MW

TIG-Without Filler Wire

Closed welding head

User manual PN-0510062

POLYSOUDE

THE ART OF WELDING

SBR

Document revision

Rev. 0	Full reorganisation of the document
Rev. 1	Update Recommended lubricant brands
Rev. 2	Note added on page 23 + update of electrical drawing Rev.G _ FNC 1107-007 (PLE - 07/2011)
Rev. 3	Addition chapter “TCI adapter kits” (10/2011)
Rev. 4	Update electrical wiring
Rev. 5	Update Illustration of consumables (07/2012)
Rev. 6	Update of consumables (11/2012)
Rev. 7	Update of consumables (02/2013)
Rev. 8	Update Elbow kit (07/2014)

When printing onto paper, this user manual must be printed on both sides of the page in order to make it easier to understand and more legible.

Contents

Fig.1.1 - MW heads with switch on power source P 4

1. Safety instructions

Warning: Protect yourself and others from injury – Read and follow these precautions.

1. 1. Hazards associated with arc welding

The symbols reproduced below are used throughout this Technical Manual in order to draw your attention and identify the potential hazards. When you see one of these symbols, **refer to the safety instructions in the following section 'Recommendations'.**
This equipment must only be installed, used, maintained and repaired by qualified persons.
While it is in use, anyone not working with the equipment must be kept well away.

1. 2. Meaning of the symbols

	**Risk of electric shocks**		**Risk of serious injury caused by rotating parts**
	**Risk of inhaling fumes or gases**		**Risk of explosion**
	**Risk of burns to the eyes or the skin due to heat radiation**		**Risk of exposure to magnetic fields**
	**Warning: hot surfaces – Risk of burns**		**Danger caused by noise**
	**Risk of burns to the eyes or the skin due to flying sparks**		**Read the instructions**
	**Risk of excessive heat or fire.**		**Safety goggles must be worn**
	**Safety boots must be worn**		**Safety helmets must be worn**
	**Fall hazard**		**Refer to the recommendations below in order to take the necessary precautions to avoid any hazard.**

1. 3. Recommendations

Risk of electric shocks

The electrical components include the electrode, the welding circuit, the input circuit and the internal circuits, the welding wire and the metal parts in contact with it, the wire dispenser and the housing for the welding wire feed rollers. The slightest contact with these parts may cause an electric shock or even electrocution when the machine is switched on. Factors increasing the risk of electric shock: Moisture in the immediate area, working on an electrically-conductive surface, inadequate earthing, poor maintenance of the equipment, unsafe working methods.
Preventing risks:

- Avoid any contact with live wire spools.
- In the case of water-cooled torches, inspect the torch at regular intervals in order to identify any leaks; take care to prevent condensation.
- Do not spool the cables around your body.
- Before replacing the electrode, ensure that it is no longer live.
- Switch off the machine before carrying out any maintenance or repair operations or while it is not in use.
- Wear safety gloves, clothing, aprons and boots which are dry and free from holes.
- Insulate the component and the earth by means of mats or other means of providing sufficient insulation if the welder is required to work on metal surfaces or structures.
- This machine must be installed and earthed in accordance with its User Manual and with national, local and municipal codes of practice.
- The return cable must be attached correctly (clean contact surface, cable securely fastened, as close as possible to the area to be welded).
- Do not use damaged, worn or bare (uninsulated) cables which are of insufficient size or not properly assembled. If this is the case, they must be replaced immediately.
- The welding station must be correctly earthed.
- If the component to be welded has to be earthed, use a separate cable.
- Use the appropriate connectors.

Note the no-load voltage, which is limited to 80 V r.m.s. for alternating current or 113 V for direct current (the voltage required to strike the arc). The maximum value for plasma cutting generators is 500 V.

Risk of inhaling fumes or gases

Welding generates fumes and gases which are hazardous to health. Do not inhale the fumes.
Origin of the fumes and gases: Base metal, filler metal, coating (flux) with welding by coated electrode, shielding gas, solvents and materials covering the metal to be welded.

In order to prevent risks:

- Use breathing apparatus, such as filtering masks, assisted-ventilation masks, inducted air masks and disposable masks.
- Avoid chlorinated solvents.
- Ensure that the components are completely dry before welding.
- Do not work alone!
- Trap the fumes and gases at source.
- Remove paint, oil or any other surface coating.

Risk of burns to the eyes or the skin due to radiation

Radiation from arc welding is liable to cause burns to the eyes and the skin.

Identifying the risks: Exposure to the radiation emitted by the arc, generating intense visible and invisible rays (ultraviolet and infrared), reflection of the rays while welding metals such as aluminium and stainless steel, arc strike, sparks, pin-holes created by the tip of a tungsten electrode.

In order to prevent risks:

- Wear gloves or leather gauntlets to protect your hands and lower arms.
- Wear an apron or gaiters to protect your legs, knees and forefoot.
- Wear a mask (headband-type, handheld or electronic mask) or goggles fitted with a suitable filter.
- Use safety shields to protect nearby workers.
- Tie a scarf around your neck and button the neck of the protective clothing.

Warning: hot surfaces – Risk of burns.

Do not touch welded or flame-cut components with bare hands. If such components have to be handled, use the appropriate tools and/or wear welders' gloves, thick and insulated, to prevent any burns. Allow the components to cool before handling them or welding them.

Risk of burns to the eyes or the skin due to flying sparks.

- Wear gloves or leather gauntlets to protect your hands and lower arms.
- Wear an apron or gaiters to protect your legs, knees and forefoot.
- Wear a mask (headband-type, handheld or electronic mask) or goggles fitted with a suitable filter.
- Use safety shields to protect nearby workers.
- Wear garments with long cotton or woollen sleeves, preferably free from any traces of oil or grease. Do not wear clothing made from synthetic fabrics.
- Tie a scarf around your neck and button the neck of the protective clothing.
- Wear welders' safety boots.

Risk of excessive heat or fire.

- Maintain the equipment at the electrical workstation in good operating condition, particularly the cables carrying the feed and return current.
- Maintain a minimum distance of 6 metres between the welding equipment and any greasy, inflammable or dust-laden materials.
- Use safety shields to protect nearby workers.

Risk of explosion.

These risks are associated with the use and handling of gas cylinders and flying sparks.

- Do not use damaged cylinders.
- Store the cylinders in a well-ventilated area and restrict access to anyone other than authorised personnel.
- Never exceed a temperature of 55 ºC while storing or using the cylinders.
- Clearly identify empty cylinders to distinguish them from full ones.
- Protect the cylinders from extremes of temperature (ice, sunlight, sparks, etc.).
- Check the connectors and hoses at regular intervals.
- Use protective shields.

Risk of serious injury caused by rotating parts.

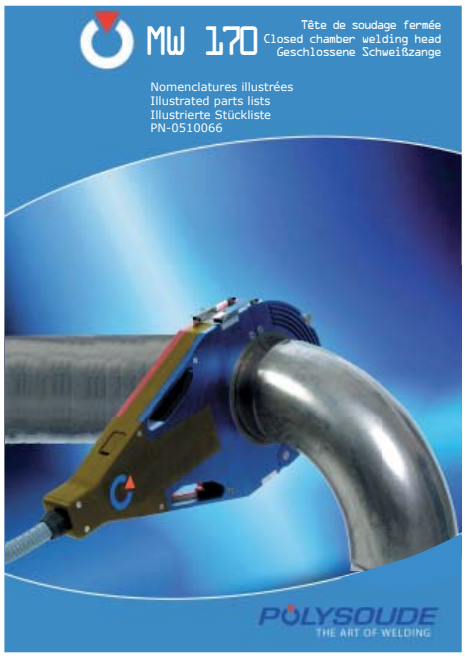
- Do not place your hands near fans or any moving parts.
- Keep all safety shields closed or in the 'safety' position.

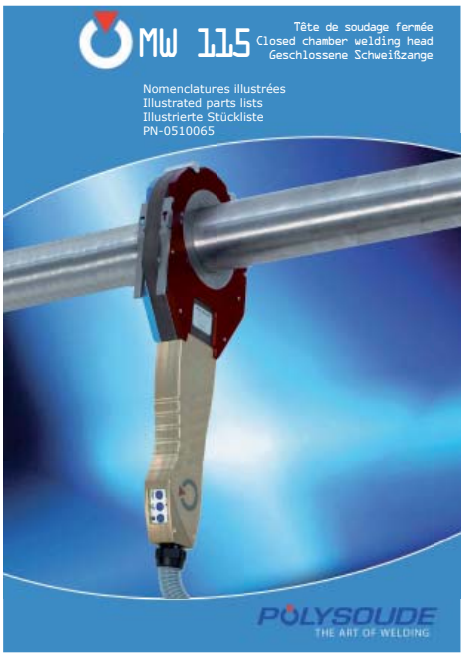
Risk of exposure to magnetic fields.

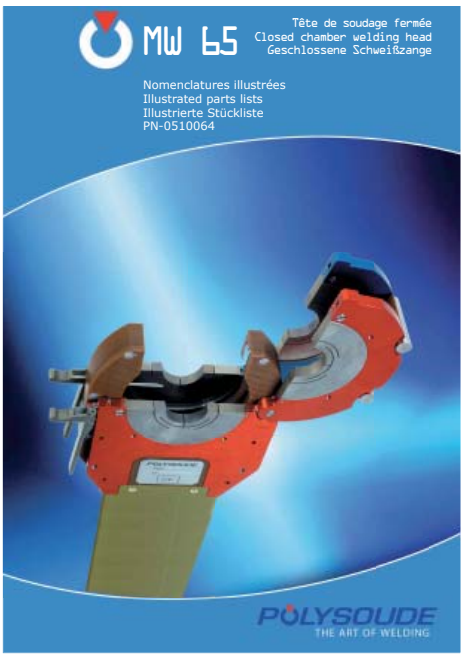
The distance between the welding circuit and the brain is of fundamental importance.

- Never spool the cables around your body and certainly not around your shoulders.
- Advise your immediate superior if you are wearing a heart pacemaker. The interference generated by the circuit requires special protective measures, which must be applied in consultation with the company doctor.

The operator must ensure that no-one is exposed to the hazardous area.







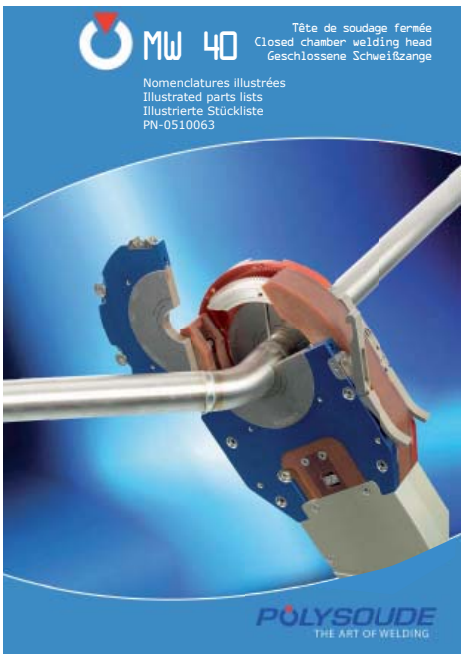


Fig.2.1 - Illustrated parts lists for MW welding heads

2. General Information

2. 1. Reference documents

PN-0510063	Illustrated parts lists Welding head MW40-3
PN-0510064	Illustrated parts lists Welding head MW65-3
PN-0510065	Illustrated parts lists Welding head MW115-3
PN-0510066	Illustrated parts lists Welding head MW170

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

Fig.3.1 - Complete range of MW welding heads

3. General presentation

3. 1. Introduction

MW closed heads are designed for orbital "butt" fusion welds of the following types:

- Tube to tube
- Tube to accessories (tees, elbows, flanges, fittings, etc.).

The welding process used is TIG without filler material. These welding heads are suited to high-productivity applications. They are suitable for applications with high duty cycles as they are water-cooled.
The MW head range can be used for welding tubes with diameters varying from 6 mm to 170 mm.

The range consists of 4 welding heads:

- MW 40-3.
- MW 65-3.
- MW 115-3.
- MW 170.

3. 2. Classification of the machine

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

3. 3. Environment and conditions of use

This equipment is designed for use in workshops, in a non-explosive atmosphere.
When operating the machine, the following conditions must be observed:
Ambient air temperature -10° to +40°C.
Relative humidity:

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

The ambient air shall not contain abnormal quantities of dust, acids, gas or corrosive substances. Fumes due to welding are considered to be normal.
Examples of abnormal conditions of use:

- Abnormal corrosive smoke.
- Vapour.
- Excessive oil vapour.
- Shaking and vibration.

Ensure that air can enter and leave when using the equipment.

It is prohibited to preheat the parts to be welded.

3. 4. Description of the equipment

3. 4. 1. General characteristics

Welding heads in the MW range provide:

- Oxidation-free welds
- Optimum ergonomics
- Simplicity of use
- High duty cycle
- Increased productivity
- Compliance with national and international standards
- Compatibility with all Polysoude power sources

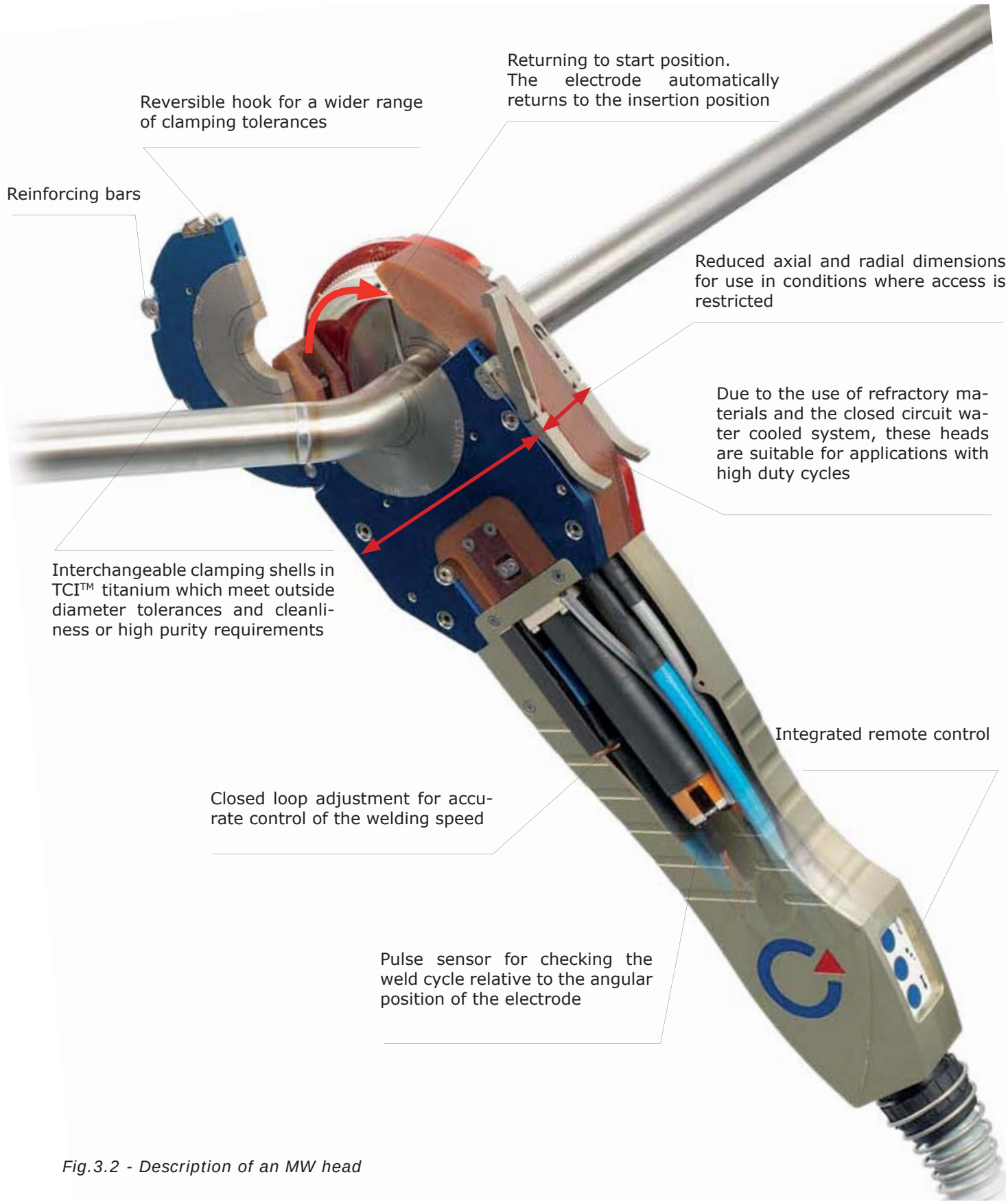


Fig.3.2 - Description of an MW head

3. 4. 2. Composition

MW welding heads are made up of the following subassemblies:

- An unclamped welding head (Fig 3.3 - 1):
- A drive (Fig. 3.3 - 5) fitted with a travel limiting system.
- A handle (Fig. 3.3 - 6)
- An integrated remote control (Fig. 3.3 - 7).
- A motor unit (Fig. 3.3 - 8).
- A bundle (Fig.3.3 - 9).
  - A red clamp (Fig 3.3 - 2).
  - A blue clamp (Fig 3.3 - 3).

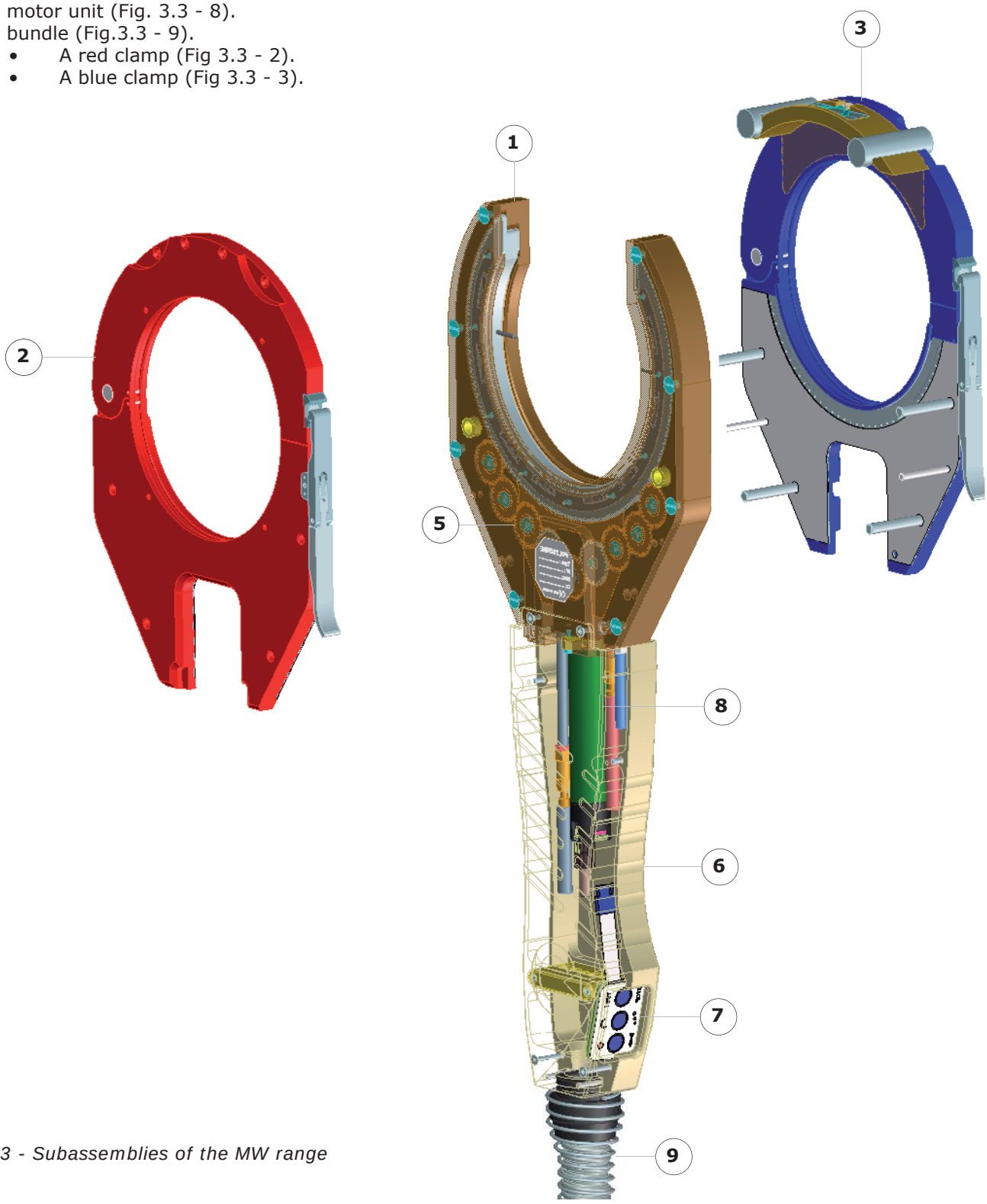


Fig.3.3 - Subassemblies of the MW range

Options:

- The elbow kits (Fig. 3.4) allow elbows and accessories with a small straight cross-sectional area to be welded. They are made up of:

- An electrode offset kit (Fig.3.4 - 1). There are three types of these. See the section entitled "Offset electrode".
- A kit for welding an elbow on one side (Fig. 3.4 - 1). The welding kit is made up of a set of plate support shells and 4 latches. See the section entitled "Elbow kit". The welding kit is fitted with a pair of plates (Fig. 3.4 - 3) corresponding to the diameter of the part.
  - The set of clamping shells in TCI™ titanium (Fig.3.5 - 1) are available for all tube outside diameters. A set of shells is made up of 2 pairs of shells identified by different letters. The shells are marked with the outside diameter of the tube to which they relate.

  - A 15-meter bundle extension.

  - A switching box for simultaneously connecting two welding heads.

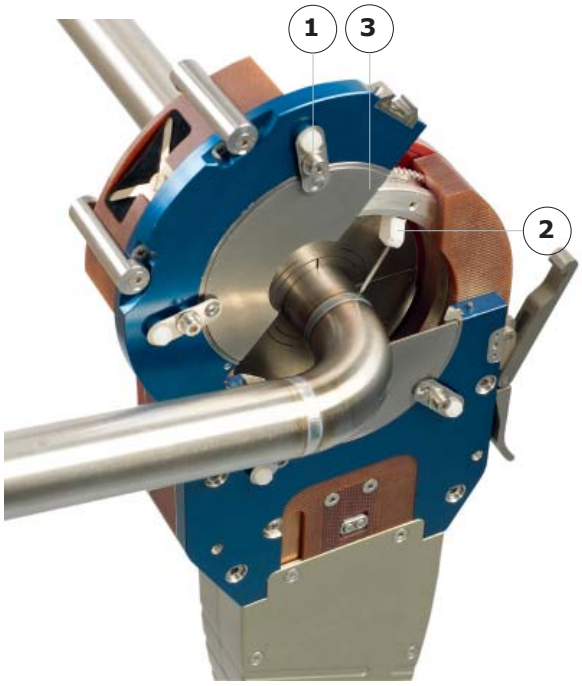


Fig.3.4 - Elbow kit

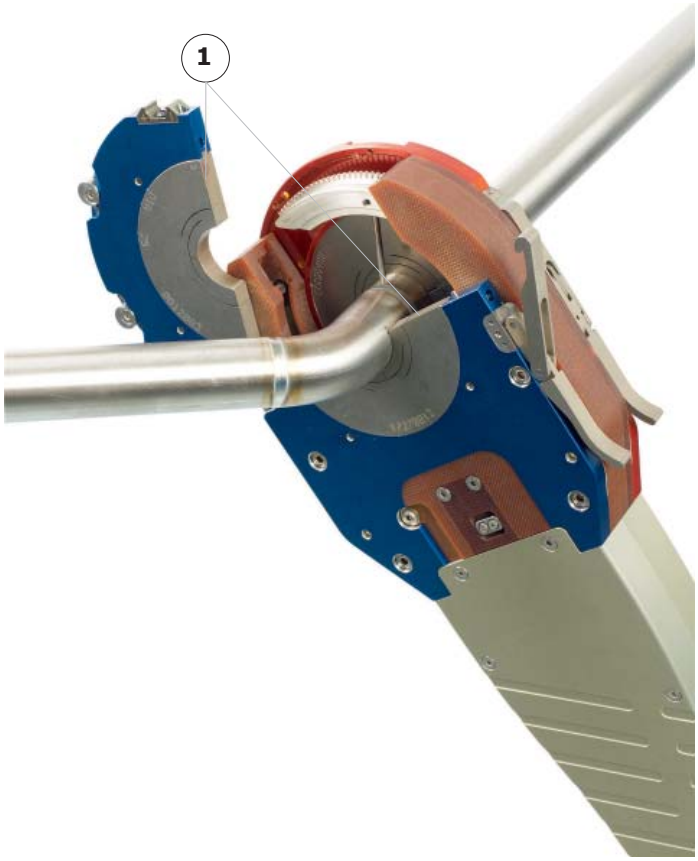


Fig.3.5 - Set of clamping shells

3. 5. Technical data

Dimensions		
Overall dimensions		See the "Dimensions" section
Weight		
Ambient noise		
In welding mode pursuant to directive 2006/42/EC (dBA)		< 70
Duty cycle		
MW 40-3 Average current I (A)		60
MW 65-3 Average current I (A)		60
MW 115-3 Average current I (A)		60
MW 170 Average current I (A)		110
Diameter of the tubes to be welded		
MW 40-3 Min - Max (mm)		6 - 40
MW 65-3 Min - Max (mm)		12 - 65
MW 115-3 Min - Max (mm)		25 - 115
MW 170 Min - Max (mm)		80 - 170
Maximum diameter of tubes to be welded with an offset electrode		
MW 40-3	Type 1 electrode offsetting device - 5 mm	33.7
	Type 2 electrode offsetting device - 11 mm	19.05
MW 65-3	Type 1 electrode offsetting device - 5 mm	60.3
	Type 2 electrode offsetting device - 11 mm	42.4
MW 115-3	Type 1 electrode offsetting device - 5 mm	114.3
	Type 2 electrode offsetting device - 11 mm	101.6
MW 170	Type 3 electrode offsetting device - 8.4 mm	168.3
Electrodes		
MW dia, 40-3 - 65-3 - 115-3 (mm)		1.6 and 2.4
MW dia. 170 (mm)		2.4

3. 6. Interface with the power source

The MW heads are compatible with all Polysoude power sources within the limit of being compliant with duty cycles (heads and power sources) and option management.

3. 6. 1. Power sources XX4, PSXX4

Enter the R30 code for the MW head used into the software.

Type	R30	I/Rot' Pulses per rotation	C Head coefficient
MW 40-3	D023 C or X	360	40
MW 65-3	D034 C or X	365	60
MW 115-3	D073 C or X	358	126
MW 170	D0103 C or X	359	178

Remember to program the C or X index at the end of the R30 code (please refer to the power source manual). Forgetting this letter could damage both the part and the welding head.

If a PS XX4 is used, the control buttons installed on the handle may not always be used.

If your software version is less than L633 7.0, do not use the controls on the handle. See the section on connecting the welding head.

If your software version is greater than L633 7.0, the controls on the handle may be used if the C or X index of the R30 ratio have not been forgotten.

3. 6. 2. Power sources XX6, PX, PSXX6 and PC

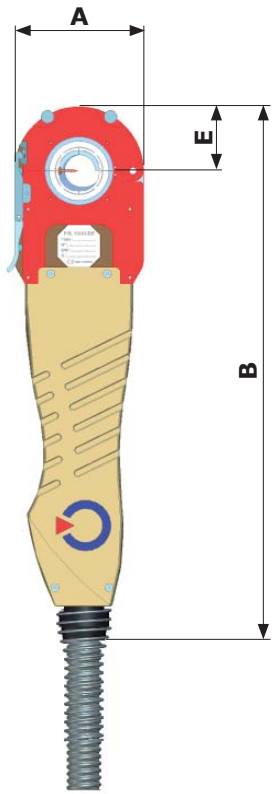
In the software, select the configuration suited to the head used.

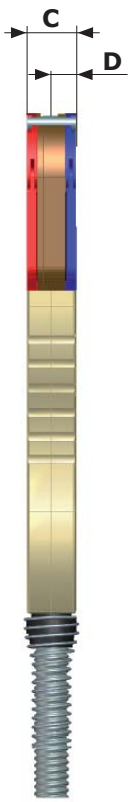
The operator must respect the choice of axe types specified by Polysoude.
In case of non-compliance with this choice, there is a high risk of destruction of equipment.

3. 7. Dimensions

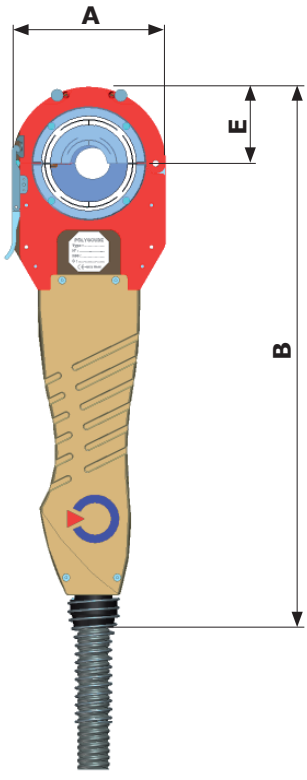
Type	Outside tube diameter (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (kg)
MW 40-3	6 - 40	100	430	38	19	50	6
MW 65-3	12 - 65	126	458	38	19	63	7

MW 40-3

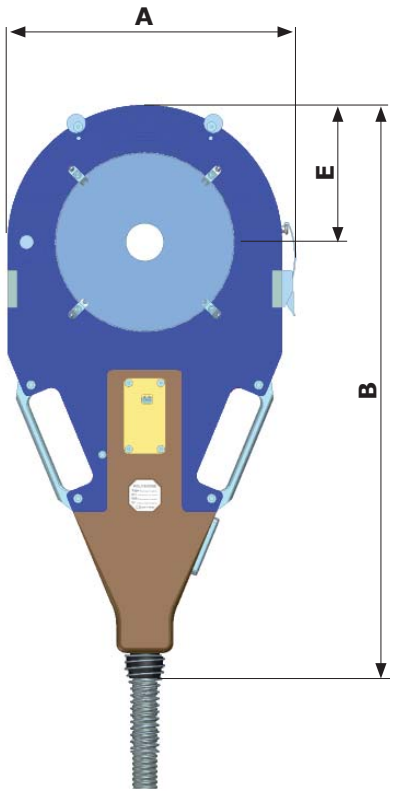


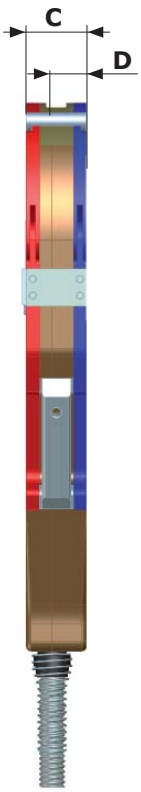


MW 65-3

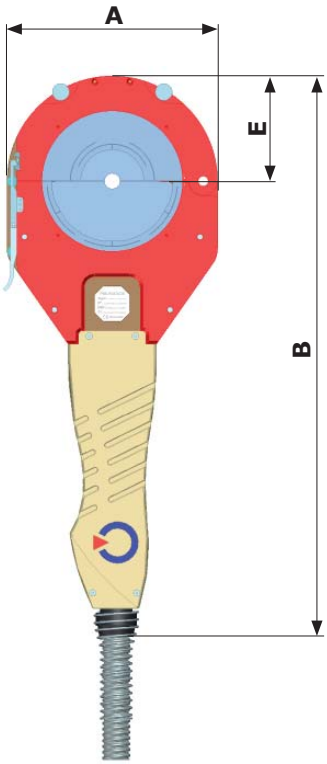


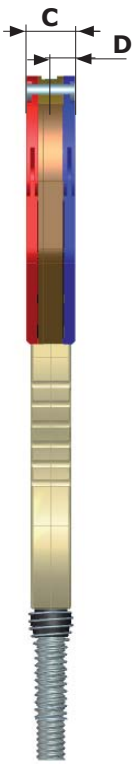
Type	Outside tube diameter (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (kg)
MW 115-3	25 - 115	200	547	46	23	100	9
MW 170	80 - 170	290	580	63	31.5	145	18





MW 170





MW 115-3

4. Installation

4. 1. Handling and manipulation

All installation and servicing must be carried out with no voltage present. Always use the handle to manipulate the head. Never manipulate it using the clamping components or the bundle.

The welding head is delivered in a sealed case. This case is specific to the head. It must be kept for use each time the head is transported in order to prevent damage.
When the head is not in use, it must be stored on a suitable support and protected against impact damage (or even in its case).

4. 2. Installation on site

The complete installation must be fitted with a power supply isolation switch that can be locked. In order to prevent people tripping over and damaging the equipment, provision must be made for appropriate routing of cables.

4. 3. Bundle

The user is responsible for the installation and use of the arc welding equipment in accordance with the manufacturer's instructions. If electromagnetic interference is detected it must be the responsibility of the user of the arc welding equipment to resolve matters, with assistance from the manufacturer (taken from EN 60974-10 2003 – Appendix A.).

Before using the machine, check the bundle. Too sharp an angle can pinch the cooling liquid and gas hoses. Limit this angle to 90° for optimum operation.

For the connection of the bundle to the power source, refer to the manual for the power source used. Connection must be carried out with the power source powered off. The installation is started by means of the power on switch on the power source.

Reference	Description
1	Manual control socket
2	Torch rotation socket
3	Electrode power plug Black cable (-)
4	Ground power plug Red cable (+)
5	Coolant circuit outgoing connector
6	Coolant circuit return connector
7	Gas supply connector

The length of the bundle is 5.5 meters.
Options:

- Extension of 15 meters.
- Switch box allowing 2 welding heads to be connected simultaneously to the same power source.

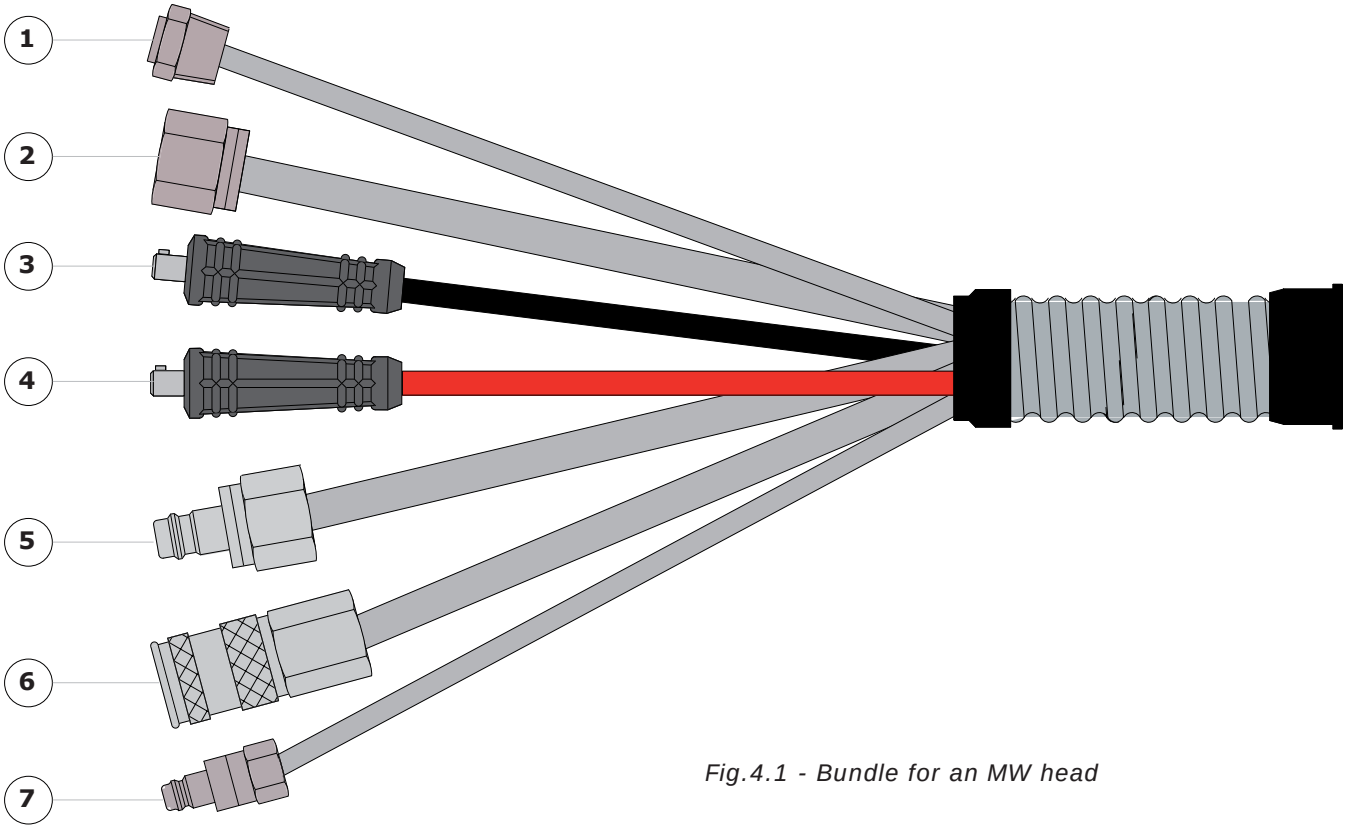


Fig.4.1 - Bundle for an MW head

5. Use

5. 1. Precautions for use

This machine must only be used by personnel who are qualified to perform the tasks involved, in accordance with the rules governed by the French Labour Code.

5. 2. Integrated remote control

The MW welding heads are fitted with a remote control integrated into the handle.

Reference	In-cycle operation		Off-cycle operation
1	STOP		TEST gas and coolant
2	Weld current downslope		TEST rotation
3	Start cycle		
4	Indicator lit	Travel limit enabled/Open position	
	Indicator off	Not in open position	

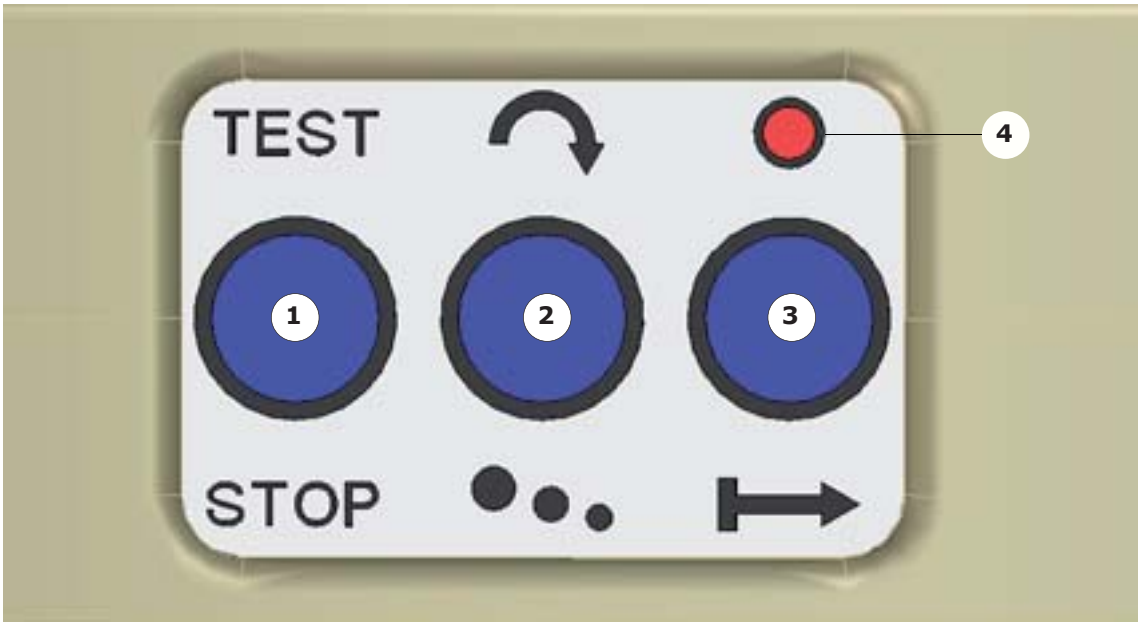


Fig.5.1 - Control buttons - MW handle

Note: for an open head start position, the recommended direction of rotation during the welding cycle is the one by which the electrode goes towards the handle of the MW head (Fig.5.2).

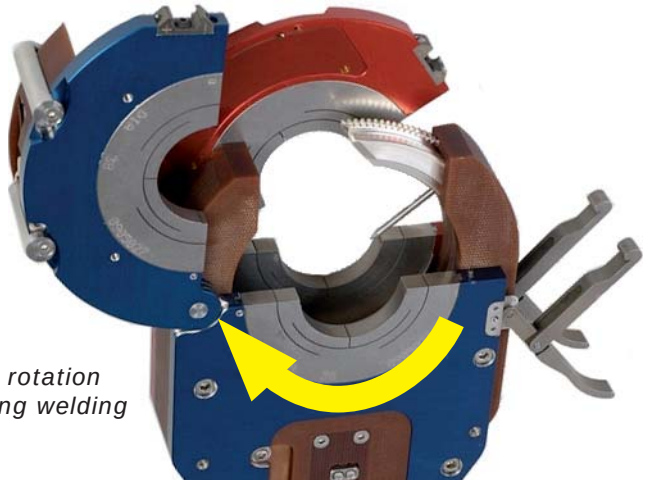


Fig.5.2 - Recommended rotation direction during welding

5. 3. Gas

Before carrying out the first weld, the whole of the gas circuit must be bled by pressing the test gas button for at least 20 to 30 seconds. One to two welds are required at the start to reach a normal protection level. Depending on the result, adjust the flow in order to reach the colour suited to your requirements.

Too high a gas flow can cause the arc to be deflected.

All these recommendations are based on the use of Argon. Where it is necessary to increase the power of the gas, Argon-Hydrogen or Argon-Helium mixes may be used.

MW head	Gas - Recommended flows and times	Flows
MW 40-3	Gas flow recommended (l/min)	10 - 20
	Pre-gas times (seconds)	20 - 30
	Post-gas times (seconds)	20 - 30
MW 65-3	Gas flow recommended (l/min)	20 - 25
	Pre-gas times (seconds)	25 - 35
	Post-gas times (seconds)	25 - 35
MW 115-3	Gas flow recommended (l/min)	20 - 30
	Pre-gas times (seconds)	25 - 35
	Post-gas times (seconds)	25 - 35
MW 170	Gas flow recommended (l/min)	20 - 40
	Pre-gas times (seconds)	30 - 40
	Post-gas times (seconds)	30 - 40

5. 4. Clamping shells

5. 4. 1. Selecting shells

A set of shells is made up of 2 pairs identified by different letters. Each pair has an identification letter (Fig 5.3 - 1) and is marked with the outside diameter of the tube to be welded (Fig. 5.3 - 2).
The shell set is chosen according to the outside diameter of the tube to be welded. Measure the diameter using callipers to select the corresponding shell set. Each part has a locking notch (Fig. 5.3 - 3) and a stop notch (Fig. 5.3 - 4).

It is absolutely essential to fit the 2 shells with the same letter on the same side of the clamping system. This is ensure the tube is aligned correctly and is concentric relative to the rotation of the electrode.

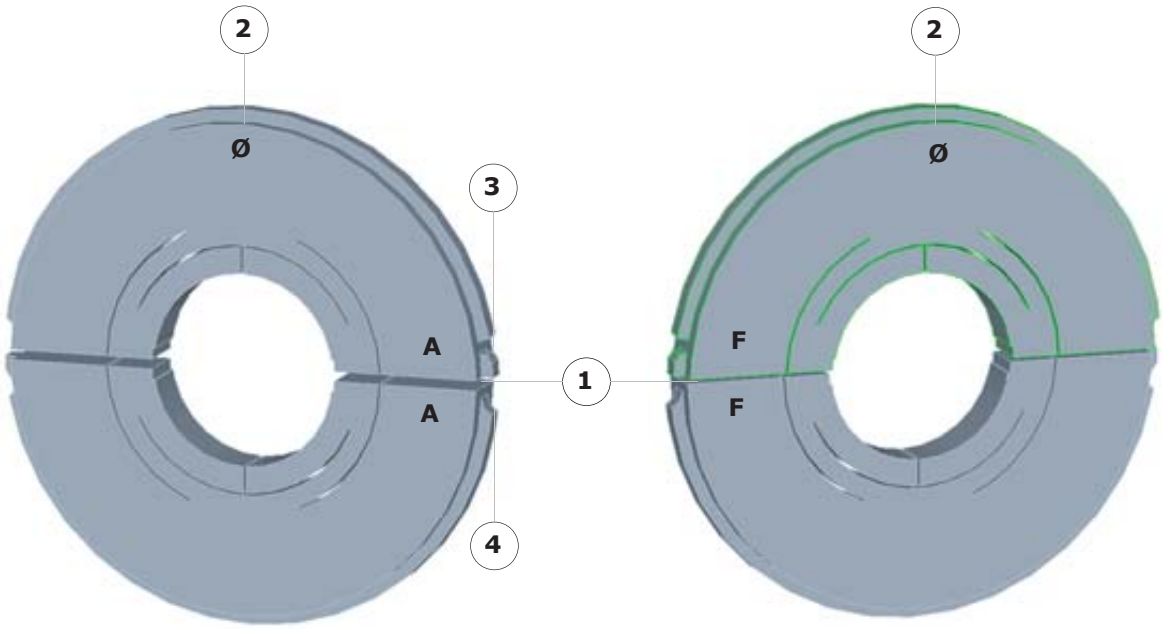


Fig.5.3 - Set of clamping shells

5. 4. 2. Fitting the shells

- Place the notches of the locking system (Fig. 5.4 - 1) into the clamping system. The diameter and identification letter markings must be on the outside of the head.
- Lock the shell by tightening the screws (Fig. 5.4 - 2).
- Carry out this operation for the other components of the shell set.
- Check how well the system is clamped. There must be no movement between the tube and the head. Ensure the 2 tubes are aligned correctly with no difference in levels. The smaller the thickness and diameter of the tube, the more detrimental any difference in levels will be.

For special cases, it is possible to produce shells which are wider at the mating surface. This helps to limit alignment problems. It is also important to check that the distance from the electrode to the workpiece remains constant during the rotation around the tube.

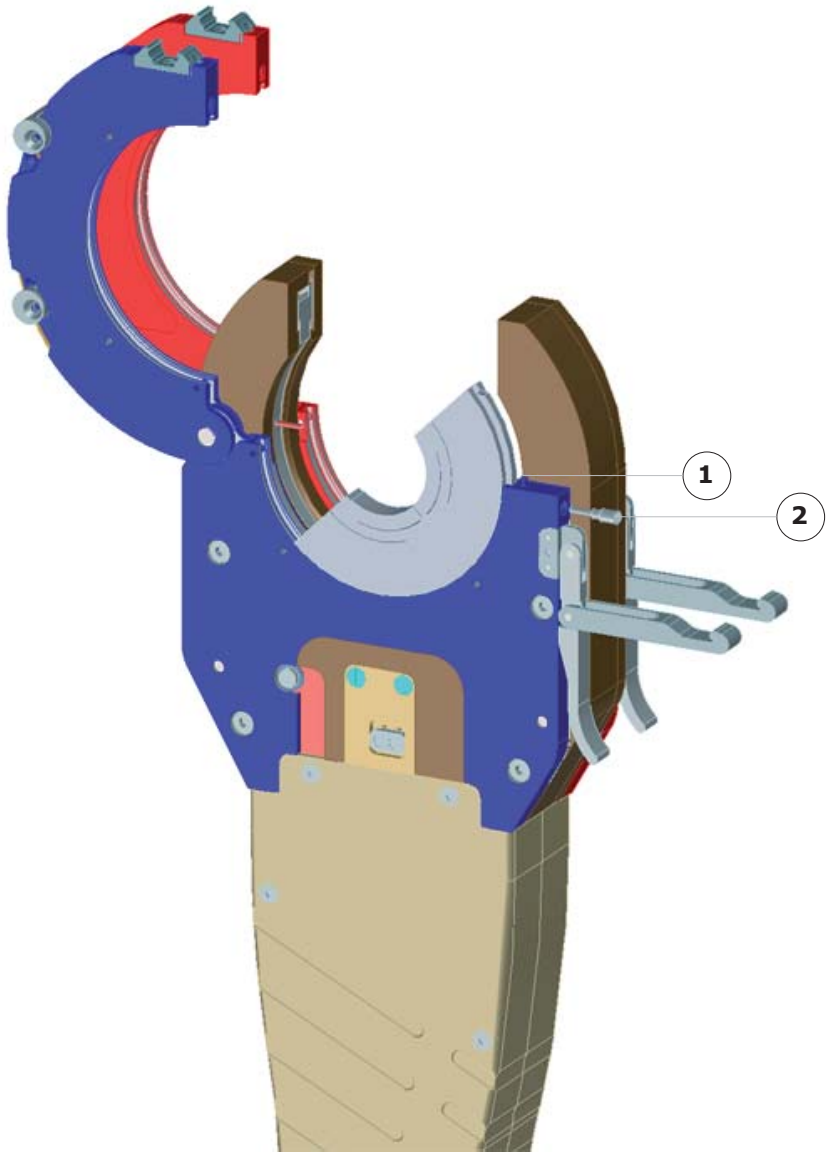


Fig.5.4 - Installing shells

5. 5. The electrode

5. 5. 1. Choice of electrode

The electrodes are fragile and must be handled carefully.
In order to obtain a good weld and avoid premature wear of the electrodes, it is essential that they are perfectly clean. Avoid contact between the filler metal and the electrode otherwise the latter will deteriorate rapidly.

The electrode supplied by Polysoude is made of tungsten alloy with additional elements such as lanthane. It is easier to strike and has a greater arc stability.

To maintain a stable and concentrated welding arc, tungsten electrode must have a conical end. The diameter of the electrode, its trimming angle and diameter of the flattened tip depend on the intensity of the welding current.

Electrodes used for the same application must have a constant geometry in order to guarantee repeatability of results.

The end of the electrode must always incorporate a flat surface. The shape of the end of the electrode is a determining factor for striking the arc (this must be checked at regular intervals).

The diameter and the shape of the tip of the electrode are dependent on the intensity of the welding current. Grinding must be carried out along the centreline of the electrode. The use of a bench grinder ensures that the operation is straightforward, fast and to a high standard.
The length and diameter of the electrode must be suited to the thickness of the tube. Each electrode can withstand a maximum current.

Mean values for grinding the electrode.

Current intensity (A)	Electrode diameter (mm)	Grinding angle (θ°)	Flat surface φ (mm)
10 - 110	1.6	15°	0.1 to 0.2
60 - 210	2.4	30°	0.1 to 0.4

Electrodes must always be replaced preventatively in order to reduce weld defects. For certain extreme applications, the electrode must be replaced after every weld.

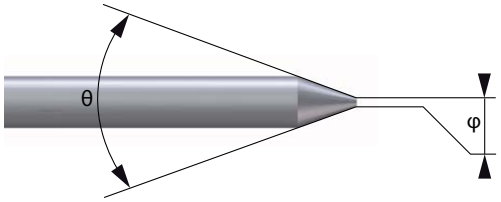


Fig.5.5 - Electrode grinding

The ranges of current intensity (A) are given as an indication for use in DC, DCEN (direct current electrode negative) under argon. In order to avoid damage to the installation, these intensities must be considered with the duty cycles of the torch (and / or lance), please refer to the technical data.

5. 5. 2. Distance between electrode and workpiece

The distance between the electrode and workpiece is of primary importance. It determines the arc voltage as well as the mechanical pressure of the arc on the weld pool. Generally speaking, short arcs are more stable and allow deeper penetration. On average, the length of the arc will be between 0.8 mm and 2 mm. Remember to check that the electrode-workpiece distance is constant around the tube. If not, this can cause a problem with the concentricity between head and tube. For small diameters, the setting is very fine. Short arc lengths can be used (0.8 mm). For large diameters, a distance of 0.8 mm is too risky and liable to cause short-circuits. A safe arc length must be chosen of up to 2 mm.

5. 5. 3. Length of electrode without electrode offsetting device

L max = A - (D/2) - Dpe

Values	Description
L	Electrode length (2)
A	Radius of ring gear (1)
D	Outside diameter of the tube
Dpe	Distance between electrode and workpiece

Value A without electrode offsetting device

Weld head	Value A Ring gear radius
MW 40-3	40
MW 65-3	52
MW 115-3	83
MW 170	113

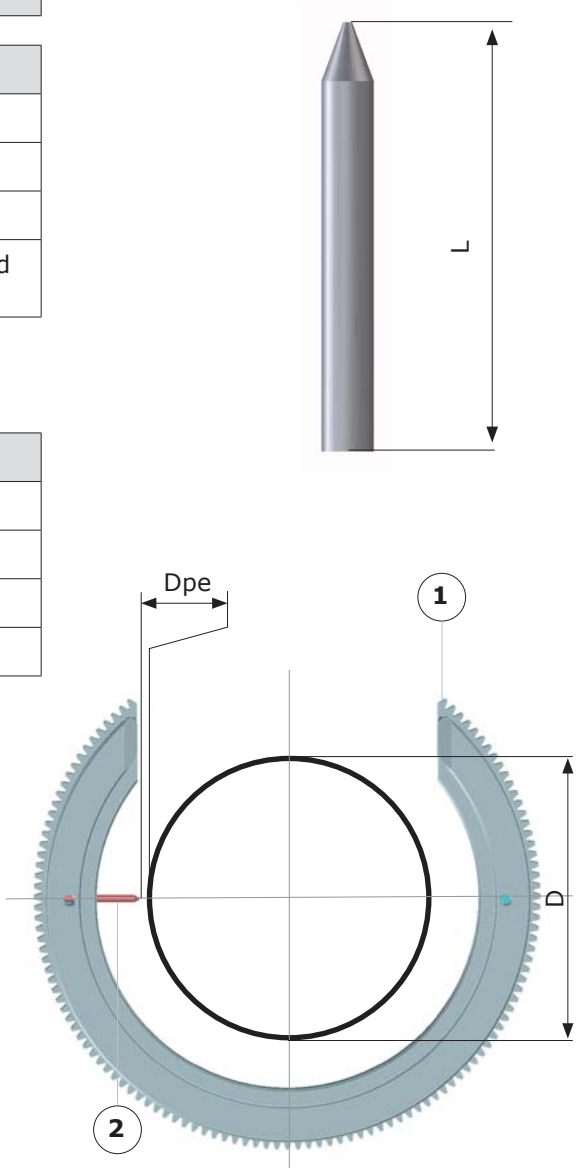


Fig.5.6 - Distance between electrode and workpiece

5. 5. 4. Installing the electrode

The electrode must be installed after the head is clamped to the tube. Only one of the sides of the head is clamped so as to allow access to the electrode securing system. It is important to position it at the end of the tube so that the unclamped shell cannot come into contact with the tube.
Once the head has been put in place:

- Check how stably the system is clamped.
- Move the wheel into position so that the hole for the electrode and the clamping screw can be accessed.
- Insert the electrode (Fig. 5.7 - 1) into its slot.
- Take a feeler gauge and a 1.5 mm Allen key.
- Set the desired distance between the electrode and workpiece using the corresponding shim (Fig. 5.7 - 2).
- Set the position of the electrode using the locking screw (Fig. 5.7 - 3).

Do no lock the electrode locking screw. Simple pressure is enough to secure the electrode. Overtightening could strip the screw thread.
Regularly check that the electrode locking screw is not damaged. If in doubt don't hesitate to change it.

The locking screw must not protrude beyond the face of the wheel, and the electrode must not go past the bottom of the groove. This could prevent the wheel rotating.

Not correct

Correct

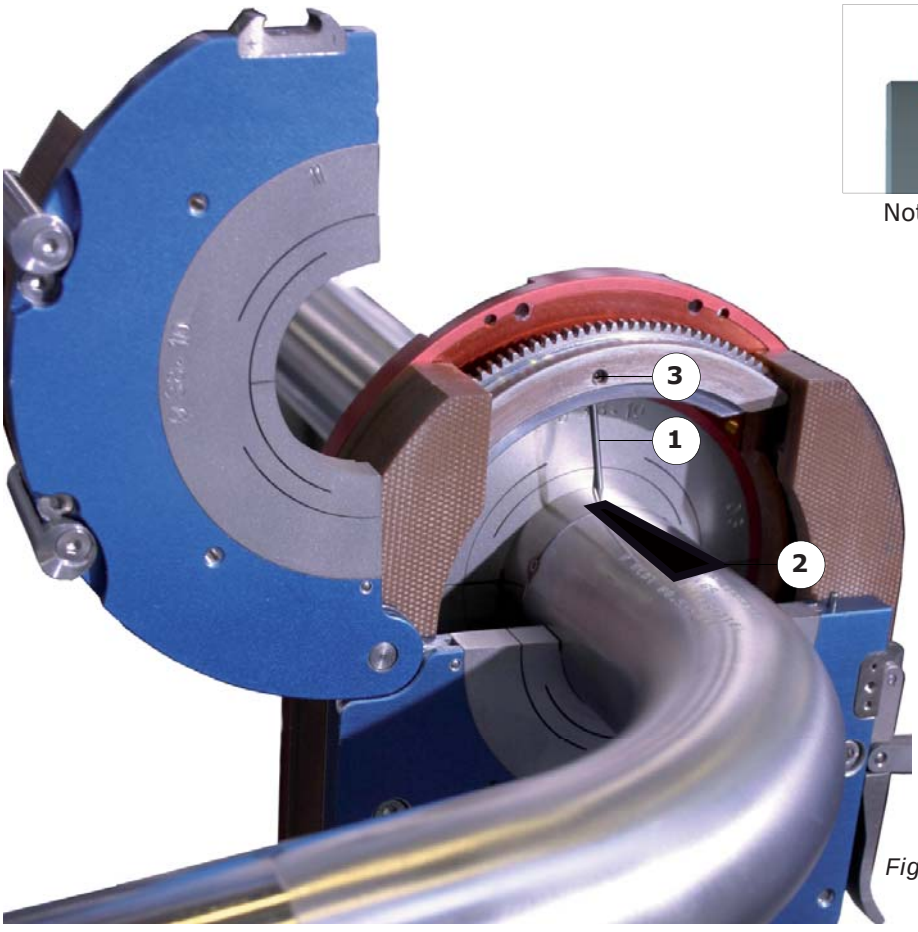


Fig.5.7 - Installing the electrode

5. 6. Elbow kit

The elbow kits allow elbows and accessories with a small straight cross-sectional area to be welded.
They are made up of:

- An electrode offset kit. There are three types of these.
- A kit for welding an elbow on one side. The welding kit is made up of a set of plate support shells and 4 latches. The welding kit is equipped with a pair of plates.

5. 6. 1. Electrode offsetting device

Weld heads	Part nos. electrode offsetting device	Tube diam-eters (mm)	B1 (mm)	B2 (mm)	B3 (mm)	Offset value (mm)	Electrode diameter (mm)
MW 40-3	Type 3 - 0017741401	6.35 to 19.05	8.10	22	38	**11**	**1.6**
	Type 3 - 0016624801	6.35 to 19.05	8.10	22		**11**	**2.4**
	Type 2 - 0017271401	6.35 to 33.70	14.10	16		**5**	**1.6**
MW 65-3	Type 3 - 0017741401	12 to 42.40	8.10	22	38	**11**	**1.6**
	Type 3 - 0016624801	12 to 42.40	8.10	22		**11**	**2.4**
	Type 2 - 0017271401	12 to 60.30	14.10	16		**5**	**1.6**
MW 115-3	Type 3 - 0017741401	25 to 101.60	12.10	23	46	**11**	**1.6**
	Type 3 - 0016624801	25 to 101.60	12.10	23		**11**	**2.4**
	Type 2 - 0017271401	25 to 114.30	18.10	17		**5**	**1.6**
MW 170	Type 3 - 0017741401	76.20 to 168.30	22.90	26.70	63	**5**	**2.4**

NB: If necessary, an MW170 offsetting device can be fitted on one of the other heads.

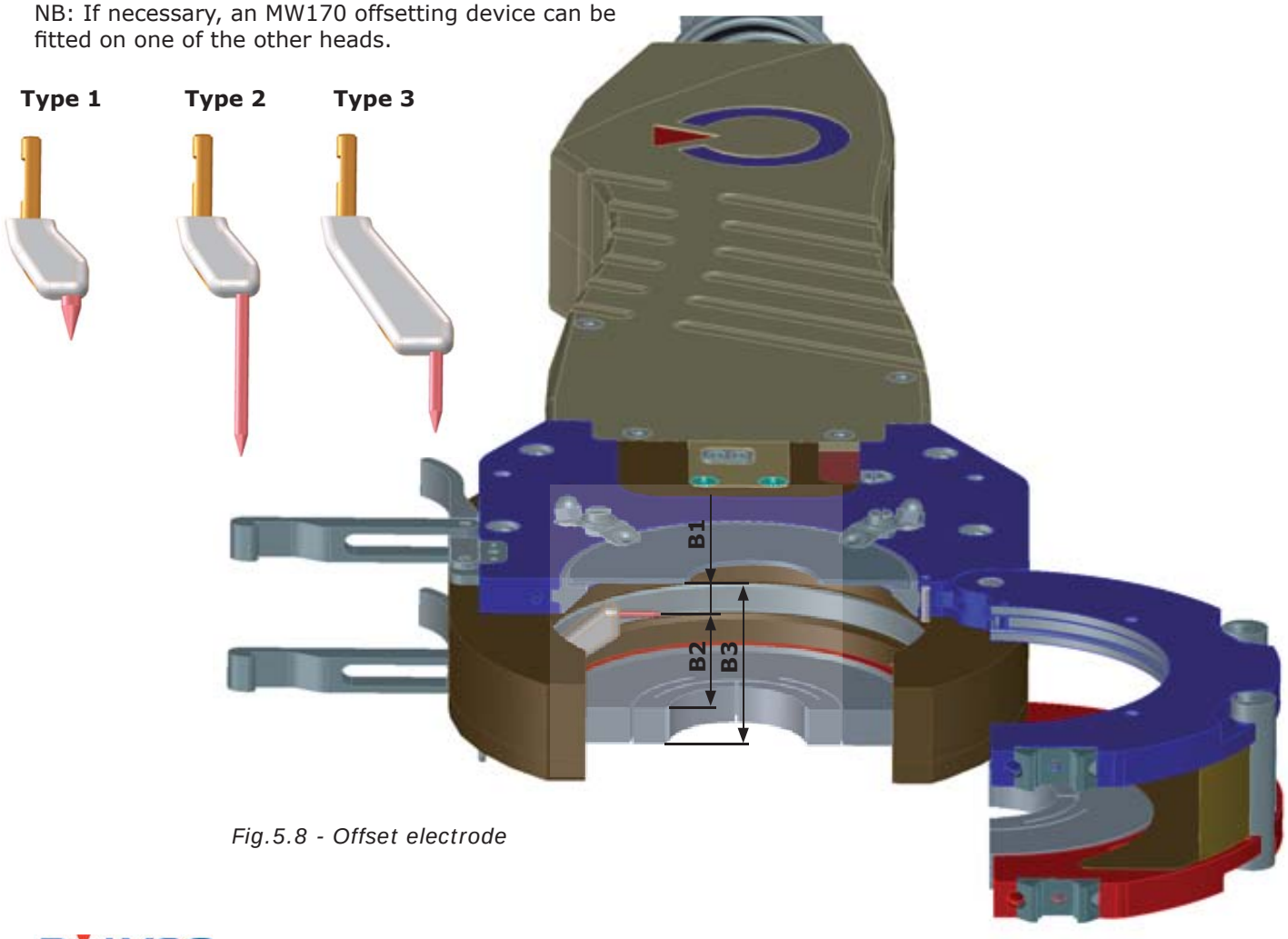


Fig.5.8 - Offset electrode

5. 6. 2. Installing the electrode offsetting device

The electrode offsetting device is installed in just the same way as a normal electrode. Refer to "Installing an electrode".
Place the electrode offsetting device at the stop on the wheel. Set the position using the fixing screw.

The fixing screw must not protrude beyond the face of the wheel. This could prevent the wheel rotating.

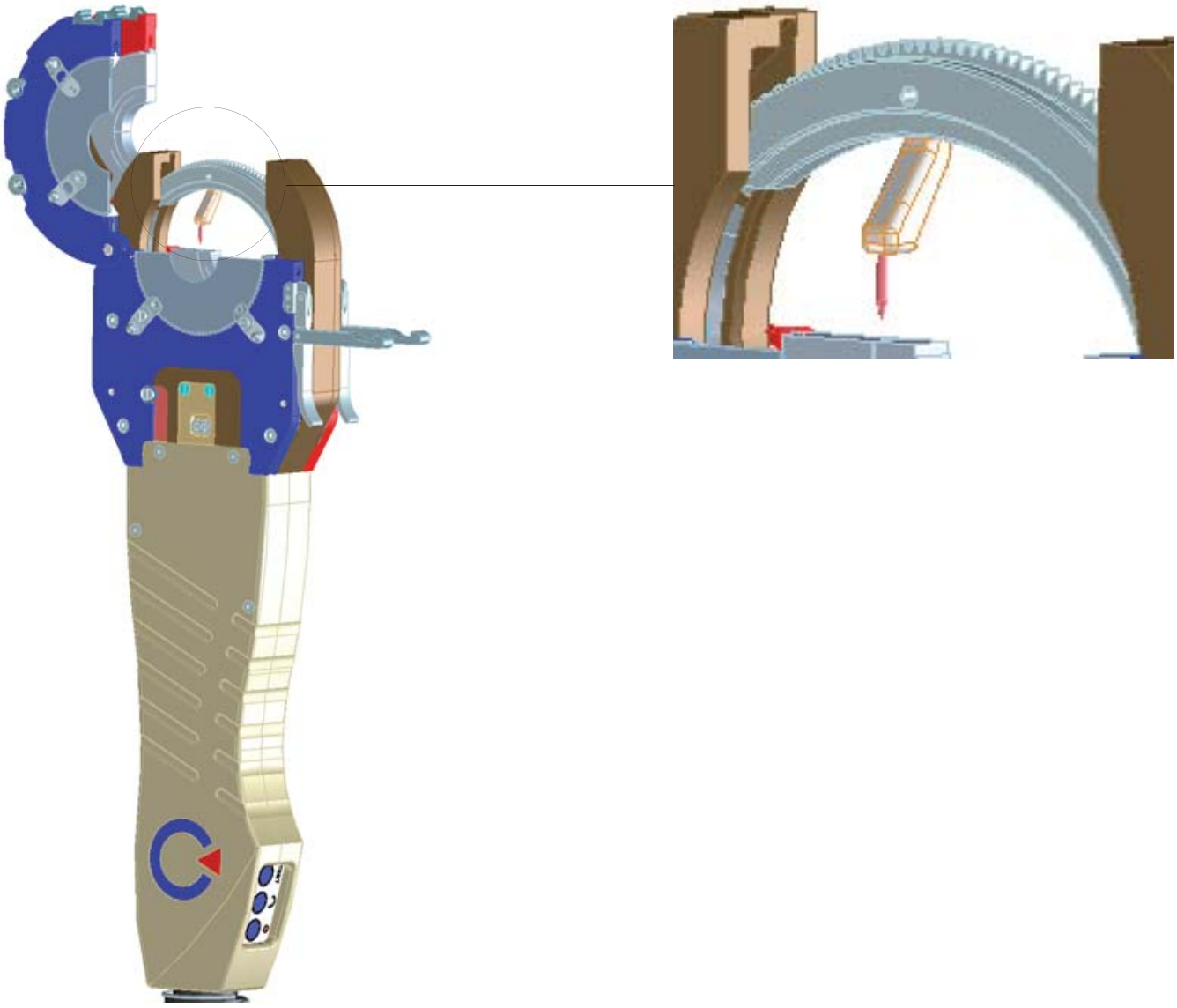


Fig.5.9 - Fitting an offset electrode

5. 6. 3. Distance between electrode and workpiece

Ditto without electrode offsetting device.

5. 6. 4. Length of electrode with electrode offsetting device

L max = A - (D/2) - Dpe

Values	Description
L	Electrode length (2)
A	Radius of ring gear (1)
D	Outside diameter of the tube
Dpe	Distance between electrode and workpiece

Value A with electrode offsetting device

Weld head	Offset	Value A
MW 40-3	5 mm	25
	11 mm	17.75
MW 65-3	5 mm	37.5
	11 mm	30.25
MW 110-3	5 mm	67.5
	11 mm	60.25
MW 170	8.4 mm	95

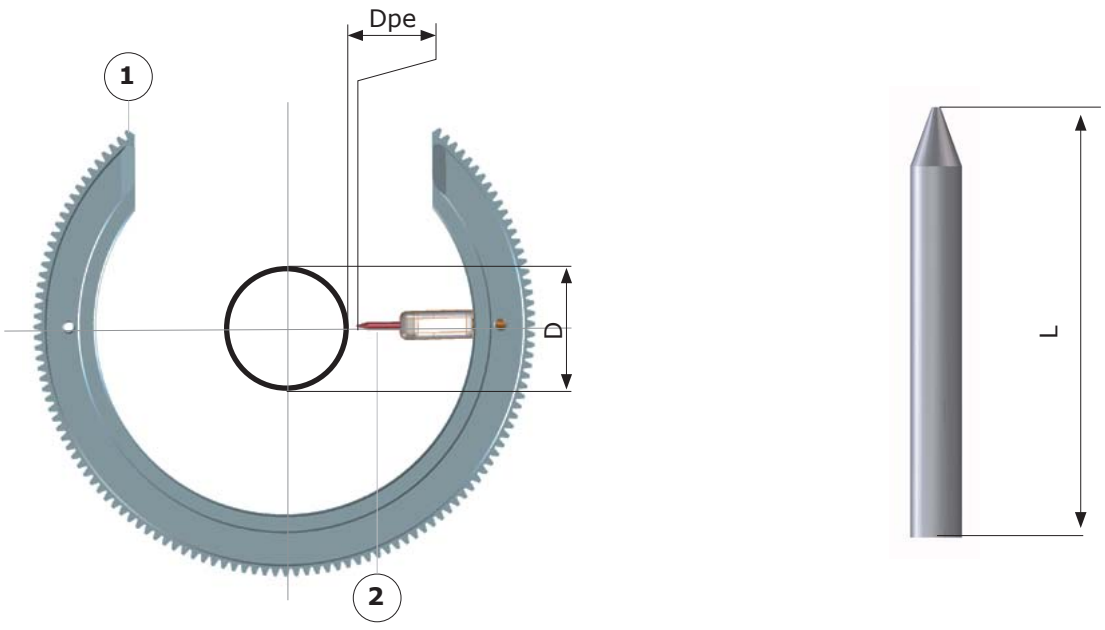


Fig.5.10 - Electrode-workpiece distance with offset electrode

5. 6. 5. Installing the elbow welding kit

The elbow welding kit is made up of:

- A pair of plate support shells (Fig. 5.11 - 1).
- 4 latches (Fig. 5.11 - 2).

The tube welding kit is combined with a pair of plates (Fig. 5.11 - 3) which relate to the diameter of the elbow to be welded.

The red clamp is fitted with a pair of simple shells (Fig.5.10 - 4) which relate to the diameter of the elbow to be welded. The blue clamp accommodates a pair of plate support shells (Fig.5.11 - 5). Fitting is the same as for the simple shells. Once the shells are in place, place the plate set (Fig.5.11 - 6) on the blue clamp and secure in place using the 4 latches (Fig.5.11 - 7).

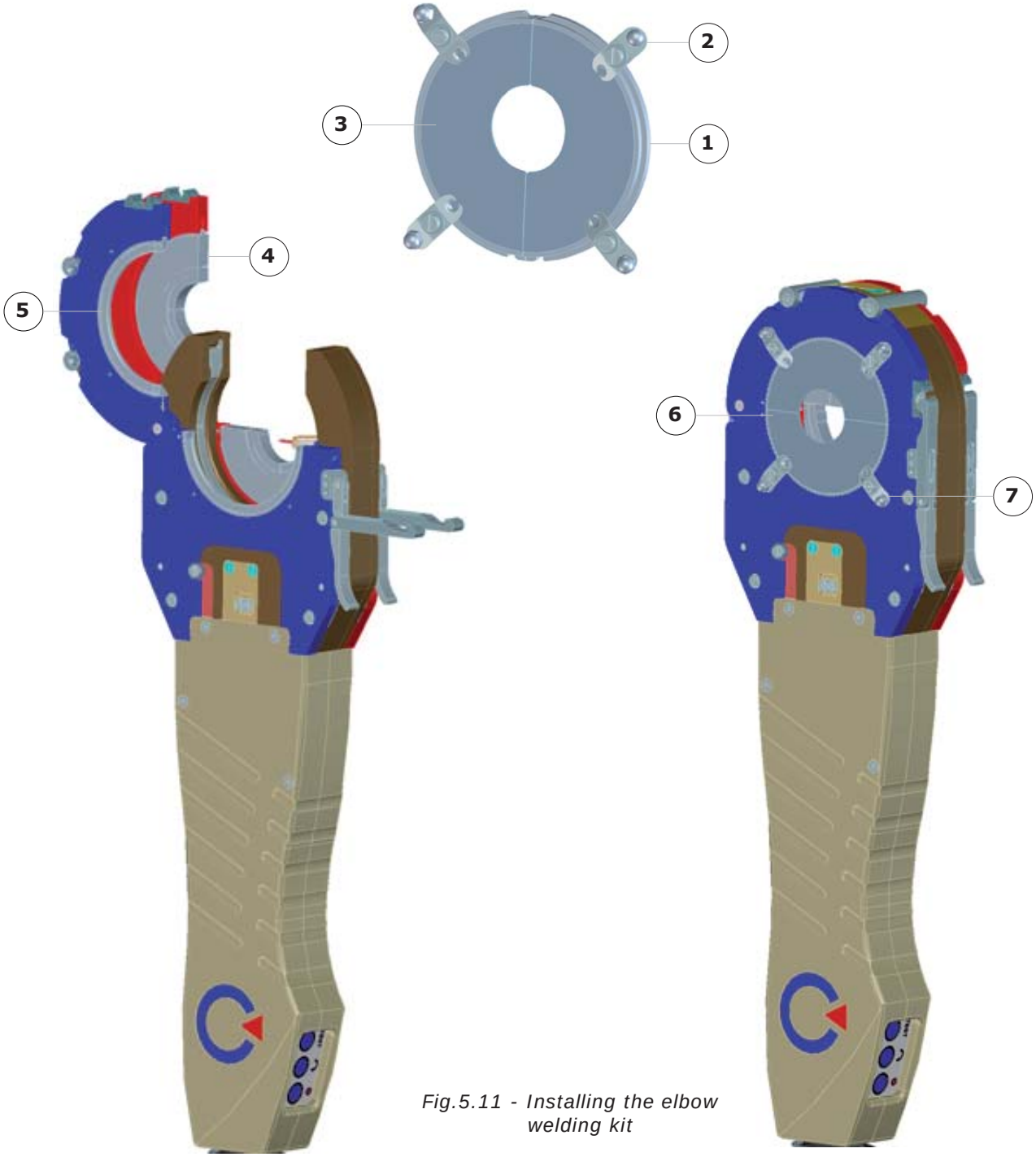


Fig.5.11 - Installing the elbow welding kit

5. 7. Clamping the workpiece

The MW welding head is never used as a tube support.
A support and tube securing device must be provided.

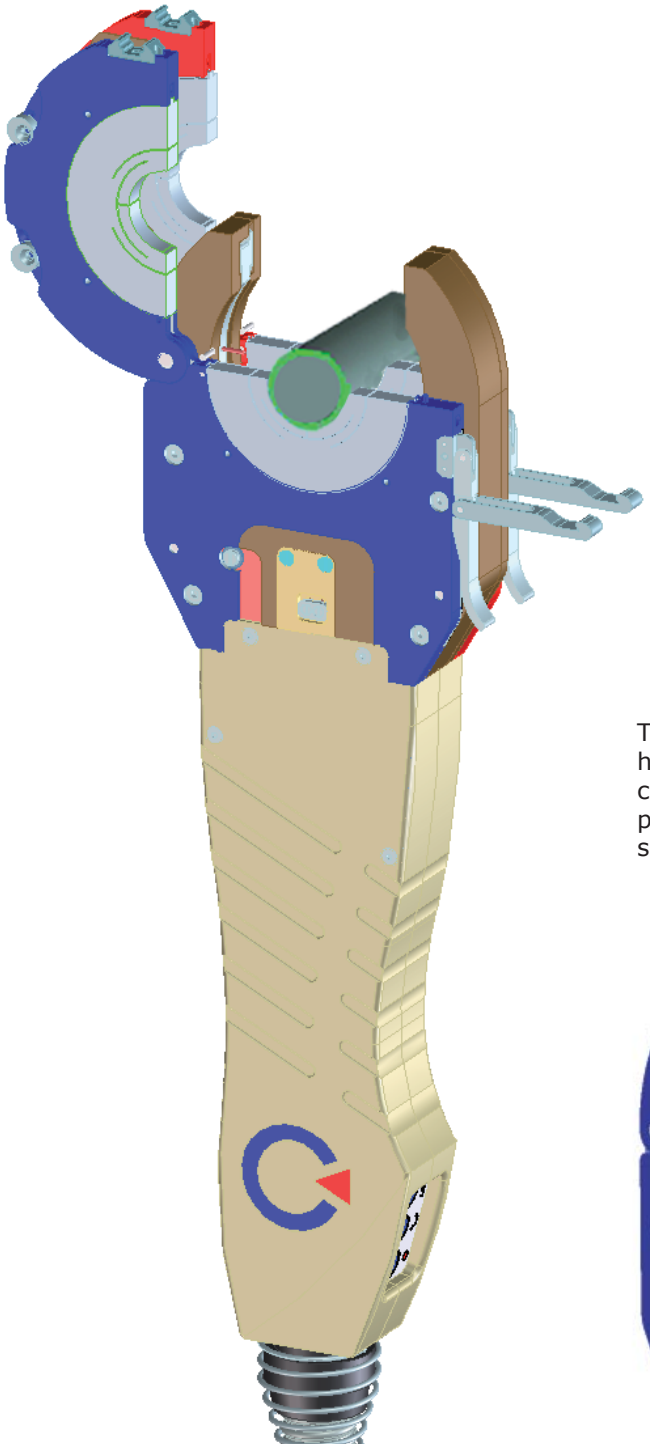


Fig.5.11 - Tube ready for clamping

The sets of shells have grooves in them (Fig.5.13 - Rep.1). The purpose of these grooves is to cushion the clamping of the tubes. Before clamping, check that the shell set relates to the diameter of the tubes to be welded. Carry out the clamping operation without forcing.

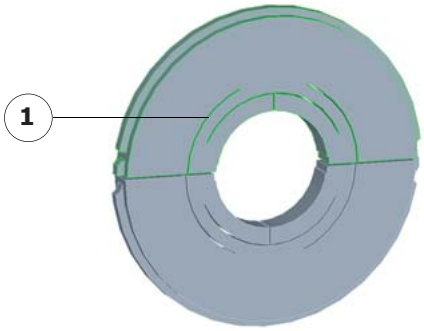


Fig.5.13 - Shell grooves

The 2 clamping systems have an allowance if needed. The hook receptacles (Fig.5.14 - 1) have 2 positions + and -. To change the position, loosen the fixing screw and reverse the position of the receptacle. Both receptacles must be in the same position.

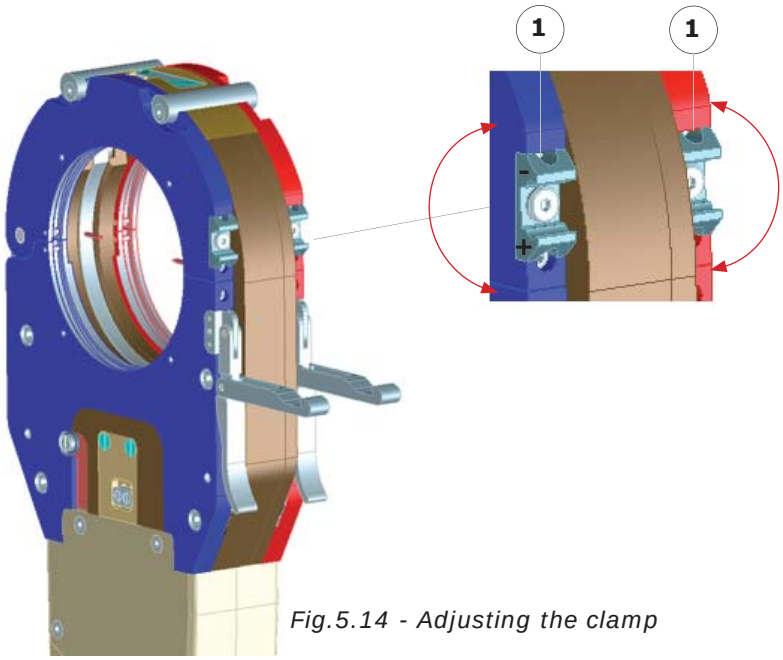


Fig.5.14 - Adjusting the clamp

5. 8. TCI adapter kits

It is possible to use shell:

- MW 1250 with a head MW 40-3.
- MW 2500 with a head MW 65-3.
- MW 4500 with a head MW 115-3.

This requires using the corresponding adapter kits:

- MW 40-3 TCI adapter kit MW 1250 reference 0017741101.
- MW 65-3 TCI adapter kit MW 2500 reference 0017271101.
- MW 115-3 TCI adapter kit MW 4500 reference 0017810901.

Installing the adapter kits on the heads MW 65-3 et 115-3:

- Place the adapter kit (Fig.5.15 - item 1) on the head (Fig.5.15 - Rep. 2).
- Set the head to the 4 screws (Fig.5.15 - Rep.3).
- Place the shell TCI (Fig.5.15 - Rep.4) on the adapter kit, set the 2 screws (Fig.5.15 - Rep.5). Screws (Fig.5.15 - Rep.5) must absolutely not exceed the shell (Fig.5.15 - Rep.6).

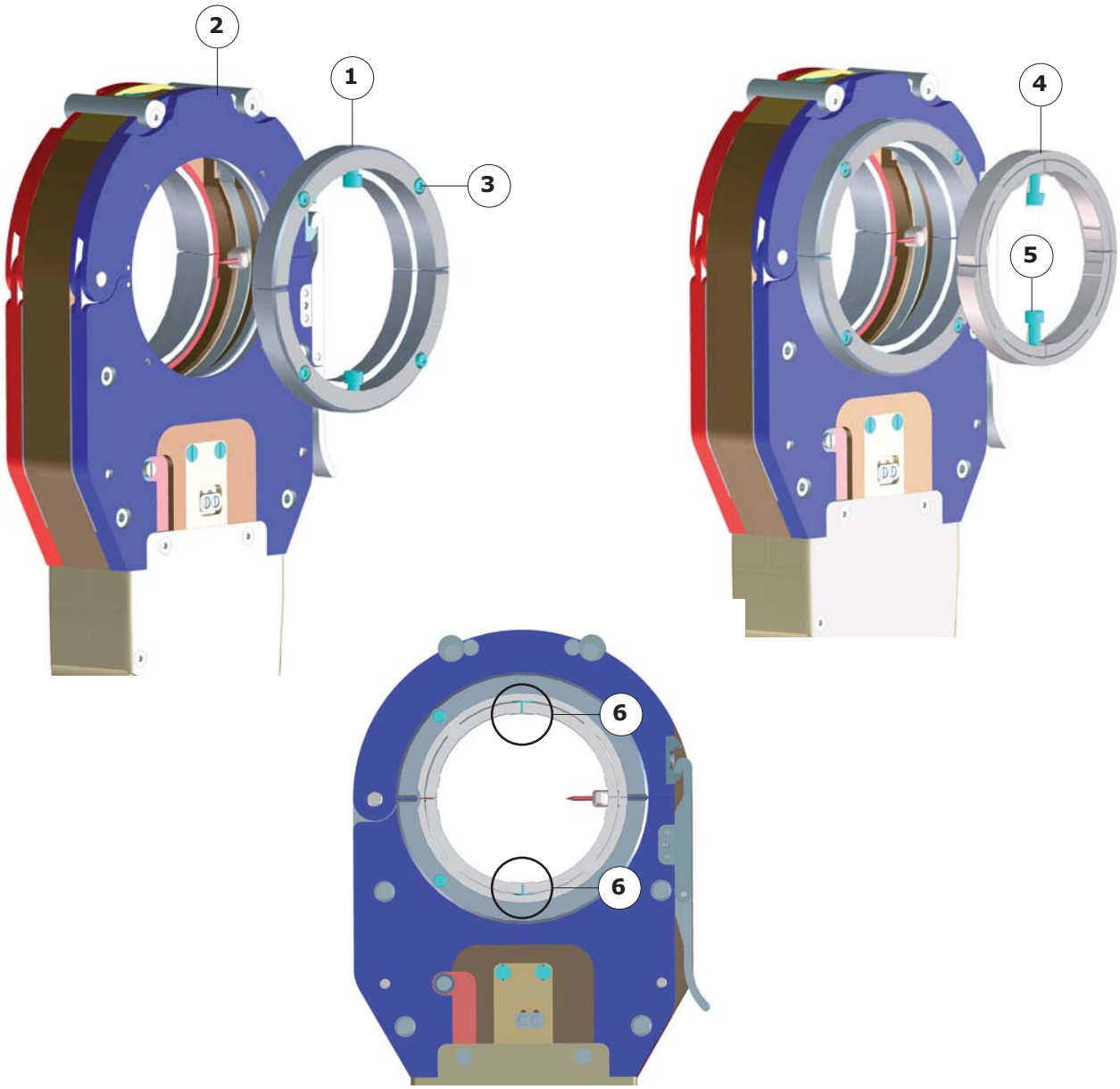


Fig.5.15 - Installing the adapter kits on the heads MW 65-3 and 115-3

Installing the adapter kit on the head MW 40-3:

- Place the first element of the adapter kit (Fig.5.16 - item 1) on the head (Fig.5.16 - Rep. 2).
- Lock the element into the screw (Fig.5.16 - Rep.3).
- Repeat this for other elements of the adapter kit.
- Place the shell TCI (Fig.5.16 - Rep.4) on the adapter kit, set the 2 screws (Fig.5.16 - Rep.5). Screws (Fig.5.16 - Rep.5) must absolutely not exceed the shell (Fig.5.15 - Rep.6).

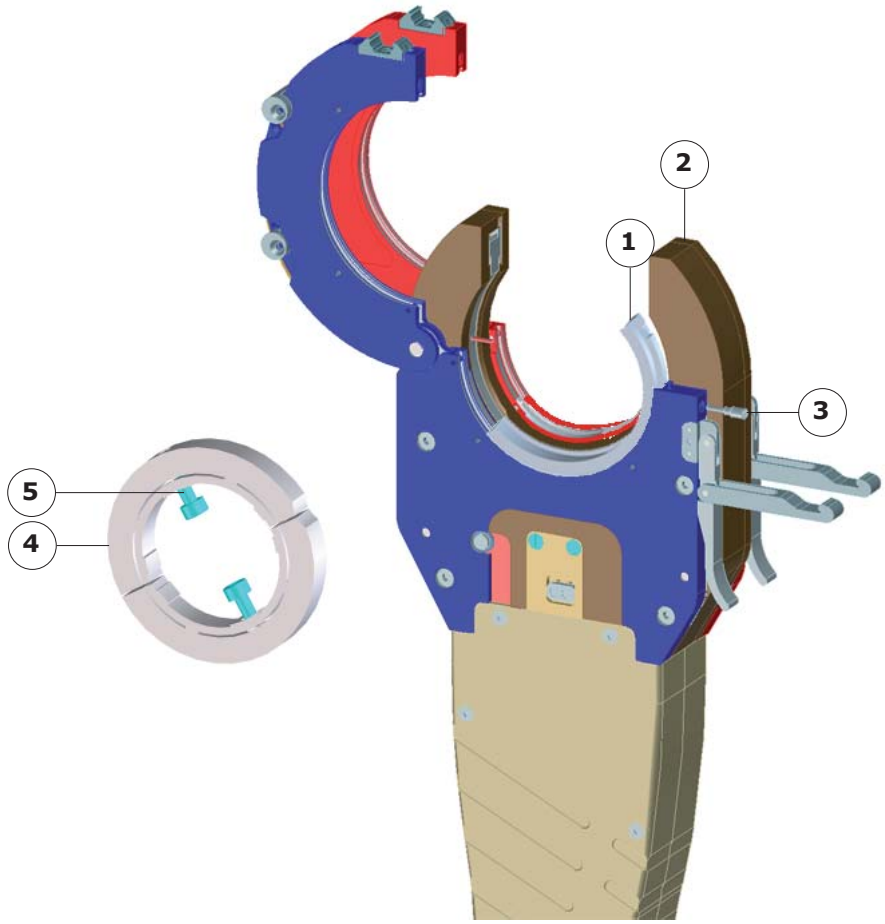


Fig.5.16 - Installing the adapter kit on the head MW 40-3

5. 9. Welding

5. 9. 1. Preparing the tubes

The MW closed heads are designed for fusion butt welding without filler metal of tubes, flanges, elbows, etc. It is essential the ends of the parts to be welded be properly squared off to avoid a gap between the tubes. The ability to reproduce welds depends on the quality of this preparation. Pay attention to any residual burrs which could adversely affect the quality of the joint. The use of a suitable facing machine suited to the diameters and thicknesses of the tubes is required. Do not forget to clean and decrease the tubes.

It is essential that the tube is cut perfectly perpendicular.

5. 9. 2. Putting the weld joint in place

Put the head in place by clamping on one side only to make it possible to see the weld joint in order to centre the electrode on it.
Then clamp the second side.

5. 9. 3. Checks before welding

Before welding, check the following points:

- Check the quality of the electrode and its adjustment.
- Presence of welding gas and internal protection.
- Head positioning.

5. 9. 4. Welding

Start the welding cycle using the program suited to the tube.

Depending on the applications, we recommend an operating limit based on a maximum temperature (at the hottest point) to be reached on the clamping plates (blue and red).

Do not overheat the MW welding head. Check the temperature does not exceed the limit recommended below.

Weld head	**MW 40-3**	**MW 65-3**	**MW 115-3**	**MW 170**
Max. temperature (°C)	100	100	120	120

5. 9. 5. Post-welding

After welding, when the cycle has finished, check the head is definitely in the open position. The red LED on the handle is lit. Otherwise, rotate it manually. Ensure the wheel is in open position before unclamping the head.

5. 9. 6. Duty cycle

The duty cycle for all MW heads is determined by Polysoude's Application Department. Several types of test are carried out to determine their operating limits. Depending on the type of application, the parameters may vary considerably. During the tests, our Application Department has clearly demonstrated that the duty cycle is linked to the following parameters in particular:

- Diameter and thickness of the tube
- Welding current/Welding speed

Test parameters produced at Polysoude's laboratory.

Weld head	**MW 40-3**	**MW 65-3**	**MW 115-3**	**MW 170**
Tubes to be welded Diameters and thicknesses (mm)	33.8x2	60.3x4	104x2	168x3
Average current I (A)	60	60	60	110
Welding frequency (minute)	3	5	5	7
Maximum temperature (°C)	100	100	120	120
Number of welds per hour	20	12	12	8

These values are given for information only without any contractual obligation.

6. Maintenance and troubleshooting

6. 1. Troubleshooting guide

Function	Nature of the incident	Possible causes
Welding current	Not striking	Earth not connected Braid cut No welding gas No cooling Faulty electrode
Gas	Poor shielding	Unsuitable gas flow Electrode too long Gas cylinder empty
Rotation	No rotation	Electrical connections not made Defective motor Programming error
	Speed not set Pulse step	Defective pulse sensor Electronic command fault
	Rotation less than 360°	Programming error Drive damaged

6. 2. Preventive maintenance

Hose inspection		
	Frequency	Operation
	Every 3 months	Machine switched off, isolating switch locked. Inspecting the hoses: • Clean all the hoses using a brush or cloth. • Inspect all the visible circuits. • Check that none of the hoses are too sharply curved or pinched and check for kinks, tears or bulges. • Check that none of the hoses are perished or worn. • Check that there is no seepage or noise; these are symptoms of leakage and, therefore, damage to the internal lining. • Check that the connectors and unions are tight.

Trace abnormal noises		
	Frequency	Operation
	Every 3 months	Machine switched on and operating. Axis movement: • Move the axis in a positive or negative direction within the physical limits of the machine. • Pay particular attention to any suspicious noises (creaking, abrasion, noise caused by abnormal vibrations, etc.).
	Every 3 months	Machine switched on and operating. Motors: • No abnormal noise should be generated while the machine is in operation: rumbling, scraping, creaking or any other unusual noise. • Also check that no unusual noise is emanating from the motor.

Check the electronic connectors		
	Frequency	Operation
	Every 3 months	Machine switched off, isolating switch locked. • Check that the connections are tight. • Check that there is no sign of overheating of the wiring between the components.

Look for leaks in the circuit		
	Frequency	Operation
	Every 3 months	Machine switched on and operating. Reminder: symptoms of a leak • Noise. • Drips. • Seepage. • Pools of liquid. • Frequent and abnormal topping-up.
	Every 3 months	Machine switched off, isolating switch locked. Visually check the following sensitive items: • All pipework accessories (connectors, tee-pieces, elbows, plugs, valves, etc.) • All application components.

Check the pinion gears		
Consumable items and tools	Frequency	Operation
Hard bristle brush.	Every 3 months	Machine switched off, isolating switch locked. • Clean all the gear teeth with solvent applied with a brush. Remove any traces of grease or debris of any kind. • Check the condition of the pinion gear. • Check the contact surfaces: report any signs of uneven wear, burrs or sharp edges. • Check the point of attachment: there should be no axial or radial free play in the pinion gear while it is being moved by hand (if possible).

Check the position switches		
	Frequency	Operation
	Every 3 months	Machine switched off, isolating switch locked. • Check the general condition of the position switch (housing and sensor head); check that the assembly is securely attached. • Remove any foreign objects which could impair satisfactory operation of the system. • Check its manual trip function. • Ensure that it is performing its intended function (stopping the machine, stopping movement, messages, other). • Check the condition, attachment and sliding function of the contact.

Contrôle général des moteurs		
	Frequency	Operation
	Every 3 months	Machine switched off, isolating switch locked. • Check the absence of dust, grease and water. • Check the general condition of the motor: - There must be no sign of impact on the motor casing or on its fins (if any). • Check the multiple conductor cable on the motor. It must not be crushed or pinched and the insulation must not be damaged.

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.

BOITE DE CONSOMMABLES - CONSUMABLES BOX - VERSCHLEIßTEILE-BOX
MW 40-3, 65-3, 115-3 PN : 29809809

N° article Item n° Bestellnummer	Qté kit Kit qty Anz. kit	Désignation Description Bezeichnung	Photo Photo Abbildung	Qté à commander Qty to order Bestellmenge
62410016	**2**	Electrode Ø 1.6 Electrode Ø 1.6 Elektrode Ø 1.6		
62410024	**2**	Electrode Ø 2.4 Electrode Ø 2.4 Elektrode Ø 2.4		
62899998	**1**	Jeu de clés allen BTR wrench assembly BTR Schlüsselsatz		
62200000	**1**	Boite accessoires Box tools Zubehörbox		
62811005	**1**	Pince Brucelle Référence 150 Brucelle-Zange Referenz 150 Pincers/Tweezers, part no. 150		
9003000303	**2**	Vis Hc M3x3 bout cuvette Set screw hex skt M3x3 cup point Gewindestift mit Innensechskant und Ringschneide, M3x3		
9003050306	**3**	Vis FHc M3x6 Screw, hex skt csk head, M3x6 Senkschraube mit Innensechskant M3x6		
9003050308	**1**	Vis FHc M3x8 Screw, hex skt csk head, M3x8 Senkschraube mit Innensechskant M3x8		
9003050325	**2**	Vis FHc M3x25 Screw, hex skt csk head, M3x25 Senkschraube mit Innensechskant M3x25		
9001202005	**2**	Goupille élastique 1.5x10 Elastic pin 1.5x10 Elastischer Stift 1.5x10		

Intention de commande / Intention of order / Bestellung

Société (Company, Firma) :.....

Responsable Commande (Purchaser, Einkäufer) :.....

Adresse facturation (Invoice address, Rechnungsanschrift)

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Pays (Country, Land) :.....
Tel :.....
Fax :.....
N° TVA (VAT-N°, ID-N°) :.....
Date (Date, Datum) :.....

Adresse livraison (Delivery address, Lieferanschrift)

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Pays (Country, Land) :.....
Tel :.....
Fax :.....
N° de commande (Order number, Bestellnummer) :.....
Date de livraison (Delivery date, Liefertermin) :.....

Polysoude S.A.S. ZI du Bois Briand 2 rue Paul Beaupère F - 44300 NANTES
Tél. : +33 (0) 2 40 68 11 00 Fax : + 33 (0) 2 40 68 11 88 www.polysoude.com e-mail : info@polysoude.com
Fax SAV : + 33 (0) 2 40 68 57 02 e-mail SAV : SAV-ADV@polysoude.com

BOITE DE CONSOMMABLES - CONSUMABLES BOX - VERSCHLEIßTEILE-BOX
MW 170 PN : 29809810

N° article Item n° Bestellnummer	Qté kit Kit qty Anz. kit	Désignation Description Bezeichnung	Photo Photo Abbildung	Qté à commander Qty to order Bestellmenge
62410024	**2**	Electrode Ø2.4 Electrode Ø2.4 Elektrode Ø2.4		
62899998	**1**	Jeu de clés allen BTR wrench assembly BTR Schlüsselsatz		
62200000	**1**	Boite accessoires Box tools Zubehörbox		
62811005	**1**	Pince Brucelle Référence 150 Brucelle-Zange Referenz 150 Pincers/Tweezers, part no. 150		
9003000408	**2**	Vis Hc M4x8 bout cuvette Set screw hex skt M4x8 cup point Gewindestift mit Innensechskant und Ringschneide, M4x8		
9003020410	**2**	Vis CHc M 4x10 Screw, hex skt head, M 4x10 Zylinderschraube mit Innensechskant M 4x10		
9003000405	**2**	Vis Hc M4x5 Set screw hex skt M4x5 Gewindestift mit Innensechskant und Ringschneide, M4x5		
9001202005	**2**	Goupille élastique 1.5x10 Elastic pin 1.5x10 Elastischer Stift 1.5x10		

Intention de commande / Intention of order / Bestellung

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Fax :.....
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Date (Date, Datum) :.....

Adresse livraison (Delivery address, Lieferanschrift)

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Tel :.....
Fax :.....
N° de commande (Order number, Bestellnummer) :.....
Date de livraison (Delivery date, Liefertermin) :.....

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Fax SAV : + 33 (0) 2 40 68 57 02 e-mail SAV : SAV-ADV@polysoude.com

6. 5. Repairs and servicing

The **Polysoude After-Sales Service** is at your disposal to assist you with solving any problems with the machine and to supply any spare parts you may require.

When you order a spare part, do not forget to quote **its order code** as shown in the 'Spare Parts' section of your equipment manual, as well as **the serial number of your machine**.

Furthermore, some subassemblies require factory settings. Some components cannot be supplied separately but are included in their preset and ready-to-fit subassemblies.

Electrical hazards: for the following operations, disconnect the head from the power source completely.

6. 6. Cleaning and annual maintenance

Safety instructions

Tools and consumables

- Clean cloth
- Set of Allen keys.
- Emery cloth.
- Screwdriver.
- Metal brush.
- A hard bristle brush.
- Solvent.
- Strip of adhesive paper.
- Feeler gauges.

Periodicity - Replacement criteria

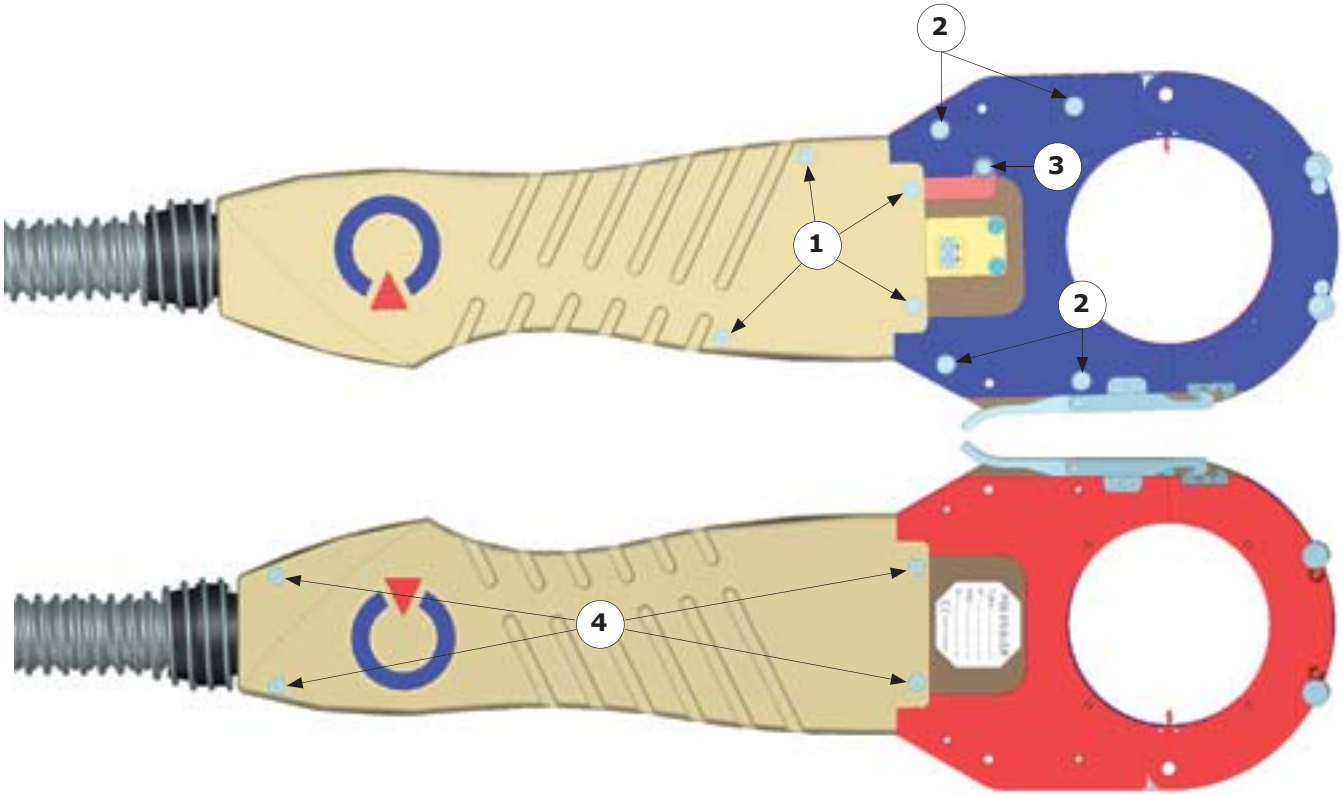
- Annually or when required.

Preliminary conditions

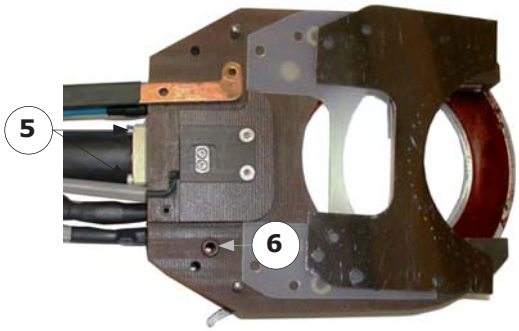
- The welding head is disconnected from the power source.
- The shells have been removed.

Procedure

- Unscrew the 4 fixing screws on the 1/2 handle (1).
- Unscrew the 4 fixing screws on the blue clamp (2).
- Unscrew the earth clamp fixing screw (3).
- Unscrew the 4 fixing screws on the 1/2 handle (4).

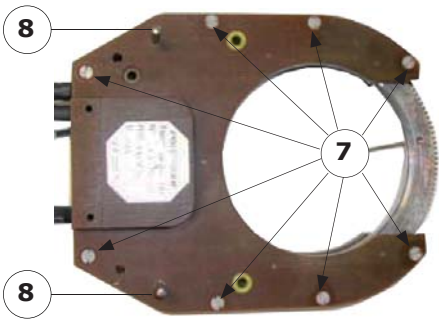


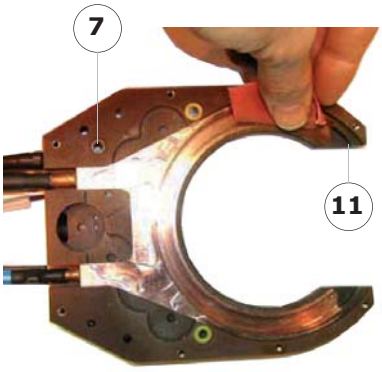
- Unscrew the 3 motor fixing screws (5) and disconnect the power supply to the motor.
- Do not loose the 2 seals (6).



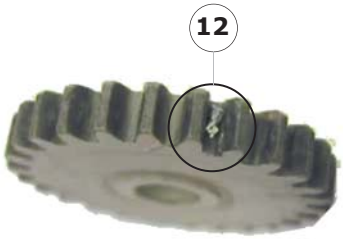
- Unscrew the 8 nylon screws (7).
- Push out the 2 pins (8) using a drift punch and a hammer.
- Push out the 2 insulating pins (9) using a drift punch and a hammer.

Once the head has been completely removed, be careful not to loose any of the parts.
Do not loose the 3rd seal (7).



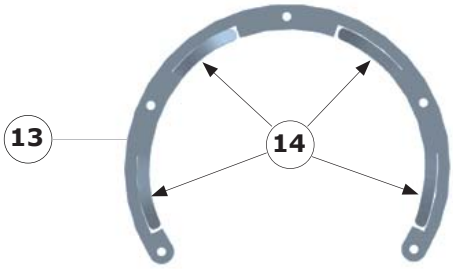


- Use an emery cloth or glass paper to clean the wheel (10) and insert (11).
- Meticulously clean these two components taking care to remove any dirt.

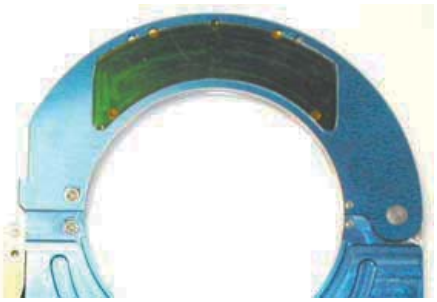


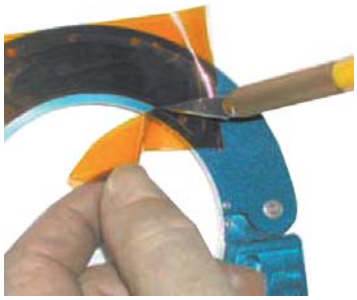
- Clean all the pinions using a metal brush to remove any dirt (12).

- Withdraw the support ring (13) from the closure plate, and clean it.
- Check the contact springs (14) and refit all of them.

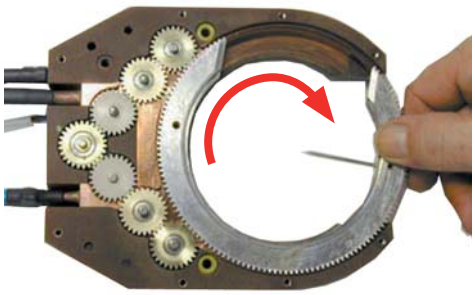


- Clean all mechanical parts with solvent.

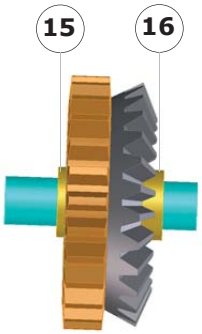


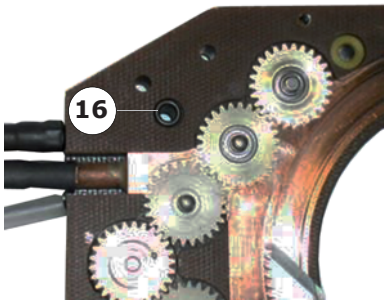


- Remove the 2 adhesive paper strips from the 2 clamps (blue and red).
- Clean the clamp bodies with solvent.
- Replace the adhesive paper strips on the 2 clamps.



- Place the lower shim (16) and the upper shim (15) on the shaft of the pinion assembly.
- Refit all pinions.
- Place the wheel in its recess taking care to engage all gear teeth correctly.
- Check by hand that the wheel rotates correctly.
- Fit the motor and its pinion.





- Fit the new seal (16).
- Refit the head, proceeding in the reverse order of dismantling.

6. 6. 1. Fitting the travel limit micro switch

Safety instructions

Spare Parts

- MW 40-3 travel limit assembly - Order code 0017744601.
- MW 65-3 travel limit assembly - Order code 0017274601.
- MW 115-3 travel limit assembly - Order code 0017814601.
- MW 170 travel limit assembly - Order code 0017844601.

Tools and consumables

- Clean cloth
- Set of Allen keys.
- Solvent.
- Screwdriver.

Periodicity - Replacement criteria

- Annually or when required.

Preliminary conditions

- The welding head is disconnected from the power source.
- The shells and clamps are removed.

Procedure

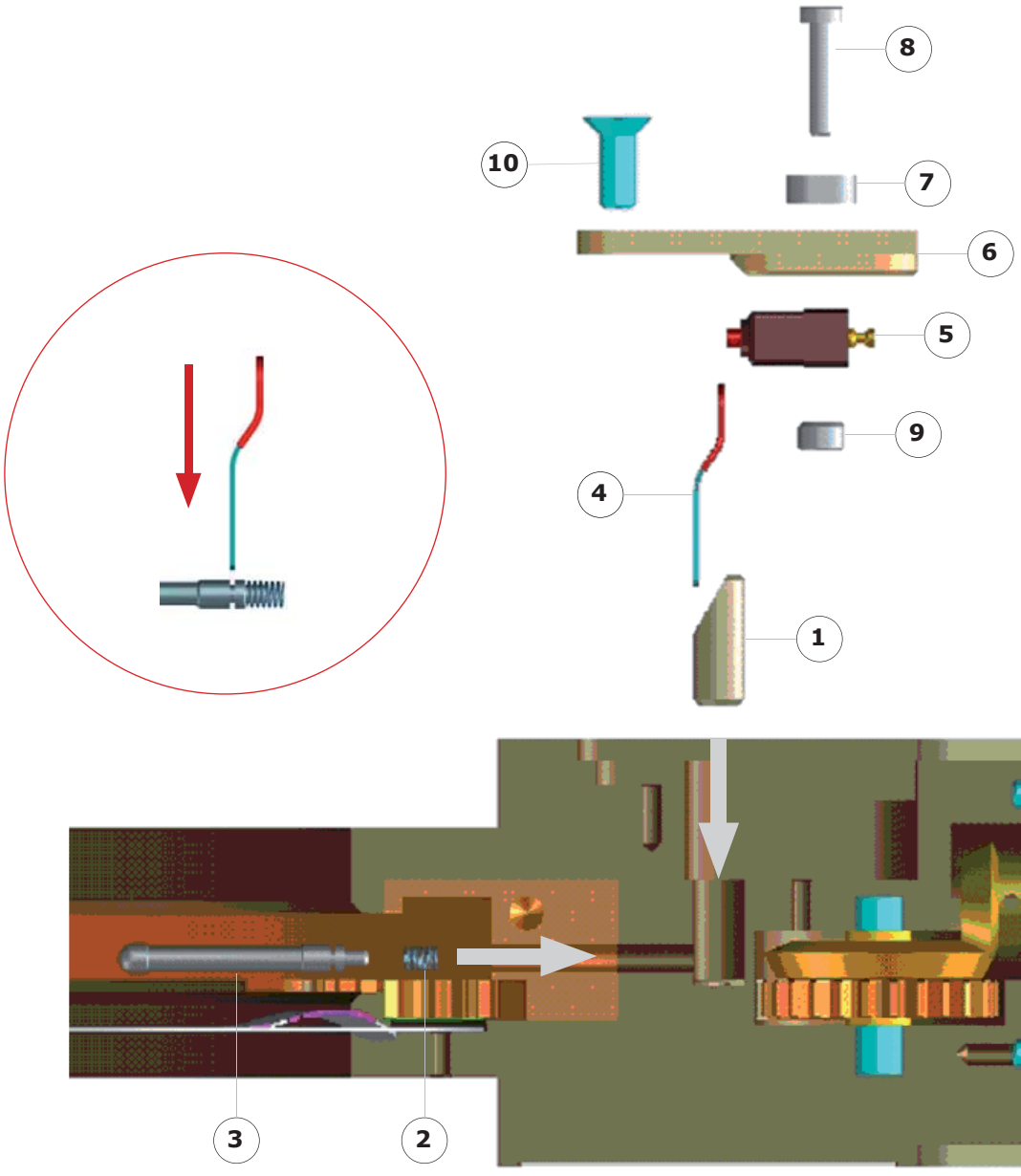
If required, do not hesitate to change the complete travel limit assembly (see order numbers above), or any component of this assembly (refer to the illustrated parts lists for the corresponding welding head).

Before fitting the MW travel limit assembly, the wheel must be turned through 180° in order to position the opening in it opposite the opening of the drive unit.

- Position the guide (03) as far as it will go in the slot provided.
- Introduce the spring (02) then the shaft (03) into the hole provided.
- Slide the blade (04) between the guide (01) and the drive unit while manoeuvring the shaft (03) so as to introduce the blade (04) into the slot of the shaft (03). See detail drawing.
- Fit switch (05) to plate (06) using plate (07), 2 screws (08) and nut (09).
- Fit the assembly (05 + 06 + 07 + 09) to the drive unit using the 2 screws (10) being careful not to damage the switch against the blade.

When these operations have been completed, the switch must be adjusted:

- Unscrew the 2 screws (08) and move the switch towards the rear of the head.
- Turn the wheel so as to position the opening in it in line with the opening in the drive unit.
- Move the switch forward until it trips (the LED on the handle lights up), then tighten the 2 screws (08).


8
10
7
6
5
9
4
1
3
2

6. 6. 2. Adjusting the travel limit micro switch

Safety instructions

Tools and consumables

- Clean cloth
- Set of Allen keys.
- Screwdriver.

Periodicity - Replacement criteria

- If necessary.

Preliminary conditions

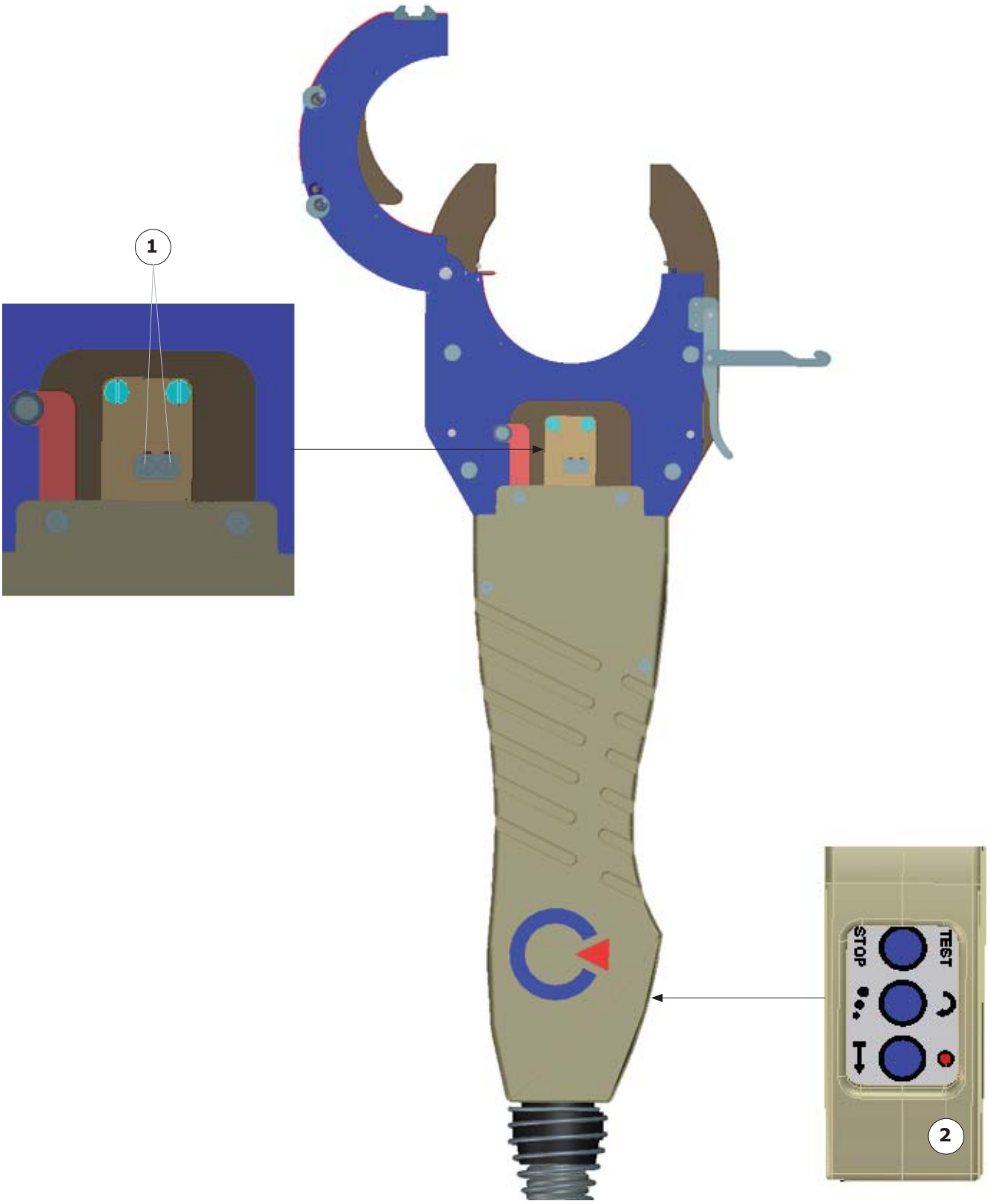
- The shells have been removed.

Procedure

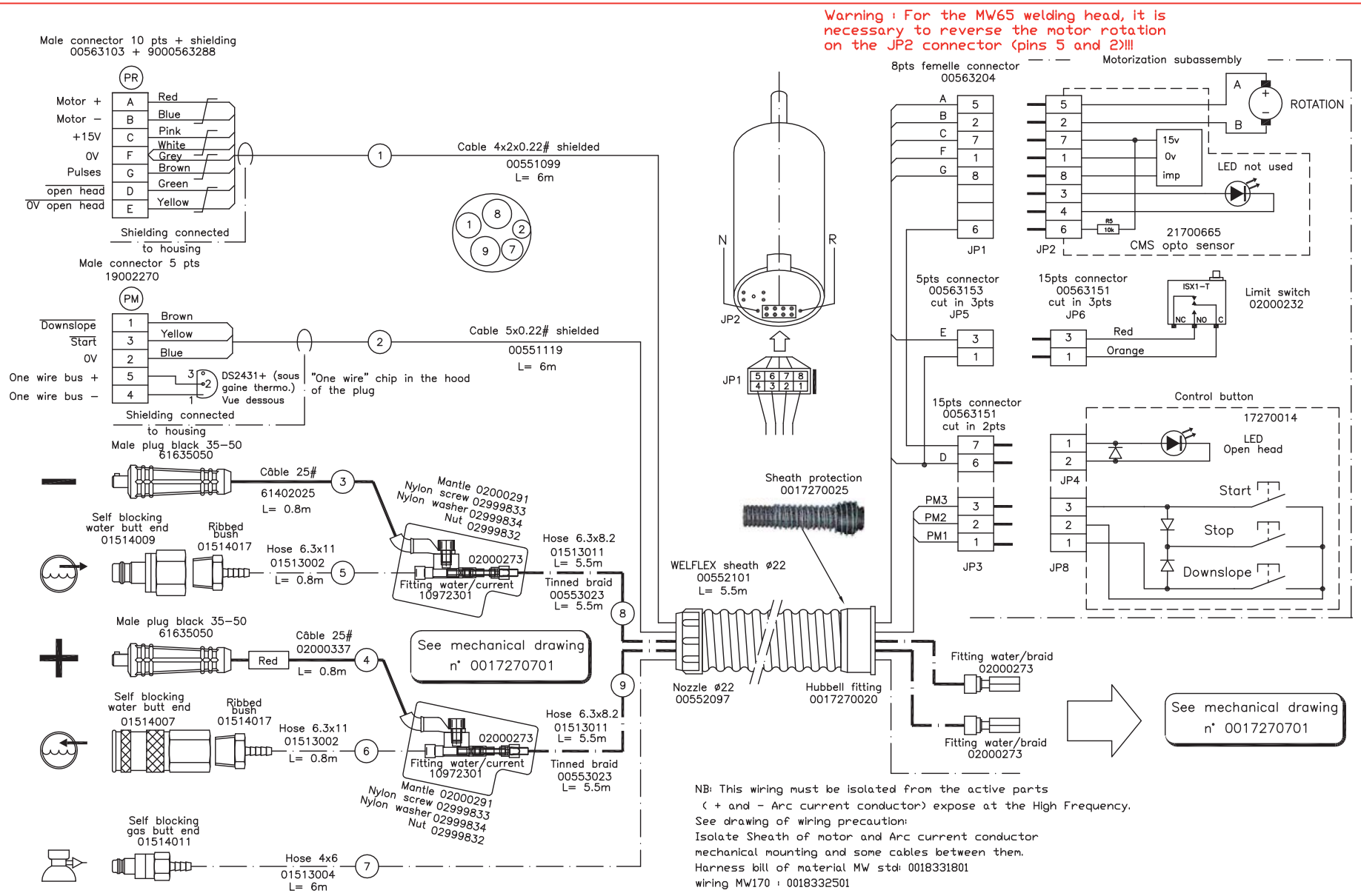
- Turn the wheel so as to position the opening in it in line with the opening on the drive unit - Head position open, see figure opposite.
- Unscrew the 2 screws (1).
- Move the microswitch forward until it trips, the LED (2) on the handle lights up.
- Tighten the two screws to maintain the position of the microswitch.
- Turn the head using the power source remote control.
- Check that:

- The LED on the MW handle goes out when the wheel leaves the "Head open" position.
- The LED on the MW handle turns on when the wheel returns to the "Head open" position.

- Otherwise, carry out the operations again after changing the position of the microswitch slightly.


1
STOP
TEST
2

7. Electrical drawing



NB: This wiring must be isolated from the active parts
(+ and - Arc current conductor) expose at the High Frequency.
See drawing of wiring precaution:
Isolate Sheath of motor and Arc current conductor
mechanical mounting and some cables between them.
Harness bill of material MW std: 0018331801
wiring MW170 : 0018332501

Ind.	Date	Modification	Name
H	03/2012	Comment on rotation for MW65	DFL
G	12/2010	open head led wiring	YBR
F	11/2008	One wire chip add	PFA
E	04/2007	Diode 1N4148 supressed	YBR

Ind.	Date	Modification	Name
D	02/2007	Hose 6.3x8.2	YBR
C	12/2006	tinned braid and hose6.3x11	YBR
B	8/2004	Diode on open head led	JYT
A	04/2004	JP3 number	CBA

Visa: CBA	Date: 04/2002	Size: /	Ens.
Material:			S-ens.
Treatm.:	Paint:		Folio:
Scale: /	Polysoude reserves all rights for this drawing according to the law 1957, 11th March		

POLYSOUDE
001833 18 01

8. End of service life - Recycling the machine

Our machines incorporate electrical and electronic components which must be recycled in accordance with EC Directive 2002/96/EC. Any item of equipment which is declared obsolete or out of service must be sent to approved recycling companies in order to reduce the amount of ultimate waste disposal. A number of solutions may be deployed, including:

- Re-use
- Recycling
- Any other form of recovery (including energy recovery) of WEEE (Waste Electrical and Electronic Equipment).

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 :

❑ Power source Type : ..... Serial number : .....

❑ Welding head Type : ..... Serial number : .....

❑ Wire feeder Type : ..... Serial number : .....

❑ Other (*specify designation*) : .....
↳ taken from :

- ❑ Power source Type : ..... Serial number : .....
- ❑ Welding head Type : ..... Serial number : .....
- ❑ Wire feeder Type : ..... Serial number : .....
- ❑ Other(*to be specified*) : ..... 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: .....

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ISO 9001
BUREAU VERITAS
Certification

Translation of original instructions

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

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

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

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

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