

MU IV

TIG – with or without filler wire , AVC , OSC

Open Welding Head

User manual PN-0706056



Review of document

| | |
|--------|--|
| Ind. 2 | Revision of document |
| Ind. 3 | Update of the graphics standards and equipment compatibility |
| Ind. 4 | Update: Tools box and <i>MU IV wiring plug: AVC/OSC wiring</i> |
| Ind. 5 | Update: Sparepart box |
| Ind. 6 | Update |
| Ind. 7 | Update Recommended lubricant brands |
| Ind. 8 | Update on page 30, 295 → 275 and document on page 75(PL - 02/2011) |

For better understanding and legibility, if this user manual is printed out, then duplex printing is preferable.

Contents

| | | |
|--------|---|----|
| 1. | Safety precautions | 5 |
| 1. 1. | Arc welding hazards..... | 5 |
| 1. 2. | Meaning of the symbols..... | 5 |
| 1. 3. | Recommendations | 6 |
| 2. | General information | 9 |
| 2. 1. | Reference documents..... | 9 |
| 2. 2. | Applicable directives | 9 |
| 3. | General introduction..... | 11 |
| 3. 1. | Introduction..... | 11 |
| 3. 2. | Classification of machine | 11 |
| 3. 3. | Environment and operating conditions | 12 |
| 3. 4. | Description of the equipment | 12 |
| 3. 5. | Technical characteristics | 21 |
| 3. 6. | Capacities..... | 21 |
| 3. 7. | Equipment compatibility | 22 |
| 3. 8. | Dimensions..... | 23 |
| 4. | Installation | 26 |
| 4. 1. | Handling | 26 |
| 4. 2. | Installation on site..... | 26 |
| 4. 3. | Handling | 26 |
| 4. 4. | Bundle | 27 |
| 5. | Use..... | 28 |
| 5. 1. | Precautions..... | 28 |
| 5. 2. | The electrode | 29 |
| 5. 3. | Wire sheaths..... | 33 |
| 5. 4. | Ignition ring..... | 35 |
| 5. 5. | Built-in feeder | 36 |
| 5. 6. | Adjusting the clamps..... | 39 |
| 5. 7. | Adjusting the gas flow rate | 41 |
| 5. 8. | Adjusting the oscillation | 41 |
| 5. 9. | Positioning the welding head and preparing the weld | 41 |
| 5. 10. | Trial cycle | 41 |
| 5. 11. | Performing a weld..... | 41 |
| 6. | Maintenance and troubleshooting | 42 |
| 6. 1. | Troubleshooting - diagnostics assistance..... | 42 |
| 6. 2. | Routine maintenance | 43 |
| 6. 3. | Recommended lubricant brands..... | 47 |
| 6. 4. | Accessories box..... | 47 |
| 6. 5. | Repairs and maintenance..... | 49 |
| 7. | Wiring diagrams | 70 |
| 8. | End of life – recycling of equipment..... | 73 |
| 9. | Returned material form | 75 |



MU IV




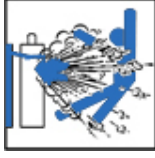








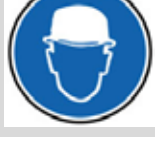

1. Safety precautions

Note: Protect yourself and others from injury - read and follow these instructions

1. 1. Arc welding hazards

The following symbols are used in the text to draw your attention and to identify risks and dangers. When you see a symbol, **consult the safety instructions in the Recommendations chapter hereafter.** Only qualified personnel should install, use, maintain and repair the system. All persons not working on the equipment must remain well clear when it is in use.

1. 2. Meaning of the symbols

| | | | |
|---|--|--|---|
|  | Risk of electric shocks |  | Risk of severe injuries caused by moving parts |
|  | Risk of fume or gas inhalation |  | Risk of explosion |
|  | Risk of eye or skin burns caused by radiation |  | Risks caused by exposure to magnetic fields |
|  | Warning: hot parts – Risk of burns |  | Danger caused by noise |
|  | Risk of eye or skin burns caused by flying sparks |  | Read the instructions |
|  | Risk of overheating and fire |  | Eye protection is mandatory |
|  | Foot protection is mandatory |  | Helmets are mandatory |
|  | Risk of falling | Read the following recommendations and take any necessary measures to avoid dangerous situations. | |

1. 3. Recommendations



Risk of electric shocks

Live parts include the electrode, the weld circuit, the supply circuit and the internal circuits, the filler wire and metal parts in contact with it, the wire feeder unit and the wire feeding mechanism. Any contact with these parts can cause an electric shock if the installation is connected to the mains supply.

Circumstances increasing the risk of electric shocks: humid environments, working on conducting surfaces, poor earth connections, system in poor condition, unsafe working conditions.

To prevent risks:

- Avoid any contact with live wire spools.
- Inspect water-cooled torches regularly to detect leakage. Pay attention to condensation.
- Never wind the cables around your body.
- Make sure that the electrode is not live when changing it.
- Before any maintenance, repair or pause, disconnect the equipment from the mains supply.
- Wear gloves, clothes, aprons and safety shoes that are dry and without holes.
- Carpets or other insulating materials must be used if the welder has to work on metal surfaces or structures.
- The equipment must be installed and earthed as specified in the operating manual.
- The current return cable must be fixed correctly (clean surface, solid clamping as close as possible to the weld area).
- Cables that are damaged, worn, unsheathed, the wrong size or poorly assembled must not be used and must be replaced immediately.
- The power supply must be properly earthed.
- Use a separate cable if the workpiece must be earthed.
- Appropriate connectors must be used.

Pay attention to the off-load voltage that is limited to 80 V efficient AC or 113 V DC (necessary for the arc ignition). Maximum value for plasma cutting power supplies: 500 V.



Risk of fume or gas inhalation

During welding, fumes and gases are released which are harmful to your health. Avoid inhaling fumes.

Sources of fume and gas emissions: basic material, filler metal, coating (flux) by covered electrode, shielding gas, solvents and materials covering the workpiece.

To prevent risks:

- Use breathing apparatus, such as filter masks, ventilated masks, air-supply masks, disposable masks.
- Avoid chlorinated solvents.
- Dry the workpieces thoroughly before welding.
- Do not work alone!
- Trap fumes and gases at the source.
- Remove paint, oil and any other coatings from the surface.



Risk of eye or skin burns caused by radiation

The radiation from the arc can cause eye and skin burns.

Risk identification: exposure to intense visible and invisible radiation from the arc (ultraviolet and infrared). Radiation is reflected by welding metals such as aluminium or stainless steel. Flash burns, sparks, stings caused by the tungsten electrode tip.

To prevent risks:

- Wear gloves or leather gauntlets to protect hands and forearms.
- Wear an apron or gaiters to protect the legs, knees and feet.
- Wear a mask (strapped to the head, hand-held or electronic) or goggles fitted with a suitable filter
- Use protective curtains to protect staff working nearby.

Wear a scarf around your neck and close the collar of your garment.



Warning: hot parts – Risk of burns

Do not touch welded or torch-cut parts. When handling hot workpieces, use suitable tools and/or wear thick, heat-proof welding gloves to avoid burns. Welded parts must be allowed to cool down before handling or further welding operations.



Risk of eye or skin burns caused by flying sparks

- Wear gloves or leather gauntlets to protect hands and forearms.
- Wear an apron or gaiters to protect the legs, knees and feet.
- Wear a mask (strapped to the head, hand-held or electronic) or goggles fitted with a suitable filter
- Use protective curtains to protect staff working nearby.
- Wear cotton or woollen clothes with long sleeves, free of stains of oil or lubricant, avoid synthetic fabrics.
- Wear a scarf around your neck and close the collar of your garment.
- Wear safety boots for welders.



Risk of overheating and fire

- Keep the power generator in good condition, especially the supply cables and the current return cable.
- Keep a minimum distance of 6 m between the welding equipment and any greasy, inflammable or dusty substance.
- Use protective curtains to protect staff working nearby.



Risk of explosion

These risks related to the use and handling of gas cylinders and flying sparks.

- Never use damaged gas cylinders.
- Stock the gas cylinders in a well-ventilated room, open to authorised staff only.
- The temperature must never exceed 55 °C when storing and using gas cylinders.
- Keep clearly marked empty gas cylinders separate from full ones.
- Protect gas cylinders against extreme temperatures (frost, sun, sparks, etc.).
- Inspect connections and hoses regularly.
- Use protective curtains.



Risk of severe injuries caused by moving parts

- Never place your hands near a fan or other moving parts.
- Keep all safety devices operational and in safety mode.



Risks caused by exposure to magnetic fields

The distance between the brain and the welding circuit is a very important factor.

- Never wind cables around your body or, even more importantly, over your shoulders.
- Pacemaker users must make themselves known. Possible interference requires special preventive measures that must be taken with a doctor's agreement.



The operator must make sure that no one is exposed in the danger zone.



MU IV

2. General information

2. 1. Reference documents

| | |
|------------|--|
| PN-0706043 | Illustrated parts lists of the wire feeder |
| PN-0706044 | User guide of the wire feeder |
| PN-0706046 | Illustrated parts lists MU IV 28 welding head |
| PN-0706047 | Illustrated parts lists MU IV 38 welding head |
| PN-0706048 | Illustrated parts lists MU IV 64 welding head |
| PN-0706049 | Illustrated parts lists MU IV 80 welding head |
| PN-0706050 | Illustrated parts lists MU IV 104 welding head |
| PN-0706051 | Illustrated parts lists MU IV 115 welding head |
| PN-0706052 | Illustrated parts lists MU IV 128 welding head |
| PN-0706053 | Illustrated parts lists MU IV 195 welding head |
| PN-0706054 | Illustrated parts lists MU IV 245 welding head |
| PN-0706055 | Illustrated parts lists MU IV 275 welding head |

2. 2. Applicable directives

| | |
|---------------|--|
| 2006/42/CE | 'Machinery' Directive |
| 2004 /108 /CE | Electromagnetic compatibility |
| 2006/95 /CE | Electrical equipment designed to be used within certain voltage limits |



MU IV

3. General introduction

3. 1. Introduction

The MU IV open welding heads are designed for butt joint welding of the following types:

- Tube/tube.
- Tube/accessories (tee, elbow, flange, etc.).

The TIG welding process is used with or without filler materials.
Some examples of applications:

The MU IV welding head range is used to weld tubes with an exterior diameter of between Ø8 mm and Ø275 mm. It includes 10 head sizes with different welding capacities as shown in the following table and diagram:

These instructions do not deal with elements that are not supplied by Polysoude.

3. 2. Classification of machine

The machine complies with the requirements of the directives 2006/42/EC "Machines", 2006/95/EC "Electrical equipment designed for use within certain voltage limits" and 2004/108/EC "Electromagnetic compatibility".

3. 3. Environment and operating conditions

This material is designed to function in the workshop in non-explosive atmospheres.

In the operational phase, the following conditions must be respected:

The ambient air temperature is between -10° and +40°C.

Relative humidity:

- Up to 50% at 40°C.
- Up to 80% at 20°C.

The ambient air must not contain unusual quantities of dust, acids, gases or corrosive substances. Emissions due to welding are considered as normal.

Examples of unusual conditions of use:

- Unusual corrosive fumes.
- Steam.
- Excessive oil vapour.
- Shaking or vibrations.

Protect the air inlet and outlet when using the equipment.

Parts can be reheated up to 150°C
Max. inter-pass temperature of 200°C.

3. 4. Description of the equipment

This range of open welding heads is flexible and adaptable.

Two welding plates:

- Simple plate: the torch is adjusted manually.
- AVC/OSC plate: the torch is controlled by software that is integrated in the power generator.

Two separate clamps:

- A chuck clamp that clamps the entire diameter of the range using the adjusting knobs.
- An cooled shell clamp that is optimised for each weld diameter (one shell per diameter). Recommended for pre-heating.

Two different motors according to the selected means of clamping (see diagram 3-1).

- Standard motor for chuck clamps.
- Motor for cooled shell clamps.

The dimensions of the head can be adjusted using two types of engine outlet:

- outlet parallel to the tube
- angle outlet

Three types of gas lens, according to the diameter of the tubes to be welded.

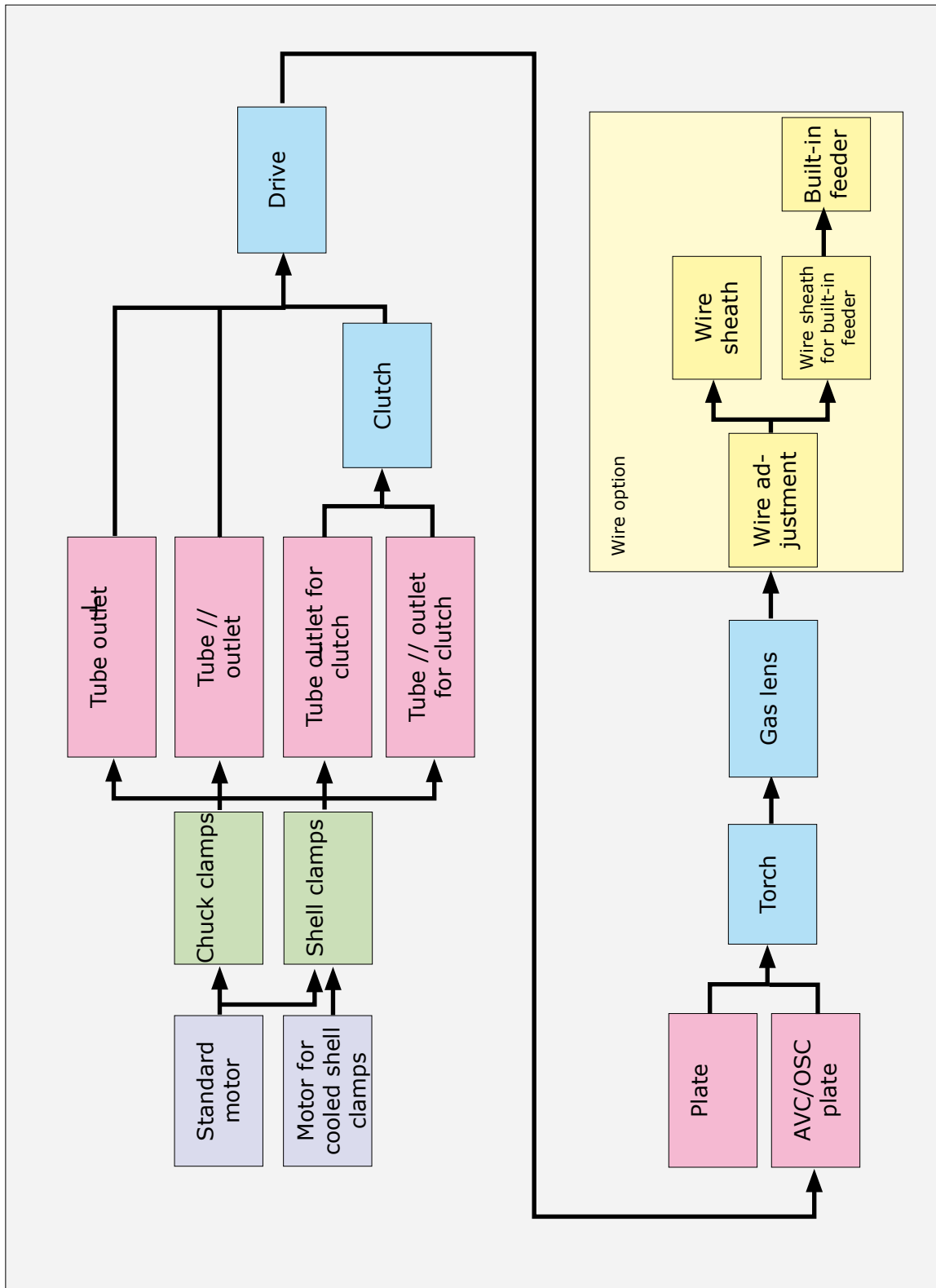


Fig.3.1 - Possible combinations

3. 4. 1. MU IV weld head

Illustration of the subassemblies of the MU IV.

- Motor (Fig.3.2 - 1).
- Coupling between the motor and the drive, called the "motor output" (Fig.3.2 - 2).
- Drive mechanism (Fig.3.2 - 3).
- Clamping device
 - Clamps (Fig.3.2 - 4a)
 - Shell (Fig.3.2 - 4b).
- Weld plate (Fig.3.2 - 5).
- Weld plate with AVC OSC (Fig.3.2 - 6).
- A built-in wire feeder (from MU 128 AVC/OSC only) (Fig.3.2 - 7).
- Wire feeder Polyfil (Fig.3.2 - 8).

The preceding assembly diagram shows the different possible combinations (Fig.3.1).

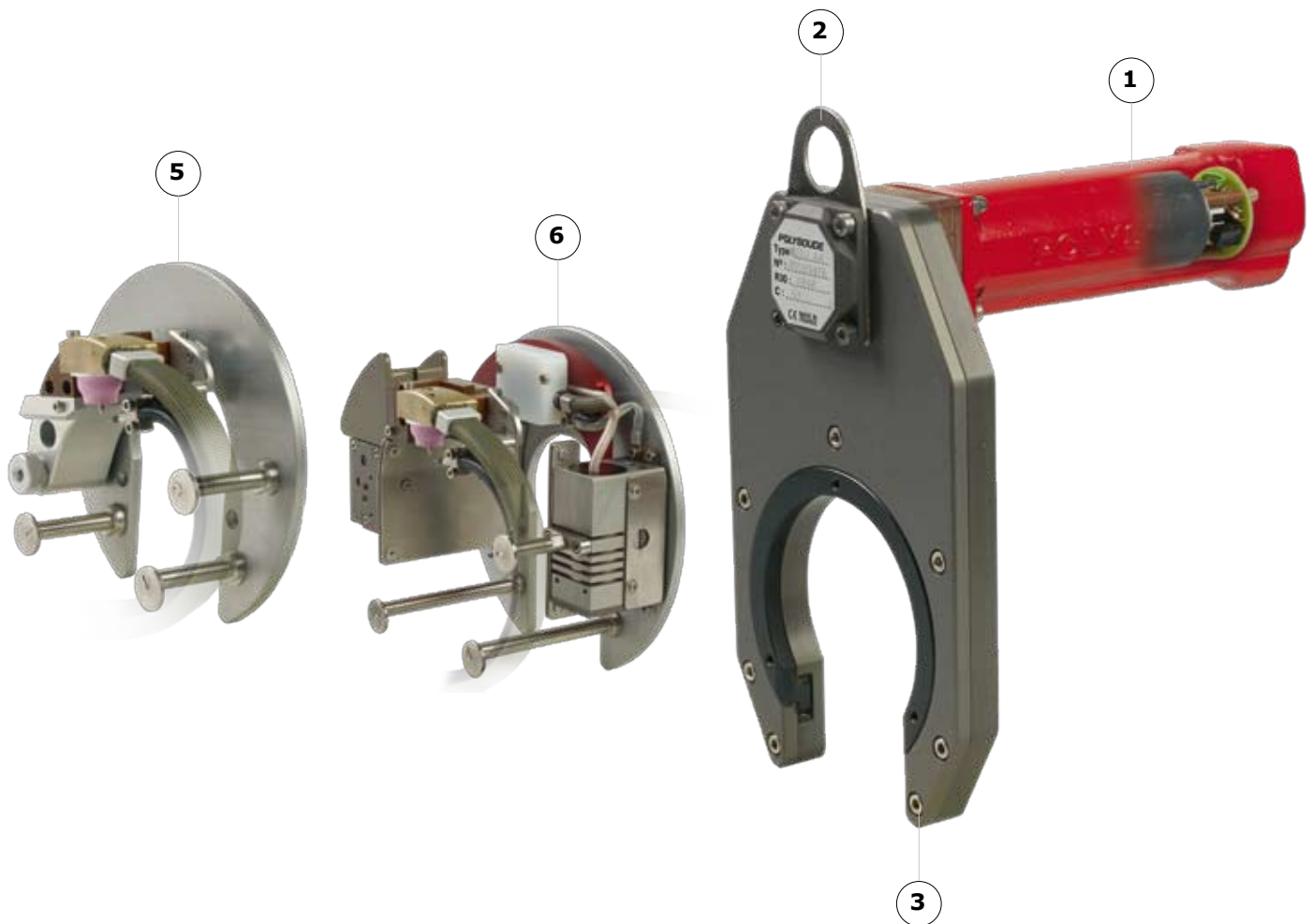
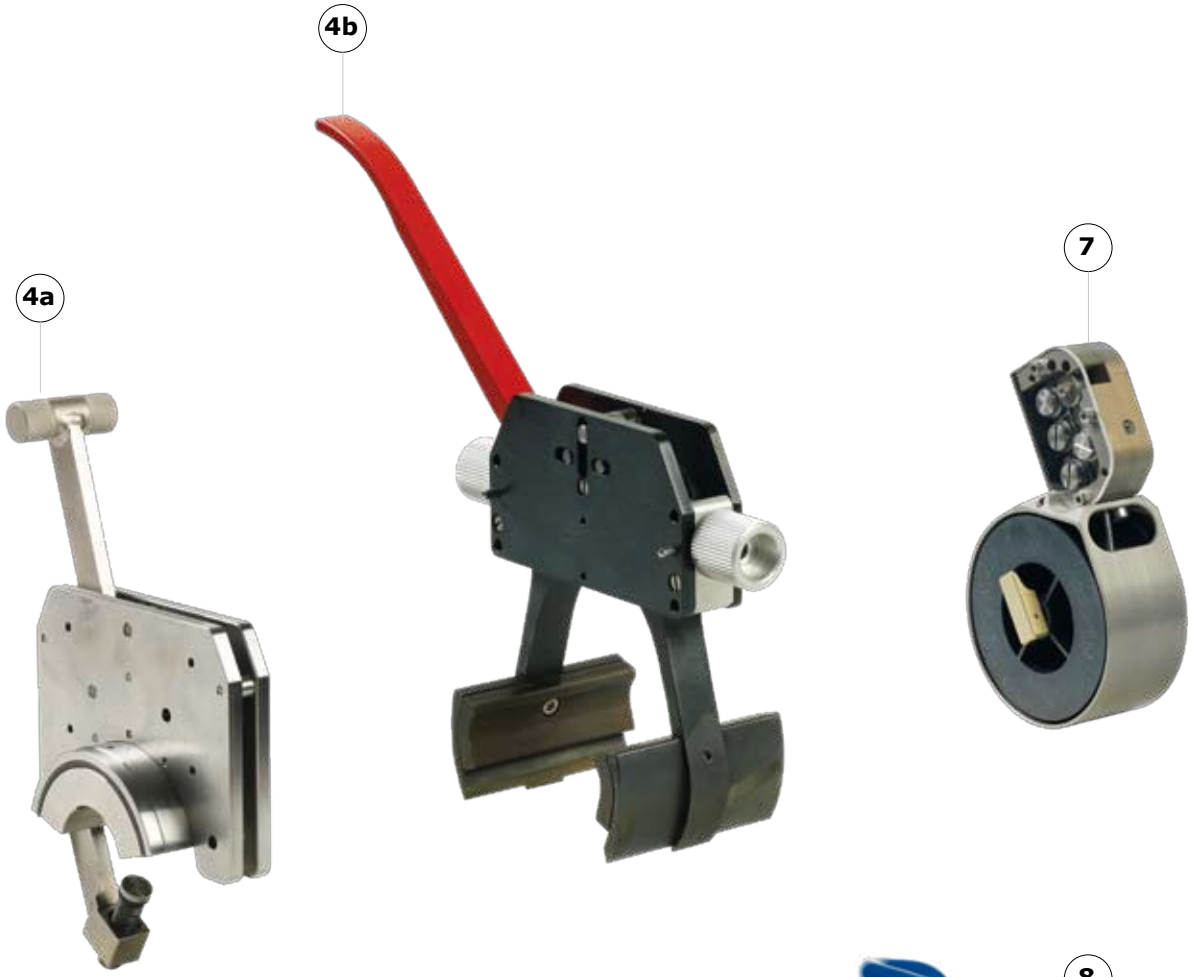


Fig.3.2 - Illustration of the subassemblies of the MU IV



Motorisation:

The motor is made up of a DC reducer motor (Fig.3.3 - 1) delivering a range of welding speeds between 50 and 150 mm/min.

The ratio of the reducer is $R=1/400$.

An encoder (Fig.3.3 - 2) attached to the motor informs the Polysoude welding generator of the actual position of the torch and is used to control the welding sequence (control of the sector starts and stops).

This encoder is also used to adjust the advance speed of the torch to a precision of about 1%.

Two motor covers are available:

- One cover if the head is assembled with a chuck or shell clamp (Fig.3.3 - 3).
- Another cover if the head is assembled with a cooled clamp (Fig.3.3 - 4).

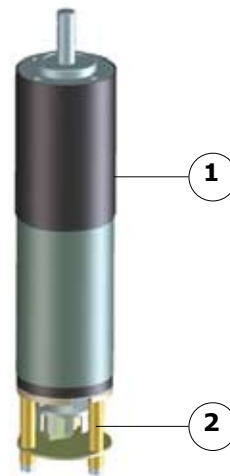


Fig.3.3 - Motors

Couplings:

A number of motor outputs are available. They are used to couple the motor to the drive. A clutch is installed on large heads (MU IV 195 to 245) to facilitate the repositioning of the head after a weld cycle.

This includes:

- An outlet parallel to the tube.
- An angle output (perpendicular to the tube).

For MU IV 195 to 275:

- A clutch.
- An outlet parallel to the tube for the clutch.
- An angle output for the clutch (perpendicular to the tube).

An outlet parallel to the tube (Fig.3.4 - 1).

An special outlet parallel to the tube for MU IV 195 to 275 (Fig.3.4 - 2) with a clutch system.

An outlet perpendicular to the tube (Fig.3.4 - 3).

An special outlet perpendicular to the tube for MU IV 195 to 275 (Fig.3.4 - 4) with a clutch system.

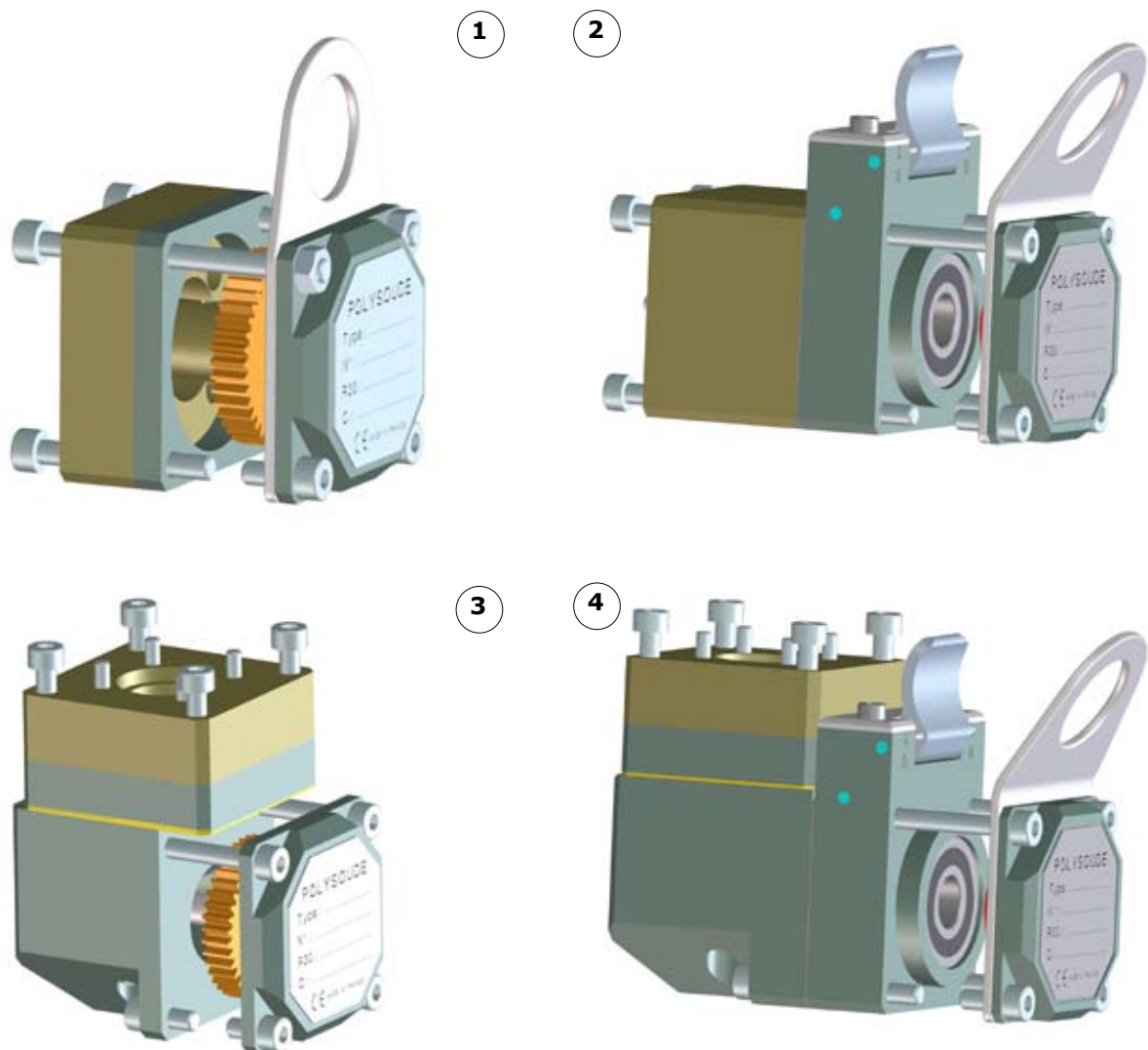


Fig.3.4 - Couplings

Clamping devices:

Two systems are available:

The chuck clamp:

The chuck clamp is made up of two synchronized arms (Fig.3.5 - 2), whose profile can be manually adjusted to clamp and centre the assembly on the part to be welded. A single control lever (Fig.3.5 - 1) is used to clamp and unclamp.

The shell clamp:

The shell clamp is made up of a spring clip type mechanism that controls a clamping arm (Fig.3.5 - 3) fitted with an adjusting screw (Fig.3.5 - 4) according to the diameter.

The mechanism receives a "parent" shell that is fitted with intermediate shells adapted to the diameters of the tubes, according to the capacity of the head.

As an option, the housing of this mechanism can be liquid-cooled in order to thermally insulate the head, in particular when welding pre-heated tubes.

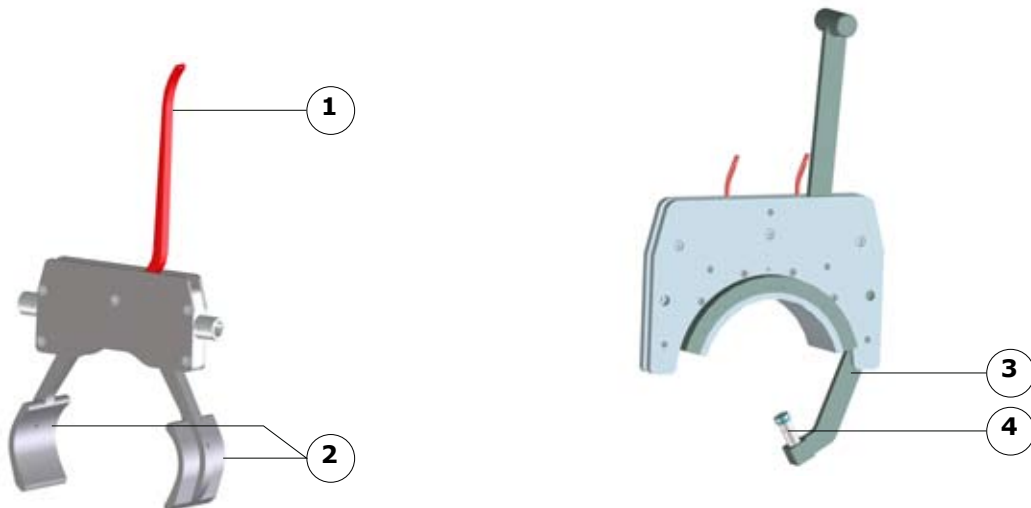


Fig.3.5 - Clamps

Welding plates:

Two systems are available:

Simple plate (Fig.3.6 - 1-2):

The simple plate is used to hold and adjust the torch with regard to the welding plane. The simple plate is manually adjusted.

This plate is made up of:

- A plate that is directly attached to the drive crown gear.
- An insulating torch support.
- An arm with a radial tube sensor used for the manual transverse adjustment of the torch in relation to the welding plane.
- A device to adjust the height that allows for an axial offset of the torch in relation to the welding plane (only on plates MU IV 195 to 245).

AVC/OSC plate (Fig.3.6 - 3-4):

Heads equipped with an AVC/OSC plate can only be used with generators with the corresponding functions. The AVC/OSC plate is fitted with two motor-driven slides controlled by the generator.

This plate includes more parts than the simple plate:

- The AVC system that moves the torch in the radial direction.
- The OSC (oscillation) assembly, that moves the torch perpendicularly to the weld plane.

The generator is used to control these two axes during the weld cycle.

The AVC shaft is used to check and adjust the tension of the arc and to keep it at the programmed value.

The OSC shaft is used to adjust the axial position of the electrode. The oscillation system can be programmed to scan the weld from right to left for wide weld beads.

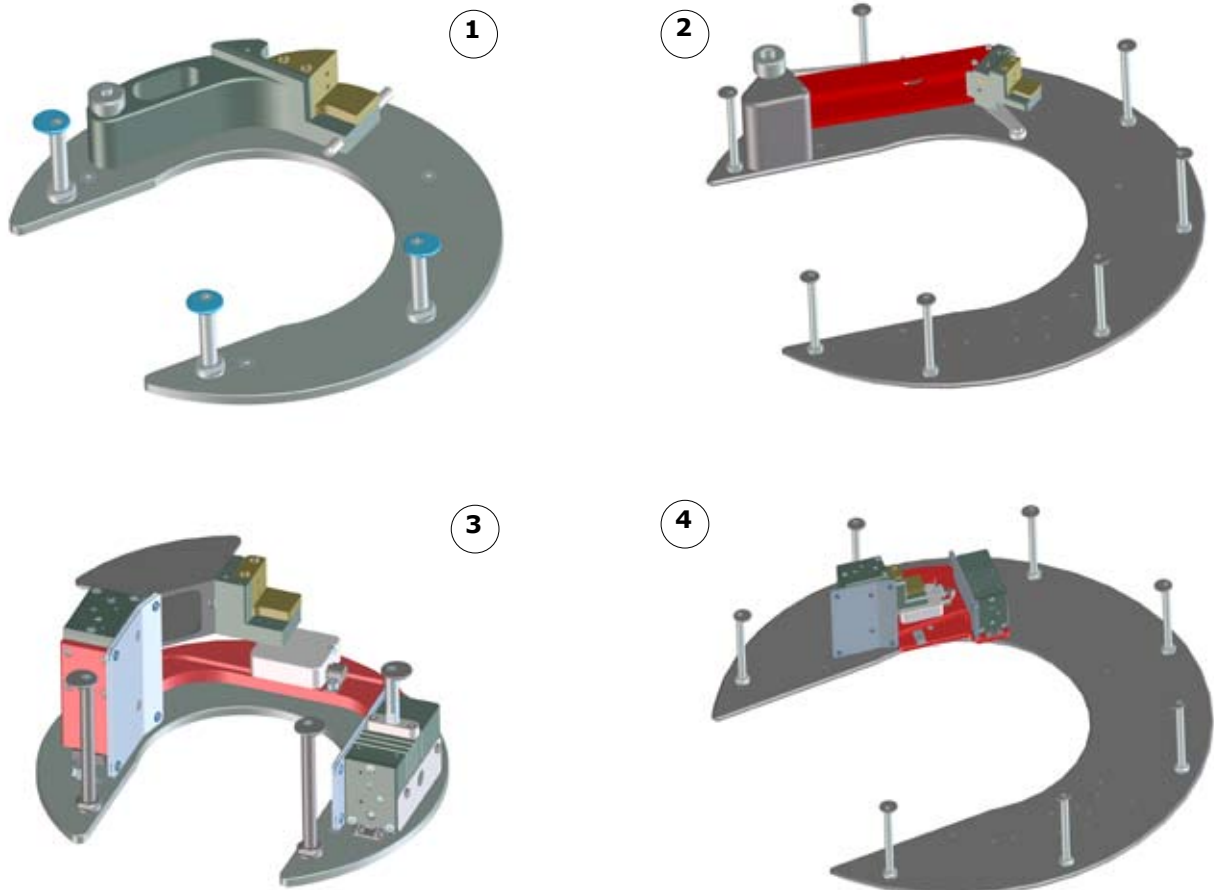


Fig.3.6 - Plates

Torch:

The torch is attached to the plate's torch support. It is liquid cooled.

It is connected to the generator by:

- A flexible multi-duct (Polysoude patent) for power, gas and coolant supply.
- A 7-meter harness fitted with quick-fit connections.

The length of the multi-duct depends on the reel diameter on the welding head:

- 2.2 m for MU IV 28 to 104.
- 3.2m for MU IV 115 to 295.



Fig.3.7 - Torch

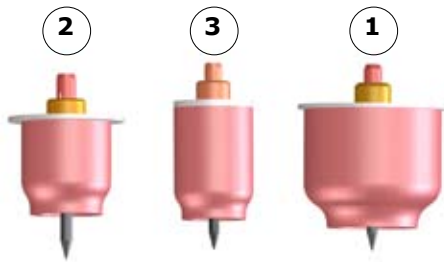


Fig.3.8 - Gas lenses

Gas lenses:

Three types of gas lens, according to the diameter of the tubes to be welded:

- GM type (Fig.3.8 - 1).
- P type (Fig.3.8 - 2).
- N type (Fig.3.8 - 3).

Wire option:

This device feeds the filler wire to the weld.

There are two types of feeder:

- The exterior feeder can be used on the entire range (Fig.3.9).
- The built-in feeder can only be used from MU IV 128, with AVC /OSC plate to MU IV 275 (Fig.3.10).



Fig.3.9 - Exterior feeder assembly



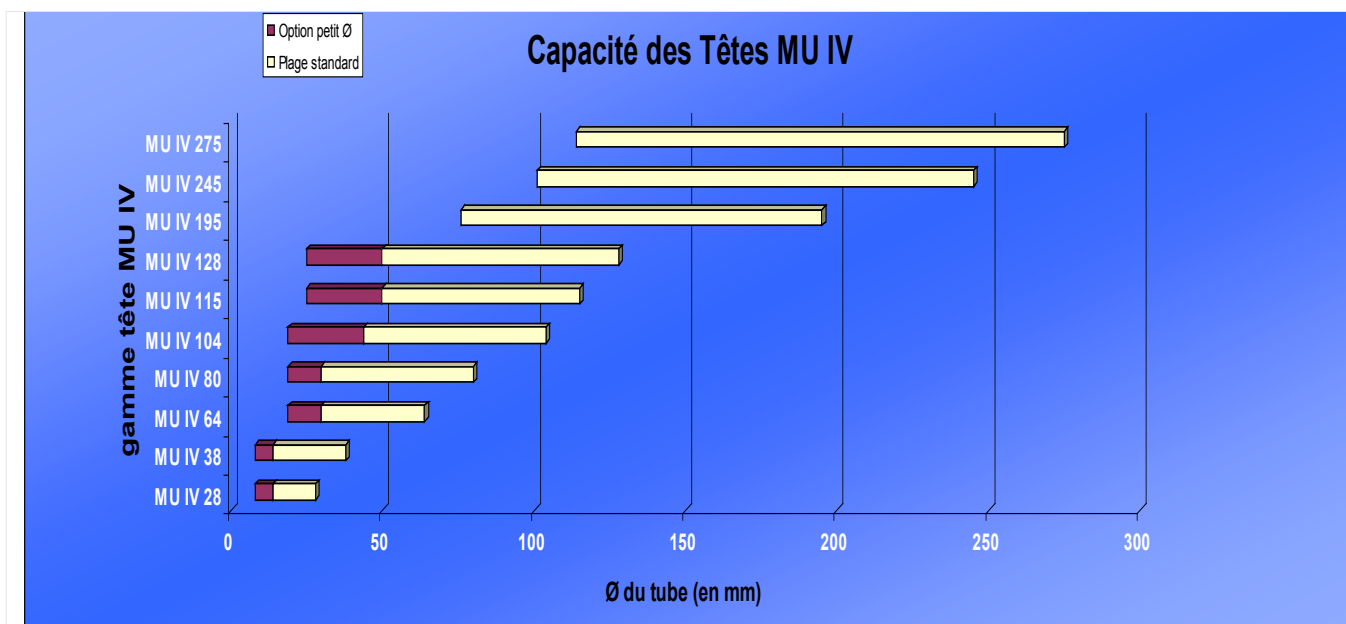
Fig.3.10 - Built-in feeder assembly

3. 5. Technical characteristics

| Dimensions (ready to weld, integrated feeder included) | | |
|---|------------------------|--------------------|
| Dimensions | See Dimensions chapter | |
| Duty cycles | Max. peak I (A) | Max. average I (A) |
| Wireless MU IV | 250 to 100% | 190 to 100% |
| MU IV with wire filler (Amps) | 250 to 100% | 190 to 100% |
| MU IV AVC/OSC (Amps) | 250 to 100% | 190 to 100% |
| Ambient noise | | |
| In welding mode, as per the directive 2006/42/EC (dBA) | < 70 | |
| Tube (see details in "Capacity" chapter) | | |
| Min. diameter of the tubes to be welded (mm) | 8 | |
| Max. diameter of the tubes to be welded (mm) | 275 | |
| Gas | | |
| Gas used | Argon or mixes | |

3. 6. Capacities

| Welding head | Small Ø option (mm) | Min. Ø (mm) | Max. Ø (mm) |
|------------------|---------------------|-------------|-------------|
| MU IV 28 | 8 | 14 | 28 |
| MU IV 38 | 8 | 14 | 38 |
| MU IV 64 | 19 | 30 | 64 |
| MU IV 80 | 19 | 30 | 80 |
| MU IV 104 | 19 | 44 | 104 |
| MU IV 115 | 25 | 50 | 115 |
| MU IV 128 | 25 | 50 | 128 |
| MU IV 195 | - | 76 | 195 |
| MU IV 245 | - | 101 | 245 |
| MU IV 275 | - | 114 | 275 |



3. 7. Equipment compatibility

The MU IV welding heads are compatible with all the generators in the Polysoude range, provided that the duty cycles (heads and generators) and options thereof are respected (AVC/OSC)

3. 8. Dimensions

| | | MU IV Min.Ø/Max.Ø | Double clamp recommended | Ø A | B | C | D | E | |
|-------------|---|------------------------------------|-------------------------------------|------------|----------|----------|----------|----------|-------|
| O.D. | I.O.D. independent adjustable clamping | MU IV 14/28 P *_o | | 116 | 16 | 5 | 96 | 70 | |
| | | MU IV 8/38 P | | 126 | 16 | 5 | 96 | 72 | |
| | | MU IV 19/64 P * | | 155 | 16 | 5 | 98 | 93 | |
| | | MU IV 19/80 P | | 172 | 16 | 5 | 97 | 103 | |
| | | MU IV 19/104 P * | | 204 | 16 | 5 | 90 | 121.5 | |
| | | MU IV 25/115 P | | 215 | 16 | 5 | 101 | 148 | |
| | | MU IV 25/128 P * | | 240 | 16 | 5 | 99 | 173 | |
| | | MU IV 76/195 P | | 410 | 30.5 | 14 | 158.5 | 208 | |
| | | MU IV 101/245 P * | | 470 | 30.5 | 14 | 174.5 | 254 | |
| | | MU IV 114/275 P | | 500 | 30.5 | 14 | 172.5 | 276 | |
| | O.D. related shell clamping | MU IV 14/28 C * | Ø 8 to 28 | | 116 | 16 | 5 | 79 | 70 |
| | | MU IV 14/38 C * | Ø 8 to 38 | | 126 | 16 | 5 | 79 | 72 |
| | | MU IV 30/64 C * | Ø 19 to 64 | | 155 | 16 | 5 | 88 | 93 |
| | | MU IV 30/80 C * | Ø 19 to 80 | | 172 | 16 | 5 | 88 | 103 |
| | | MU IV 44/104 C * | Ø 19 to 104 | | 204 | 16 | 5 | 90 | 121.5 |
| | | MU IV 50/115 C * | Ø 25 to 115 | | 215 | 16 | 5 | 92 | 148 |
| | | MU IV 50/128 C * | Ø 25 to 128 | | 240 | 16 | 5 | 108 | 173 |
| | | MU IV 76/195 C * | NA | | 410 | 30.5 | 14 | 178 | 208 |
| | | MU IV 101/245 C * | NA | | 470 | 30.5 | 14 | 180 | 254 |
| | | MU IV 114/275 C * | NA | | 500 | 30.5 | 14 | 178.5 | 276 |

*On demand -

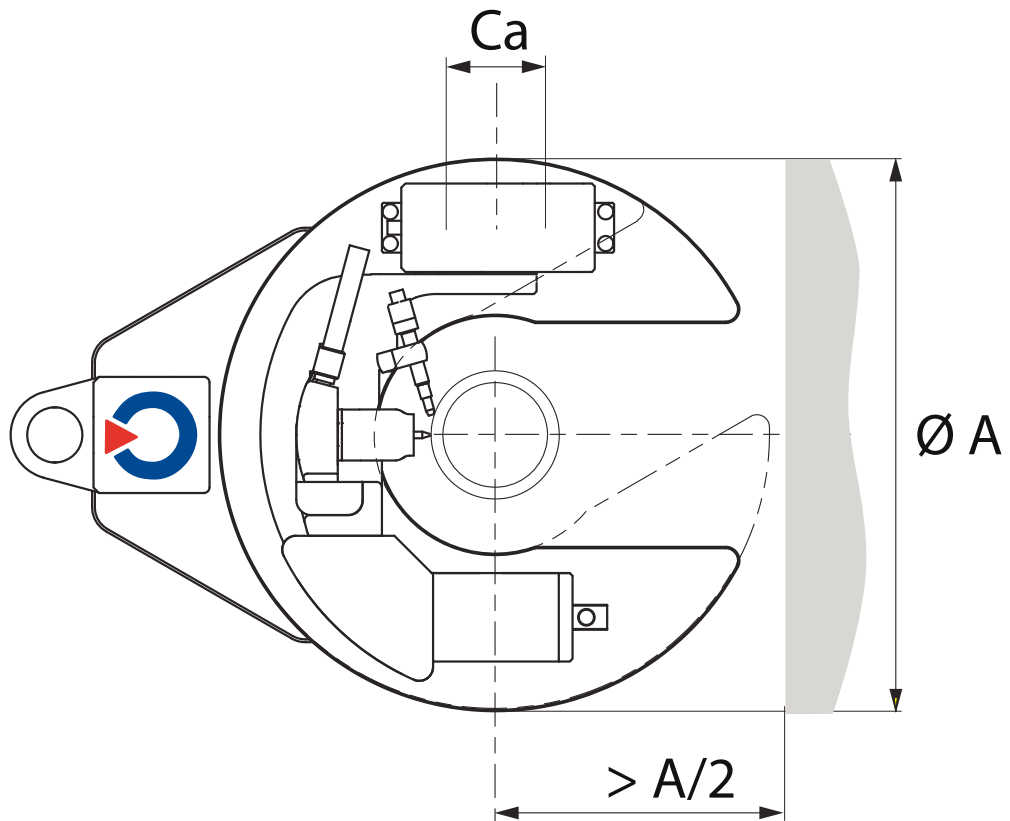
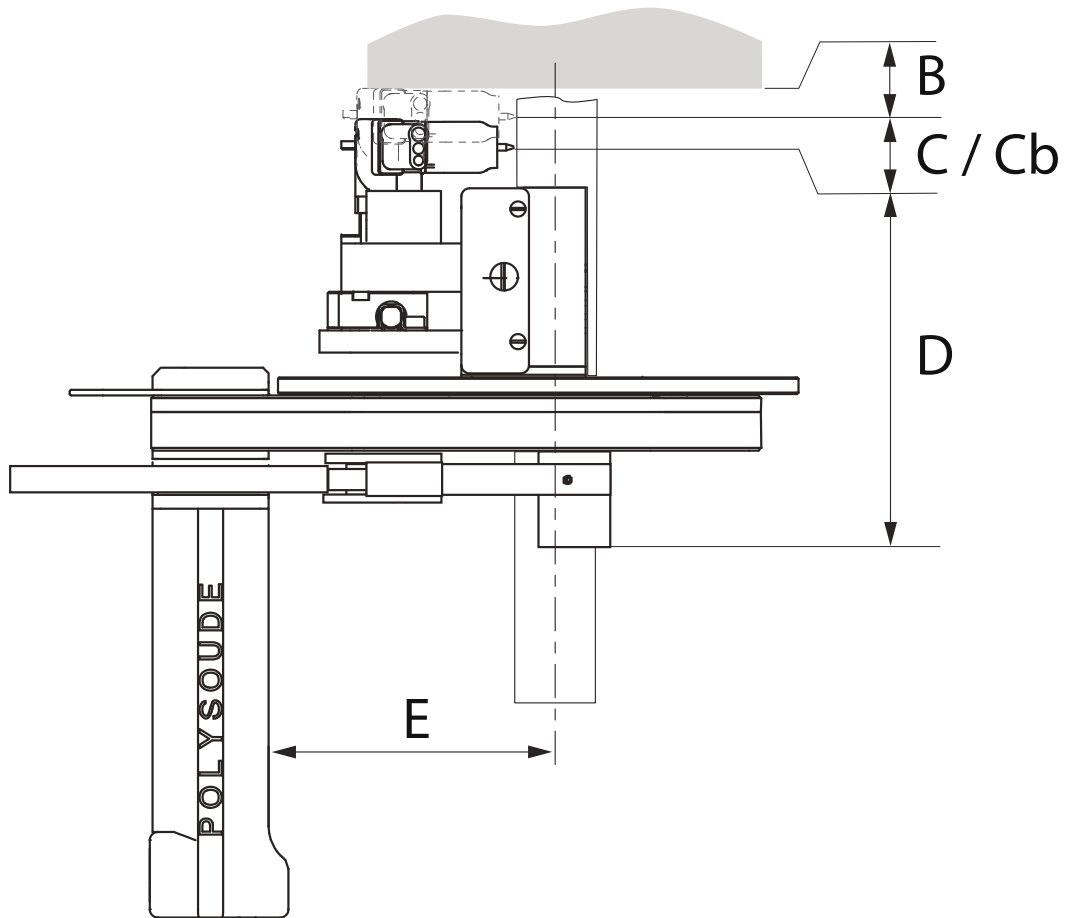
o With two 15630605 adapters, it is possible to weld tubes with a diameter of 8 mm to 14 mm.

P - Chuck clamps

C - Shell clamps

NA - Not applicable

| | | MU IV AVC/BL Min.Ø/Max.Ø | Double clamp recommended | Ø A | B | Amplitude | | D | E | |
|-------------|---|-----------------------------|-----------------------------|-----|-----|-----------|----|-----|-------|-------|
| | | | | | | Ca | Cb | | | |
| O.D. | Independent exterior diameter, adaptable clamp | MU IV 8/38 P | | 142 | 23 | 20 | 20 | 150 | 72 | |
| | | MU IV 19/64 P * | | 184 | 16 | 20 | 20 | 136 | 93 | |
| | | MU IV 19/80 P | | 200 | 16 | 20 | 20 | 136 | 103 | |
| | | MU IV 19/104 P * | | 222 | 16 | 20 | 20 | 140 | 121.5 | |
| | | MU IV 25/115 P | | 235 | 16 | 20 | 20 | 139 | 148 | |
| | | MU IV 25/128 P * | | 340 | 16 | 20 | 30 | 134 | 173 | |
| | | MU IV 76/195 P | | 410 | 16 | 20 | 30 | 165 | 208 | |
| | | MU IV 101/245 P * | | 500 | 16 | 20 | 30 | 179 | 254 | |
| | | MU IV 114/275 P | | 530 | 16 | 20 | 30 | 179 | 276 | |
| | O.D. related shell clamping | MU IV 14/38 C * | Ø 8 to 38 | | 142 | 23 | 20 | 20 | 130 | 72 |
| | | MU IV 30/64 C * | Ø 19 to 64 | | 184 | 16 | 20 | 20 | 128 | 93 |
| | | MU IV 30/80 C * | Ø 19 to 80 | | 200 | 16 | 20 | 20 | 126 | 103 |
| | | MU IV 44/104 C * | NA | | 222 | 16 | 20 | 20 | 128 | 124.5 |
| | | MU IV 50/115 C * | NA | | 235 | 16 | 20 | 20 | 128 | 148 |
| | | MU IV 50/128 C * | Ø 25 to 128 | | 340 | 16 | 20 | 30 | 143 | 173 |
| | | MU IV 76/195 C * | NA | | 410 | 16 | 20 | 30 | 185 | 208 |
| | | MU IV 101/245 C * | NA | | 500 | 16 | 20 | 30 | 184 | 254 |
| | | MU IV 114/275 C * | NA | | 530 | 16 | 20 | 30 | 184 | 276 |



4. Installation

4.1. Handling



All installation and maintenance operations must be performed with the equipment switched off.
To handle the unit always use the positions provided to this effect.
Never use the machine parts as handles: Risk of damaging or destroying the equipment.

The machine is delivered packed, in a crate with protective materials. This packaging is specific to the machine. Please keep the original packaging and use it whenever transporting the machine in order to avoid any damage.

When the machine is not in use and is removed from its support, it must be stored on a suitable support and kept well clear of any risks of impact (see packaging).

4.2. Installation on site



The complete installation must be provided with a lockable power switch.
The cable paths must be organised to prevent any risk of tripping and damage to the equipment.

4.3. Handling

A hoist ring (Fig.4.1 - 1) is provided to suspend the head.
When handling, use the handles on the drive (Fig.4.1 - 1) (from MU 115 only).

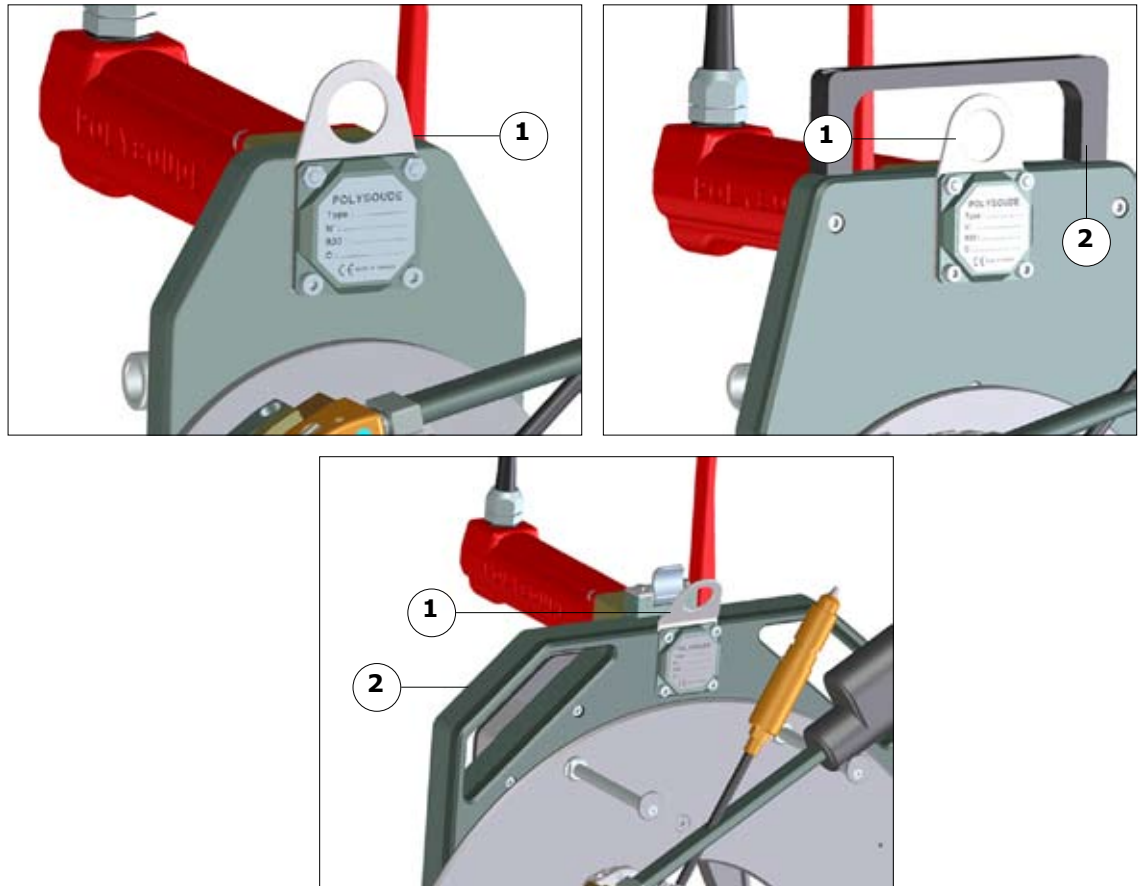


Fig.4.1 - Slings

4. 4. Bundle



The user is responsible for installing and using the arc welding equipment in accordance with the manufacturer's instructions. If electromagnetic interference is detected, the user of the arc welding material is responsible for correcting the situation with the manufacturer's assistance (extract from the standard EN 60974-10 2003 – Annex A).



Check the wiring before using the machine. If the angle of the wiring is too great, the coolant and gas pipes may be pinched. Limit this angle to 90° for, optimal operation.

5. Use

5. 1. Precautions



This machine should only be used by suitably qualified staff in accordance with the rules stipulated by labour legislation.



Any operation involving contact with the AVC axis or self-aligning with the oscillation axis must always be performed under the user's supervision (unless otherwise stated). There is a risk of a poor contact, due to impurities, silicate on the metal, etc. In this case the operator must press the emergency stop, thus avoiding the destruction of the torch or the slides. The operators must be informed to this effect.



When welding large parts whose shape is similar to a confined space or tank, the operator must check that the oxygen level (between 19.5 and 23% of the ambient air) is sufficient before intervening. The use of an oxygen analyser is strongly recommended. This is a reminder that below 18 %, discomfort may occur that can cause suffocation. In addition, the operator must be supervised by a third person inside the work space who can call for assistance in case of emergency.



**No changes must be made to the sensors on the different parts of the welding equipment (positions, settings, connections, etc.).
Risk of serious injury.
Risk of damaging or destroying the equipment.**

5. 2. The electrode



The electrodes are fragile and must be handled with care.

In order to make quality welds and avoid premature wear of the electrodes, keep the electrodes perfectly clean. Avoid all contact between the filler metal and the electrode in order to avoid rapid wear of the electrode.

The electrode provided by Polysoude is made of tungsten alloyed with additive element such as lanthanum. The outcome is an easier ignition and greater arc stability.

5. 2. 1. Grinding of the electrode:

- The diameter and the form of the electrode tip depend on the intensity of the welding current. The grinding should be performed according to the electrode axis. The use of a grinding machine enables the work to be done quicker, more easily and to be a higher standard.
- The tip of the electrode must always have a flat section. The form of the tip of the electrode is crucial for the ignition arc (to be checked regularly).
- The length of the electrode must be adapted to the type of gas lens used and the thickness of the tube.

Each electrode can withstand a maximum current.

Average values for electrode grinding:

| Current intensity (A) | Ø of the electrode (mm) | Grinding angle θ° | Flat section ϕ (mm) |
|-----------------------|-------------------------|-------------------------------|--------------------------|
| 10 - 110 | 1.6 | 15° | 0.1 to 0.2 |
| 40 - 190 | 2.0 | 15 - 30° | 0.1 to 0.3 |
| 60 - 210 | 2.4 | 30° | 0.1 to 0.4 |
| 125 - 290 | 3.2 | 30° | 0.2 to 0.5 |
| 250 - 400 | 4 | 30° | 0.3 to 1 |

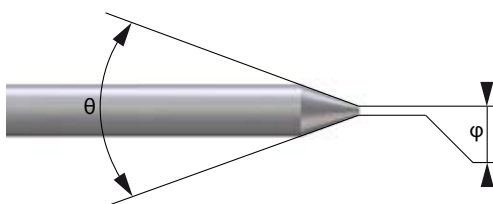


Fig.5.1 - Electrode grinding

5. 2. 2. The gas lens

The diameter of the gas lens must be adapted to the diameter of the electrode. If the drill hole diameter of the gas lens is greater than the diameter of the electrode, then there is a risk of ignition faults or poor protection of the weld.

Two types of standard gas lenses are used on MU heads:

- The small and short "P type" gas lens (Fig.5.4).
- The normal or long "N type" gas lens (Fig.5.3).

A third large-diameter gas lens can also be used to meet special requirements for gas protection. But the range of diameters covered by heads fitted in this way is reduced. "GM type" large model (Fig.5.2).

5. 2. 3. Selecting the gas lens

| MU IV | | | | |
|--------------|-----------------|------------------------------|---------------|---------------|
| Model | Gas lens | Length of the nozzles | Min. Ø | Maxi Ø |
| 28 | P | 12 | 8 | 28 |
| 38 | P | 12 | 8 | 38 |
| 64 | P | 12 | 30 | 64 |
| | P | 16 | 19 | 56 |
| 80 | P | 12 | 30 | 80 |
| | P | 16 | 19 | 64 |
| | GM | 26 | 19 | 51 |
| 104 | P | 16 | 44 | 104 |
| | N | 26 | 19 | 84 |
| | GM | 26 | 19 | 104 |
| 115 | P | 16 | 25 | 115 |
| | N | 26 | 25 | 95 |
| | GM | 26 | 25 | 115 |
| 128 | P | 16 | 70 | 128 |
| | N | 26 | 42 | 108 |
| | GM | 36 | 25 | 88 |
| 195 | N | 26 | 76 | 195 |
| | GM | 26 | 76 | 195 |
| 245 | N | 26 | 101 | 245 |
| | GM | 26 | 101 | 245 |
| 275 | N | 26 | 114 | 275 |
| | GM | 26 | 114 | 275 |



Fig.5.2 - "GM Type" gas lens



Fig.5.3 - "N Type" gas lens

| MU IV AVC/BL | | | | |
|---------------------|-----------------|------------------------------|---------------|---------------|
| Model | Gas lens | Length of the nozzles | Min. Ø | Maxi Ø |
| 38 | P | 16 | 14 | 38 |
| 64 | P | 19 | 19 | 64 |
| | GM | 26 | 19 | 50 |
| 80 | P | 19 | 30 | 80 |
| | GM | 26 | 19 | 66 |
| 104 | P | 19 | 44 | 104 |
| | GM | 26 | 31 | 104 |
| 115 | P | 19 | 50 | 115 |
| | GM | 26 | 42 | 102 |
| 128 | N | 26 | 63 | 128 |
| | GM | 26 | 63 | 128 |
| | GM | 36 | 42 | 88 |
| 195 | N | 26 | 76 | 195 |
| | GM | 26 | 76 | 195 |
| 245 | N | 26 | 101 | 245 |
| | GM | 26 | 101 | 245 |
| 275 | N | 26 | 114 | 275 |
| | GM | 26 | 114 | 275 |



Fig.5.4 - "P Type" gas lens

5. 2. 4. Assembly of the gas lens

- Pass the electrode (Fig. 5.5 - 4) in the chuck (Fig. 5.5 - 1) with the tip of the electrode on the side of the slits in the chuck.
- Install the chuck/electrode assembly in the gas lens (Fig.5.5 - 3).
- Screw the gas lens with its washer (Fig.5.5 - 2) (pay attention to the direction of the washer) in the torch without tightening.
- Adjust the length by which the electrode protrudes.
- Lock the retaining screw of the electrode.
- Place the ignition ring (Fig.5.5 - 6) on the nozzle (Fig.5.5 - 5).

The recommended lengths by which the electrode protrudes are:

- 8 mm for "Type P" gas lenses
- 11 mm for "Type N" gas lenses

These values must be adapted to each application (thickness, etc.).

The ring (Fig.5.5 - 6) on the nozzle (Fig.5.5 - 5) is intended to facilitate ignition. Its braid (not shown) is connected to a grounded metal part. This ring must never come into contact with the torch, otherwise the welding current will pass through the braid and destroy it.

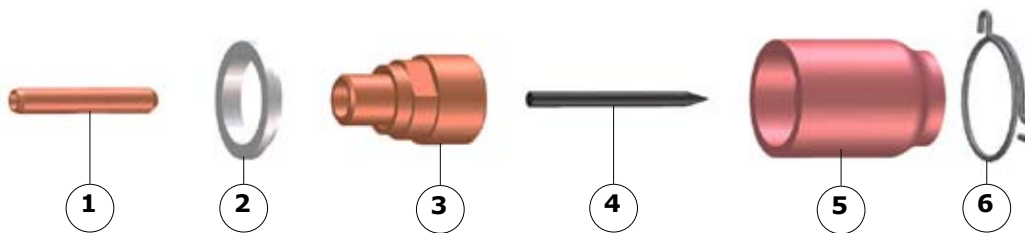


Fig.5.5 - Gas lens assembly

5. 2. 5. The chuck

The chuck is chosen according to the type of gas lens and the diameter of the electrode.

5. 2. 6. The nozzles

- "N Type" gas lenses allow for the use of two gas outlet diameters: \varnothing 9 or \varnothing 11 mm
- The nozzles for "N type" gas lenses are available in several dimensions, in terms of both length and diameter. The most common dimensions for these nozzles are a diameter of 9 mm and a length of 12 mm.
- The dimensions of the "GM Type" gas lens nozzles vary from \varnothing 13 to \varnothing 19 mm for the gas outlet and a length of 26 to 36 mm.

5. 2. 7. *Adjusting the distance between the electrode and the part*

MU IV 28, 38, 64, 80, 104, 115 and 128 welding heads without servo-control.

The radial adjustment is made using the sensor screw (Fig.5.6 - 1) fitted with a countersunk hexhead.

The welding tool is held close to the tube by a return spring.

- Tighten the screw to increase the distance between the electrode and the part.
- Loosen the screw to reduce the distance between the electrode and the part.

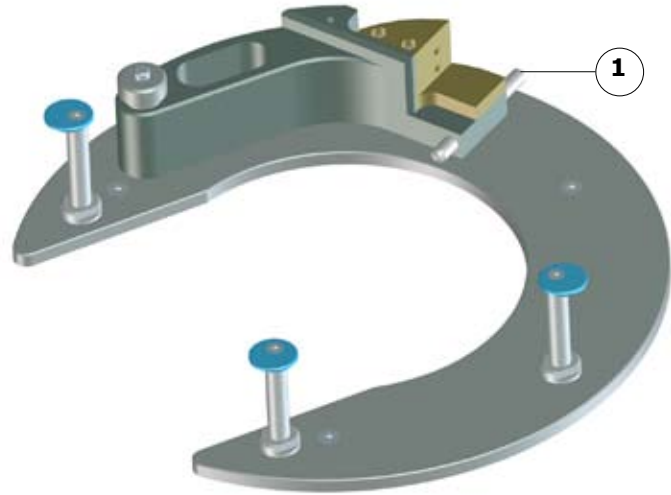


Fig.5.6 - Adjustment of the distance between the electrode and the part

MU IV 195, 245 and 275 welding heads without servo-control

The adjustment is made using the knurled button (Fig.5.7 - 1). The sensor fitted with a roller (Fig.5.7 - 2) is fixed in relation to the arm (travel of 15 mm).

- Tighten the button to increase the distance between the electrode and the part.
- Loosen the button to reduce the distance between the electrode and the part.

MU IV welding heads with servo-control. See User Manual of the generator.

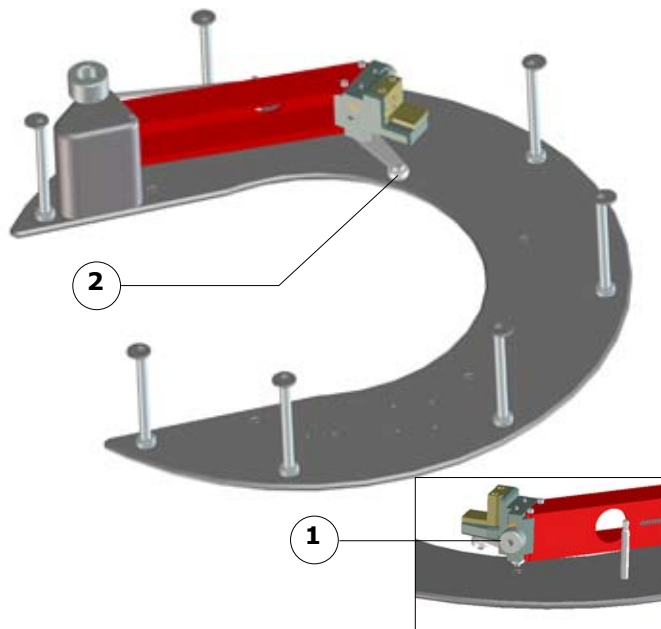


Fig.5.7 - Adjustment of the distance between the electrode and the part

5. 2. 8. Torch direction

All the MU IV welding heads can direct the torch from 0° to +45° (where 0° is the axis of the electrode perpendicular to the axis of the tube).

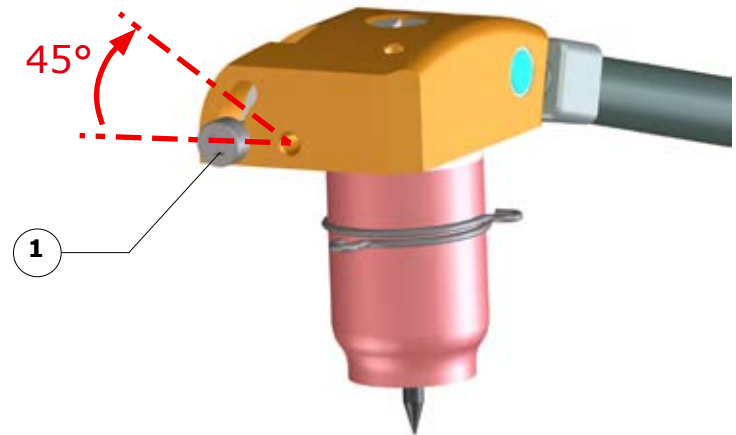


Fig.5.8 - Torch direction

5. 3. Wire sheaths

5. 3. 1. Selecting the wire sheaths and wire contact nozzle

There are two types of wire sheath, depending on the selected feeder:

- Standard wire sheath for exterior feeder (Fig.5.9 - 1)
- Wire sheath for built-in feeder (Fig.5.9 - 2)

Standard wire sheath (Fig.5.9 - 1)

The length of the standard wire sheaths depends on the width of the welding head. The length is 2.2 m for MU IV 28 to 80 welding heads and 3.2 m for MU IV 104 to 275 welding heads.

Four wire contact nozzles are available, depending on the diameter of the wire: Ø 0.6 - Ø 0.8 - Ø 1.0 - Ø 1.2 mm

A small nozzle option is available for Ø 0.9 wire.

Two Teflon liners are available, according to the diameter of the wire.

- Ø 2.4 x Ø 1.1 liner for Ø 0.6 and Ø 0.8 mm wire.
- Ø 2.4 x Ø 1.5 liner for Ø 0.9 to Ø 1.2 mm wire.

Wire sheath for built-in feeder (Fig.5.9 - 2)

On this sheath, only the nozzles are interchangeable, depending on the diameter of the wire. The four available nozzles are the same as those for the standard sheath.

5. 3. 2. Wire sheath connection

- Unscrew the nozzle from the wire sheath (Fig.5.9 - 4)
- Round off the end of the wire with a soft file and manually insert it into the sheath, which has already been straightened.
- Feed in enough wire until it protrudes from the sheath.
- Tighten the nozzle corresponding to the diameter of the wire and cut the wire so that 2 or 3 mm are left protruding.

For large tube diameters, and depending on the stiffness of the wire, it is possible to install a nozzle extension (Fig.5.9 - 3) between the nozzle and the sheath in order to limit the free length of wire between the bath and the nozzle outlet.

It is advisable to use wires with a diameter of 0.8 mm or 0.9.

Note: if the diameter of the wire is changed, remember to change the corresponding accessories:

- wire contact nozzle matching the diameter of the wire,
- Teflon liner inside the sheath with a diameter of 1.1 mm for \varnothing 0.6 and \varnothing 0.8 mm wires, or 1.5 mm for \varnothing 0.9 to \varnothing 1.2 mm wires
- Feeder drive roller matching the diameter of the wire (built-in feeder).

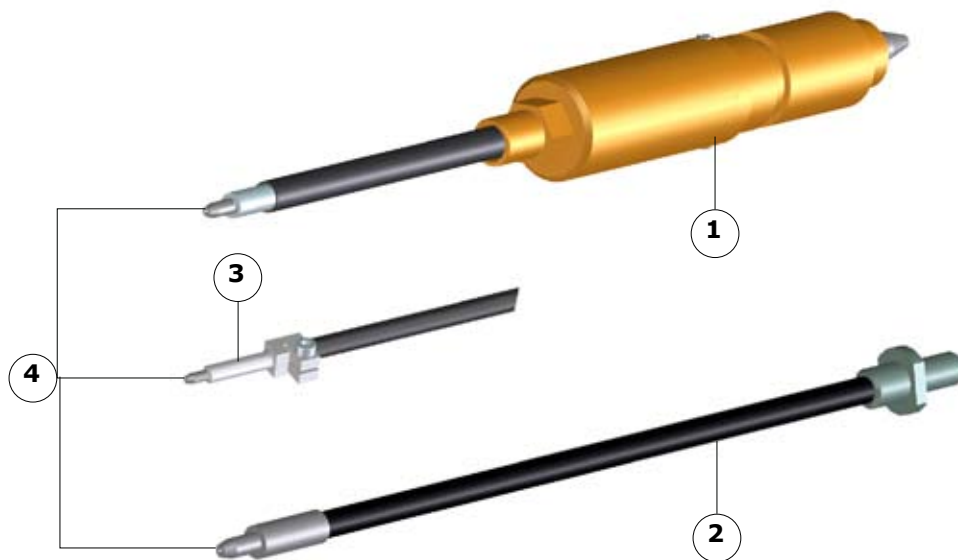


Fig.5.9 - Wire sheaths and small nozzles

5. 3. 3. Adjusting the electrode wire

The position of the wire can be precisely adjusted in relation to the welding electrode. The average values for correct settings are:

- Free length at outlet: $S_f = 8$ to 10 mm.
- Distance between the wire and the tip of the electrode: $De-f = 2$ to 3 mm.
- Incline of the wire/torch axis: $C = 70$ to 80° .

These values are for reference only and must be adapted to each welding application.

The adjustment system comprises:

- A vertical runner used to control the altitude ($De-f$) using a screw (Fig.5.10 - 1).
- A transverse runner used to adjust the wire in the same plane as the electrode (or the welding plane) using a screw (Fig.5.10 - 2).
- A screw used to adjust the angle of the wire inlet (C) (Fig.5.10 - 3).
- A screw used to adjust the free length of wire at the small nozzle outlet (S_f) (Fig.5.10 - 4).

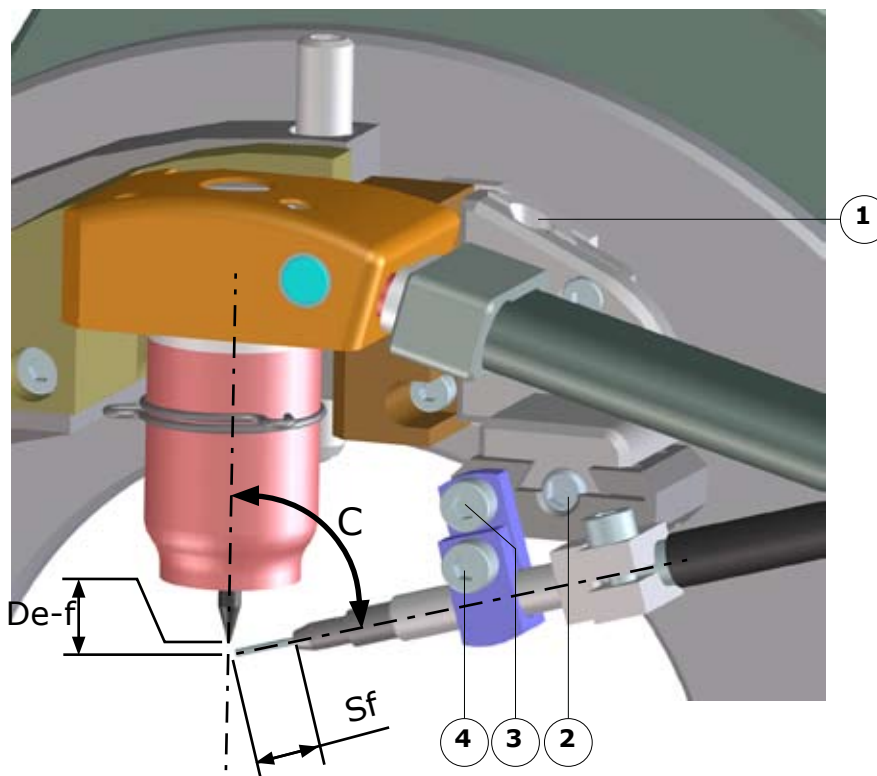


Fig.5.10 - Electrode wire settings

5. 4. Ignition ring

The ignition ring on the nozzle makes it easier to ignite the torch. The braid must be connected to an isolated part of the torch.



Fig.5.11 - Ignition ring

5. 5. Built-in feeder

5. 5. 1. Setting up the wire in the feeder

- Unscrew the screw M3 and remove the cover (Fig. 5.12-View A).
- Unscrew the adjustment screw for the gearing in order to move the feeder roller (12), away from the driving roller (1) (Fig. 5.12 - View B).
- Tighten or loosen either one of the adjustment screws (3) of the straightening roller (4), to move them apart (Fig.5.12 - View C).
- Mount the inlet of the feeder and the liner. The inlet is then held in place by the screw (Fig.5.12 - View D).
- Insert the wire into the assembly (Fig.5.12 - View E).
- Actuate "Auto Wire" (with the driving rollers rotating) (Fig.5.12 - View F).



**The wire speed is important: do not place your hand in front of the wire. Direct the wire so that it may not reach you. Actuate the wire at a low speed.
The wire must be inside the grooves of the rollers.**

- Screw on the adjustment screw for the gearing until the wire begins to be drawn, then tighten the screw by a 1/2 turn (3/4 max. turn) (Fig. 5.12- View G).
- Check that the wire unwinds correctly:
 - Unwind the wire with the remote control by actuating "auto wire" at low speed.
 - Hold the wire manually at a few centimetres from the end.
 - The wire should twist and continue to unwind.
- Feed out a few centimetres then cut it closely to the feeder (Fig. 5.12 - View H)
- Reassemble the cover and tighten the screw M3.



The drive roller must be changed according to the wire diameter.

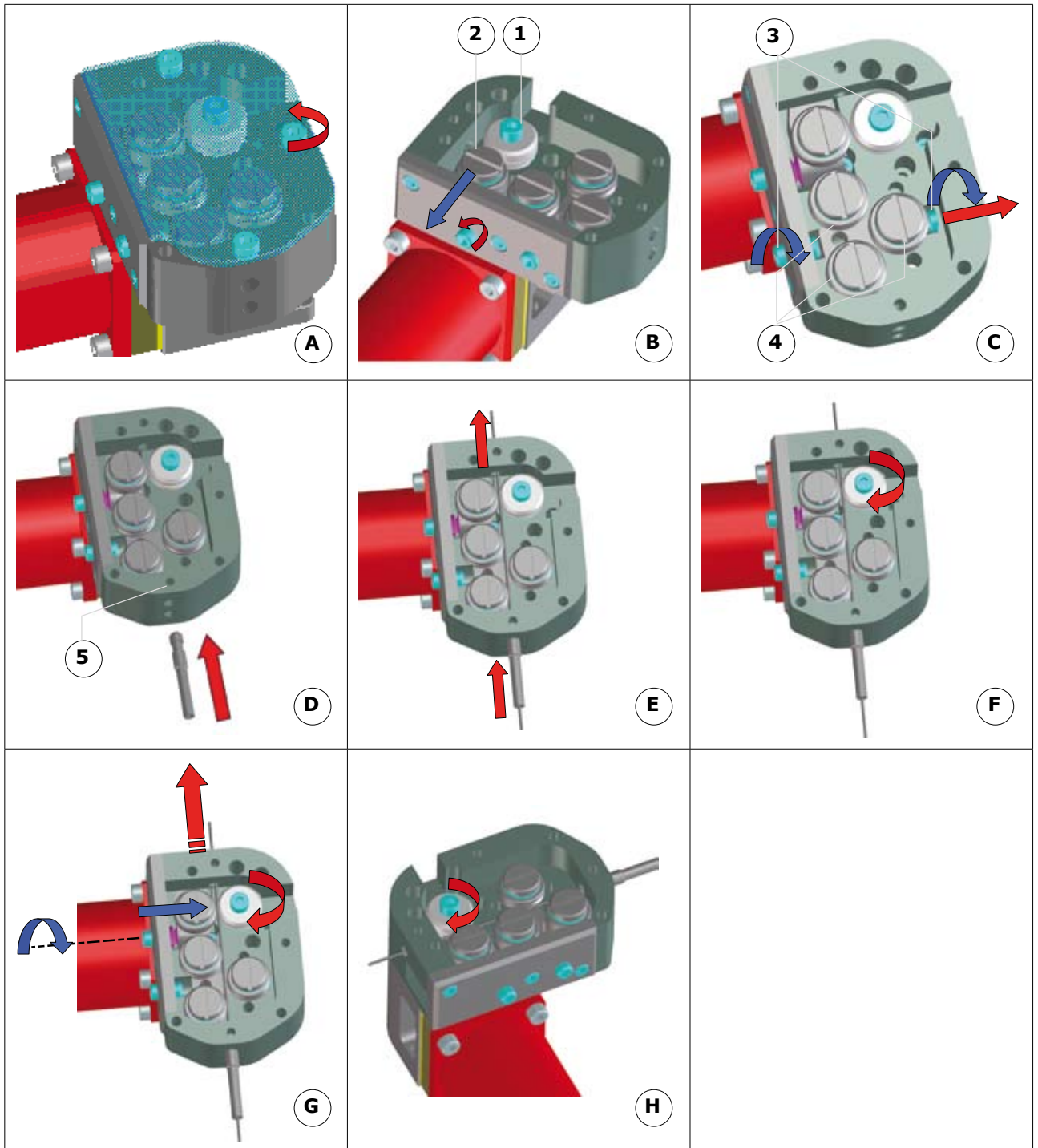


Fig.5.12 - Placing the wire

5. 5. 2. Adjustment of the wire curvature



- Feed a few centimetres of wire, then check the curve (Fig.5.13 - View A).
- If the wire unwinds on the side opposite to the two straightening rollers (Fig.5.13 - View B):
- Remove the wire from the assembly
 - Reverse the straightening rollers on the side (Fig.5.13 - View C)
 - Replace the wire
 - Adjust with the adjusting screws of the rollers until the wire comes out straight.
- If the wire unwinds on the same side as the two guide rollers (Fig.5.13 - View E):
- Adjust until the wire is straight (Fig.B - View F).



Warning! The wire must be inside the grooves of the rollers.

- Unwind a few centimetres of wire.
- Cut the wire.
- Deburr the end so that it does not damage the wire sheath, the wire feeder rollers or other components.

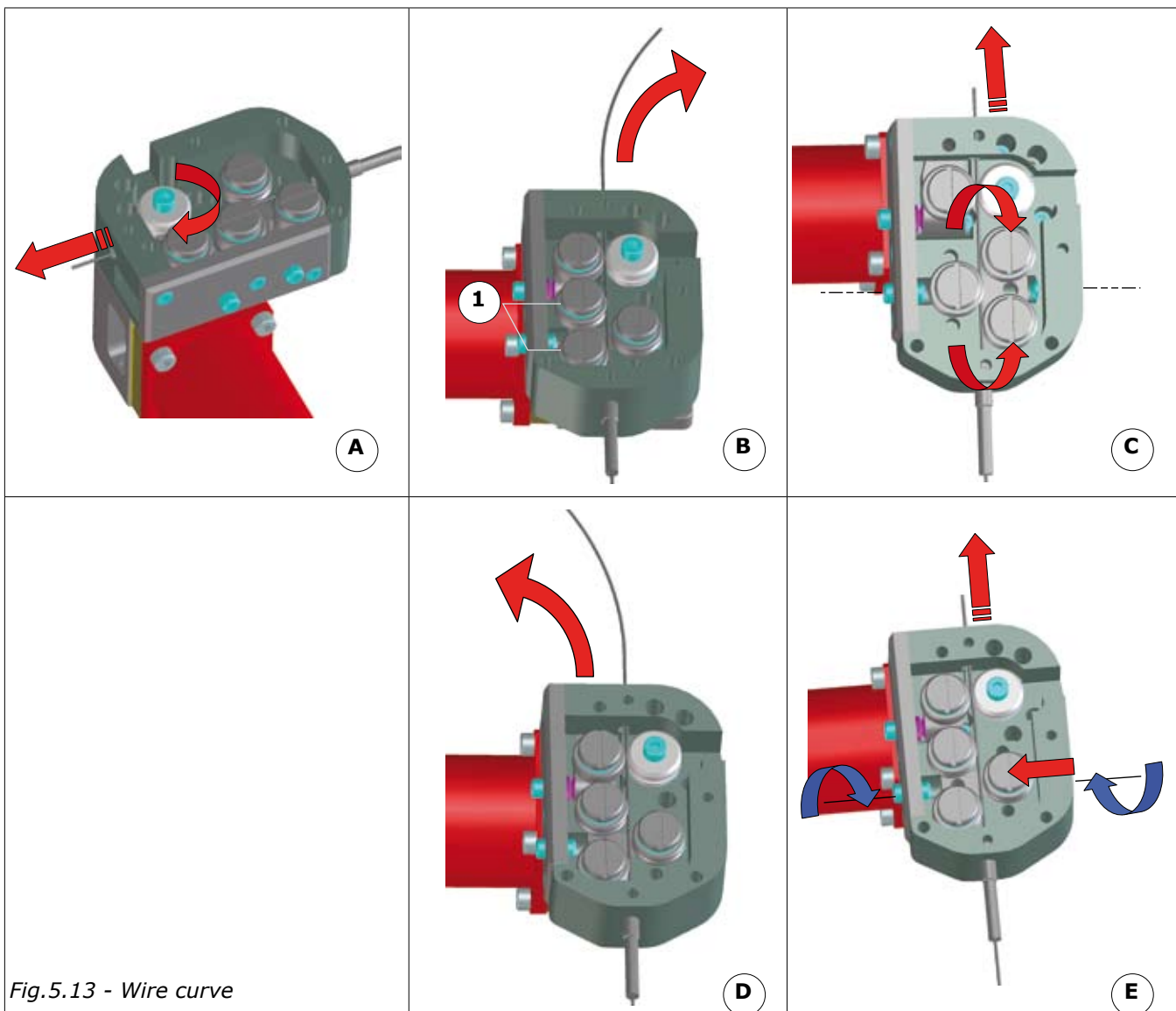


Fig.5.13 - Wire curve

5. 6. Adjusting the clamps

5. 6. 1. Chuck clamps

- Place the welding head on the tube.
- Close the clamp using the control lever (direction A) (Fig.5.14 - 1). In this position, the tube must be free.
- Bring the clamp into contact with the tube using one of the adjusting knobs (Fig.5.14 - 2),
- Open the clamp with the lever (direction B).
- Tighten the clamp by turning the adjusting knob by a 1/6 turn (*),
- Close and check that the welding head is properly clamped onto the tube.

(*) Adjustment may be necessary, depending on the pressure required on the tube. Excessive pressure may result in permanent deformation.

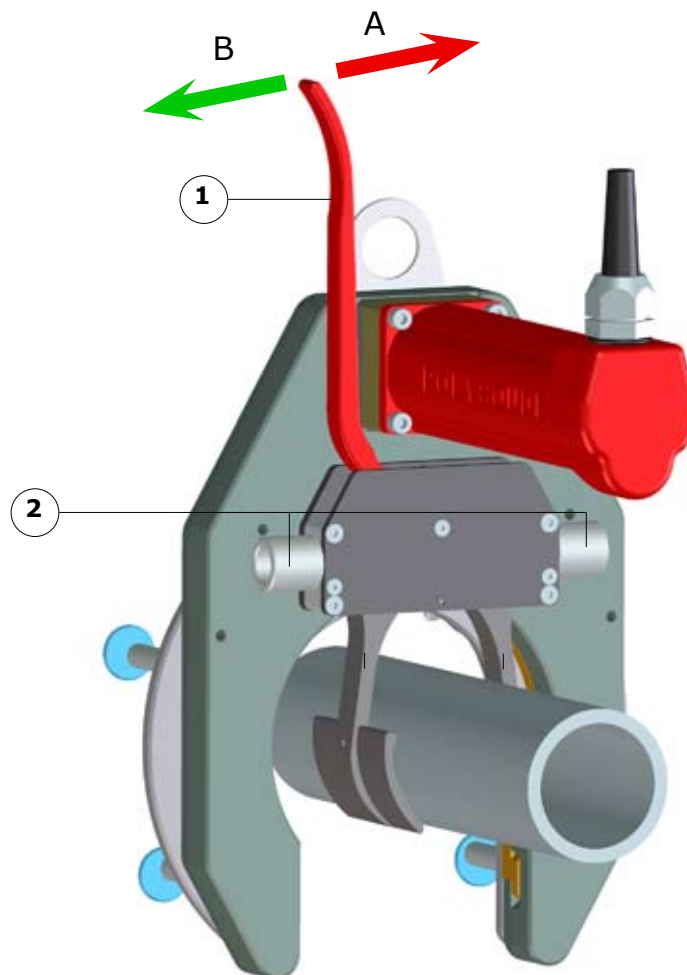


Fig.5.14 - Chuck clamps

5. 6. 2. Shell clamps

- Install the shell corresponding to the diameter of the tube in the clamp (Fig.5.15 - 1).
- Place the welding head on the tube.
- Close the clamp using the control lever (direction A) (Fig.5.15 - 2).
- In this position, the tube must be free.
- Adjust the screw (Fig.5.15 - 3) until it is in contact with the tube.
- Open the clamp (direction B).
- Tighten the locking screw by 1/2 turn (*).
- Close and check that the clamp is secure.

(*). Adjustment may be necessary, depending on the pressure required on the tube. Excessive pressure may result in permanent deformation.

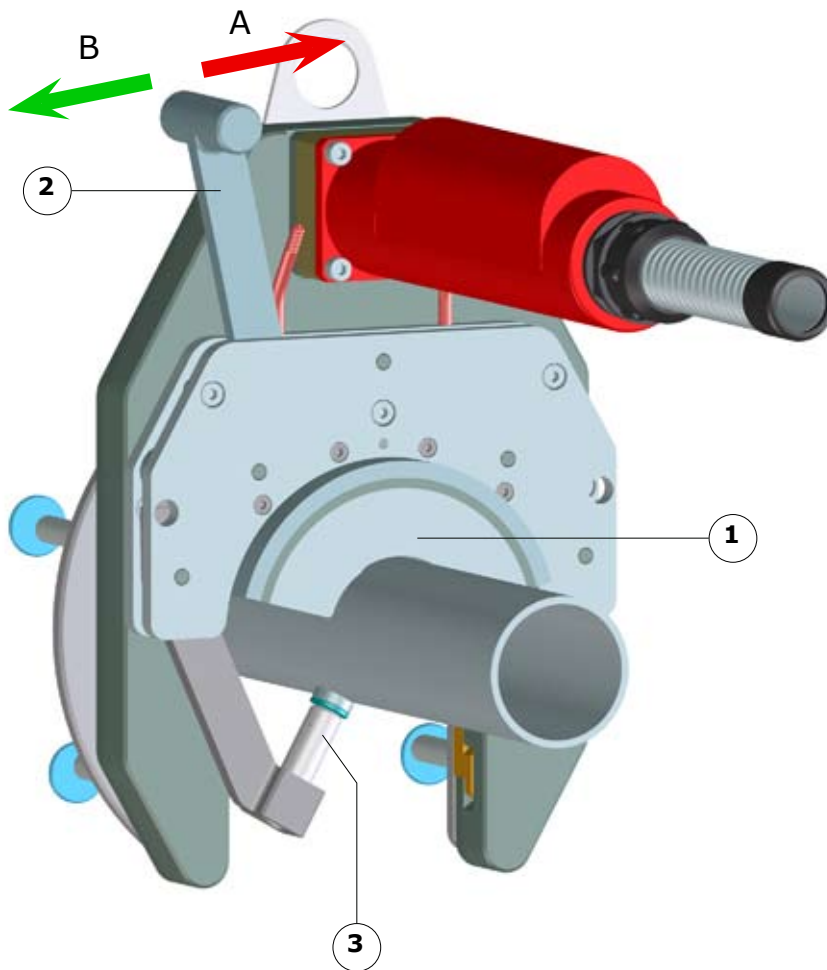


Fig.5.15 - Shell clamps

5. 7. Adjusting the gas flow rate

The gas flow rate must be approximately:

- 7 l/min for type P gas lenses
- 8 l/min for type N gas lenses
- 12 l/min for type GM gas lenses

The gas flow rate must be adjusted to provide optimal protection, depending on the applications. Insufficient or excessive gas flow rates will result in ignition and/or weldability problems (gas cavities, undercuts, etc.).

5. 8. Adjusting the oscillation

Before starting a weld cycle, the carriage of the oscillation device must be positioned in the centre (position manually or using the remote control if the plate is fitted with AVC/BL). Also check that the adjustments required for the application have been made or can be made.

5. 9. Positioning the welding head and preparing the weld

The ground cable must be connected as close as possible to the weld and at a point that is free of grease and rust.

- Position the welding head on the plane of the join.
- Use the radial and axial adjusting screws or, on welding heads with AVC and oscillation, the remote control unit to position the welding head correctly.
- Wind the multi-duct and the wire sheath on the reels provided on the welding plate before starting the automatic welding cycle. They must always unwind during the welding cycle.

The welds are usually made with the wire at the front, but are also possible with the wire at the rear. The starting point of the torch is selected according to the pre-defined recommendations.

5. 10. Trial cycle

Before welding, it is advisable to complete one trial cycle without any wire and without an arc. Proceed as follows (see generator manual):

- Select cycle "without solder" on the generator or "simulation" on the remote control.
- Set the "wire" switch to the manual position.
- Wind the multi-duct and the wire guide sheath (see 5.9).
- Select "start cycle".
- Check that the system is in good working order (speed, gas flow rate, pulses, etc.).

5. 11. Performing a weld

Check the following before welding:

- The quality and settings of the electrode
- The presence of weld gas and protective gas
- The position of the welding head
- Adjust the settings.
- Wind the multi-duct and wire sheath.
- Wet the generator to "with solder".
- Set the wire switch to "auto".
- Select "start cycle".
- Check that the system is working properly.
- Wait for the end of the "post gas" delay.
- Place the welding head in the open position.
- Release and remove the welding head.

6. Maintenance and troubleshooting

You must refer to the chapter on spare parts to obtain the part reference: Spare parts

6. 1. Troubleshooting - diagnostics assistance



| Function | Kind of incident | Possible causes |
|------------------------------------|--|---|
| Welding current | No igniting | No earth connection Braid cut No welding gas No ignition ring No cooling Faulty electrode Remote control set to "no arc" position |
| Gas | Poor protection | Wrong gas flow rate Worn gas lens Too long after leaving electrode Empty gas bottle |
| Rotation | No movement | Electrical connections not done Faulty engine Drive pin broken Programming error |
| | Speed not adjusted No impulses | Faulty impulse emitter Control electronic fault |
| | Rotation under 360° | Programming error Drive damaged Drive pin broken |
| Wire | No wire | Wire switch in wrong position Polyfil not engaged Wire sheath blocked Teflon liner worn Pin broken Programming error |
| | Speed not adjusted | Faulty impulse emitter Control electronic fault |
| Arc Voltage Control movement (AVC) | No movement of the torch | Function motor fault Poor connections Hard spot on slide Programming error Electronic fault |
| | No return movement after the electrode has touched the workpiece | No ground cable No specific cable |
| Oscillation | No movement | Function motor fault Poor connections Programming error Electronic fault |
| | Discrepancy of the oscillation movement | Hard spot on slide Oscillation slide at stop Hard spot on slide Programming error Electronic fault |

6. 2. Routine maintenance



6. 2. 1. Preventive maintenance

| Inspection of flexible pipes | | |
|------------------------------|-----------------|--|
| | Frequency | Operation - |
| | Every 3 months. | <p>Equipment switched off, power switch locked. Inspection of flexible pipes</p> <ul style="list-style-type: none"> • Clean the flexible pipes with a paintbrush or cloth. • Inspect all the visible circuits. • Check that the flexible pipes do not have a curve radius that is too tight, pinches, crimps, tears or bulges. • Check that the flexible pipes do not rub against a mobile part of the machine (protector, etc.). • Check that the flexible pipes are not worn. • Check for the absence of seepage or noise, which are indicative of leaks and therefore deterioration of the internal housing. • Check the connections and end pieces are tight. |

| Looking for abnormal noises | | |
|-----------------------------|-----------------|---|
| | Frequency | Operation - |
| | Every 3 months. | <p>Live equipment, working. Axis movement:</p> <ul style="list-style-type: none"> • Move in the +/- axis within the physical limits of the machine. • Pay particular attention to any suspicious noises (cracking, rubbing, abnormal vibration noises, etc.). • Repeat this operation on all the axes. |
| | Every 3 months. | <p>Live equipment, working. Motors:</p> <ul style="list-style-type: none"> • No abnormal noise should occur during operation: droning, scratching, cracking or any other unusual noise. • Also check that the motor does not make any abnormal noises. |

| Checking the torch | | |
|-----------------------|-------------------|--|
| Consumables and tools | Frequency | Operation - |
| | According to use. | <p>Equipment switched off, power switch locked.</p> <ul style="list-style-type: none"> • Check the general good condition, the gas lens nozzle and the torch. |

| Looking for leaks in the circuit | | |
|----------------------------------|-----------------|---|
| | Frequency | Operation - |
| | Every 3 months. | <p>Live equipment, working.</p> <p>Reminder: Appearance of a leak</p> <ul style="list-style-type: none"> Noises. Discharges. Seepage. Puddles. Other abnormal and frequent elements. |
| | Every 3 months. | <p>Equipment switched off, power switch locked.</p> <p>Check the following sensitive points visually:</p> <ul style="list-style-type: none"> All piping accessories (connections, tees, elbows, plugs, valves, etc.). All application components. |

| Inspection of electronic connectors | | |
|-------------------------------------|-----------------|---|
| | Frequency | Operation - |
| | Every 3 months. | <p>Equipment switched off, power switch locked.</p> <ul style="list-style-type: none"> Check the tightening of connections Check that there is no overheating on the component connections. |

| Inspection of pinions | | |
|-----------------------------|-----------------|---|
| Consumables and tools | Frequency | Operation - |
| Hard paint brush, lubricant | Every 3 months. | <p>Equipment switched off, power switch locked.</p> <ul style="list-style-type: none"> Clean all the teeth with solvent with a brush. Remove all traces of lubricant or other debris. Check the condition of the pinion: it should not be oxidised and its surface treatment should not be damaged. Check the teeth: report any irregular wear, smudges or sharp edges. Check the attachment, the pinion should not have any axial or radial clearance when moving manually (if possible) Lubricate the pinion or the crown with a paintbrush and the lubricant recommended by the manufacturer. |

| General inspection of the motors | | |
|----------------------------------|-----------------|---|
| | Frequency | Operation - |
| | Every 3 months. | <p>Equipment switched off, power switch locked.</p> <ul style="list-style-type: none"> Check the motor and the louver for dust and grease. Check the general condition of the motor: <ul style="list-style-type: none"> There should be not traces of impacts on the motor frame and on the blades (if any) The ventilation cover should not be broken and the louver should not be blocked or clogged. Check the motor multicore cable. It should not be crushed, pinched or stripped. Check the motor fastening. |

| Checking the position switches | | |
|--------------------------------|-----------------|---|
| | Frequency | Operation - |
| | Every 3 months. | <p>Equipment switched off, power switch locked.</p> <ul style="list-style-type: none"> • Check the general condition of the position switch (body and head); check the fastening of the assembly. • Check the condition of the cable clamp (broken, unscrewed) and check its effect on the multicore cable manually. • Remove any foreign body that might interfere with the system. • Check manual activation. • Check that it operates correctly (stop machine, stop movement, messages, other) • Check the condition, the fastening and the movement of the contact element. |

| Checking and lubricating the slides | | |
|---|-----------------|---|
| Consumables and tools | Frequency | Operation - |
| Clean cloth, hard paint-brush, lubricant. | Every 3 months. | <p>Equipment switched off, power switch locked. Clean and lubricate the slide:</p> <ul style="list-style-type: none"> • Clean the motion-generating screw-nut assemblies of both slides by means of a soft paint brush. • Lubricate both sides of the screws with a hard paint brush. • Put some lubricant on the joints and adjusting screws with a small paintbrush. • Clean the servo and oscillation systems with a cloth (attention, any brushing is prohibited). • Lubricate the slides repeatedly with a hard paintbrush. <p>Live equipment, working.</p> <ul style="list-style-type: none"> • Let the unit move several times and lubricate slightly again. |
| | Every 3 months. | <p>Equipment switched off, power switch locked. Check the condition of the slide:</p> <ul style="list-style-type: none"> • Check that there are no deep scratches on the slide. • Check that the slide is not oxidised. • Check that the slide does not have dimples. <p>Live equipment, working.</p> <ul style="list-style-type: none"> • Listen for any unusual noise when in movement. |
| | Every 3 months. | <p>Equipment switched off, power switch locked. Cable support fixture:</p> <ul style="list-style-type: none"> • Check the condition of the fixture. • Clean with a clean cloth. |
| | Every 3 months. | <p>Equipment switched off, power switch locked. Rails and flanges:</p> <ul style="list-style-type: none"> • Check the condition of the rails and flanges. • Clean with a hard paintbrush |

| Checking and lubricating the slides | | |
|-------------------------------------|-----------------|--|
| Consumables and tools | Frequency | Operation - |
| | Every 3 months. | Equipment switched off, power switch locked. Protective casing <ul style="list-style-type: none"> • Check that the casings are not distorted, worn and unhooked. |
| | Every 3 months. | Equipment switched off, power switch locked. Notched belt <ul style="list-style-type: none"> • Check the condition of the belt. It should not be broken, torn, tangled, cut, dry or greasy, and it should not have any signs of elongation. Also check that its braid is not apparent. • Check the profile of the belt. • Ensure that the belt does not rub against a casing or a protective component. • Check the tension of the belt. If the belt is not sufficiently tight, it should be replaced. <p>Live equipment. After the operation, carry out a test to control the absence of unusual noises.</p> |
| | Every 3 months. | Equipment switched off, power switch locked. Pulleys: <ul style="list-style-type: none"> • Check the general condition of the pulley: it should not be oxidised, cracked or masked. • Check that the groove base is not smooth (the belt should not rest on it) and that it does not have any foreign bodies or sharp edges likely to tear the notches of a notched belt, for example. • Check that the sides of the groove base are worn in the same way. Deeper wear on one side may be a sign of a bad alignment. • Check its attachment on the shaft: there should not be any axial or radial clearance. • Check that there are no hard spots on the pulleys and if possible turn the assembly manually. |
| | Every 3 months. | Equipment switched off, power switch locked. Scraper: <ul style="list-style-type: none"> • There should not be any play between the surface of the slide and the scraper. • The scraper should not be torn, used, folded, eroded by possible grease or lubricant, or by various substances. • Check its fastening. |
| Hard paint-brush, lubricant | Every 3 months. | Equipment switched off, power switch locked. Check the steering rack: <ul style="list-style-type: none"> • Clean the fuel steering rack with a paintbrush. Remove all traces of lubricant and other debris. • Check the condition of the steering rack: it should not be oxidised and its surface treatment should not be damaged. • Check the teeth: <ul style="list-style-type: none"> - The wear should be even. - The teeth should not be bent or broken and they should not have any smudges. • Check the fastening of the assembly. • Lubricate the teeth assembly. |

6. 3. Recommended lubricant brands

| For the O rings | For all motor-driven movements | For mechanical contacts | For electrical contacts |
|------------------------|--------------------------------|-------------------------|-------------------------|
| KF:2301 silicon grease | Molykote BR2 Plus | Molykote BR2 Plus | E452 gel |

6. 4. Accessories box

The wear and tear parts of the feeder and the torch, which are used to guide and convey the solder wire, must be suited to the type and the diameter of the solder wire. Wear of these parts may affect the welding results. Therefore, it is necessary to regularly check that they are in good condition and replace them if necessary. Consumables are delivered in the accessories box:

- For MU IV 28 to 80 Ref.100001720.
- For MU IV 104 to 275 Ref.100001721.

6. 4. 1. Consumables

| Order code | Designation | MU IV 28 to MU IV 80 | MU IV 104 to MU IV 275 |
|------------------|--------------------------------------|----------------------|------------------------|
| 29810143 | Short chuck Ø 2,4 | X | X |
| 29820170 | Chuck Ø 2.4 | X | X |
| 29810146 | Flat seal Ø 24 | X | X |
| 62325105 | Shoulder pivot | X | X |
| 29840112 | Big Téflon seal | | X |
| 01216201 | Washer GM | | X |
| 29840113 | Silicon seal | | X |
| 01202006 | 2 x 14 elastic pin (motor drive pin) | X | X |
| 100003539 | Set of screw | X | X |
| 29810142 | Short Gas lens Ø 2.4 | X | X |
| 29820160 | Long gas lens Ø 2.4 | X | X |
| 29840301 | Long gas lens GM Ø 2.4 | | X |
| 62410024 | Tungsten electrode Ø 2.4 | X | X |
| 29810175 | Ceramic nozzle Ø 9 Length 16 | X | X |
| 29810170 | Ceramic nozzle Ø 9 Length 12 | X | |
| 62300117 | Ceramic nozzle Ø 11 Length 26 | X | X |
| 29840107 | Ceramic nozzle Ø16 Length 26 | | X |
| 25610560 | Outlet contact nozzle for Ø 0.8 wire | X | X |
| 25614520 | Nozzle extension | X | X |
| 29830200 | Ignition device Length 90 | X | X |
| 29830300 | Ignition device GM | | X |

6. 4. 2. Tools

| Order code | Designation | MU IV 28 MU IV 80 | MU IV 104 MU IV 275 |
|-------------------|-----------------------------|------------------------------|--------------------------------|
| 100003625 | BTR wrench assembly Ref 82H | X | X |
| 62209801 | Box tools 240x195x42 | X | X |
| 62811004 | Screwdriver 4x75 | X | X |
| 29810144 | Pipe Wrench | X | X |

6. 5. Repairs and maintenance



The **After Sales Service of Polysoude** is at your service to provide information on any problems encountered in using this product and to supply the spare parts you order.

When ordering a spare part, do not forget to indicate **the order code**, as indicated in the spare parts section of your material instructions, as well as **the serial number of your machine**.

Furthermore, certain subassemblies require factory adjustments. Certain parts cannot be delivered separately; they must be included with the pre-adjusted subassembly, ready for mounting.



Risk of electric shocks: for the following operations, the welding head must be completely disconnected from the power supply.

6. 5. 1. *Changing the electrodes, the chuck and the gas lens*

See the "Torches" section in the chapter 5 "Use" in this manual.

6. 5. 2. *Replacing the torch*

See the "Torches" section in the chapter 5 "Use" in this manual.

6. 5. 3. *Replacing the wire nozzle*

See the "Outlet wire nozzle" section in the chapter 5 "Use" in this manual.

6. 5. 4. *Replacing the wire sheath*

See the "Wire sheath" section in the chapter 5 "Use" in this manual.

6. 5. 5. Cleaning and maintenance of the drive assembly



Safety precautions



Tools

- Clean cloth.
- Hex head key set



Consumables - Spare parts



Frequency - Replacement criteria

- In the event of ingress of foreign bodies.



Preconditions

- Disconnect the equipment from the power supply.

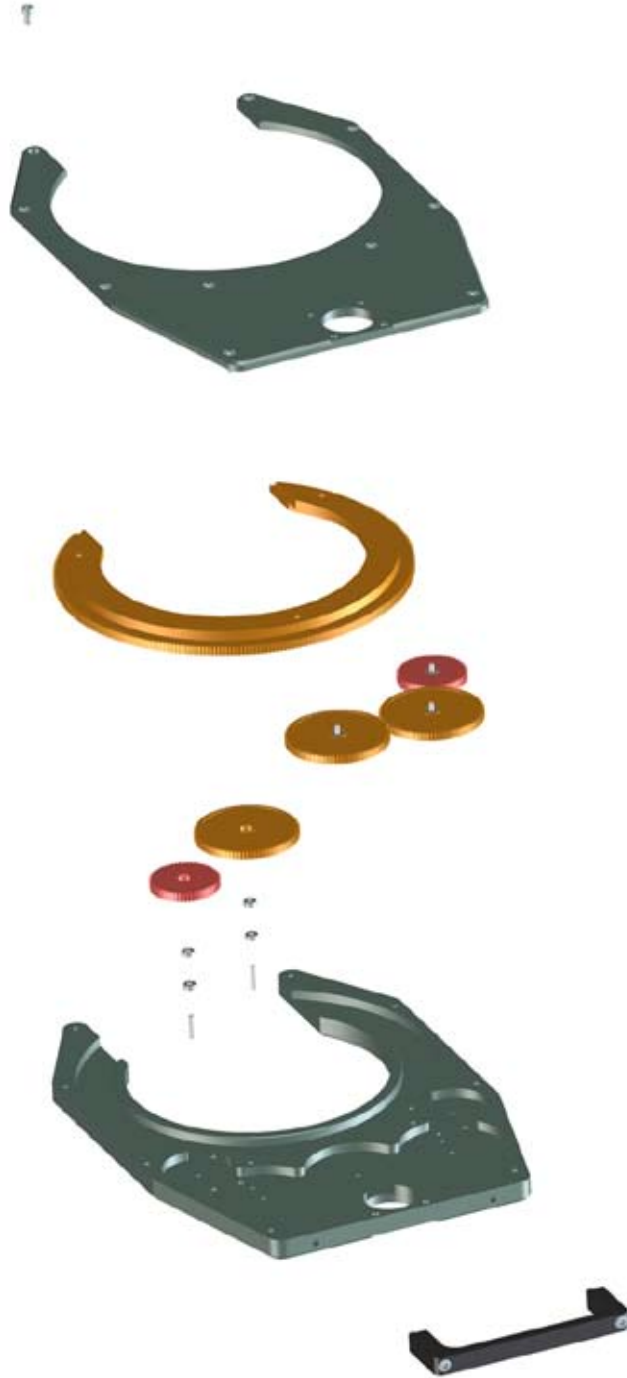


Procedure

- Completely dismantle the drive mechanism.
- Clean.
- If necessary, replace any damaged parts.
- Grease.
- Assemble the drive mechanism.



Advice



6. 5. 6. Replace the drive pin.



Safety precautions



Tools

- Clean cloth.
- Hex head key set
- Pin punch



Consumables - Spare parts

- 2x14 elastic pin - Order code 1202006



Frequency - Replacement criteria

- If the pin breaks.



Preconditions

- Disconnect the equipment from the power supply.



Procedure

- Loosen the screws securing the motor hood (1 and 2) and the cover. Pay attention to the original wiring.
- Remove the motor assembly (2 + 3 + 4 + 5).
- Use a pin punch ($\varnothing < 2$ mm), making sure that a support is placed beneath the drive's insulating gear support to avoid bending the motor shaft. Remove the faulty pin (5).
- Check the shaft at the outlet of the reducer gear. If the $\varnothing 2$ mm hole is oval or if the shaft shows signs of scratches or impacts, then install a new reducer gear.
- Check the insulating gear support (3). If it is split or broken, install a new insulating gear support.

Installation

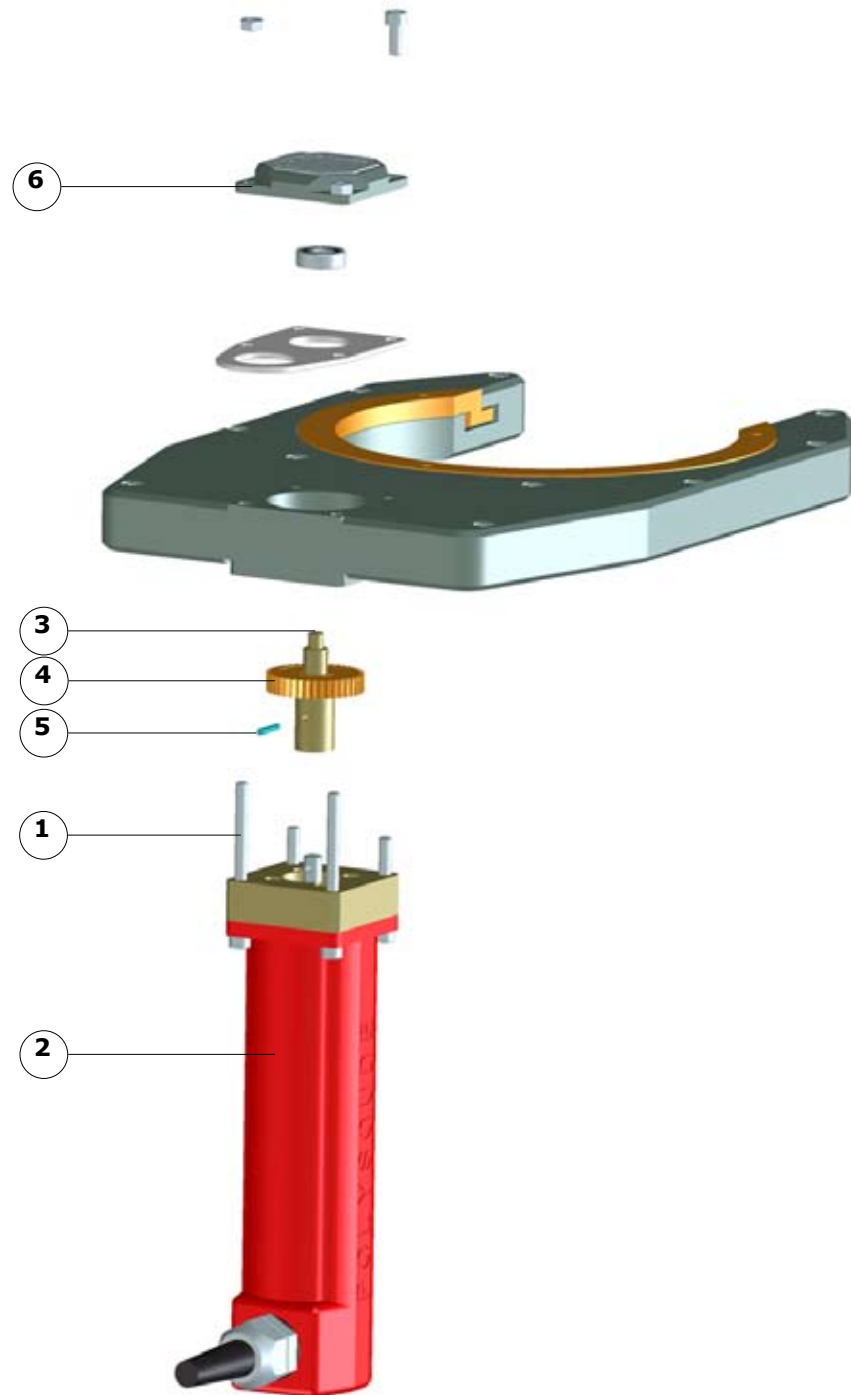
Once all the parts have been checked, the welding head can be installed again.

- Align the $\varnothing 2$ hole in the insulating gear support with the hole in the reducer gear.
- Install a new $\varnothing 2$ pin.
- Mount the assembly on the drive and tighten the retaining screws without changing their position (some screws are shorter than others. See the diagram).



Advice

The pin acts as a safety device that prevents excessive torque in the reducer gear. If the pin breaks again, the cause must be found and corrected. It is necessary to identify and correct the cause of the breakage of the pin before replacing it.



6. 5. 7. Replacing the optical sensor


Safety precautions

Tools

- Clean cloth.
- Hex head key set


Consumables - Spare parts

- Optical sensor: n° according to welding head


Frequency - Replacement criteria

- In case of wear or deterioration of the part.


Preconditions

- Disconnect the equipment from the power supply.

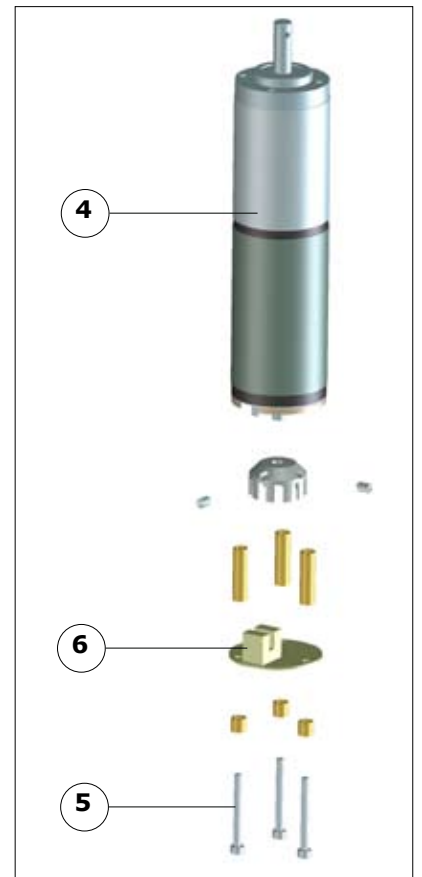
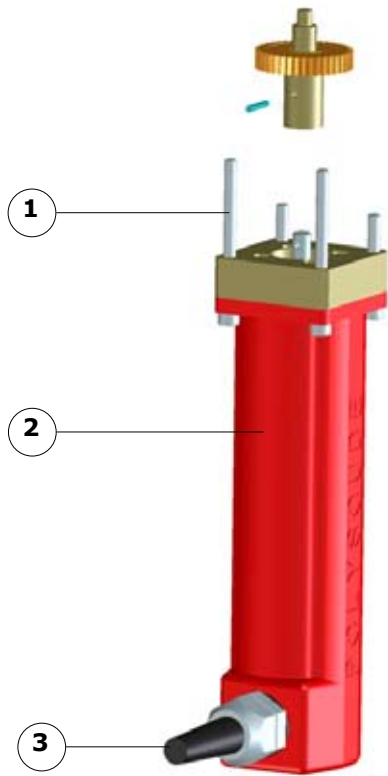
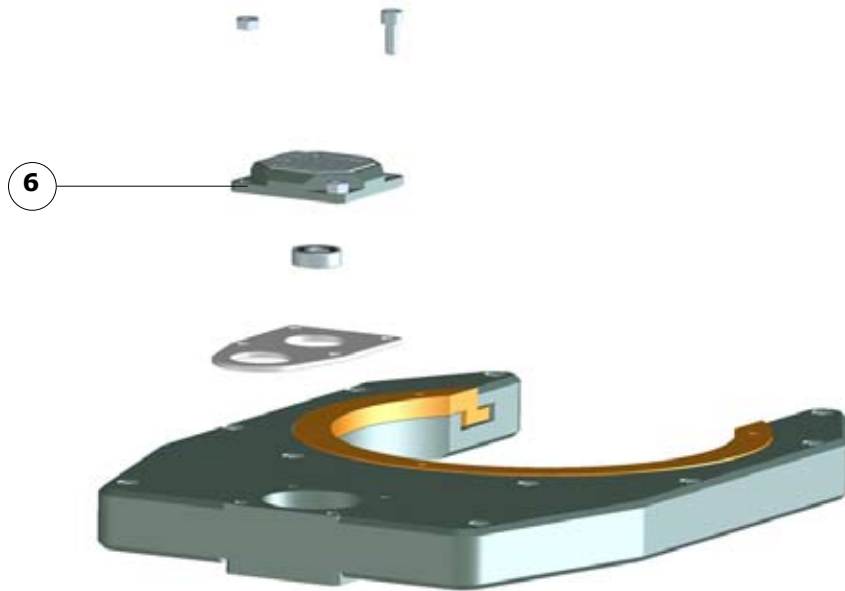

Procedure

- Loosen the screws attaching the motor hood and the screws securing the cover (1 and 2).
- Loosen the packing gland at the rear of the hood (3).
- Gently extract the motor (4) by pushing the power cable through the packing gland.
- Loosen the screws in the pillars (5) supporting the sensor.
- Unsolder the five wires.
- Remove the sensor (6).
- Solder the three wires on the new sensor and the two wires on the motor.
- Install the new sensor.
- Tighten the screws in the pillars.
- Install the motor, taking care not to jam the wires in the motor hood. Tighten the packing gland.
- Mount the assembly on the drive and tighten the retaining screws without changing their position (some screws are shorter than others. See the diagram).


Advice

Take care to clearly identify the five wires (two for the motor and three for the sensor).

Take care to respect the original wiring.



6. 5. 8. *Changing the wheel for wire, the wire feeder pressure rollers and the straightening roller.*



Safety precautions



Tools

- Clean cloth.
- Flat screwdriver.
- 2.5 Hex head key.



Consumables - Spare parts

- Ø 0.8 wire button - Order code: 11000107 (11)
- Wire feeder pressure roller - Order code: 10731212 (Rep.6)
- Straightening roller - Order code: 10731217 (9)
- Washer - Order code: 10731216 (8)



Frequency - Replacement criteria

- In case of wear or deterioration of the part.



Preconditions

- Disconnect the equipment from the power supply.
- Remove the cover "Thermal protection" from the arm.
- Remove the wire.



Procedure

- Unscrew the two stop screws of the hose connectors (1).
- Unscrew the fastening screw (2) of the cover (3).
- Remove the cover plate.

Wire feeder pressure roller:

- Unscrew the roller axle (4).
- Remove the pressure roller (6) and the washer (5).
- Install the pressure roller and the new washer.
- Tighten the roller axle.

Straightening roller:

- Unscrew the roller axle (7).
- Remove the straightening roller (9) and the washer (8).
- Install the new straightening roller and the new washer.
- Tighten the roller axle.

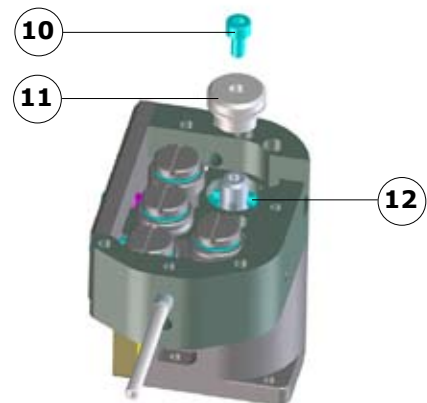
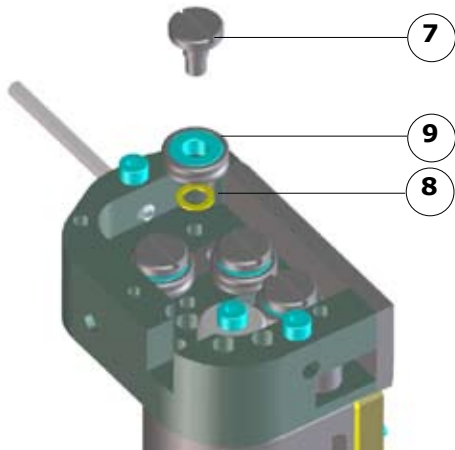
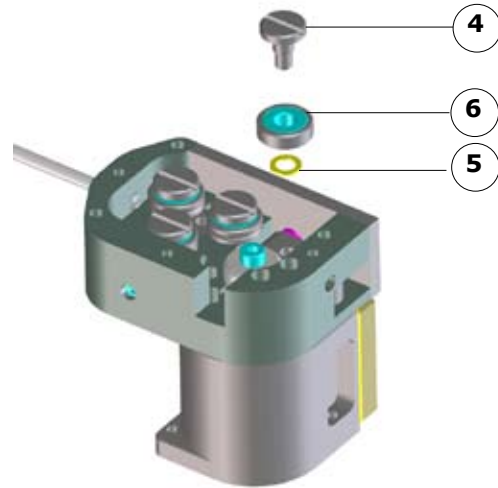
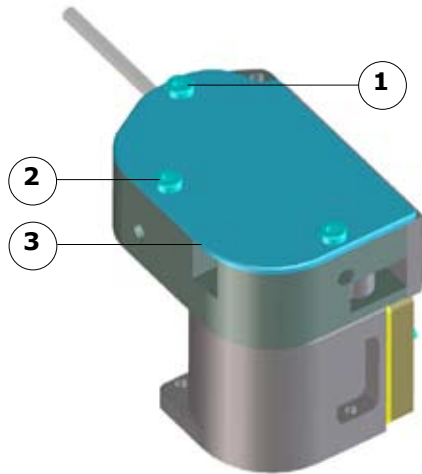
Wheel for wire Ø0.8:

- Unscrew the CHc M4x8 screw (10).
- Remove the wheel for wire (11).
- Reassemble the new wheel for wire by placing the pin correctly (12).
- Tighten the CHc M4x8 screw.



Advice

- It is strongly recommended to change all the rollers and the wheel for wire at the same time.
- See the "Wire Set up" chapters and "Adjustment of the wire curve" during the wire reassembly.



6. 5. 9. Replacing the inner wire sheath



Safety precautions



Tools

- Clean cloth.
- 2.5 Hex head key



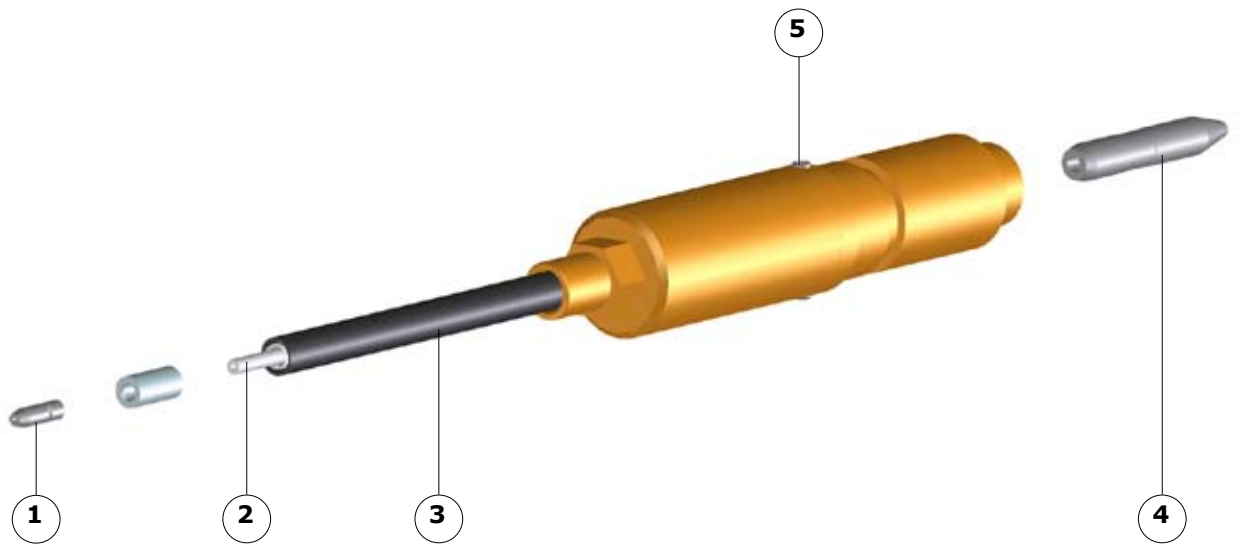
Consumables - Spare parts

- Ø1.1x Ø2.4 Teflon liner sheath for Ø0.6 and Ø0.8 wires - Order code: 00552081
- Ø1.5x Ø2.4 Teflon liner sheath for Ø0.9 and Ø0.2 wires - Order code: 00552082



Procedure

- Stretch out the complete sheath (3) as straight as possible.
- Loosen the screw retaining the inlet nozzle (5).
- Remove the inlet nozzle (4) and the worn Teflon sheath (2).
- Remove the worn Teflon sheath from the inlet nozzle.
- Unscrew the small outlet nozzle (1).
- Cut a length of Teflon sheath that is 5 cm longer than the wire sheath.
- Screw the inlet nozzle on the new Teflon sheath.
- Insert the new Teflon sheath assembly in the wire guide sheath on the inlet nozzle side until it abuts against the wire sheath support.
- Tighten the screw retaining the inlet nozzle.
- Cut the Teflon sheath flush with the wire sheath on the small outlet nozzle side.
- Screw the small outlet nozzle in the wire sheath.
-



6. 5. 10. Repairing a leak in the multi-duct



Safety precautions



Tools

- Clean cloth.
- Cutter.
- 2.5 Hex head key.



Frequency - Replacement criteria

- In the event of a leak



Preconditions

- Disconnect the equipment from the power supply.



Procedure

Removal

- Push back the collar (5) on the multi-duct, then push back the silicon sheath (4) and the Nomex sheath (6) at the same time.
- Cut the Nomex sheath and the silicon sheath at the same time upstream of the leak using a knife or scissors.
- Loosen the pressure screw retaining the braid (2).
- Stretch the braid (1) and the multi-duct.
- Cleanly cut the braid, leaving about 20 mm protruding.

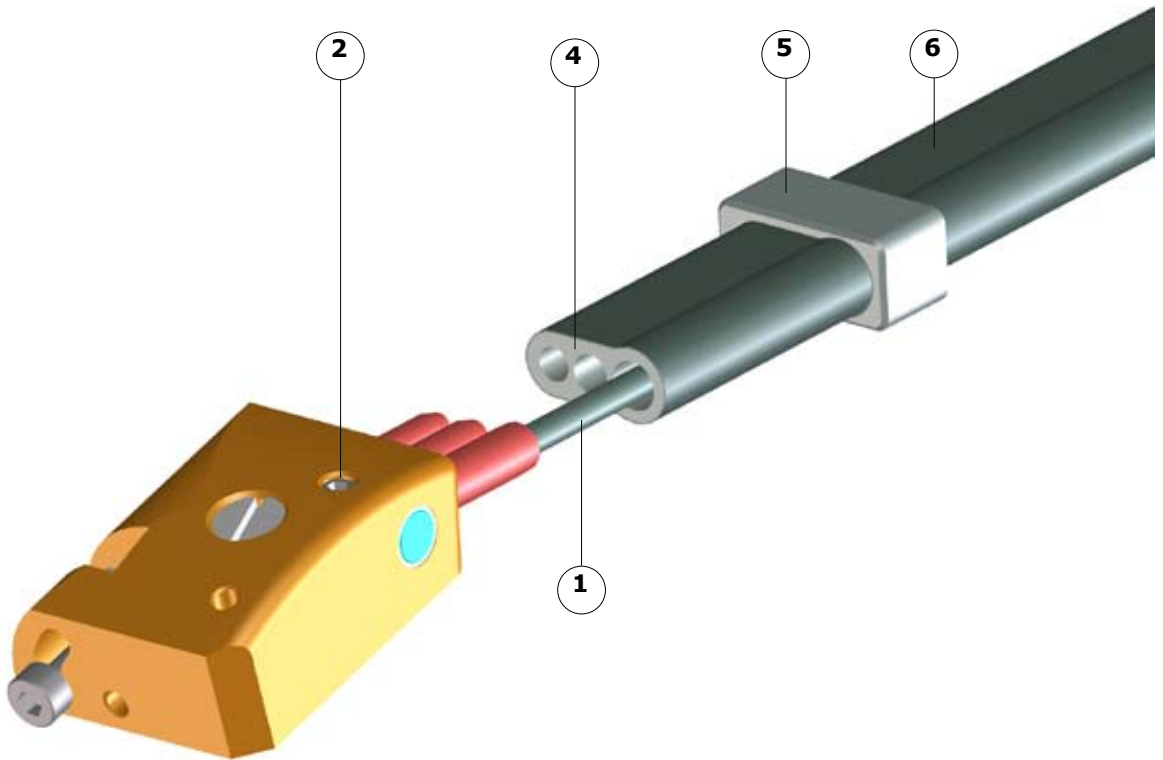
Installation

- For greater ease of installation, slide the multi-duct on the braid and secure with a pointed object, leaving about 10 cm of braid protruding.
- Slide the collar onto the multi-duct into its final position.
- Insert the braid into the water inlet tube, coat the screw with sealing oil to prevent leaks through the screw and then tighten the screw.
- Remove the pointed object then push the silicon sheath, the Nomex sheath and the collar over the torch pipes at the same time.



Advice

Take care not to remove the collar from the multi-duct.
Take care not to cut the braid.



6. 5. 11. Repairing broken braid in the multi-duct

Note:

This point only applies to breakages at the torch outlet (< 200 mm) and depends on the length of multi-duct required for the machine to work properly.



Safety precautions



Tools

- Clean cloth.
- Cutter.
- 2.5 Hex head key.



Frequency - Replacement criteria

- If the braid breaks.



Preconditions

- Disconnect the equipment from the power supply.



Procedure

- Slide the collar (5) on the multi-duct, then push back the silicon sheath (4) and the Nomex sheath (6) at the same time.
- Loosen the pressure screw retaining the braid (4), then remove the piece of braid (1) remaining in the torch.
- Cut the Nomex sheath and the silicon sheath at the same time about 30 mm upstream of the break in the braid using a knife or scissors.
- Stretch the braid and multi-duct and cleanly cut the braid, leaving about 20 mm protruding.

Installation

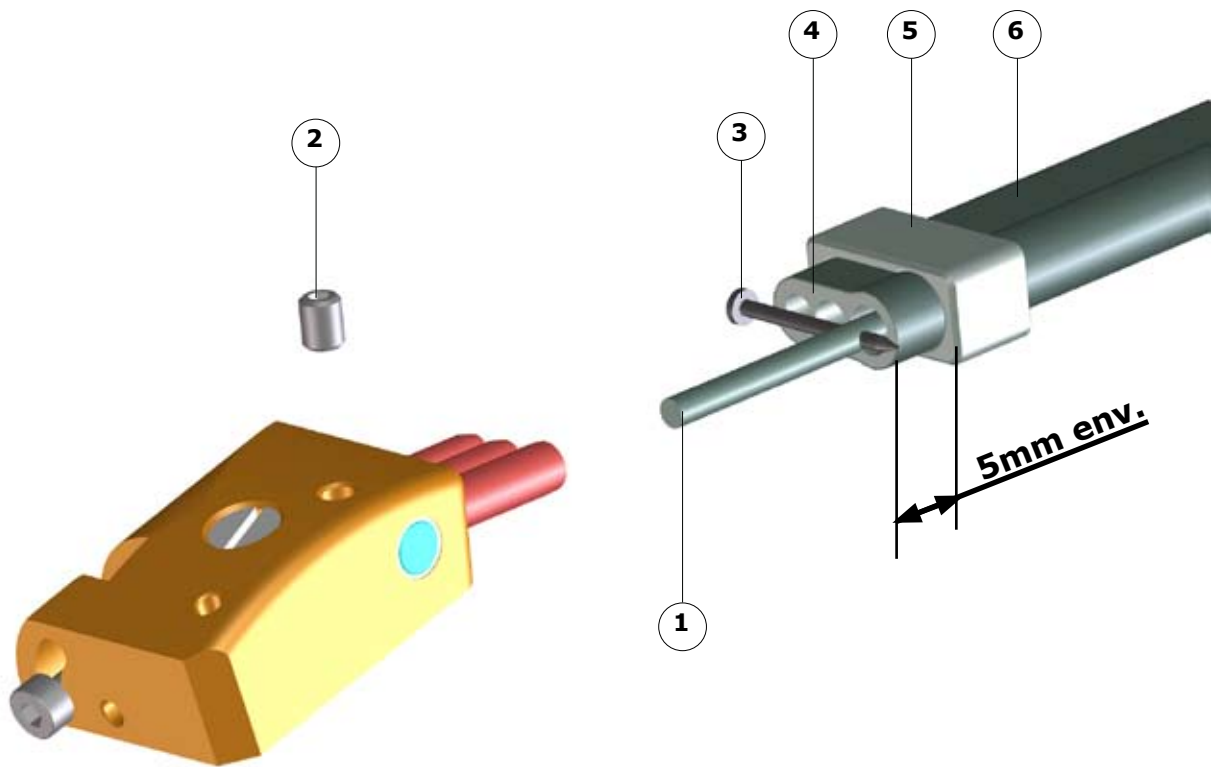
See above (Installation) and use a pointed object (1) to secure the braid. Tighten the braid pressure screw with a sealing product.



Advice

Take care not to remove the collar from the multi-duct.

Take care not to cut the braid.



6. 5. 12. MU IV wiring plug: AVC/OSC wiring



Safety precautions



Tools

- Clean cloth.
- Set of BTR wrenches.
- Crimping and cutting pliers
- Soldering tool for electrical equipment



Consumables - Spare parts

- Silicone tube
- Plug 00563302
- Grounding braid



Frequency - Replacement criteria

- Wiring repair



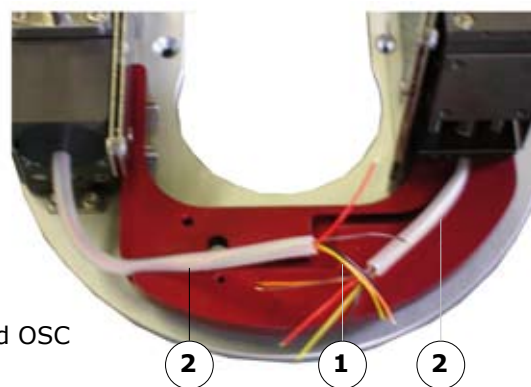
Preconditions

- Non-live equipment.



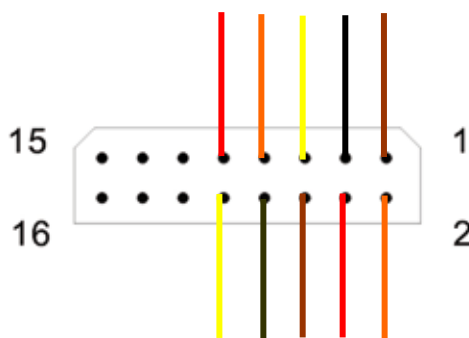
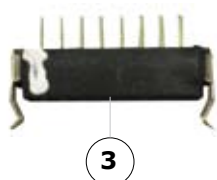
Procedure

Insert the AVC/OSC wires (1) in the two silicone tubes (2). Adjust the length of the silicone tubes as shown.




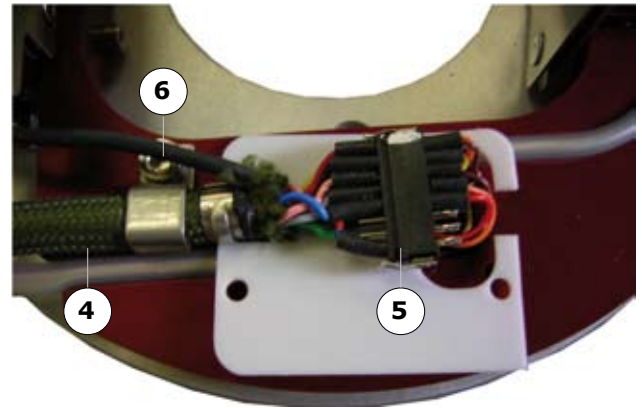
- Identify the pin of the plug 00563302 (3).
- Position and solder the wires of the AVC and OSC motors to the pin.

AVC 1; 2; 3; 4; 5
OSC 6; 7; 8; 9; 10



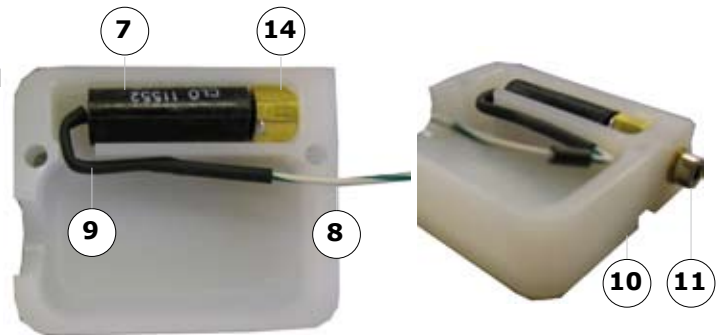
- Connect the 12 core cable (4), which is already wired, to plug 00563302 (5).
- Secure to the plate with a hex socket head screw (6).
- Solder the induction coil to the nut (14)

 **Do not overheat the induction coil during the soldering operation.**

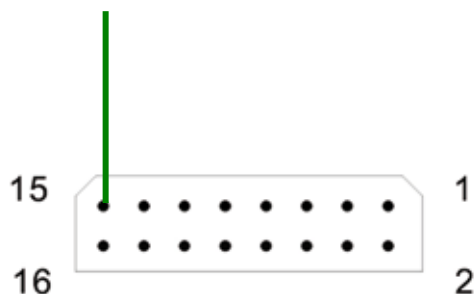
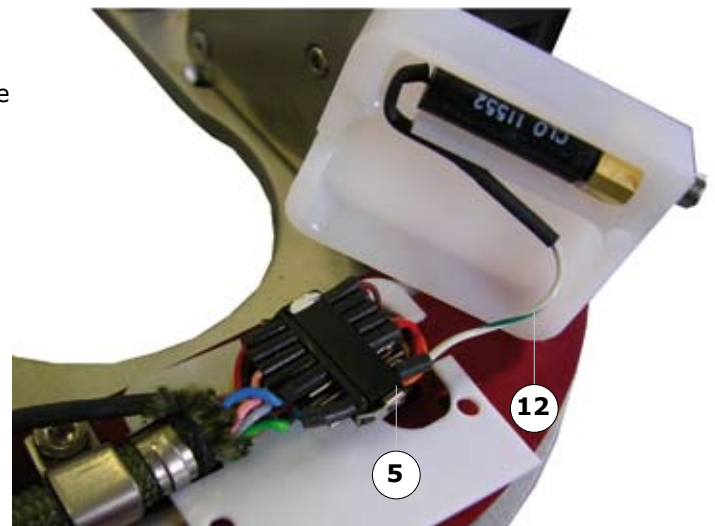


- Cut the tab of the induction coil (7) to 6 +/- 0.5 mm.
- Tin-plate the cut tab and nut hole.
- Insert the induction coil tab in the hole (while hot).
- Wait a few seconds for the assembly to cool down.

- Solder a 5 cm wire onto the induction coil (8).
- Insert the wire into a heat-shrinkable sheath (9).



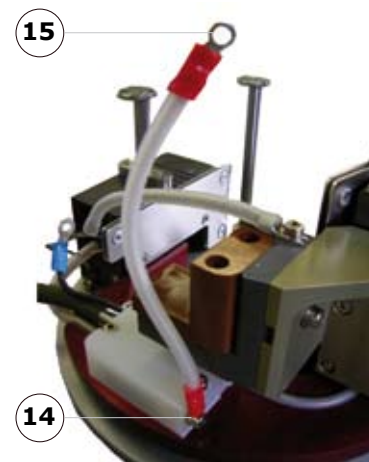
- Place the induction coil in the connection unit (10).
- Secure the induction coil with an M3x10 hex socket head screw + washer (11).
- Solder the induction coil wire (12) to pin 15 of plug 00563302 (5).
- Close the connection unit using two hex socket head screws, taking care not to pinch the wires.
- Put back the electrode support and secure with four hex socket head screws.



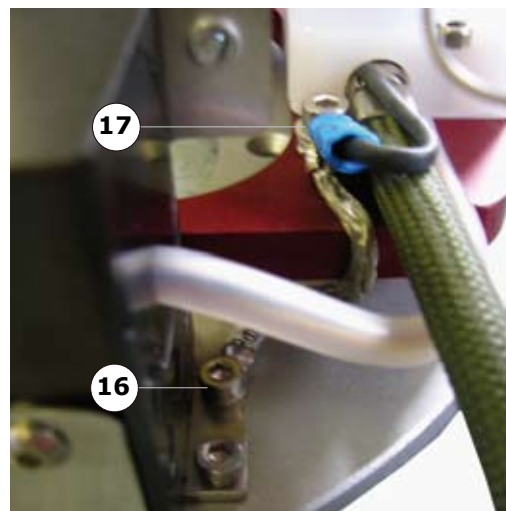


Procedure (continued)

- Insert a wire approximately 10 cm long into a silicone tube and crimp two Ø3 lugs.
- Attach one of the lugs to the retaining screw of the induction coil (14).
- Leave the other lug (15) free, ready to be connected to the harness.
- Assemble a grounding braid with two lugs, one with a diameter of 3 mm and the other with a diameter of 4 mm.
- Crimp and solder the lugs to the braid.



- Attach the braid between the AVC motor (16) and the shielded cable attachment (17).



Advice

It is strongly advised to test AVC/OSC motor operation on a model.

6. 5. 13. MU IV wiring plug: cooled motor wiring



Safety precautions



Tools

- Clean cloth.
- Set of BTR wrenches.
- Crimping and cutting pliers
- Welding tool for electric equipment



Consumables - Spare parts



Frequency - Replacement criteria

- Repairing the wiring.



Preconditions

- Non-live equipment.



Procedure

- Strip the 4x0.5 + 3x2x0.22 cable.
- Discard any unused wires.
- Add a length of heat shrinkable sheath.
- Solder the wires to the motor cable.
- Insert the motor in the block.



- +
-
- Impulsion
- +15v
- 0V

6. 5. 14. MU IV wiring plug: drive wiring, generator side



Safety precautions



Tools

- Clean cloth.
- Set of BTR wrenches.
- Crimping and cutting pliers
- Welding tool for electric equipment



Consumables - Spare parts



Frequency - Replacement criteria

- Repairing the wiring.



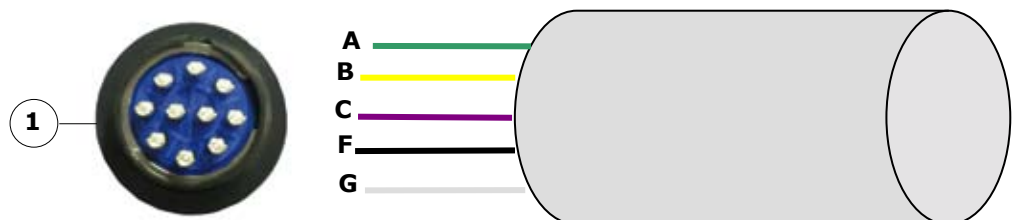
Preconditions

- Non-live equipment.



Procedure

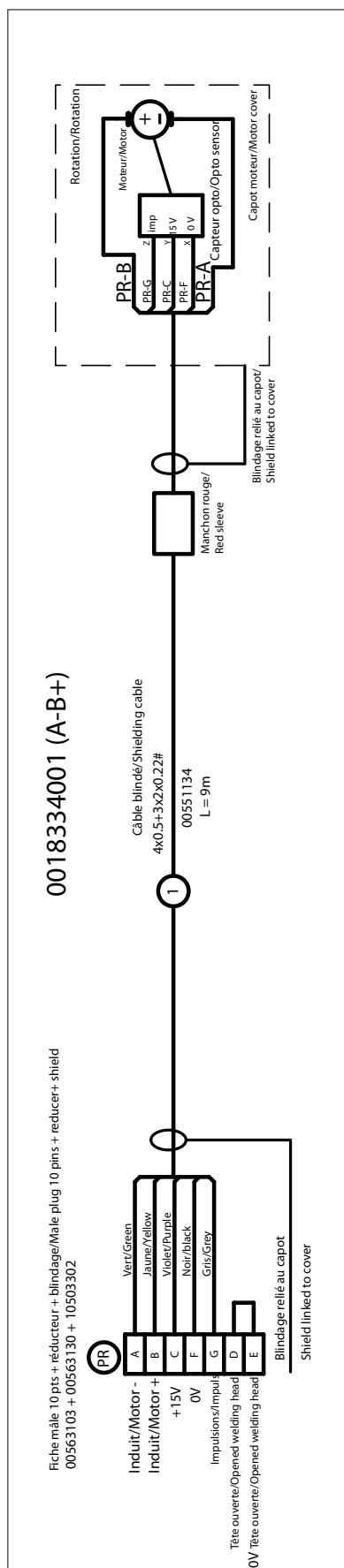
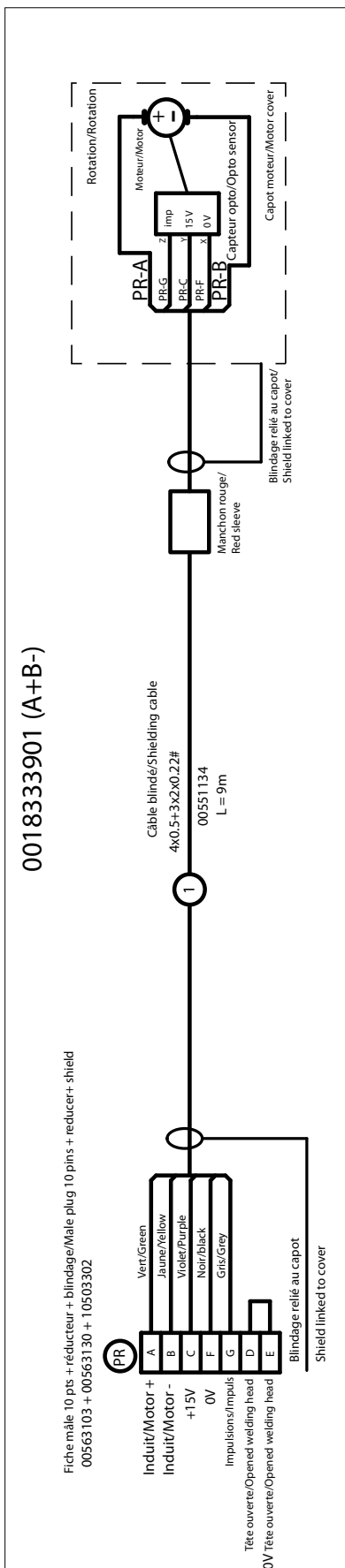
- Strip the 4x0.5 + 3x2x0.22 cable on the generator side.
- Place a rubber ring in the sleeve.
- Insert the rotation wire on the shielding and reducer gear assembly.
- Strip the wires and solder them to the male 10-point connector (1) D and E with a solder.

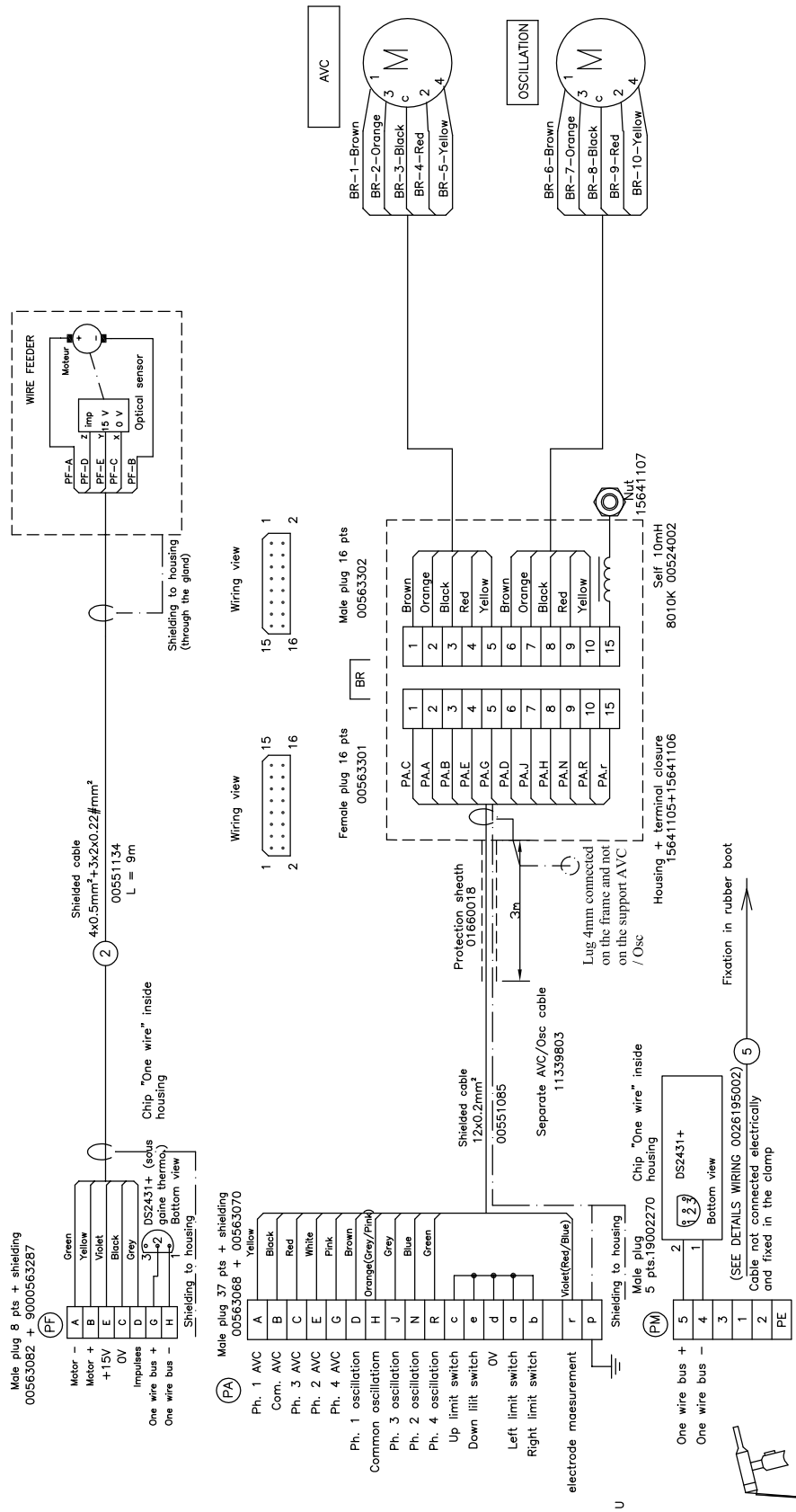


- Connect the grounding braid to the hood (2). The braid must make one complete turn, as shown opposite.
- Add some Loctite270 all around (3).



7. Wiring diagrams





MU IV Welding head wiring
piece of wiring diagram 11334101



MU IV

8. End of life – recycling of equipment

In accordance with current legislation and the directive 2002/96/EC, some of the electric and electronic components installed in the equipment must be recycled. At the end of its life expectancy, the material must be handed over to approved recycling companies, using different methods to reduce the waste finally to be eliminated:

- reuse
- recycling
- any other form of reuse (including for energy) of WEEE.



MU IV

RETURN OF EQUIPMENT

(Please fill out and join this sheet when returning equipment to POLYSOUDE)

Reseller / Person in charge :
Customer / Person in charge / Tel. :

EQUIPMENT RETURNED :

| | | |
|---|--------------|-----------------------|
| <input type="checkbox"/> Power source | Type : | Serial number : |
| <input type="checkbox"/> Welding head | Type : | Serial number : |
| <input type="checkbox"/> Wire feeder | Type : | Serial number : |
| <input type="checkbox"/> Other (<i>specify designation</i>) : | | |
| ↳ taken from : | | |
| <input type="checkbox"/> Power source | Type : | Serial number : |
| <input type="checkbox"/> Welding head | Type : | Serial number : |
| <input type="checkbox"/> Wire feeder | Type : | Serial number : |
| <input type="checkbox"/> Other (<i>to be specified</i>) : | | Serial number : |

REASON FOR RETURN :

- Return of loan equipment
- Return of demonstration / fair equipment
- Return of hired equipment
- Return after exchange
- Deficient delivery / incorrect order
- Return for modification (*to be specified*) :
- Return for revision
- Return for calibration

- Return for repair
 to be specified : systematically occurring error
 occasionally occurring error

Description of breakdown :
.....
.....
.....
.....

- Other issue (*to be specified*) :

Date : Signature:



MU IV

List of illustrations

| | |
|--|----|
| Fig.3.1 - Possible combinations..... | 13 |
| Fig.3.2 - Illustration of the subassemblies of the MU IV..... | 14 |
| Fig.3.3 - Motors | 16 |
| Fig.3.4 - Couplings | 17 |
| Fig.3.5 - Clamps..... | 18 |
| Fig.3.6 - Plates..... | 19 |
| Fig.3.8 - Gas lenses | 20 |
| Fig.3.7 - Torch | 20 |
| Fig.3.9 - Exterior feeder assembly | 20 |
| Fig.3.10 - Built-in feeder assembly..... | 20 |
| Fig.4.1 - Slinging..... | 27 |
| Fig.5.1 - Electrode grinding..... | 29 |
| Fig.5.2 - "GM Type" gas lens | 30 |
| Fig.5.3 - "N Type" gas lens..... | 30 |
| Fig.5.4 - "P Type" gas lens..... | 30 |
| Fig.5.5 - Gas lens assembly | 31 |
| Fig.5.6 - Adjustment of the distance between the electrode and the part..... | 32 |
| Fig.5.7 - Adjustment of the distance between the electrode and the part..... | 32 |
| Fig.5.8 - Torch direction | 33 |
| Fig.5.9 - Wire sheaths and small nozzles | 34 |
| Fig.5.10 - Electrode wire settings..... | 35 |
| Fig.5.11 - Ignition ring | 35 |
| Fig.5.12 - Placing the wire | 37 |
| Fig.5.13 - Wire curve | 38 |
| Fig.5.14 - Chuck clamps..... | 39 |
| Fig.5.15 - Shell clamps..... | 40 |



MU IV

2009 Polysoude
 First Edition: Polysoude S.A.S. Nantes France.

The photos, diagrams and drawings are used for greater ease of understanding and are therefore not contractual.

All rights reserved. No total or partial reproduction of this work will be made in any form or by any means whatsoever, be it electronic or mechanical, including photocopying, recording or by computer, without the written consent of the publisher.

Printed in France.
 Published by Polysoude, Nantes, France.

www.polysoude.com info@polysoude.com



Translation of
 original instructions

POLYSOUDE : Related Services

► Guidance and technical support

A welding application specialist in your area will advise you on the welding process and appropriate equipment for your application.

► Commissioning / Training

A complete training program will enable you to start using the equipment immediately and in the best way possible.

► Maintenance / Repair

Maintenance and repair operations can be carried out at the Polysoude plant as well as on site by our service network.

► Rental service

Increase the flexibility of your production! A large range of equipment is available for rental from our hire fleet.

Your partners worldwide

AUSTRALIA
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

AUSTRIA
POLYSOUDE AUSTRIA GmbH
☎ +43 (0) 3613 200 36
austria@polysoude.at

BELGIUM
POLYSOUDE BENELUX
☎ +31 (0) 653 84 23 36
k.meurs@polysoude.com

POLYSOUDE BENELUX (SERVICE)
☎ +31 (0) 653 38 85 58
h.milder@polysoude.com

BRAZIL
AJADE COMÉRCIO INSTALAÇÕES
E SERVIÇOS Ltda.
☎ +55 (0) 11 45 24 38 98
fernando@ajade.com.br

BULGARIA
KARWELD FOOD
☎ +359 (0) 29 73 32 15
Karweld@bg400.bg

CANADA
MAG TOOL Inc.
EDMONTON - ALBERTA
☎ 800 661 9983
magtool@magtool.com

MAG TOOL Inc.
CAMBRIDGE - ONTARIO
☎ +1 519 651 10 50
michael@magtool.com

CHINA
POLYSOUDE SHANGHAI CO. Ltd
☎ +86 (0) 21 64 09 78 26
j.zhang@polysoude.cn

CROATIA
EUROARC D.O.O.
☎ +385 (0) 1 2 40 60 77
euroarc@euroarc.hr

CZECH REPUBLIC
POLYSOUDE CZ
☎ +420 602 60 28 55
m.matousek@polysoude.cz

DENMARK
POLYSOUDE DENMARK
☎ +45 (0) 32 94 85 10
orbital@polysoude.dk

EGYPT
POLYSOUDE UK
☎ +44 (0) 1942 820 935
info@polysoude.com

ESTONIA
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

FINLAND
SUOMEN TEKNOHAUS OY
☎ +358 (0) 927 47 2 10
info@teknohaus.fi

FRANCE
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

GERMANY
POLYSOUDE DEUTSCHLAND
KORNWESTHEIM
☎ +49 (0) 7154 1796 90
info@polysoude.com

**POLYSOUDE DEUTSCHLAND
LEVERKUSEN / OPLADEN**
☎ +49 (0) 7154 1796 90
info@polysoude.com

ITALY
POLYSOUDE ITALIA SRL
☎ +39 02 93 79 90 94
info@polysoude.it

JAPAN
GMT CO Ltd - KAWASAKI
☎ +81 (0) 44 222 6751
gmt@e-gmt.co.jp

GMT CO Ltd - OSAKA
☎ +81 (0) 789 35 6751
gmt.kansai@e-gmt.co.jp

JORDAN
POLYSOUDE UK
☎ +44 (0) 1942 820 935
info@polysoude.com

NEW ZEALAND
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

NORWAY
TEMA NORGE AS
☎ +47 (0) 51 69 25 00
tor.inge.tjensvoll@tema-norge.no

PAKISTAN
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

PHILIPPINES
POLYSOUDE ASIA
☎ +86 (0) 65 862 60 08
Jmpan@singnet.com.sg

SINGAPORE
POLYSOUDE ASIA
☎ +86 (0) 65 68 62 60 08
Jmpan@singnet.com.sg

**SIN SOON HUAT WELDING
PRODUCTS PTE. Ltd**
☎ +65 (0) 62 65 60 88
wchng@sshcorp.com

SLOVAKIA
POLYSOUDE CZ
☎ +420 602 60 28 55
m.matousek@polysoude.cz

SOUTH AFRICA
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

SOUTH KOREA
CHEMIKO CO Ltd
☎ +82 (0) 2 567 5336
chemiko@chol.com

SPAIN
PRAXAIR SOLDADURA S.L.
☎ +34 (0) 91 78 55 77 09
Luis_Alfredo_de_Andres@praxair.com

SWEDEN
POLYSOUDE BENELUX
☎ +31 (0) 653 84 23 36
k.meurs@polysoude.com

SWITZERLAND
POLYSOUDE (SWITZERLAND) Inc.
☎ +41 (0) 43 243 50 80
contact@polysoude.ch

TAIWAN R.O.C.
FIRST ELITE ENT. CO. Ltd
☎ +886 (0) 287 97 88 99
auto.pipe@msa.hinet.net

THAILAND
POLYSOUDE ASIA
☎ +86 (0) 65 6862 60 08
Jmpan@singnet.com.sg

TURKEY
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

UNITED ARAB EMIRATES
GERMAN GULF ENTERPRISES Ltd
☎ +971 (0) 65 31 61 71
info@polysoude.com

UKRAINE
POLYSOUDE RUSSIA
☎ +7 (0) 495 564 86 81
polysoude@co.ru

UNITED STATES
ASTRO ARC POLYSOUDE Inc.
☎ +1 (0) 661 702 01 41
sales@astroarc.com

VENEZUELA
ENRIVA C.A.
☎ +58 (0) 243 242 45 41
enriva@cantv.net



GREAT BRITAIN
POLYSOUDE UK
☎ +44 (0) 1942 820 935
info@polysoude.com

GREECE
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

HUNGARY
POLYWELD Kft.
☎ +36 (0) 28 42 22 36
polyweld@polyweld.hu

INDIA
POLYSOUDE INDIA
☎ +91 (0) 20 40 03 59 31
ab.kulkarni@polysoude.in

INDONESIA
PT. TIRA AUSTENITE
☎ +62 (0) 21 460 25 94
yusuf@tiraustenite.com

ISRAEL
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

LATVIA
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

LITHUANIA
POLYSOUDE S.A.S.
☎ +33 (0) 2 40 68 11 00
info@polysoude.com

MALAYSIA
POLYSOUDE ASIA
☎ +86 (0) 65 862 60 08
Jmpan@singnet.com.sg

MEXICO
ASTRO ARC POLYSOUDE Inc.
☎ +1 (0) 661 702 01 41
sales@astroarc.com

NETHERLANDS
POLYSOUDE BENELUX
☎ +31 (0) 653 84 23 36
k.meurs@polysoude.com

POLYSOUDE BENELUX (SERVICE)
☎ +31 (0) 653 38 85 58
h.milder@polysoude.com

POLAND
TEFROMES Sp. z o.o. - IMIELIN
☎ +48 (0) 32 225 62 77
biuro@tefroles.com.pl

UNIDAWELD - BEDZIN
☎ +48 (0) 32 267 05 54
dariusz.szota@unidaweld.pl

ZALCO Sp. z o.o. - WARSZAWA
☎ +48 (0) 22 894 55 30
mbergman@zalco.pl

PORTUGAL
PRAXAIR PORTUGAL GASES, S.A.
☎ +351 (0) 229 438 320
pbarbosa@praxair.com

ROMANIA
DEBISUD S.R.L.
☎ +40 (0) 255 21 57 85
debusud@rdslink.ro

RUSSIA + C.I.S.
POLYSOUDE RUSSIA
☎ +7 495 564 86 81
polysoude@co.ru

SAUDI ARABIA
ALRUQUEE INDUSTRIAL
MARKETING COMPANY
☎ +966 (0) 385 7 63 87
11 Manager.Khaldoun@alruqee.com