



A6 GMD

Joint tracking equipment

Simplified service manual

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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 keep fumes and gases 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.

MALFUNCTION

- Call for expert assistance in the event of malfunction.

**READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE
INSTALLING OR OPERATING THE EQUIPMENT**

PROTECT YOURSELF AND OTHERS!

TECHNICAL DESCRIPTION

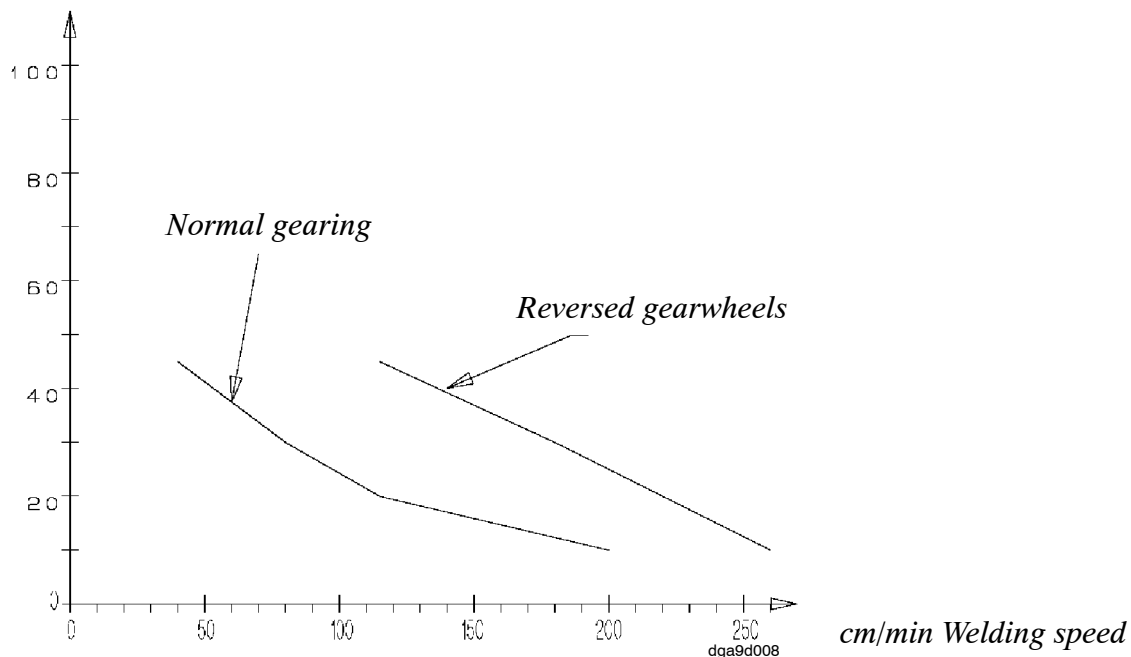
The A6 GMD joint tracking equipment is used for positioning and joint-tracking of automatic welding machines with all types of joints in which there is a guide edge for the sensor finger to follow. The equipment has been designed to suit standard ESAB slides, and can control either one or two servo motors simultaneously.

Technical data

Joint tracking equipment	A6 GMD
Control and operating voltage	42V AC 50-60 Hz
Power requirement	460 V A
Motor regulator, type	Switched four-quadrant
Stator voltage, joystick control	40 V DC
Field voltage, separately excited motor	48 V DC
Enclosure type	IP 53
Max. ambient temperature	+ 45° C
Weights:	
Sensor and cross-saddle with mount	2.2 kg
Joint tracking unit	4.5 kg
Sensor finger	0.6 kg
Remote control unit	2 kg
Working range sensor, radially 360°	4 mm

The figure below shows the working range and setting speed of the equipment. For the A6 servo slide, see Simplified service manual no. 334 346-001.

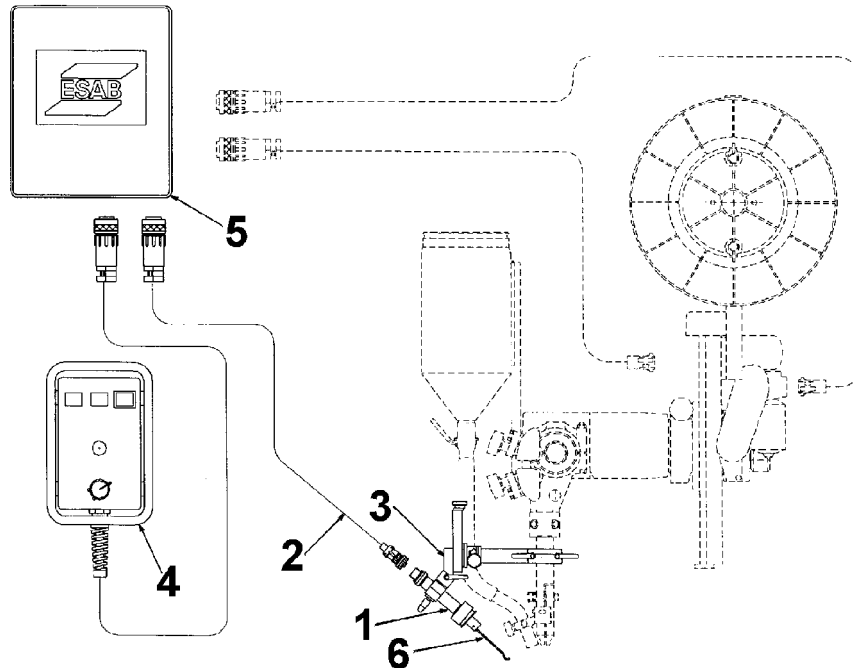
Welding speed/Angular deviation



Maximum angular deviation of the weld joint in relation to the preset welding speed.

The A6 GMD comprises:

1. Sensor, order no. 416 688-880
2. Control cable (2 m), order no. 416 749-887
3. Cross saddle for sensor, order no. 416 739-880
4. Control unit, order no. 416 065-880
5. Joint tracking unit, order no. 416 066-880



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For welding column and boom units the control box and the control cable (points 4 and 5 above) are replaced by product specific items.

Extra equipment for A6 GMD

- Sensor finger, order no. 416 719-001 (L=100 mm)
- Sensor finger, order no. 416 719-002 (L=150 mm)
- Sensor finger for internal and external corners, order no 418 091-880
- Auxiliary control power transformer for separate power supply from mains:
190, 220, 380, 415, 440, 500 V 50 Hz
200, 230, 380, 415, 440, 500 V 60 Hz, to secondary 42V, 660 VA
see order no. 148 636-002
- Cable 3 x 2.5 mm², for transformer, order no. 2626 134-04
- Sensor cable with 90°-contact, order no. 418 091-887
- Rubber guard bellows, order no 412 013-001
- Bracket for control box 433 762-xxx. The bracket is available in different applications.

ESAB standard servo slides for A6 GMD

- A6 servo slide of ball bushing type with permanently excited 42 V DC motor, see 334 333
- A6 motorized slide, long travel, with sliding support and A6 VEC motor 42 V DC - 4000 rpm - ratio 74:1, see 334 426
- Motor cable, order no. 417 310-xxx.
The cable is available in different lengths, see spare parts list.

Controls and connections

Control box

1. **Indicating lamp, red**

Lamp for joint tracking control. When lit, indicates that the sensor finger is outside its working range (vertically). The automatic control devices are now blocked.

2. **Illuminated pushbutton, orange**

Selection of high speed for manual operation.

3. **Joystick**

For manual control of servo slide motions: Up/Down and Left/Right. The joystick is always in command. When the indicating lamp is out any manual motion downwards is blocked.

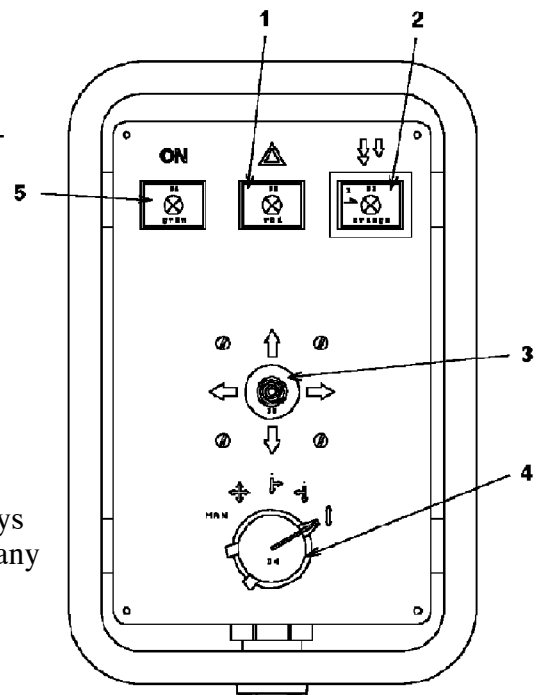
4. **Selector switch, 5 positions**

Selection of joint location and joint tracking modes:

- Manual pre-setting
- Vertical and horizontal joint tracking
- Vertical and horizontal joint tracking with search/location to right
- Vertical and horizontal joint tracking with search/location to left
- Vertical joint tracking

5. **Indicating lamp, green**

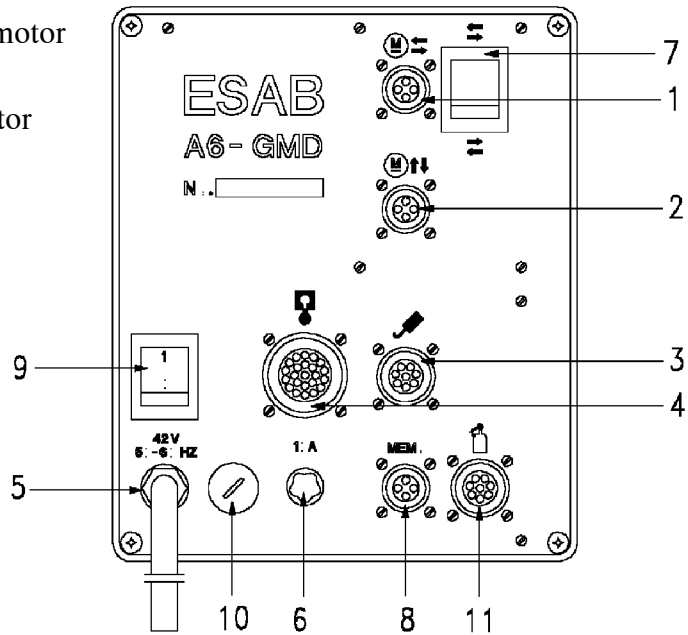
Power On indication.



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Joint tracking unit - rear panel

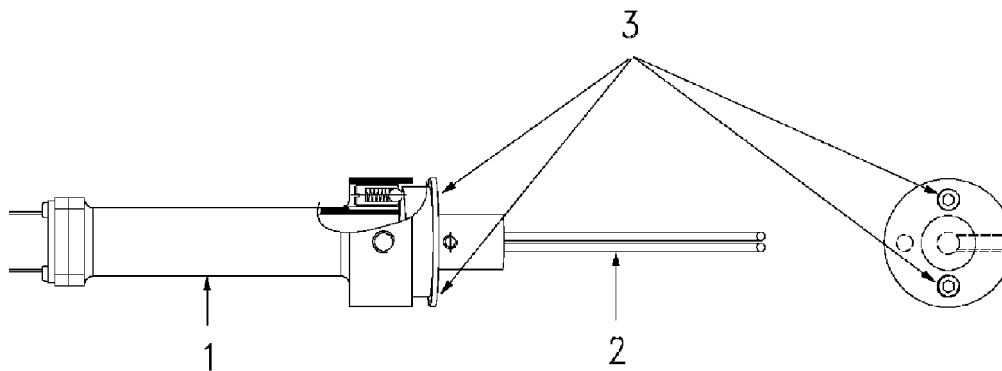
1. Socket, 4-way
for connection of horizontal slide motor
2. Socket, 4-way
for connection of vertical slide motor
3. Socket, 8-way
for connection of guide finger
4. Socket, 23-way
for connection of control unit
5. Power supply, 42 V
6. Control circuit fuse,
10 A anti-surge (1 pc)
7. Switch
for selection of horizontal slide
direction of travel
8. Socket, 3-way
for joint memory unit (MEMO)
9. Switch
Power supply, On/Off
10. Spare socket
11. Socket, 8-way
for connection of Limit switch



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Sensor

1. Sensor with cable connection for joint tracking unit and fixing device in front for the fitting of different sensor fingers.
2. Sensor fingers.
3. 2 stop screws for adjustment of the horizontal flexibility of the of the fingers. The screws are intended for the setting of the different joint types.



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INSTALLATION

1. For dimensions and settings, see Dimensions on page 13.
2. Connection, see page 16
Check that the necessary power supplies, of the correct voltage, are available.
 - When using a power source of one of the types LAE 800 - 1000 - 1250 - 1600, connected for 42 V control voltage, the necessary power can be obtained from the standard automatic welding machine - see terminal PEG1.
 - When suitable voltage is unavailable or when an LAH 500-630 42 V power source is used, there must always be installed a 42 V intermediary transformer for the voltage supply to the A6 GMD (see "Accessories" section).
3. See page 6 for details of the controls.

Commissioning of the joint tracking equipment




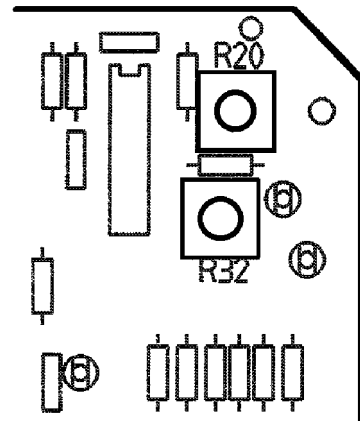
WARNING!

N.B. When the sensor is to be exchanged, the joint tracking equipment (ordering no 416 066-880) must be adapted to the supplied sensor (ordering no. 416 688-880).

N.B. In case the adaptation does not take place on installation, the joint tracking function can be seriously impaired and mechanical damages may come about on the control and contact devices through collision with the workpiece.

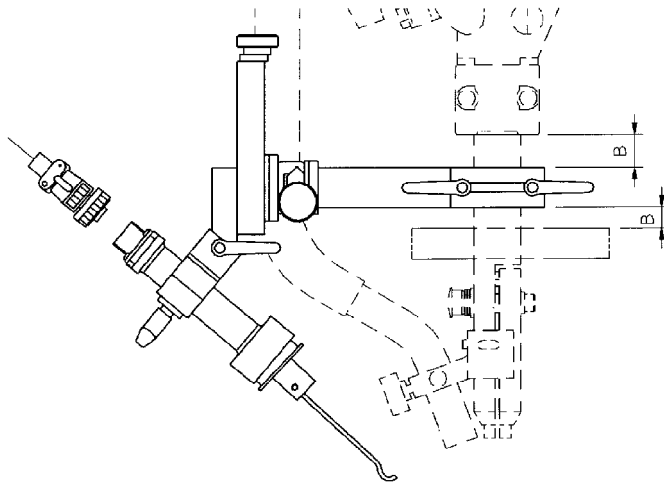
Trimming of the sensor voltage

1. Dismount the front panel of the control unit.
2. In case more space is needed for measuring, the regulator boards can be removed.
3. Connect a voltmeter to measuring point TP1-TP0.
4. Run the vertical slide downwards by way of the remote control unit until the tip of the sensor finger contacts a flat base and the warning lamp on the remote control unit goes out.
5. Set the selector switch on the remote control to vertical tracking. 
6. Move the finger tip aside as far as possible.
7. Check the value on the voltmeter and adjust with potentiometer R20 to 1,8 +/- 0.6 V, see figure below. Don't touch potentiometer R32.





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8. Fit the sensor so that there is the least possible angle between the longitudinal axis of the sensor and the weld joint, in both the horizontal and vertical planes less than 35° .
(See the drawing on page 13 and 14)
9. When fitting the sensor, ensure that the front part of the sensor finger (secured by a universal joint) is pointing downwards towards the weld joint or towards the edge to be sensed/tracked. This applies for all types of joints, including fillet welding when the welding head is inclined. The sensor must not be radially misaligned by more than $\pm 3^\circ$ from this position in relation to the axes of the slide cross.
Any large deviation towards one side or the other puts the control performance at risk, see page 13 and 14.



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10. The equipment includes a fixing device for securing the sensor with a type D20 or D35 contact block. This allows course setting of the welding direction, height and angle round the contact block. **Important!** The distance B between the steel clamp A and live parts should be at least 5 mm.
11. Use the mini slide cross-head for exact adjustment of the position of the tip of the wire in the welded joint. Adjust, too, the distance between the tip of the wire and tip of the guide finger if necessary.
The mini-slide can be adjusted till no play exists by means of the stop screws on the runner.
12. Check as follows that the sensor is operating correctly:



- Turn the selector switch to 
- Using the joystick, run the vertical slide downwards towards a flat base until the tip of the guide finger contacts the base. Continue to lower the slide until the red indicating lamp goes out.
- Take hold of the tip of the guide finger and push it to one side or the other. If the equipment is working correctly, the horizontal slide motor should then start and move in the same direction as the sensor tip is being pushed. If this does not happen, change over the switch marked  on the apparatus unit backplane.

13. As supplied, the tip of the sensor is straight, but can be bent by the user to suit a particular application or be replaced by some other type or shape of sensor, see "Extra Equipment for A6 GMD".



OPERATION

The joint tracking equipment is adjustable for different kinds of joint tracking, such as tracking by sensing the edge and tracking by sensing the groove. The adjustment is made both on the control box and on the sensor.













- Joint tracking by sensing the edge:















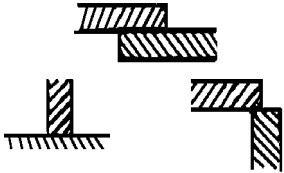

Set the selector switch on the control box to  or  depending on whether the desired sensing direction is left or right. The two stop screws shall be screwed home, see figure on page 7. This means that the sensor fingers are laterally spring-loaded and thus permit edge sensing. Joint tracking by sensing the edge is used for fillet joints and similar joints, see also table below.

- Joint tracking by sensing the groove:

Set the selector switch on the control box to  or  depending on whether vertical and horizontal sensing is desired or vertical sensing only. The two stop screws shall be **screwed out** at least two turns or to stop, see figure on page 7. This will disengage the spring-load of the sensor fingers and permit groove sensing. If the stop screws are not screwed out there is a risk that the sensor fingers start "climbing" the joint walls of shallow V and U joints. See also joint table below for correct settings.

Examples of some different types of joints and of the guide finger angle against the guiding edges.

	Joint type	Settings, control box
Double-flanged butt joint		
I-weld		 A=Guide bar
V-weld		
1/2 V-weld		
1/2 V-weld		
U-weld		

	Joint type	Settings, control box
Double U-weld		
J-weld		
Double J-weld		
X-weld		
Asymmetrical X-weld		
K-weld		
K-weld		
Fillet weld		

Positioning prior to start of welding

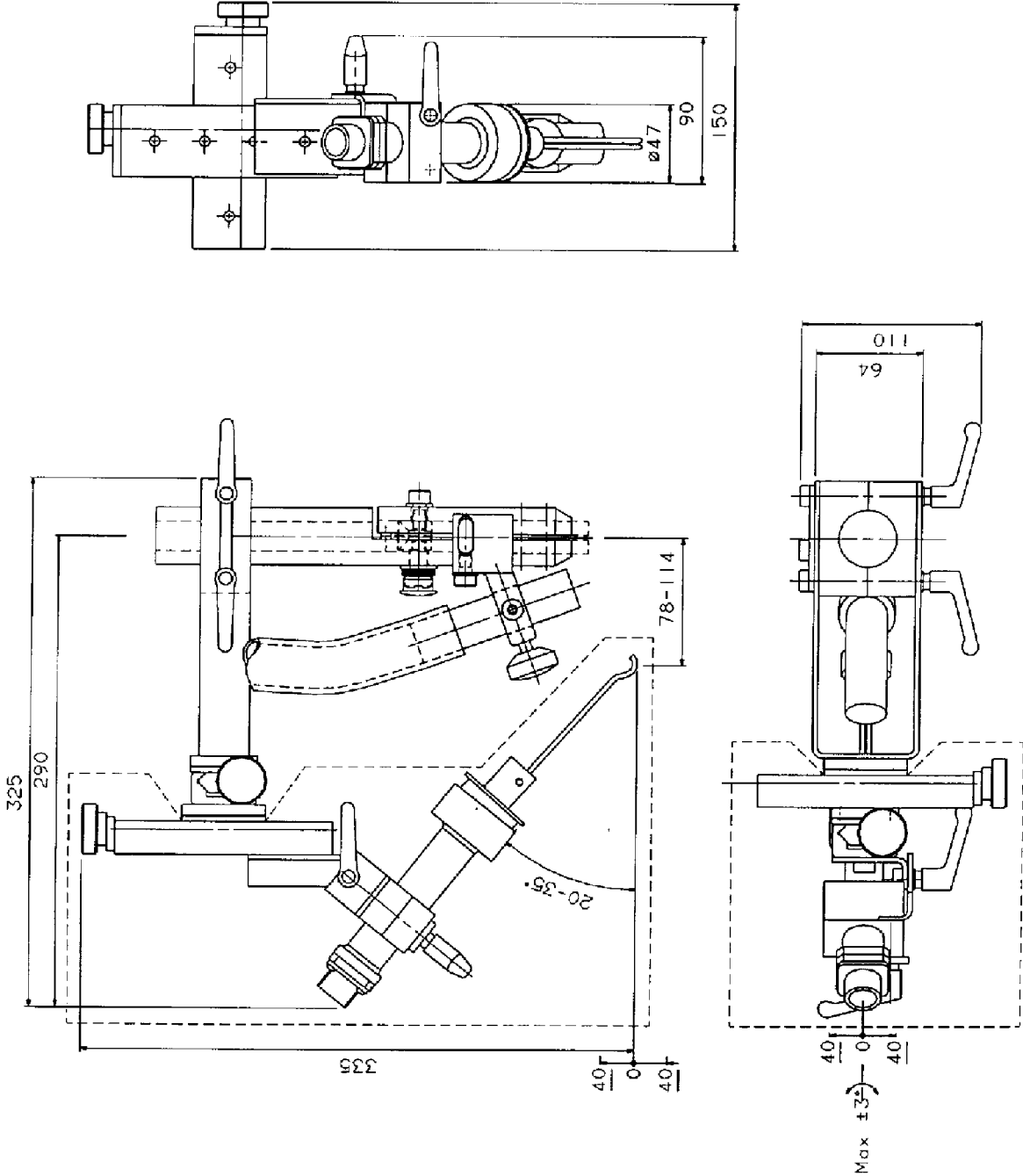
1. Position the welding equipment so in relation to the weld joint that the working range of the cross slide covers the entire height of the joint, as well as the deviation in the lateral from the starting point to the end point.
2. Set switch (4), see figure on page 6, to the desired joint tracking position. Operate the guide finger vertically downwards using the joystick until the indicating lamp (1) goes out.
3. GMD now looks for its zero position and by that also the position of the welding nozzle in the joint. Adjust the position as necessary by means of the cross saddle of the control device.

MAINTENANCE

- Check each day that the guide fingers are not worn or damaged.
- Clean the sensor regularly using compressed air.
- Follow the instructions for the components in the system.
- See "Commissioning of the joint tracking equipment" on page 8 for details of system adjustments.

DIMENSION DRAWING

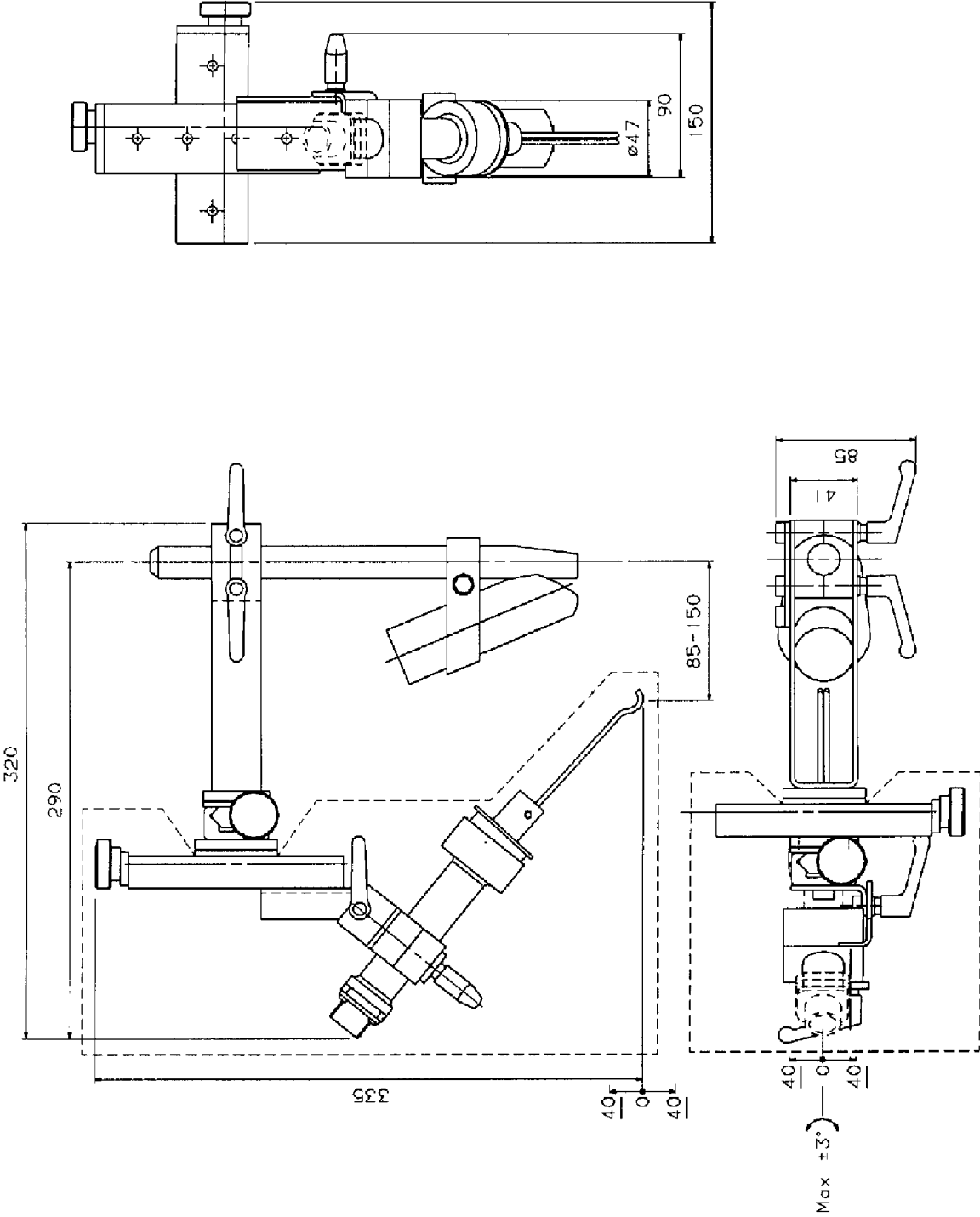
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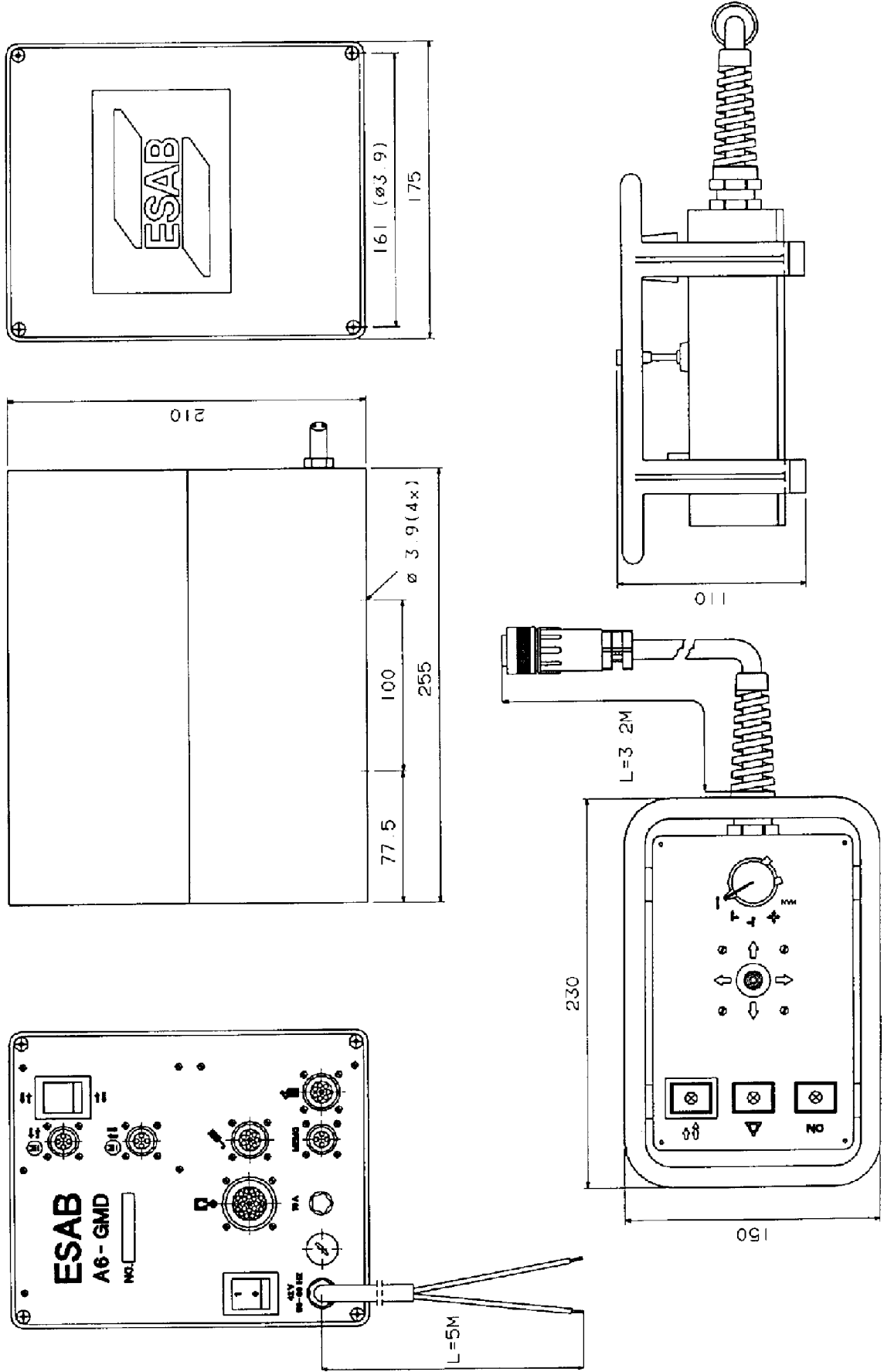
DIMENSION DRAWING

A2

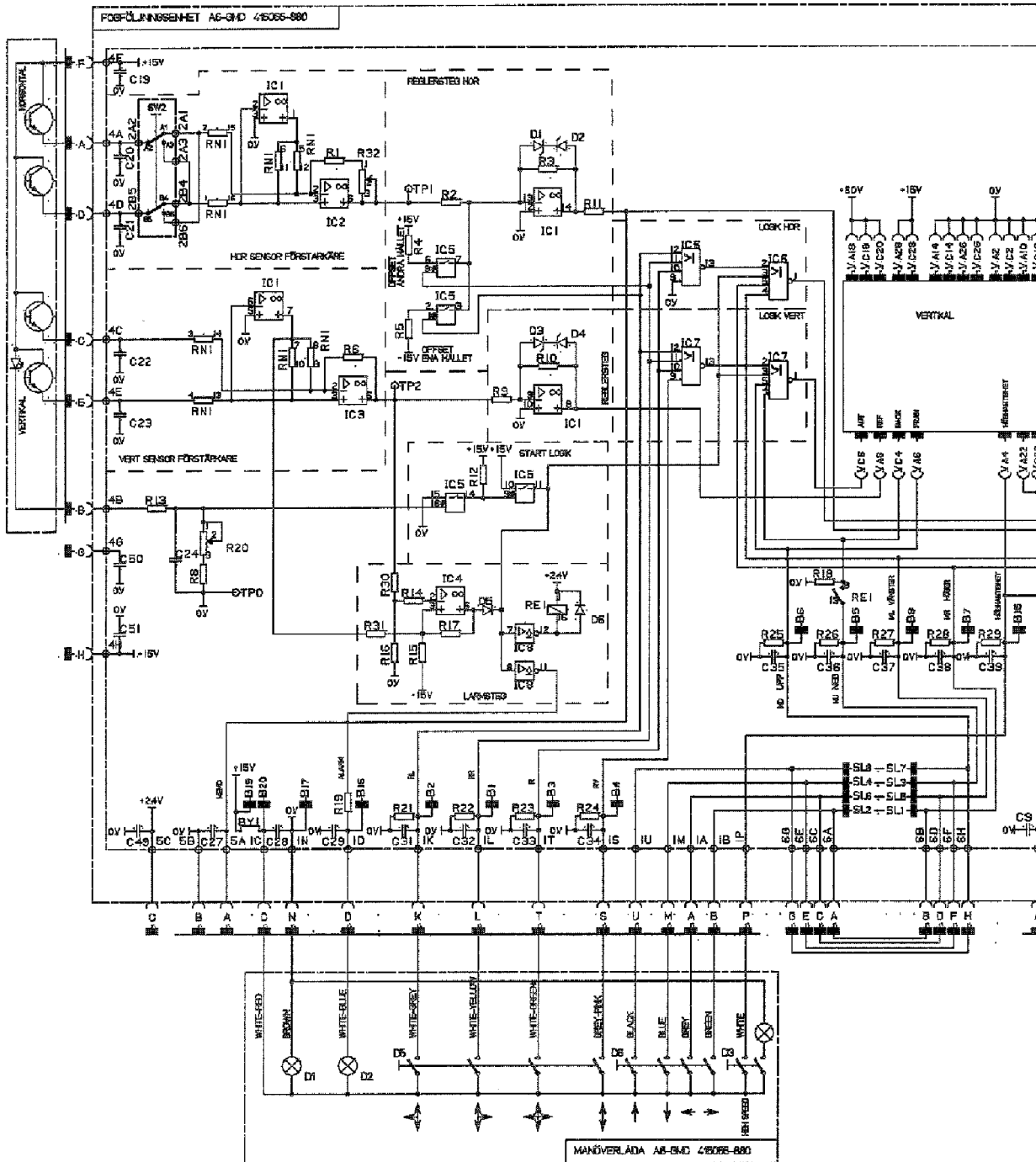


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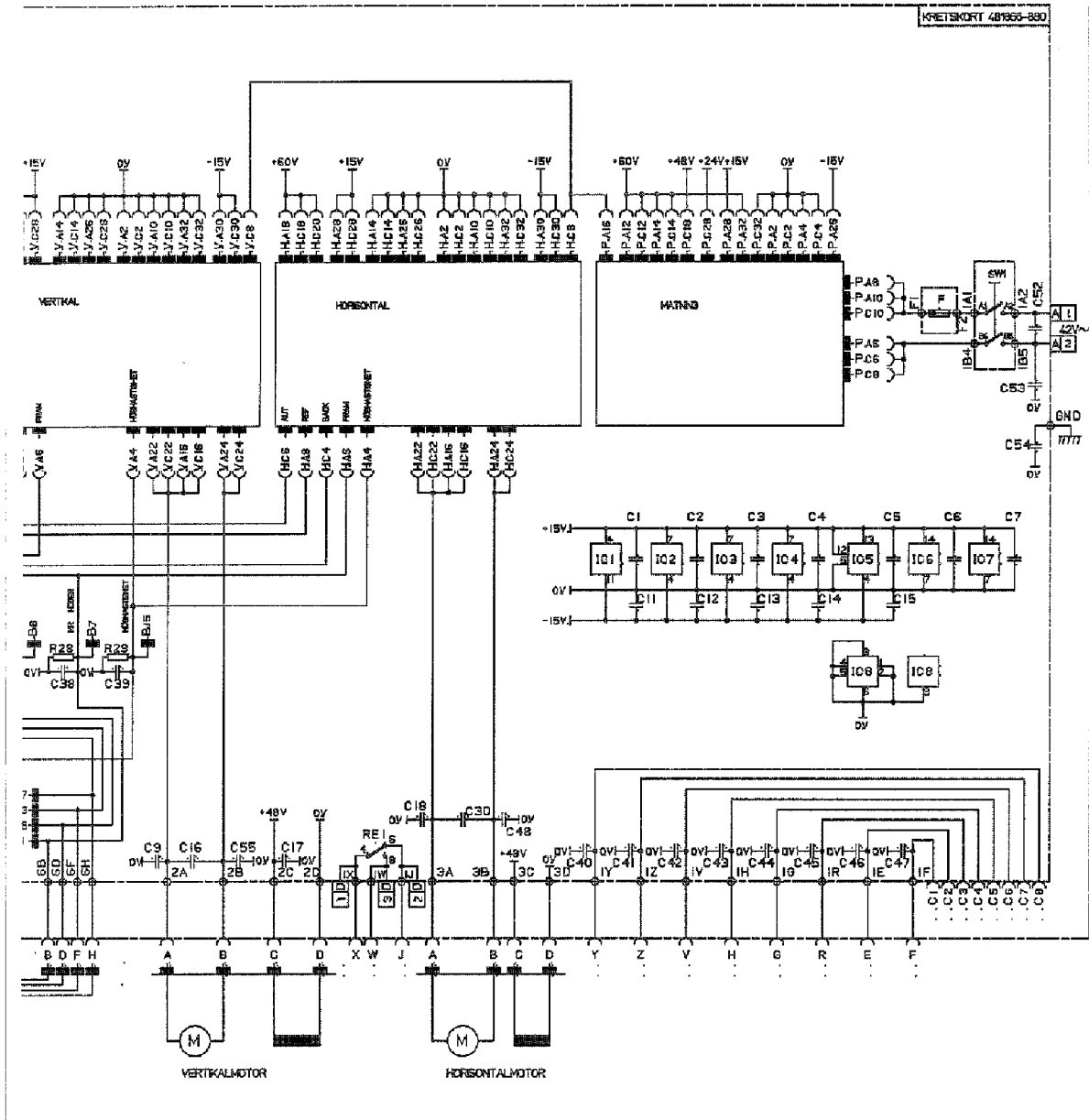
DIMENSION DRAWING



DIAGRAM



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dga9ep02

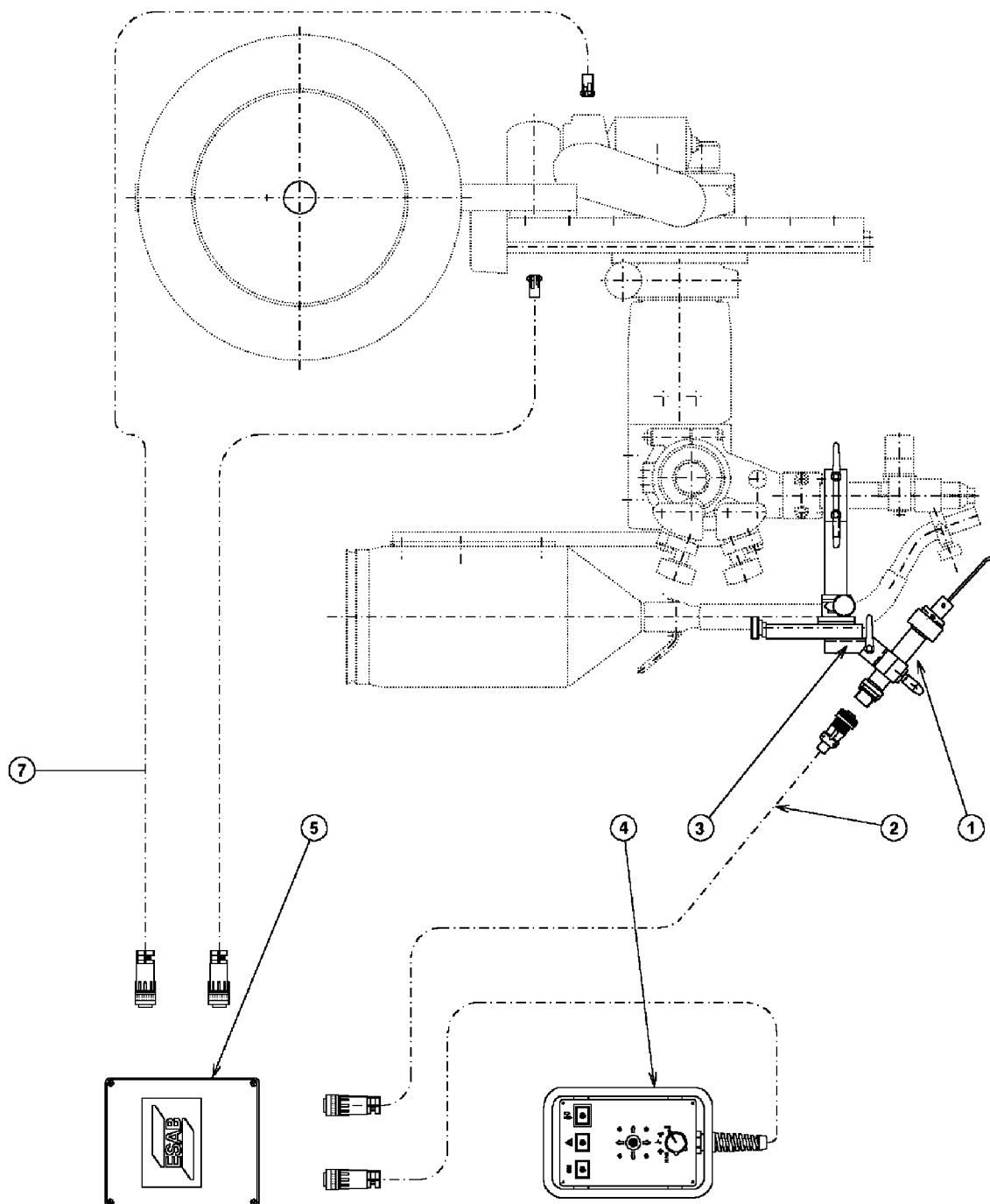
SPARE PARTS LIST A6 GMD

Edition 9704

Spare parts are to be ordered through the nearest ESAB agency as per the list on the back of the cover. Kindly indicate type of unit, serial number, denominations and ordering numbers according to the spare parts list.

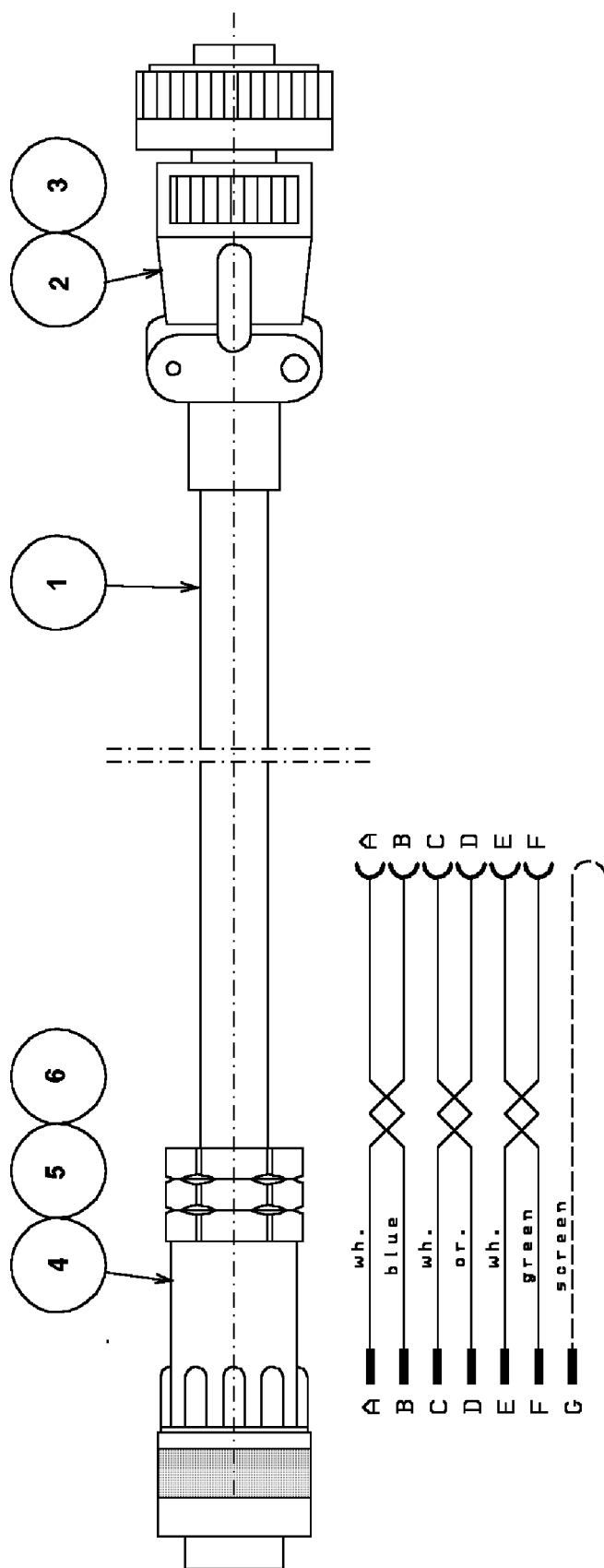
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		417 142-880	Joint tracking equipment, incl. control box	D35/D20	
1	1	416 688-880	Sensor		
2	1	416 749-887	Cable		
3	1	416 739-880	Cross saddle, sensor		
4	1	416 065-880	Control box		
5	1	416 066-880	Joint tracking unit		
6	1	161 337-158	Box		
		417 142-881	Joint tracking equipment, excl. control box	D35/D20	
1	1	416 688-880	Sensor		
3	1	416 739-880	Cross saddle, sensor		
5	1	416 066-880	Joint tracking unit		
6	1	161 337-158	Box		



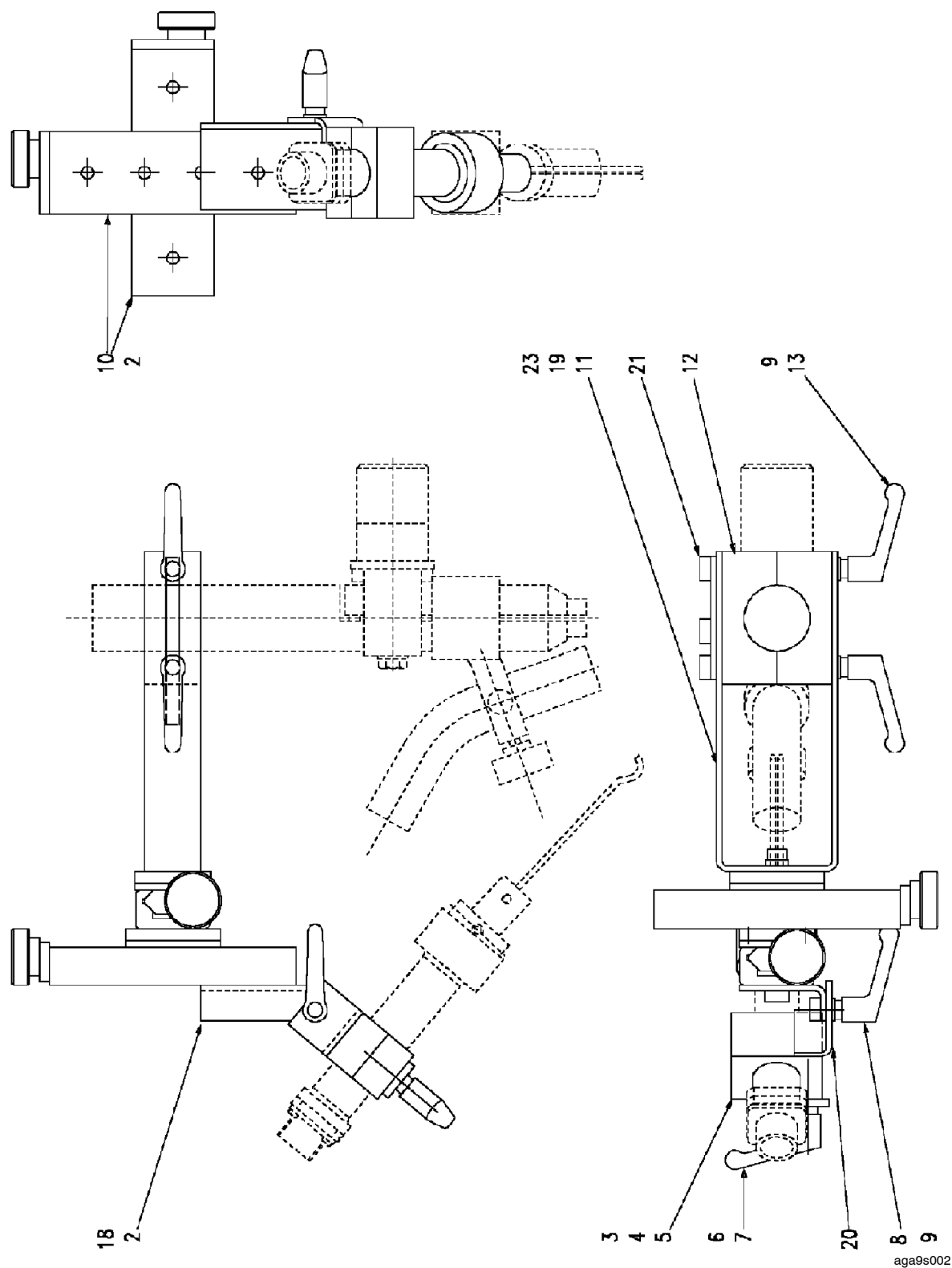
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
1		416 749-880 191 812-103	Control cable Apparatus cable	L=19 m	
1		416 749-881 191 812-103	Control cable Apparatus cable	L=22 m	
1		416 749-882 191 812-103	Control cable Apparatus cable	L=25 m	
1		416 749-883 191 812-103	Control cable Apparatus cable	L=28 m	
1		416 749-884 191 812-103	Control cable Apparatus cable	L=32 m	
1		416 749-885 191 812-103	Control cable Apparatus cable	L=36 m	
1		416 749-886 191 812-103	Control cable Apparatus cable	L=40 m	
1		416 749-887 191 812-103	Control cable Apparatus cable	L=2 m	
1		416 749-888 191 812-103	Control cable Apparatus cable	L=5 m	
1		416 749-889 191 812-103	Control cable Apparatus cable	L=9 m	
2		5385 012-11	Sleeve plug	6-pol	
3		5385 023-02	Sleeve(rubber)		
4		323 942-002	Pin plug	8-pol	
5		323 945-001	Plug		
6		323 943-102	Counterbalance		



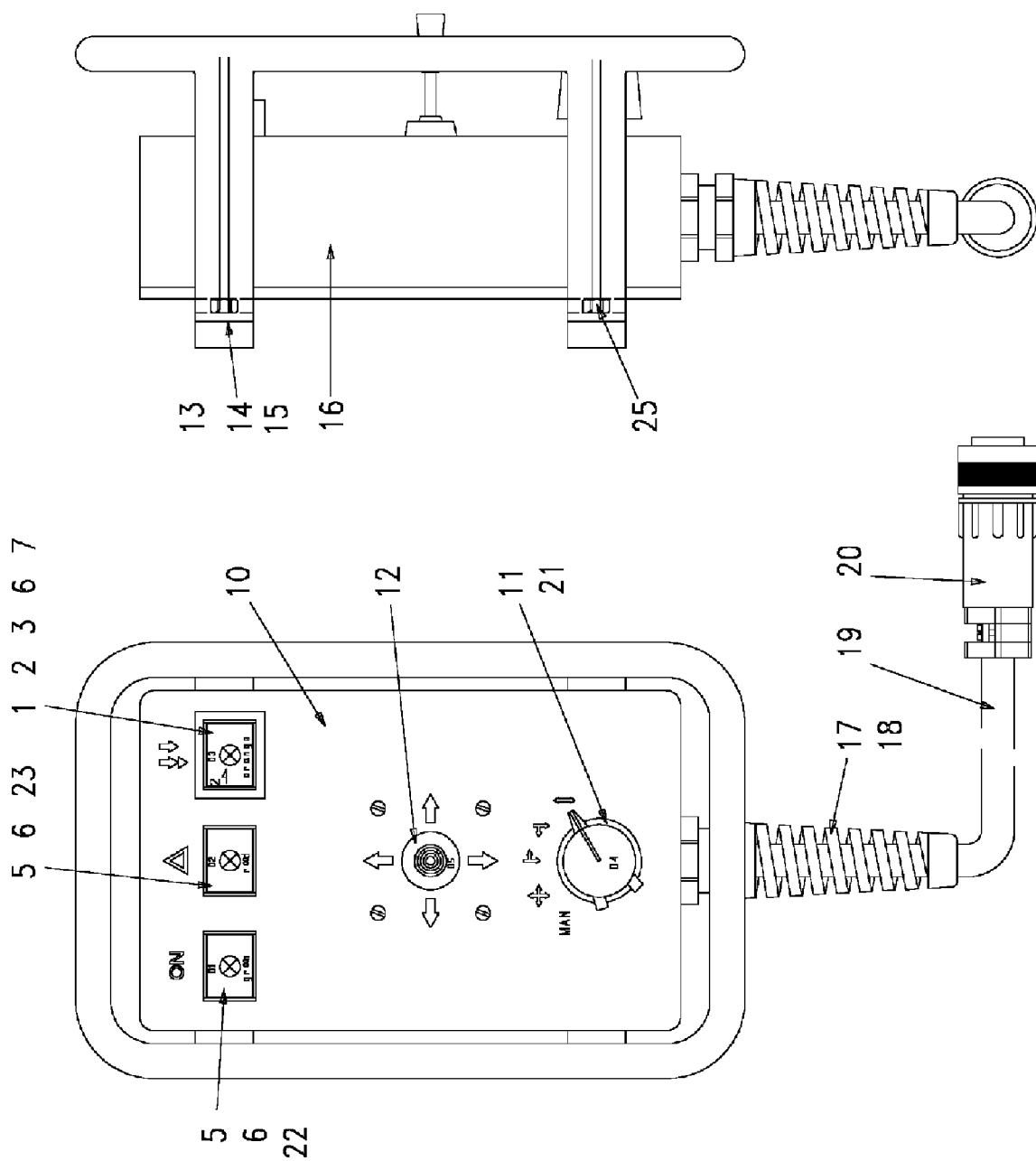
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		416 739-880	Slide cross for sensor		
2	4	190 684-362	Screw	M6x12	
3	1	413 366-112	Clamp	D25	
4	1	192 238-374	Screw	M6x30	
5	1	2126 011-07	Nut	M6	
6	3	193 570-120	Locking lever	M6	
7	1	.2151002-01	Washer	D22/6.4x4	
8	1	193 570-109	Locking lever	M6	
9	5	193 500-102	Washer	D14/7x1.5	
10	2	433 851-001	Mini slide		
11	2	192 238-366	Screw	M6x12	
12	1	413 366-115	Clamp	D35	
13	2	193 570-150	Locking lever		
15	1	413 366-320	Clamp	D20	
16	1	161 337-051	Box		
18	1	417 096-880	Bracket		
19	1	417 097-001	Clamp		
20	1	417 098-880	Bracket		
21	1	417 099-880	Plate		
22	1	417 097-002	Clamp		
23	2	2151 001-01	Washer	6.4x12.6	



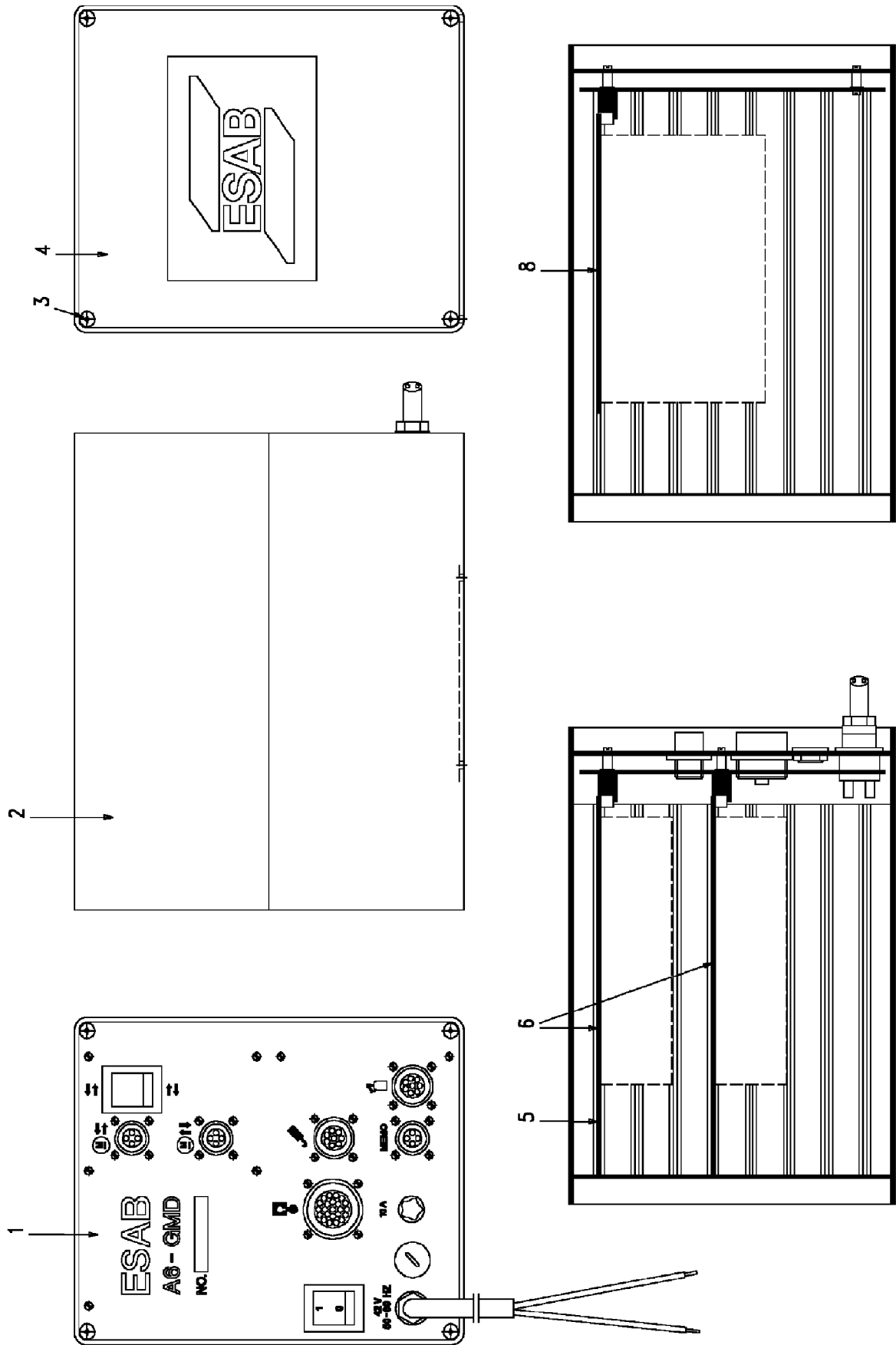
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		416 065-880	Control box		
1	1	415 200-001	Pushbutton		
2	2	415 200-020	Switch mechanism		
3	1	415 200-027	Cap, orange		
4	0,7	191 953-101	Cable	0.25 mm ²	
5	2	415 200-005	Indicating lamp		
6	3	415 200-047	Bulb		
7	1	415 200-058	Splash shield (water)		
10	1	416 067-001	Plate		
11	1	192 722-004	Selector swich	1 pol	
12	1	415 302-001	Manipulator		
13	1	332 556-001	Protective clamp		
14	4	2121 080-45	Screw	M4x16	
15	4	2126 011-05	Nut	M4	
16	1	416 064-001	Apparatus box		
17	1	193 307-104	Cable fitting		
18	1	2126 022-08	Nut		
19	3,5	433 145-001	Control cable		
20	1	368 541-005	Pin plug	23 pol	
21	1	333 158-880	Knob		
22	1	415 200-024	Cap, green		
23	1	415 200-026	Cap, red		
24	1	161 337-051	Box		
25	4	2126 011-06	Nut	M5	



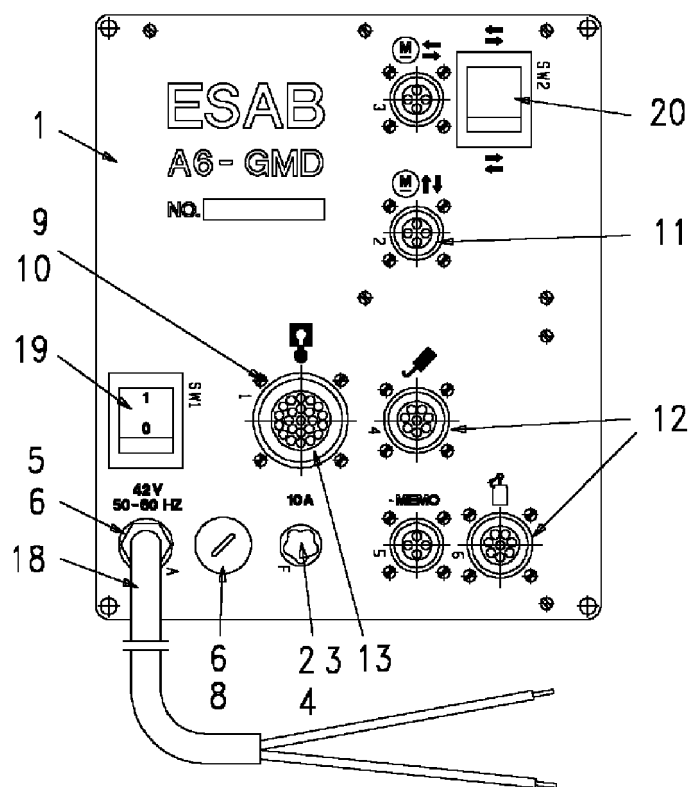
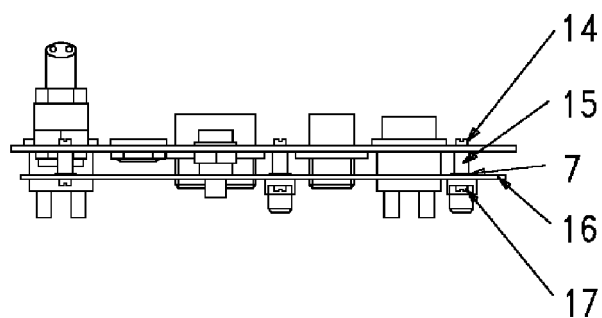
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		416 066-880	Joint tracking equipment		
1	1	417 630-880	Rear plate		
2	1	332 908-880	Box		
3	8	2121 107-18	Screw	B8x13	
4	1	416 060-001	Front panel		
5	2	417 615-003	Housing pin		
6	2	481 859-880	PC-board		
8	1	333 181-881	Feed unit		



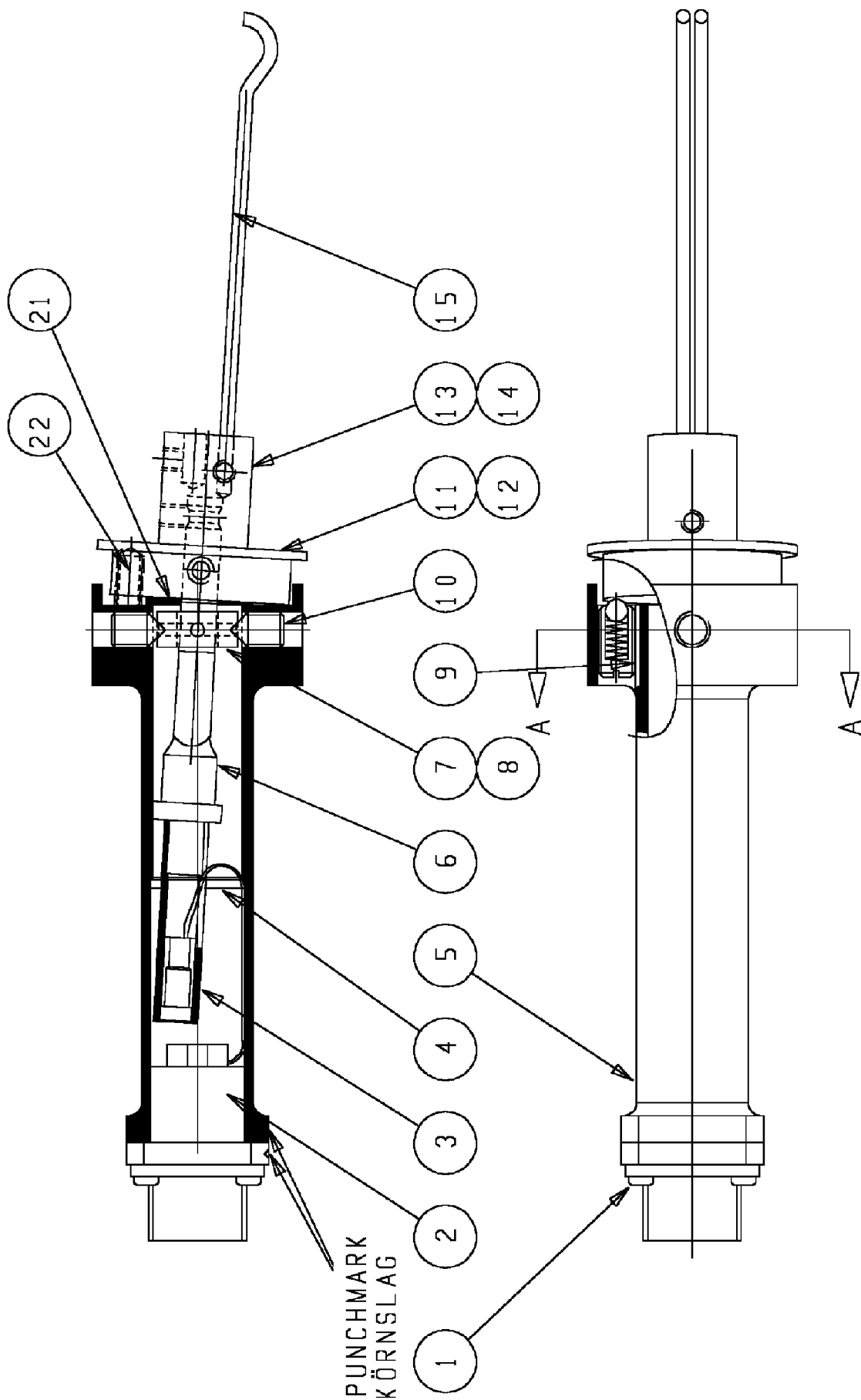
Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		417 630-880	Rear panel, compl		
1	1	417 649-001	Rear panel		
2	1	193 701-001	Fuseholder		
3	1	567 900-107	Quick-blow fuse		
4	1	193 701-002	Fuse holder		
5	1	267 101-301	Fitting		
6	2	2126 022-06	Nut	Pr 15,2	
7	8	193 147-124	Insulating washer		
8	1	2129 101-06	Plug		
9	20	2121 088-23	Screw	M3x6	
10	20	2126 011-03	Nut	M3	
11	3	323 941-001	Sleeve socket	4-pol.	
12	1	323 941-002	Sleeve socket	8-pol.	
13	1	368 544-005	Sleeve socket	23-pol.	
14	10	2121 080-82	Screw		
15	8	333 551-001	Spacer sleeve		
16	1	481 866-880	PC-board		
17	6	2121 080-83	Screw		
18	1	2626 134-01	Cable		
19	1	193 317-001	Switch		
20	1	466 238-001	Switch		
21	8	323 945-002	Connector		
22	12	323 945-003	Connector		



Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

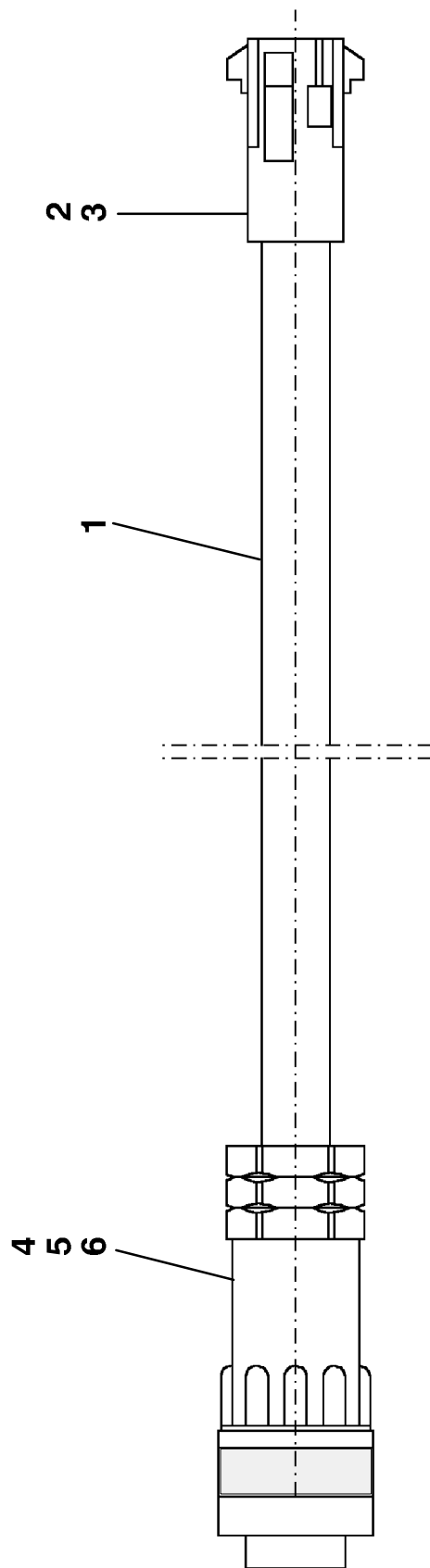
Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
		416 688-880	Sensor		
1	4	2121 080-29	Screw		
2	1	156 106-880	Transducer unit		
3	1	415 836-880	Diffusor		
4	1	415 739-001	Insulation		
5	1	417 258-880	Sleeve		
6	1	416 671-001	Guide arm		
7	1	415 328-001	Yoke		
8	1	2111 010-49	Pin		
9	2	193 860-109	Pressure pin		
10	2	193 051-447	Stop screw	M8x12	
11	1	417 958-880	Ring		
12	1	193 051-366	Stop screw	M6x12	
13	1	415 329-001	Guide arm attachment		
14	4	2122 045-45	Stop screw	M5x6	
15	2	146 586-001	Guide finger		
21	1	415 332-002	Seal		
22	1	418 090-001	Compression spring		
	1	6880 003-02	Allen key		



Reservdelsförteckning - Spare parts list - Ersatzteilverzeichnis - Liste de pièces détachées

Item	Qty	Orderingno.	Denomination	Remarks	Component designation in the circuit diagram
1		417 310-880 2626 134-01	Control cable Apparatus cable	*) L = 19 m	
1		417 310-881 2626 134-01	Control cable Apparatus cable	*) L = 22 m	
1		417 310-882 2626 134-01	Control cable Apparatus cable	*) L = 25 m	
1		417 310-883 2626 134-01	Control cable Apparatus cable	*) L = 28 m	
1		417 310-884 2626 134-01	Control cable Apparatus cable	*) L = 32 m	
1		417 310-885 2626 134-01	Control cable Apparatus cable	*) L = 36 m	
1		417 310-886 2626 134-01	Control cable Apparatus cable	*) L = 40 m	
1		417 310-887 2626 134-01	Control cable Apparatus cable	*) L = 2 m	
1		417 310-888 2626 134-01	Control cable Apparatus cable	*) L = 5 m	
1		417 310-889 2626 134-01	Control cable Apparatus cable	*) L = 10 m	
2		192 784-002	Sleeve plug		
3		192 784-101	Plug		
4		323 942-001	Pin plug	4-pol	
5		323 945-001	Plug		
6		323 943-102	Counterbalance		

*) Additional system components



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