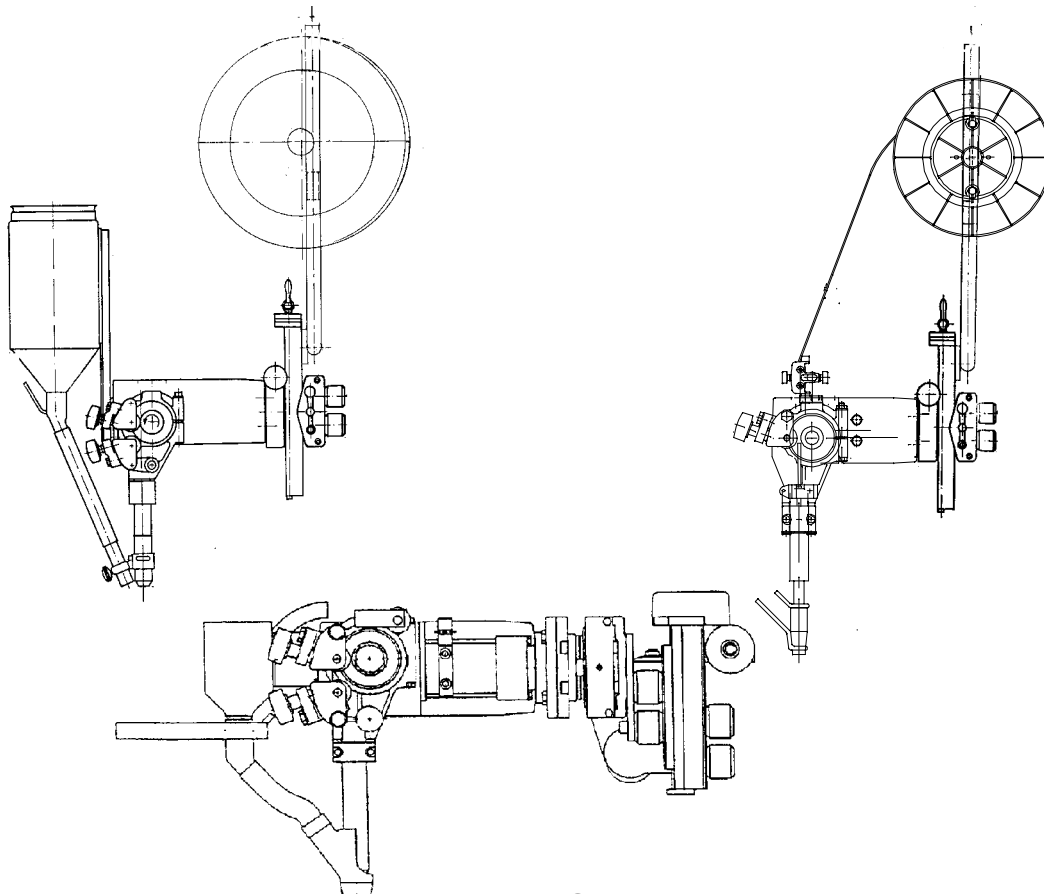


A6 S Arc Master ***A6 S G Master*** ***A6 S Compact 500***

A6 SFE1 / A6 SFE2 / A6 SGE1/ A6 SFE1C



Bruksanvisning
Brugsanvisning
Bruksanvisning
Käyttöohjeet
Instruction manual
Betriebsanweisung
Manuel d'instructions

Gebruiksaanwijzing
Instrucciones de uso
Istruzioni per l'uso
Manual de instruções
Οδηγίες χρήσεως
Instrukcja obsługi

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1 DIRECTIVE

DECLARATION OF CONFORMITY

Esab Welding Equipment AB, 695 81 Laxå, Sweden, gives its unreserved guarantee that automatic welding machine A6 SFE1 / A6 SFE2 / A6 SGE1/ A6 SFE1C from serial number 740 complies with standard EN 60292, in accordance with the requirements of directive (89/392/EEA) and addendum.

Laxå 97-11-19



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2 SAFETY

Users of ESAB welding equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of welding equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well-acquainted with the operation of the welding equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

1. Anyone who uses the welding equipment must be familiar with:
 - its operation
 - location of emergency stops
 - its function
 - relevant safety precautions
 - welding
2. The operator must ensure that:
 - no unauthorised person is stationed within the working area of the equipment when it is started up.
 - no-one is unprotected when the arc is struck
3. The workplace must:
 - be suitable for the purpose
 - be free from draughts
4. Personal safety equipment
 - Always wear recommended personal safety equipment, such as safety glasses, flame-proof clothing, safety gloves.
 - Do not wear loose-fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns.
5. General precautions
 - Make sure the return cable is connected securely.
 - Work on high voltage equipment **may only be carried out by a qualified electrician.**
 - Appropriate fire extinguishing equipment must be clearly marked and close at hand.
 - Lubrication and maintenance must **not** be carried out on the equipment during operation.



WARNING



ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK - Can kill

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES - Can be dangerous to health

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area.

ARC RAYS - Can injure eyes and burn skin.

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

NOISE - Excessive noise can damage hearing

- Protect your ears. Use earmuffs or other hearing protection.
- Warn bystanders of the risk.

MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

3 INTRODUCTION

3.1 General

All the automatic welding machines included in this instruction manual are designed for SAW and MIG/MAG welding of butt and fillet joints.

ESAB's welding heads are of the **A6 S** type and are intended for use in combination with A2-A6 Process Controller and ESAB's welding power sources LAF and TAF.

The welding head can be positioned horizontally and vertically with the linear slides. The angular position is adjusted with the angular slide.

3.2 Definitions

| | |
|-------------------------|---|
| SAW welding | The weld bead is protected by a cover of flux during the welding. |
| SAW Heavy duty | Permits welding with high current load and thick wire. |
| SAW Light duty | Permits welding with low current load and thin wire. |
| MIG/MAG welding | The weld bead is protected by shielding gas during welding. |
| Tandem welding | Welding with two welding heads. |
| Twinnarc welding | Welding with two wires in the same welding head. |

3.3 Technical data

| | A6 SFE1 | A6 SFE1 | A6 SFE2 | A6 SGE1 | A6 SFE1C | |
|--|---------------|--------------------------|----------------------|----------------------|---------------------|----------------------|
| | UP | UP | UP | MIG/MAG | UP | |
| | LD D20 | HD D35 | HD D35 | | | |
| Rated load | 100% 60 % | 800 A 1000 A AC/DC | 1500 A - AC/DC | 1500 A - AC/DC | 600 A - AC/DC | 1500 A - AC/DC |
| Wire dimensions: | | | | | | |
| solid single wire | 1.6-4.0 mm | 3.0-6.0 mm | 3.0-6.0 mm | 0.8-2.5 mm | - 4.0 mm | |
| flux-cored wire | 1.6-4.0 mm | 3.0-4.0 mm | - | 1.2-3.2 mm | - | |
| twin wire | 2x1.2-2.0 mm | 2x2.0-3.0mm | 2x2.0-3.0mm | - | - | |
| Wire feed speed | 0.2-4.0 m/min | 0.2-4.0 m/min | 0.2-4.0 m/min | 0.2-15 m/min | 0.2-4.0 m/min | |
| Brake drum braking torque | 1.5 Nm | 1.5 Nm | 1.5 Nm | 1.5 Nm | 1.5 Nm | |
| Max weight, wire | 2x30 kg | 2x30 kg | 4x30 kg | 30 kg | 2x30 kg | |
| Flux hopper capacity (Must not be filled with preheated flux) | 10 l | 10 l | 10 l | - | 1 l | |
| Weight (flux and wire excluded) | 50 kg | 50 kg | 100 kg | 15 kg | 50 kg | |
| Sideways tilt, max. | 25° | 25° | 25° | 25° | 25° | |
| Setting length of slide * | | | | | | |
| manual | 210 mm | 210 mm | 210 mm | 210 mm | | |
| motor-driven (with ball bearings) | 300 mm | 300 mm | 300 mm | 300 mm | 60 mm | |
| Continuous A-weighted noise pressure | 68 dB | 68 dB | 68 dB | 83 dB | 68 dB | |

*) NB! Other lengths on request.

3.4 Welding method

Submerged arc welding (SAW)

For SAW welding the **A6 SF** welding head is always used. It is available in the following designs:

- **Submerged-arc Light duty**

Submerged-arc light duty, with a \varnothing 20 mm connector, which permits a load of up to 800 A (100%) or 1000 A (60%).

- **Submerged-arc Heavy duty**

Submerged-arc heavy duty, with a \varnothing 35 mm connector, which permits a load of up to 1500 A.

Both versions can be equipped with feed rollers for single or twin wire welding (twin-arc). A special knurled feed roller is available for flux-cored wire, which guarantees even wire feed without the risk of deformation due to high feed pressure.

For work in confined spaces, (smaller than 50 cm), a special welding head of type **A6 SFE1C** is available, which can be installed on the Mastertrac as required.

Tandem welding (submerged-arc)

For tandem welding, a welding head of type **A6 SFE2** is always used, which must be connected to 2 welding power sources and 2 control boxes of type A2-A6 Process Controller.

The tandem welding head includes 2 single welding heads (A6 SF), each with its own contact tip. Each contact tip has a maximum rated load of 1500 A.

MIG/MAG welding

For MIG/MAG welding the **A6 SG** welding head is always used, permitting a max. load of 600 A. The welding head is water-cooled, with the cooling water supplied by hoses from connections intended for the purpose.

3.5 Equipment

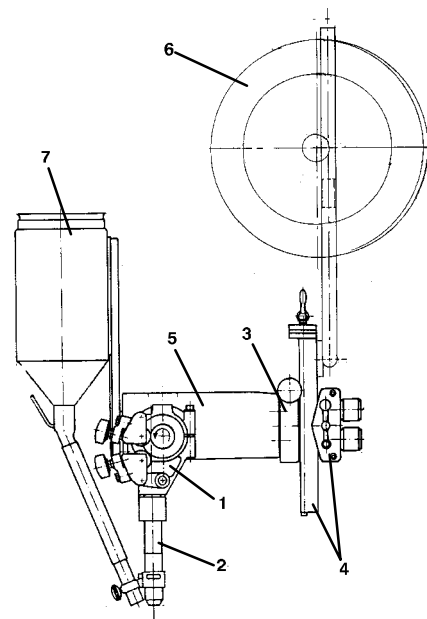
Included in a complete welding head are a feed motor (A6 VEC) to feed in the wire and contact equipment which supplies current to the wire and provides a good contact.

Contact equipment is available in several different versions.

- A6 SF is used for submerged-arc welding.
- A6 SG is used for MIG/MAG welding.

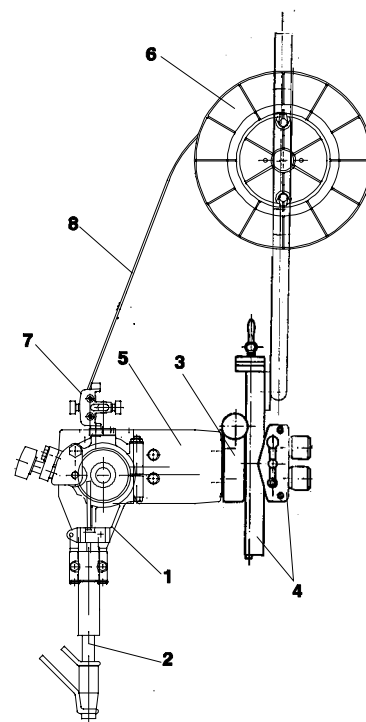
Example - A6 SFE1 and A6 SFE2

- 1 Straightener.
- 2 Contact equipment which consists of a contact tip, connector and flux tube.
- 3 Angular slide
- 4 Slide (motor-driven or manually operated)
- 5 Motor and gearbox (A6 VEC)
- 6 Wire drum
- 7 Flux hopper (may be fitted with a cyclone)



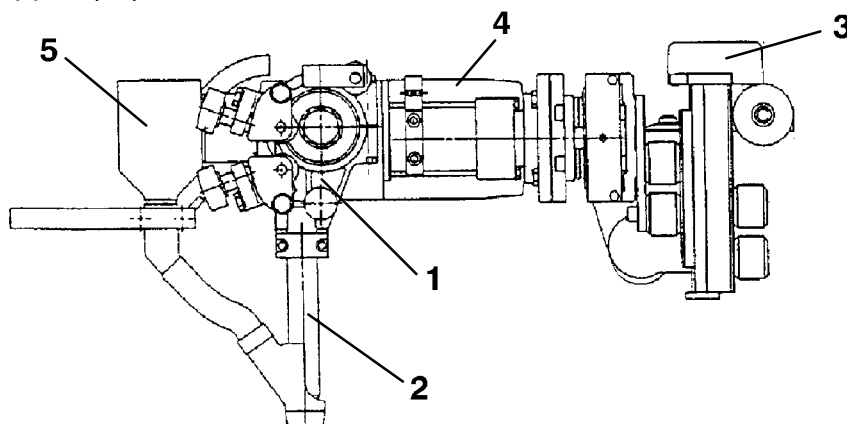
Example - A6 SGE1

- 1 Straightener.
- 2 Contact equipment which consists of a connector, gas nozzle and water hoses.
- 3 Angular slide.
- 4 Slide (motor-driven or manually operated)
- 5 Motor and gearbox (A6 VEC).
- 6 Wire drum.
- 7 Fine-wire straightener (Accessories).
- 8 Wire guide.



Example of the A6 SFE1C

- 1 Straightener.
- 2 Contact equipment, which consists of a contact tip, connector and flux tube.
- 3 Slide (motor-driven).
- 4 Motor and gearbox (A6 VEC).
- 5 Flux hopper (1 l).




Connection instructions for SAW and MIG/MAG welding appear from the system diagram on page 69.

4 INSTALLATION

4.1 General

Installation shall only be performed by qualified personnel.

| | |
|---|---|
|  | <p>WARNING</p> <p><i>Rotating parts can cause injury, take great care.</i></p> |
|---|---|

4.2 Mounting

The automatic welding machines can easily be fitted with 4 screws M10x40 on a rail-borne carriage or on a column and boom unit.

4.3 Connections

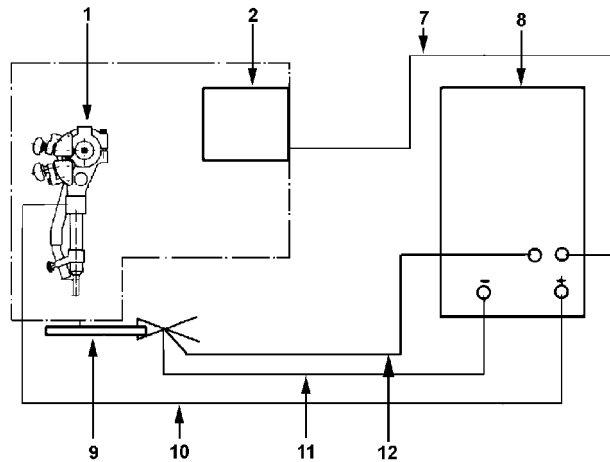
1. The connection of the A2-A6 Process Controller (PEH) to the welding machine shall be done according to the connection instructions in the A2-A6 Process Controller (PEH) service manual.

For further information, see instruction manual for the A2-A6 Process Controller (PEH).

2. Connect the A6 welding heads as follows:

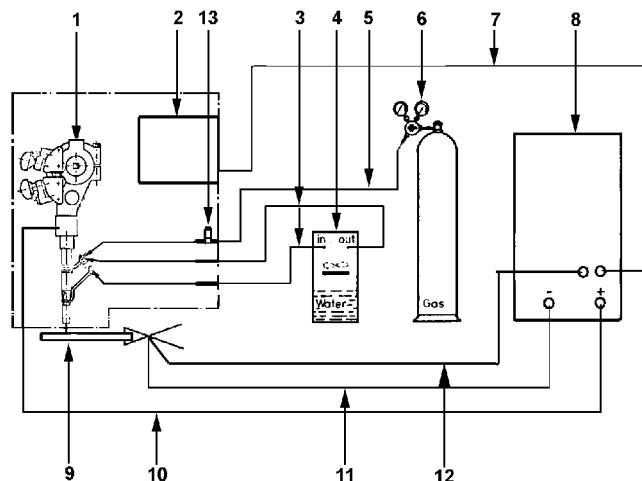
SUBMERGED ARC WELDING (SAW)

- Connect the control cable (7) between the welding power source (8) and the A2-A6 Process Controller (PEH) (2).
- Connect the return cable (11) between the welding power source (8) and the work piece (9).
- Connect the welding cable (10) between the welding power source (8) and the automatic welding machine (1).
- Connect the measuring cable (12) between the welding power source (8) and the work piece (9).



GAS METAL ARC WELDING (MIG/MAG)

- Connect the control cable (7) between the welding power source (8) and the A2-A6 Process Controller (PEH) (2).
- Connect the return cable (11) between the welding power source (8) and the work piece (9).
- Connect the welding cable (10) between the welding power source (8) and the automatic welding machine (1).
- Connect the gas hose (5) between the reduction valve (6) and the gas valve on the automatic welding machine (13).
- Connect the hoses for cooling water (3) between the cooling unit (4) and the automatic welding machine (1).
- Connect the measuring cable (12) between the welding power source (8) and the work piece (9).



5 OPERATION

5.1 General

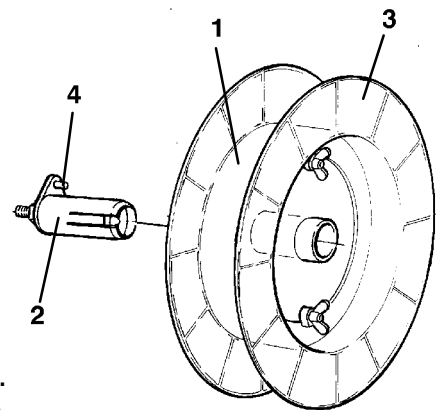
General safety regulations for the handling of the equipment can be found on page 64. Read through before you start using the equipment!

- Select wire type and flux or shielding gas so that the weld material is as close as possible to the analysis of the base metal. Select wire size and welding data in accordance with the values recommended by the welding materials supplier.
- Thorough preparation of the weld surfaces is necessary to achieve a good weld. **NOTE!** The width of the weld joint gap must be uniform.
- To minimise the risk of heat crack formation, the width of the weld must be greater than the penetration depth.
- Always carry out a test weld with the same joint type and sheet thickness as the production work piece.
- For control and adjustment of the automatic welding machine and welding power supply, see the instruction manual for the A2-A6 Process Controller (PEH).
- For replacement of wear parts, see table on page 204.

5.2 Starting work

Loading the welding wire

- Remove the wire drum (1) from the brake hub (2) and take off the side plate (3).
- Locate the wire reel on the wire drum (1).
- Cut off the binding wires from around the wire reel.
- Fit the side plate (3).
- Fit the wire drum (1) on the brake hub (2).
Check that the carrier (4) is in the correct position.



NOTE! The maximum angle for the wire bobbin is 25°.

At extreme angles, wear will occur on the brake hub locking mechanism and the wire bobbin will slide off the brake hub.



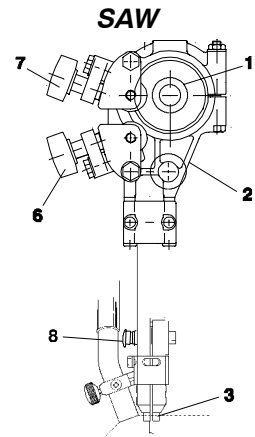
WARNING


To prevent the reel sliding off the hub:

- Lock the reel in place by turning the red knob as shown on the warning label attached next to the hub.



- Check that the feed roller (1) and contact jaw or contact tip (3) are of the correct dimension for the selected wire size.
- Pull the end of the wire through the straightener (2). For a wire diameter greater than 2 mm; straighten out 0.5 m of wire and feed it by hand down through the straightener.
- Locate the end of the wire in the feed roller (1) groove.
- Set the wire tension on the feed roller with the knob (7).
- **Note!** Do not tension more than is required to achieve an even feed.
- The pressure screw (8) must not be dismantled. (Applies to Submerged-arc Heavy duty).



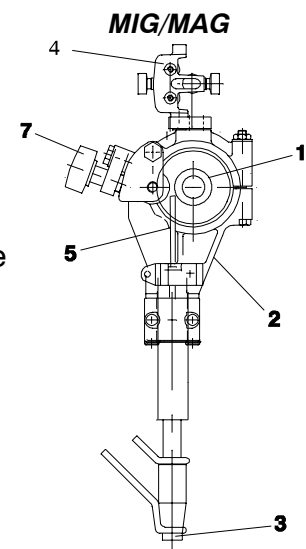
- Feed the wire forward 30 mm by pressing  on the control box A2-A6 Process Controller.
- Direct the wire by adjusting the knob (6).

For fine wire, the special fine wire straightener (4) is used for both single and twin wire.

Ensure that the straightener is correctly adjusted so that the wire emerges straight out through the contact jaws or contact tip.

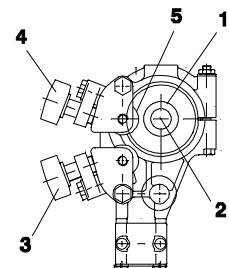
Always use a guide tube (5) to ensure even feeding of fine wire (1.6 - 2.5 mm).

For MIG/MAG welding with wire sizes < 1.6 mm, use a guide spiral, which is inserted in the guide tube (5).



Changing the feed roller

- **Single wire**
 - Release the knobs (3) and (4).
 - Release the hand wheel (2).
 - Change the feed roller (1). The rollers are marked with their respective wire sizes.
- **Twin wire (Twin-arc)**
 - Change the feed roller (1) with twin grooves in the same way as for single wire.
 - **NOTE!** The pressure roller (5) must also be changed. A special spherical pressure roller for twin wire replaces the standard pressure roller for single wire.
 - Assemble the pressure roller with special stub shaft (order no. 146 253-001).
- **Flux-cored wire** (for knurled rollers)
 - Change the feed roller (1) and pressure roller (5) in pairs for the wire size to be used. **NOTE!** A special stub shaft is required for the pressure roller (order no. 0212 901 101).
 - Tighten the pressure screw (4) with moderate pressure to ensure that the flux-cored wire does not deform.

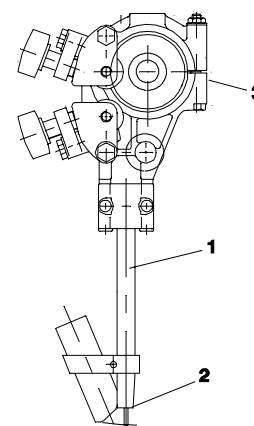


Contact equipment for submerged-arc welding

- **For single wire 3.0 - 4.0 mm. Light duty (D20)**

Use the straightener (3), connector (1) D20 with contact tip (2) (M12 thread).

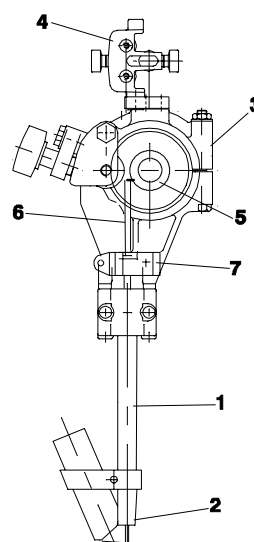
- Tighten the contact tip (2) with a key in order to ensure that a good contact is achieved.



- **For single wire 1.6 - 2.5 mm Submerged-arc. Light duty (D20)**

Use the straightener (3), connector (1) D20 with contact tip (2) (M12 thread) and separate fine wire straightener (4) with guide tube (6).

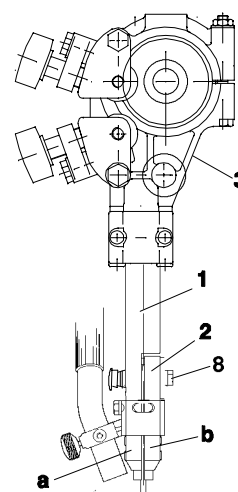
- Fit the clamp (7) with guide tube (6) in the M12 hole on the straightener (3). The guide tube (6) should bottom on the contact tip (2).
- If necessary, cut the guide tube (6) to length so that the feed roller (5) runs freely.
- Fit the fine wire straightener (4) on the upper side of the clamp for the straightener (3).



- **For single wire 3.0 - 6.0 mm. Heavy duty (D35)**

Use the straightener (3), connector (1) D35 with contact jaws (2).

- Fit one of the contact jaws with the M5 bolts provided, in the fixed contact tip (a).
- Fit the other contact jaw in the free half of the two-piece connector (b) under the bolt (8) and tighten down hard to ensure that a good contact is achieved between the contact jaws and the wire.



- **For flux-cored wire 1.6 mm - 4.0 mm (D20 and D35) (Accessories)**

If contact jaws (D35) are used, the contact jaws must not be tightened too hard in order that the flux-cored wire is not deformed. Ensure that good contact is achieved with the wire.

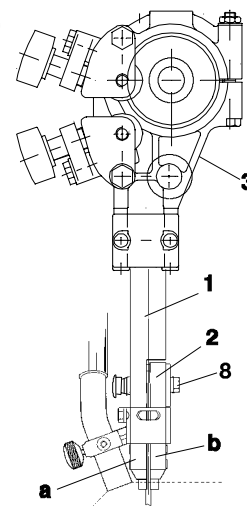
- **Adjustment of the wire for tandem welding**

- The distance between the first and second wire must not be so great that the slag gets time to solidify between the wires.
- Ensure that good flux coverage is achieved between the first and second wires.

- **For twin wires 2 x 2.0 - 3.0 Heavy Twin (D35) (Accessories)**

Use the straightener (3), connector (1) D35 with contact jaws (2).

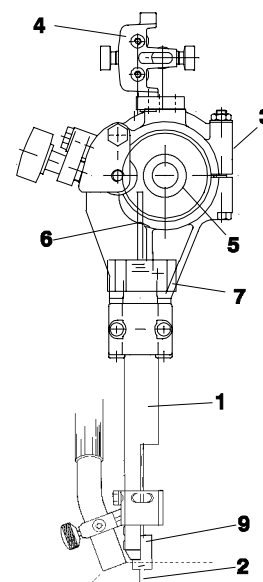
- Fit the first contact jaw with the M5 bolts supplied, in the fixed connector (a).
- Fit the other contact jaw in the free half of the two-piece connector (b) under the bolt (8) and tighten down hard to ensure that a good contact is achieved between the contact jaws and the wire.



- **For twin wire 2 x 1.2 - 2.0 mm, Light Twin (D35) (Accessories)**

Use the straightener (3), connector (1) D35 with twin adapter (9) and 2 contact tips (2) (M6 threads) and separate fine wire straightener (4) with two guide tubes (6). For twin wire < 1.6 mm, insert a guide spiral into each guide tube.

- Fit the twin adapter (9) for M6 contact tips (2) with the M5 bolts in the fixed half of the two-piece connector (1).
- Fit the clamp (7) with guide tube (6) in the M12 hole on the standard straightener (3). The guide tube should bottom on the twin adapter (9) for the contact tip (2).
- Tighten the contact tip (2) with a key to ensure that a good contact is achieved.
- If necessary, cut the guide tube (6) to length so that the feed roller (5) runs freely.



- **Adjustment of the wires for Twin-arc welding:**

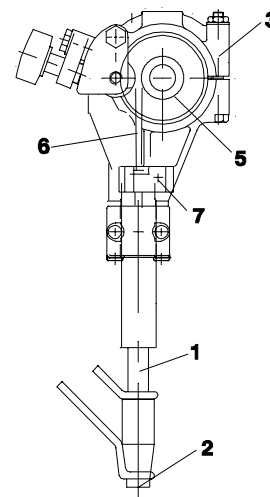
- Position the wires in the joint so as to achieve optimal weld quality by rotating the connector. The two wires can be rotated so that they are positioned one after the other along the line of the joint, or in any position up to 90° across the joint, i.e. one wire on each side of the joint.

Contact equipment for MIG/MAG welding.

- **For single wire 1.6 - 2.5 mm (D35)**

Use the straightener (3), connector (1) D35 with contact tip (2) (M10 thread).

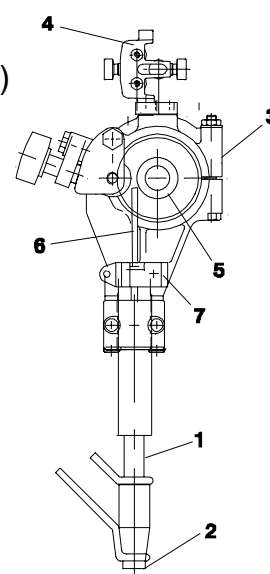
- Tighten the contact tip (2) with a key to ensure that a good contact is achieved.
- Fit the clamp (7) with guide tube (6) in the M12 hole on the standard straightener (3). The guide tube (6) should bottom on the contact tip (2).
- If necessary, cut the guide tube (6) to length so that the feed roller (5) runs freely.



- **For single wire < 1.6 mm (D35)**

Use the straightener (3), connector (1) D35 with contact tip (2) (M12 thread), fine wire straightener (4) with guide tube (6) and guide spiral, which is inserted in the guide tube (6).

- Fit the clamp (7) with guide tube (6) in the M12 hole on the standard straightener (3). The guide tube (6) should bottom on the contact tip (2).
- If necessary, cut the guide tube (6) to length so that the feed roller (5) runs freely.
- Fit the fine wire straightener (4) on the upper side of the clamp for the straightener (3).
- Connect the cooling water and gas (MIG/MAG welding).



Filling of flux (Submerged arc welding)

- Close the flux valve on the flux hopper.
- Remove the cyclone on the flux recovery unit, if fitted.
- Fill with flux . **NOTE!** The flux must be dry. If possible, avoid using agglomerating flux outdoors and in a damp environment.
- Position the flux tube so that the flux hose does not become kinked.
- Adjust the height of the flux nozzle above the weld so that the correct amount of flux is delivered.
The flux coverage should be high enough to prevent the arc from burning through.

5.3 Conversion of A6 SFE1 (Submerged arc welding) to MIG/MAG welding

Assemble the conversion kit according to the instructions provided.

5.4 Conversion of A6 SFE1 / A6 SFE2 (Submerged arc welding) to Twin-arc

Assemble the conversion kit according to the instructions provided.

6 MAINTENANCE

6.1 General

NB! Before doing any kind of maintenance work, make sure the mains is disconnected.

For the maintenance of the A2-A6 Process Controller (PEH), see the instruction manual.

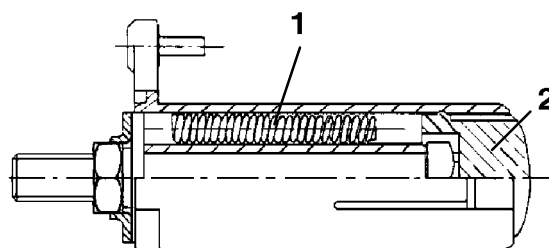
6.2 Daily

- Clean flux and dirt off moving parts of the welding machine.
- Check that the contact tip and all electric cables are connected.
- Check that all bolted joints are tight and that guides and drive rollers are not worn or damaged.
- Check the brake hub braking torque. It should not be so low, that the wire reel continues to rotate when wire feed is stopped, and it should not be so great that the feed rollers slip. As a guide, the braking torque for a 30 kg wire reel should be 1.5 Nm.

Adjusting the braking torque:

- Set the locking button (2) to the locked position.
- Insert a screwdriver into the hub springs.
- Turning the springs (1) clockwise reduces the braking torque.
- Turning the springs anticlockwise increases the torque.

NOTE! Turn the springs by the same amount.



6.3 Regularly

- Check the carbon brushes of the wire feed motor every three months. Replace when they are worn down to 6 mm.
- Check the slides and lubricate if they bind.
- Check the wire guides, drive rollers and contact tip of the wire feed unit. Replace any worn or damaged components, (see spare parts list on page 207).

7 FAULT TRACING

- Equipment**
- Instruction manual for control box A2-A6 Process Controller.
 - Operating manual for motor with gear A6 VEC, order no. 0443 393.
- Check**
- that the power source is connected for the correct mains supply
 - that all three phases are live (phase sequence is not important)
 - that welding cables and connections are not damaged
 - that the controls are correctly set
 - that the mains supply is disconnected before starting repairs

POSSIBLE FAULTS

1. Symptom Current and voltage readings show large fluctuations

Cause 1.1 Contact jaws or nozzle are worn or wrong size.

Action Replace contact jaws or nozzle.

Cause 1.2 Feed roller pressure is too low.

Action Increase pressure on feed rollers.

2. Symptom Wire feed is irregular

Cause 2.1 Feed roller pressure not correct.

Action Change the feed roller pressure.

Cause 2.2 Feed rollers wrong size.

Action Replace feed rollers.

Cause 2.3 Grooves in feed rollers are worn.

Action Replace feed rollers.

3. Symptom Welding cables overheating

Cause 3.1 Poor electrical connection.

Action Clean and tighten all electrical connections.

Cause 3.2 Cross-section of welding cables too small.

Action Use cables with a larger cross-section or use parallel cables.

8 ACCESSORIES

| | |
|---|--------------|
| Manually operated slide | 0154 465 xxx |
| Motor-driven slide | 0334 333 xxx |
| Angular slide | 0671 171 580 |
| Contact equipment for twin wire 2x1.2 – 2x2.0 Light duty | 0333 852 881 |
| Contact equipment for twin wire 2x2.0 – 2x2.5–3.0 Heavy duty | 0417 959 881 |
| Fine-wire straightener for single wire | 0332 565 880 |
| Conversion kit A6 SFE1 to MIG/MAG welding | 0334 299 890 |
| Conversion kit A6 SFE1/A6 SFE2 to Twin with fine-wire straightener (LD) ... | 0334 291 888 |
| Conversion kit A6 SFE1/A6 SFE2 to Twin (HD) | 0334 291 889 |
| Pilot lamp (D20) | 0153 143 885 |
| Adapter M6/M10 | 0147 333 001 |

9 ORDERING OF SPARE PARTS

Spare parts are ordered through your nearest ESAB representative, see back cover. When ordering spare parts, please state machine type and number as well as designation and spare part number as shown in the spare parts list on page 207. This will simplify dispatch and ensure you get the right part.

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