |
|--|---|---|
| The welding machine supplies limited current                                       | Line fuse blown   | Replace line fuse                                   |
|  | Burnt out diode or diodes   | Replace   |
|  | Burnt out electronic board  | Replace   |
|  | Loosened torch or earth connections or any other electrical power connections | Tighten all connections                             |
|  | Voltage adjustment switch has a loose contact                                 | Replace the switch                                  |
| The wire jams or entangles between the drive rolls and the torch infeed wire guide | Contact tip with wrong diameter   | Replace   |
|  | Misalignment of the drive roll groove   | Realign   |
|  | Inlet wire guide out of position  | Position it as close as possible to the drive roll. |
|  | Obstructed or clogged liner   | Remove and clean                                    |

| TROUBLE                             | PROBLABLE CAUSE                                       | REMEDY   |
|-------------------------------------|---|--|
| No wire feed or irregular wire feed | Drive roll with too large a groove                    | Replace the drive roll   |
|                                     | Obstructed or clogged liner                           | Remove and clean   |
|                                     | Wire holding roller not completely tightened          | Tighten all the way  |
|                                     | Spool holder clutch too tight                         | Loosen the clutch through the adjustment   |
|                                     | Clogged contact tip                                   | Replace  |
| Welding with a lot of metal spatter | Improper adjustment of welding parameters             | Select the correct parameters through the welding-voltage and the wire-speed adjustment potentiometers |
|                                     | Insufficient grounding                                | Check grounding connections  |
| Porosity in the welding seam        | Insufficient shielding gas                            | Increase gas delivery  |
|                                     | Excess oxidation of the edges to be welded            | Thoroughly clean the edges with a metal brush  |
|                                     | Gas nozzle partially or completely clogged by spatter | Remove and clean or replace being careful not to clog the gas outlets                                  |