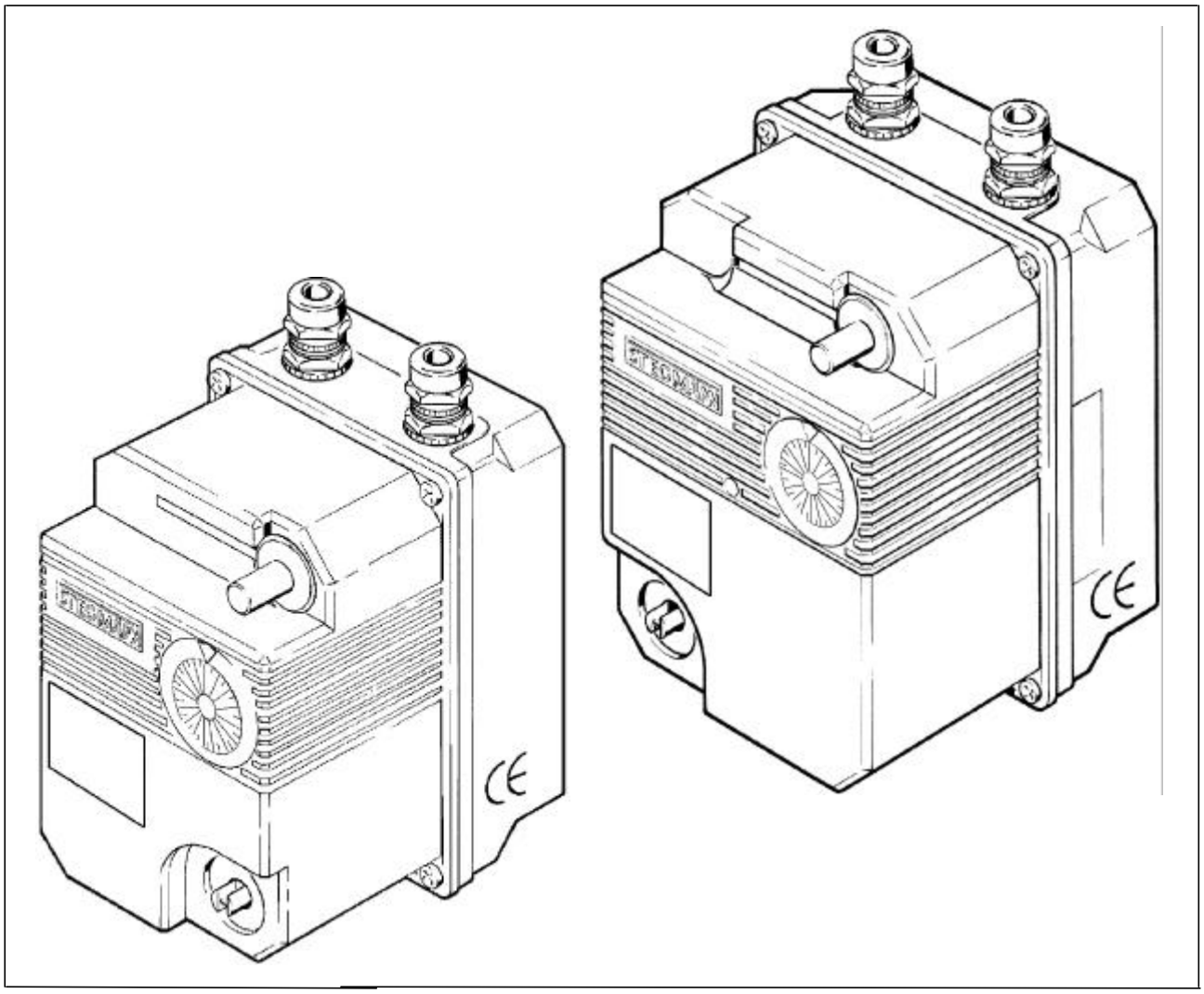
Mounting and Operating Instructions

Electrical position controller

Series ER 20/ER 50



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Documentation overview

The overall documentation on the **ER 20/ER 50 electrical position controller** comprises the following:

- **Product-specific information**
- **Mounting and operating instructions ***

* this is the present documentation.

To request these documents, please apply to **Max Stegmann GmbH**.

The address and the telephone/fax number will be found on the inside front cover of these mounting and operating instructions.

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1. Foreword

These mounting and operating instructions are intended to give you the knowledge which is necessary for you to be able to carry out the mounting and adjustment of an **ER 20/ER 50 position controller** rapidly and correctly.

Please read these instructions through carefully and pay particular attention to the advice and warning notes!

The **Stegmann ER 20/ER 50 position controllers** are supplied in various versions, depending on

- the actuating time for 90° rotation angle in each case,
- the operating voltage,
- the maximum number of revolutions of the output drive shaft,
- the design of the output drive shaft,
- the direction of rotation of the output drive shaft with increasing setpoint,
- the type of drive and
- with or without manual adjustment.

In addition, each individual position controller is set at the manufacturer in accordance with installation-specific conditions!

The fields of use of these position controllers are predominantly

- in industrial fittings
- in chemical installations
- in ventilation and blower construction
- in heating and air-conditioning technology
- in machine and plant construction
- in water treatment, etc.

If you have any questions in relation to the **ER 20/ER 50 position controllers**, we shall be pleased to answer them.

The telephone number will be found on the inside front cover of these mounting and operating instructions.

Max Stegmann GmbH

2. General advice

2.1 Validity

These mounting and operating instructions apply to Standard versions of the **ER 20/ ER 50 electrical position controllers**.

2.2 Inward monitoring

- Check
  - directly after delivery the position controller for any **transport damage** and deficiencies.
  - with reference to the accompanying **delivery note** the number of parts.
- Do not leave any parts in the packaging.

2.3 Items supplied

- position controller
- crank for manual adjustment (option)

2.4 Complaints

Claims for compensation which relate to transport damage can only be considered valid if the delivery company is notified without delay.

- For returns (because of transport damage/repairs), prepare a damage report immediately and send the parts back to the manufacturing plant, if possible in the original packaging.
- Attach the following information to the return:
  - name and address of the receiver
  - reference/order/part number
  - description of the defect.

2.5 Guarantee

For the **ER 20/ER 50 position controllers** we give a guarantee period in accordance with the sales contract.

The general guarantee conditions of **Max Stegmann GmbH** apply.

2.6 Symbols and their meaning

Paragraphs which are identified with this symbol contain very important advice; this also includes advice **for averting health risks.**
Observe these paragraphs without fail.

Paragraphs which are identified with this symbol contain very important advice; this also includes **how to avoid damage to property.**
Observe these paragraphs without fail.

This symbol indicates paragraphs which contain comments/advice or tips.

- This point identifies the description of actions which you should carry out.

3. Safety advice

Depending on the technical circumstances and the time under and at which the position controller is mounted, adjusted and commissioned, you must in each case take into account particular safety aspects.

If, for example, the position controller actuates a slide in an operational chemical plant, the potential hazards of commissioning have another dimension from that when this is only being carried out for test purposes on a **"dry"** part of the plant in the assembly room.

Since we do not know the circumstances at the time of the mounting/readjustment/ commissioning, you may find advice on hazards in the following descriptions which are not relevant to you.

Please observe (only) the advice which applies to your situation.

3.1 Personal protection

3.1.1 Safety advice for mounting

We wish to point out expressly that the mounting, the electrical installation and the readjustment of the ER 20/ER 50 must be carried out only by trained specialist personnel having sound mechanical and electrical knowledge.

- **Switch off all the devices/machines/plant affected by mounting or repair.**

  If appropriate, isolate the devices/machines/plant from the mains.
- **Check (for example in chemical plants) whether the switching off of devices/ machines/plant will cause potential danger.**
- **If appropriate, in the event of a fault in the position controller (in a plant which is in operation) inform the shift foreman/safety engineer or the works manager without delay about the fault, in order, for example, to avoid an outflow/overflow of chemicals or the discharge of gases in good time by means of suitable measures.**
- **Before mounting or repair, remove the pressure from pneumatic/hydraulic devices/machines/plant.**
- **If necessary, set up warning signs in order to prevent the inadvertent starting up of the devices/machines/plant.**
- **Observe the respective relevant professional safety and accident prevention regulations when carrying out the mounting/repair work.**
- **Check the correct functioning of the safety equipment (for example the emergency off push buttons/safety valves, etc.).**

3.1.2 Safety advice for commissioning/readjustment

As a result of the commissioning (electrically or by hand) of the position controller, the position of a slide/valve/flap or the like on which it is flangemounted - referred to below as the actuating element - will be changed.

As a result, the flow of gases, steam, liquids, etc. may be enabled or interrupted.

- **Satisfy yourself that, as a result of the commissioning or the test adjustments on the position controller, no potential hazards will be produced for personnel or the environment.**
- **If necessary, set up warning signs in order to prevent the inadvertent starting up or shutting down of the devices/machines/plant.**
- **After completing the mounting, check the correct functioning of the position controller.**
- **Check the functioning of the minimum and maximum position microswitches (in the uninstalled state).**
- **Check whether the actuating element is actually 100 per cent closed when the controller signals the corresponding end stop.**
- **Through suitable measures, prevent body parts being trapped by moving actuating elements.**
- **Check the correct functioning of any safety devices (for example emergency off push buttons/safety valves etc.).**
- **Carry out the commissioning or the readjustment only in accordance with the instructions described in this documentation.**

- **When a position controller is open and ready for use, and if tools are being used (for example small screwdrivers, forceps, etc.), there is the risk that live parts (230 V AC~) on the power supply board can be touched, and therefore deliver a shock.**
- **The readjustment must therefore be carried out only by an electrician or a person having adequate training, who is aware of the potential hazard.**

3.2 Device safety

The **ER 20/ER 50 position controller** is a quality product which is produced in accordance with the recognized industrial regulations and left the manufacturer's works in a perfect safety condition.

In order to maintain this condition, as installer/user you must carry out your task **in accordance with the descriptions in these instructions, technically correctly and with the greatest possible precision.**

We assume that you have, as a trained specialist, sound mechanical and electrical knowledge.

The position controller must be used only for the purpose corresponding to its construction.

The position controller must be used only within the values specified in the technical data.

- **Satisfy yourself that, as a result of the mounting, the commissioning or as a result of the test adjustments on the position controller, no potential hazards will be produced for devices/machines/plant.**
- **Open the position controller only to such an extent as described in this documentation.**
- The plastic housing cover has a metallic layer vapour-deposited on the inside in order to shield it against external electromagnetic fields. Do not damage this layer. Electromagnetic fields penetrating into the housing may influence the electronics and trigger malfunctions of the position controller.
- Hold the opened position controller only by the metallic housing and not by the electronic circuit boards or other components. Handling of the opened position controller may change the setting of the cam disc and/or short-circuit the bare connecting wires of the electronic circuit boards.
- **Do not mount the position controller, commission the position controller or carry out any readjustments on it if the position controller, the supply lines or the part of the plant on which it is flange-mounted is damaged.**
- Before mounting the position controller, check the free movement of the actuating element.
- After completing the mounting or the readjustment, check the correct functioning of the position.

3.3 Application-specific safety advice

During the order processing for **Stegmann position controllers ER 20/ER 50, the specific use and the installation-specific conditions for each position controller are defined between the customer and the manufacturer.**

The manufacturer adjusts each position controller in accordance with these definitions.

It is therefore not possible to replace a (defective) position controller by a position controller which has been preadjusted for other conditions.

3.3.1 Adjustment on site

Changing the adjustment is complex and must be carried out at the manufacturer or by a person who has been authorized to do this by the manufacturer.

Any (unauthorized) wrong adjustment may lead to malfunctioning of the position controller.

As a result of wrong information or component tolerances, it is possible - in the case of an output drive shaft in the square or keyed design - for the mounting of the position controller on the actuating element to be impossible (because of different angular positions of the surfaces of the square or the key of the output drive shaft in relation to that in the fitting opening of the actuating element).

3.3.2 Readjustment on site

– If the (installed) position controller actuates the minimum and/or the maximum position microswitch (during the test run, during the initial commissioning or in normal operation), the range of an on-site readjustment has been exceeded. The position controller is wrongly adjusted for this application.

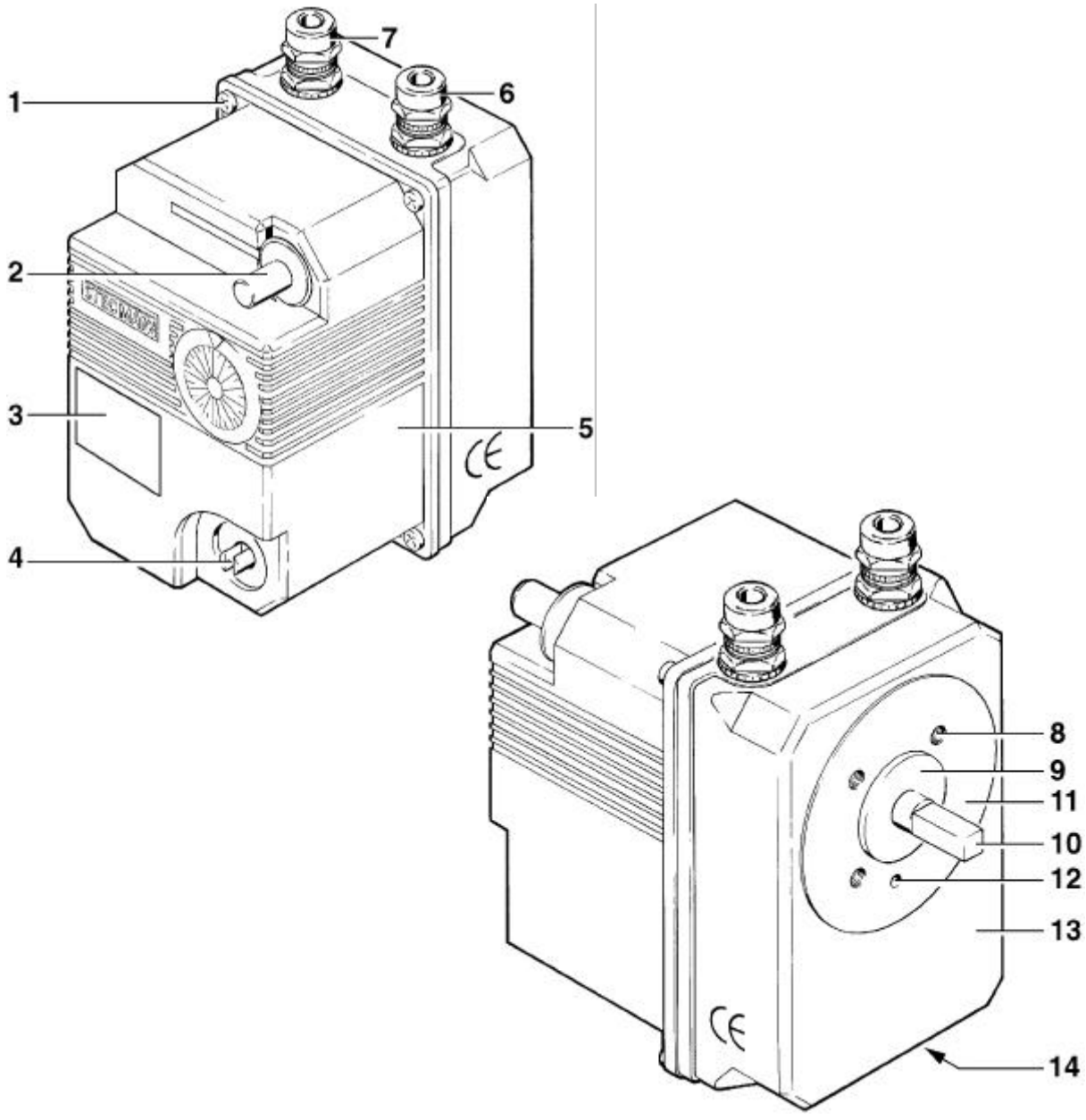
  Please have the position controller readjusted at the manufacturer, with information about the correct adjustment position.

– If the actuating element is not rotated by the position controller into the desired end positions, readjustment on site may be carried out - observing the preceding descrip tion. For this, see

  9.2 Readjustment.

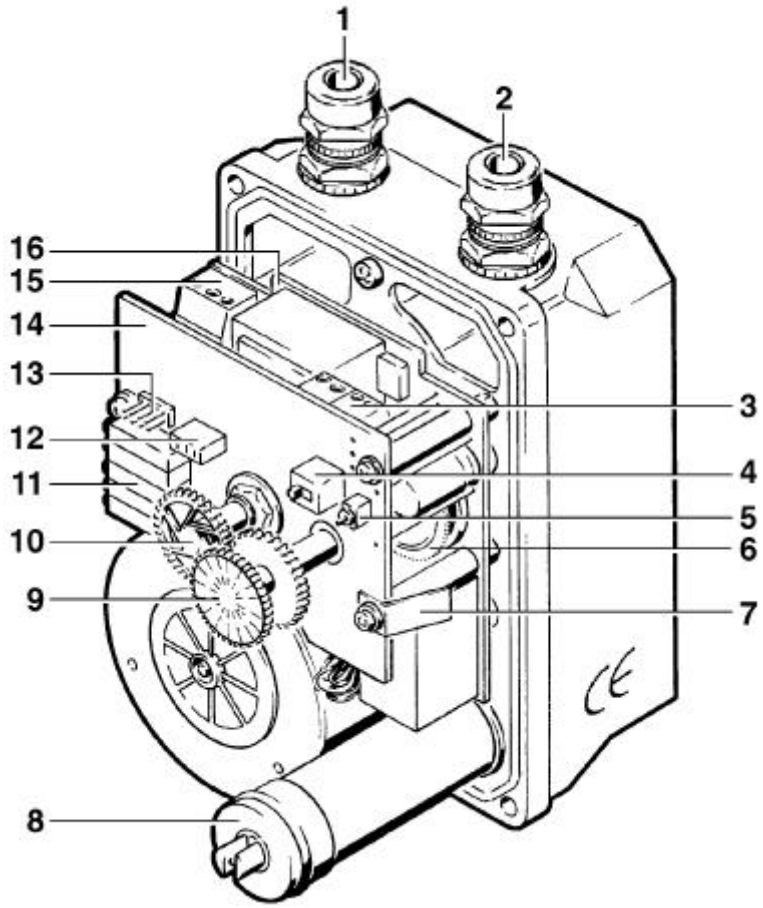
4. Device description

4.1 Device description ER 20



1 *cross-point screws (4 x) for fastening the housing cover*
2 *crank for manual adjustment (option)*
3 *crank operating instructions for emergency operation (option)*
4 *shaft for manual adjustment of the output drive shaft (emergency operation) (option)*
5 *housing cover*
6 *PG screw fitting for the setpoint/actual value cable*
7 *PG screw fitting for the power supply cable (230 VAC~)*
8 *threaded holes M6 (4 x)*
9 *centring attachment*
10 *output shaft*
11 *fastening surface*
12 *reference mark (index hole)*
13 *basic housing*
14 *type label*

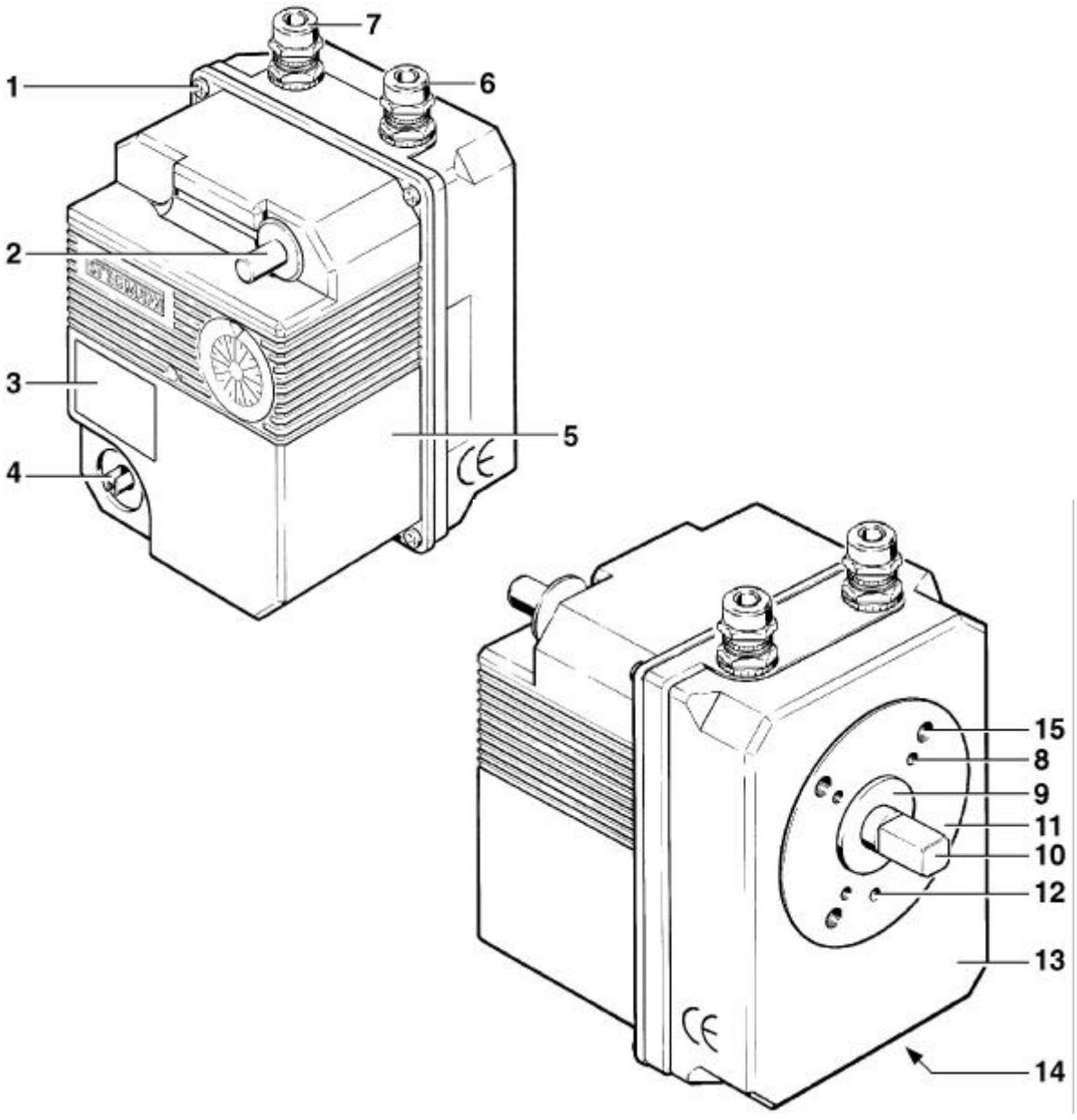
Fig. 4-1 ER 20 position controller - front/rear



1 *PG screw fitting for the power supply cable (230 V AC~)*
2 *PG screw fitting for the setpoint/actual value cable*
3 *terminal strip X2 (4 terminals), connection for the setpoint/actual value lines*
4 *slide switch S1, change-over switch for automatic/manual operation*
5 *rocker switch S2, change-over switch for the direction of rotation of the output shaft in manual operation*
6 *switching cam disc of the minimum/maximum position microswitch*
7 *contact tab, connection between housing earth and screen on the inside of the housing cover*
8 *shaft for the manual adjustment of the output shaft (emergency operation) (option)*
9 *position indicator disc*
10 *drive wheel for position potentiometer P1*
11 *trip potentiometers P2 to P6*
12 *jumper J2, if jumper is fitted - drive via 0 - 20 mA current interface or 0 - 10 V voltage interface*
13 *jumper J1, if jumper is fitted*
- drive via 4 - 20 mA current interface or via voltage interface 2 - 10 V
14 *control circuit board*
15 *terminal strip X1 (3 terminals), connection for the power supply lines (230 V AC~)*
16 *supply circuit board*

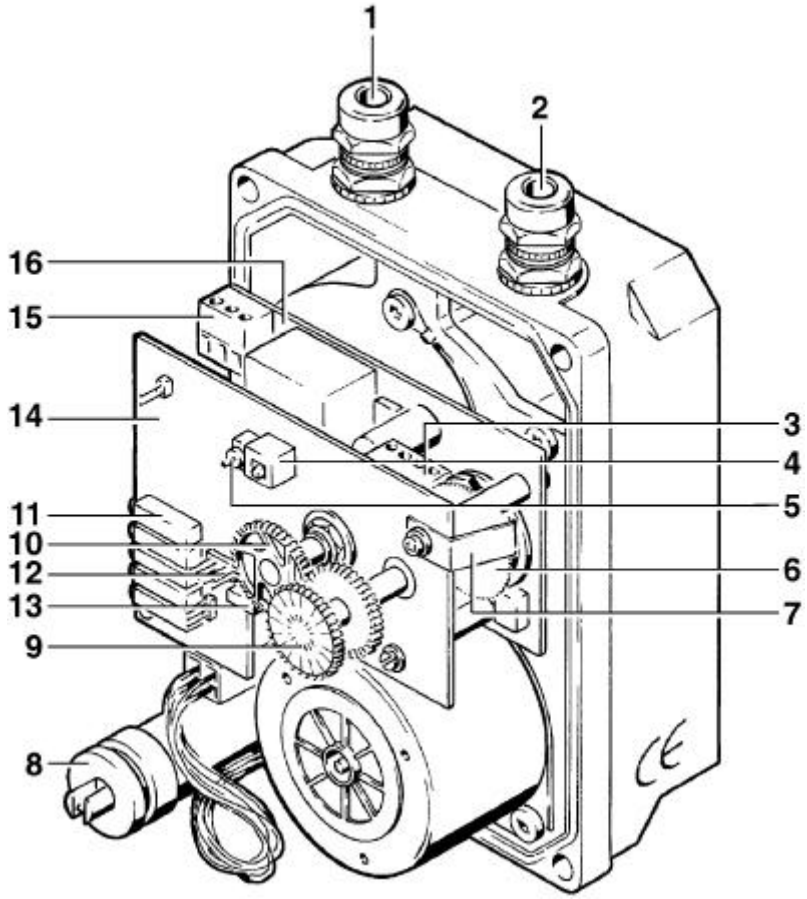
Fig. 4-2 ER 20 position controller - internal view

4.2 Device description ER 50



1 *cross-point screws (4 x) for fastening the housing cover*
2 *crank for manual adjustment (option)*
3 *crank operating instructions for emergency operation (option)*
4 *shaft for manual adjustment of the output drive shaft (emergency operation) (option)*
5 *housing cover*
6 *PG screw fitting for the setpoint/actual value cable*
7 *PG screw fitting for the power supply cable (230 V AC~)*
8 *threaded holes M6 (4 x)*
9 *centring attachment*
10 *output shaft*
11 *fastening surface*
12 *reference mark (index hole)*
13 *basic housing*
14 *type label*
15 *threaded holes M8 (4 x)*

Fig. 4-3 ER 50 position controller - front/rear



1 *PG screw fitting for the power supply cable (230 V AC~)*
2 *PG screw fitting for the setpoint/actual value cable*
3 *terminal strip X2 (4 terminals), connection for the setpoint/actual value lines*
4 *slide switch S1, change-over switch for automatic/manual operation*
5 *rocker switch S2, change-over switch for the direction of rotation of the output shaft in manual operation*
6 *switching cam disc of the minimum/maximum position microswitch*
7 *contact tab, connection between housing earth and screen on the inside of the housing cover*
8 *shaft for the manual adjustment of the output shaft (emergency operation) (option)*
9 *position indicator disc*
10 *drive wheel for position potentiometer P1*
11 *trip potentiometers P2 to P6*
12 *jumper J2, if jumper is fitted - drive via 0 - 20 mA current interface or 0 - 10 V voltage interface*
13 *jumper J1, if jumper is fitted - drive via 4 - 20 mA current interface or via voltage interface 2 - 10 V*
14 *control circuit board*
15 *terminal strip X1 (3 terminals), connection for the power supply lines (230 V AC~)*
16 *supply circuit board*

Fig. 4-4 ER 50 position controller - internal view

4.3 Device variants

The **Stegmann ER 20/ER 50** position controllers are supplied in various variants, depending on the customers' requirements.

The variants relate to

- the actuating time for 90 ° rotation angle in each case of the output shaft,
- the operating voltage,
- the maximum number of revolutions of the output shaft,
- the design of the output shaft,
- the direction of rotation of the output shaft with increasing setpoint,
- the type of drive and
- the manual adjustment (with or without).

The variants can be recognized in each case by the designation on the type label:

Example **Typ:** **ER 20 - 01 - 1 1 1 R A 1**

Electrical position controller:
ER 20,
ER 50

Actuating time in seconds for 90 ° rotation angle:

	(50 Hz)	(60 Hz)
01*	**7.5 sec.**	**6.25 sec.**
02	15 sec.	12.5 sec.
03	30 sec.	25 sec.
04	60 sec.	50 sec.

* only for ER 20

Voltage:
1 = 230 V
2 = 115 V

Max. revolutions at the output shaft:
1 = 1/4 revolution (90 °)
2 = 1/2 revolution (180 °)
3 = 1 revolution
4 = 5 revolutions

output shaft:
1 = Ø 16
2 = with internal square 14 A/F
3 = with internal square 17 A/F
4 = with external square 9 A/F
5 = with external square 12 A/F
6 = Ø 12 with keyway 4 x 18 mm
7 = Ø 16 with keyway 5 x 20 mm

Direction of rotation of the output shaft:
R = right operation with increasing setpoint
L = left operation with increasing setpoint

Drive:
A = current (0 - 20 mA)
B = current (4 - 20 mA)
C = voltage (0 - 10 V)
D = voltage (2 - 10 V)

Manual adjustment:
0 = without manual adjustment
1 = with manual adjustment

4.4 Installation-specific conditions

The position controller is preadjusted by the manufacturer to the installationspecific conditions.

These conditions were defined between the customer and the manufacturer when the order was being processed.

The definition relates (among other things) to

- the design shape of the output shaft and the fitting opening of the adjusting element;
- the angular range over which the adjusting element is to be moved;
- the angular values of the minimum and maximum position of the adjusting element (referred to the reference mark on the drive) and
- the installation position of the position controller.

The position controller is supplied such that the position of the output shaft corresponds to the **minimum position of the adjusting element.**

In the case of a **round output shaft,** care should be taken when mounting the position controller that the adjusting element is also in its minimum position.

- In the case of an **output shaft in the square or keyed design,** wrong information about the conditions or tolerances of the components may mean that the position controller cannot be mounted on the adjusting element (because of different angular positions of the surfaces of the square or of the key of the output shaft in relation to those of the fitting opening of the adjusting element.

  Readjustment of the output shaft position on site is possible only within the range predefined by the end switch adjustment!

5. Definition of the direction of rotation

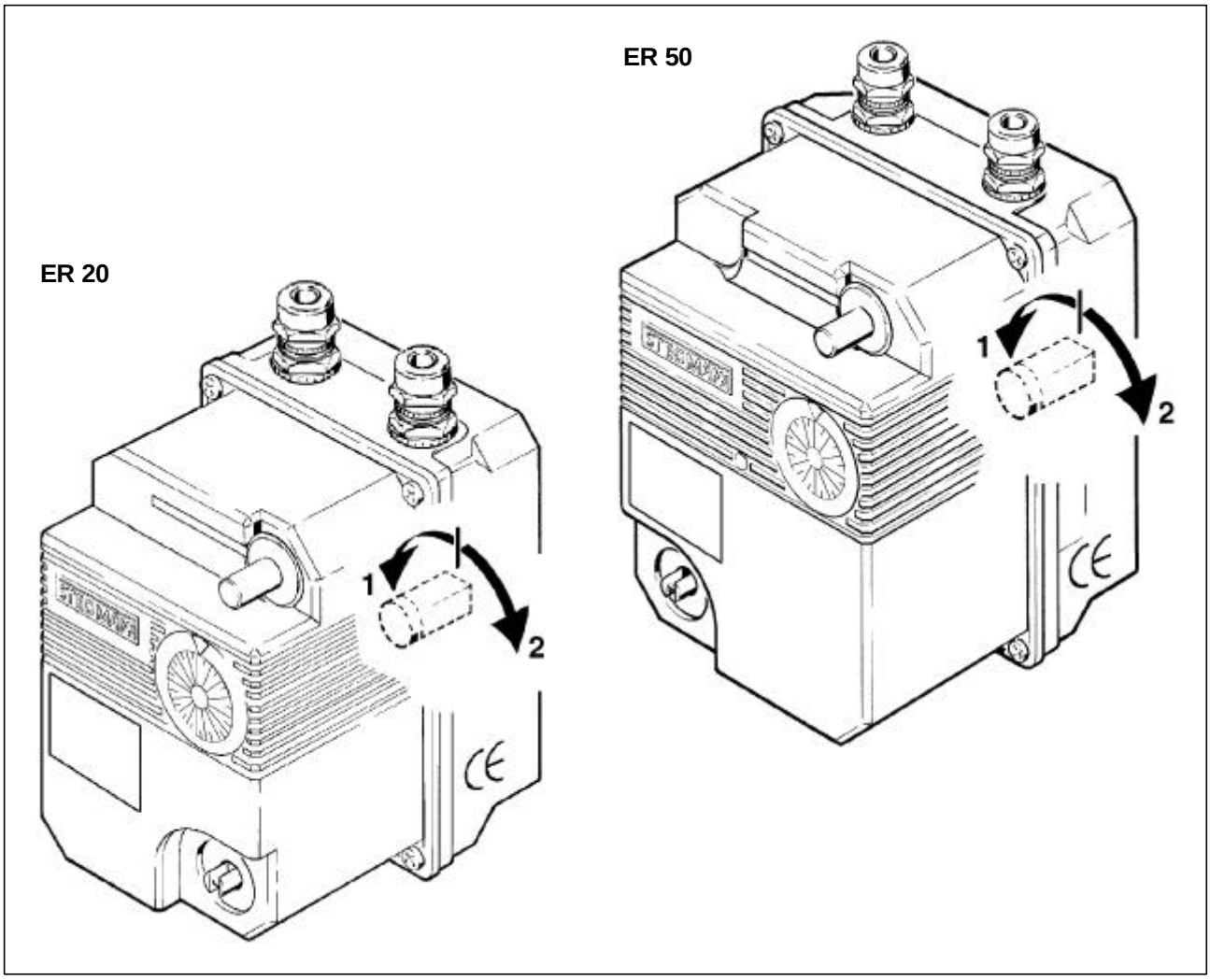


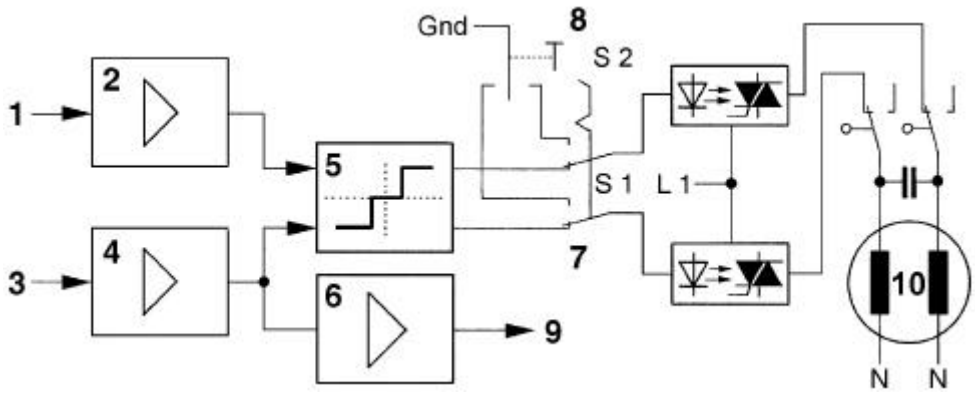
Fig. 5-1 Position controller ER 20/ER 50 - directions of rotation

The direction of rotation is defined below as follows:

When viewed from the front side of the device, when driven with a high setpoint, the output shaft moves

- **counterclockwise (1) for left operation** and
- **clockwise (2) for right operation.**

6. Functional description



1 *position setpoint*
0 ... 20 mA, 0 ... 10 V
4 ... 20 mA, 2 ... 10 V
2 *setpoint conditioning*
3 *position actual value*
4 *actual value conditioning*
5 *3-point controller*
6 *actual value output*
7 *switch S1 (auto./man.)*
8 *ocker switch S2 manual operation direction of rotation left/right*
9 *actual value output*
0 ... 20 mA, 0 ... 10 V
4 ... 20 mA, 2 ... 10 V
10 *motor*

Fig. 6-1 Block diagram

The following functional description relates (as an example) to a position controller with **right operation.**
We assume that the position controller is mounted on the adjusting element, connected to the power supply (230 V AC~) and to the controller. If a voltage or a current is applied to the terminals X2-1 and X2-2 with an **high setpoint,** the motor drives the output shaft - via the reduction gear box - in the clockwise direction.

At the same time, the two cam discs for limiting the direction of rotation (end of travel switches) and the position potentiometer P1 are driven via a gear box take-off. The potentiometer P1 produces a voltage **(actual value)** which is proportional to the angular position of the output shaft (or a corresponding current flows), which is continuously compared with the setpoint by the electronics connected downstream.

The rotational movement of the output shaft continues until either

- the actual value corresponds to the setpoint or
- the switching cam actuates the microswitch for maximum position or right stop.

The two switching cams are adjusted by the manufacturer (end switch adjustment) such that - outside the normal control range of the control electronics - they serve as a safety end of travel switch. The functional sequence outlined applies in a similar way to a position controller with left operation.

In the event of any interruption to the setpoint cable, the output shaft is rotated into its minimum position or into the minimum position of the adjusting element.

The **actual** value can be picked off for measurement at the terminals X2-3 and X2-4, and can be compared with the **setpoint**.

7. Ambient conditions

The **ER 20/ER 50 position controller** is designed for rough operating conditions.

However, some special conditions are to be observed for its mounting and subsequent operation.

- Take care that
  - the position controller is mounted in accordance with the mounting advice listed below.
  - the position controller is used in accordance with the characteristic values specified in the technical data.

  The non-observance of the mounting advice or use outside the specified characteristic values can have a negative influence on the functional reliability of the position controller.

The use of the position controller under the influence of radioactive radiation may take place only after discussions with the manufacturer.

8. Mounting/Disassembly

The mounting of the **ER 20/ER 50 position controller** is restricted to

- the mechanical mounting of the position controller on the part of the devices/ machines/plant which contains the actuating element, and
- the connection of the position controller to the power supply and to the control lines.

The mounting position (for this, please see 4.4 Installation-specific conditions) of the ER 20/ER 50 must follow the position defined during the order processing.

We assume, in the following description, that you have carefully read the previous chapter and that you will observe the safety advice and the warning notes in Chapter 3 during the mounting/disassembly work.

If you have not yet read Chapter 3, please do so now and then return to this point.

The mounting and the electrical installation may be carried out only by trained specialist personnel with sound mechanical and electrical knowledge.

Which variant of the device you have in front of you can be seen from the type label on the underside of the ER 20/ER 50.

The explanation of the designation will be found under

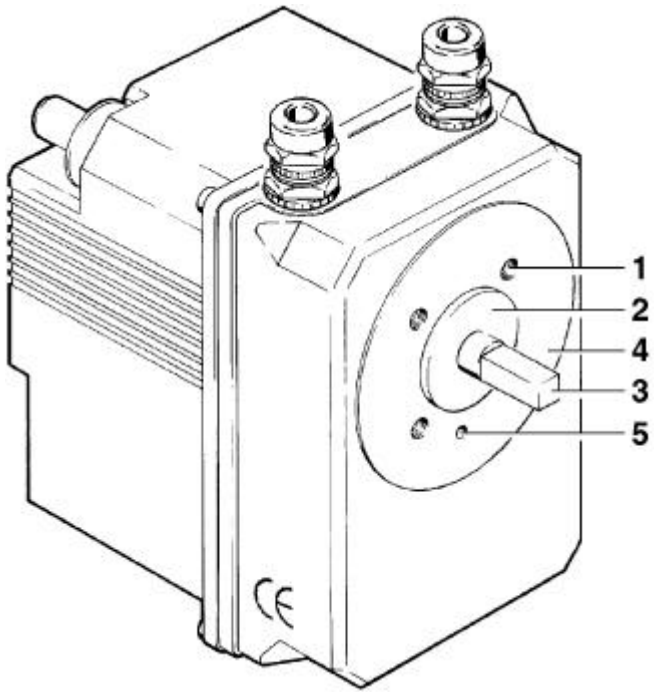
4.1/4.3 Device variants.

The **mechanical mounting** and the **electrical installation** are identical in all variants.

For the electrical installation, observe the wiring diagrams on pages 41/42 of these mounting and operating instructions.

8.1 Mechanical mounting

ER 20



ER 50

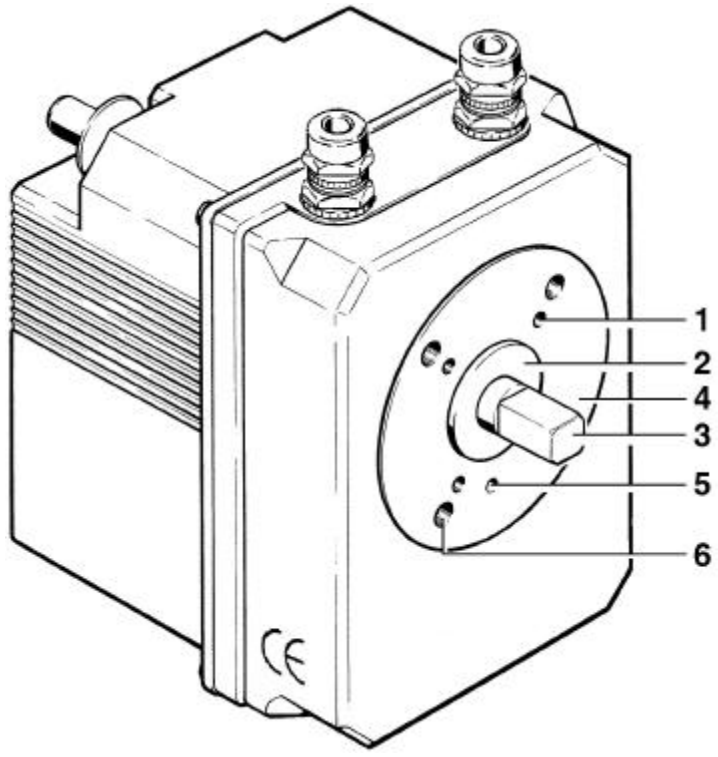


Fig. 8-1 Position controller ER 20/ER 50 - rear view

- Guide the position controller with its rear side against the part of the devices/ machines/plant in such a way that the output shaft (3) penetrates into the fitting opening in the actuating element.
- Push the position controller so far towards the mounting position that it is centred on the location spigot (2) and the index hole (5) and finally rests flat on the fastening surface (4).
- Fasten the ER 20 using 4 M6 screws (1) and the ER 50 using 4 M6 screws (1) or 4 M8 screws (6).

The depth of the threaded holes is 13 mm.

In addition to direct mounting of the position controller, it can also be mounted on the part of the devices/machines/plant with the aid of an adapter.

In this case, observe the mounting instructions which are supplied with the adapter.

8.1.1 Offset between output shaft and fitting opening in the actuating element

If mounting is not possible - in the case of an output shaft in the square or keyed design - (because of different angular positions of the surfaces of the square or of the key in the output shaft in relation to the fitting opening in the actuating element), it is possible

– in the case of a **slight** offset (up to about 5 degrees) to compensate for this with the (optional) mechanical manual adjustment. For this, see

9.2.7 Direction of rotation of the shafts ER 20/ER 50

and

11. Emergency operation.

– in the case of an offset **over about 5 degrees,** do **not** compensate for this!

The position controller must be readjusted at the manufacturer, with information about the angle of offset!

8.2 Electrical installation

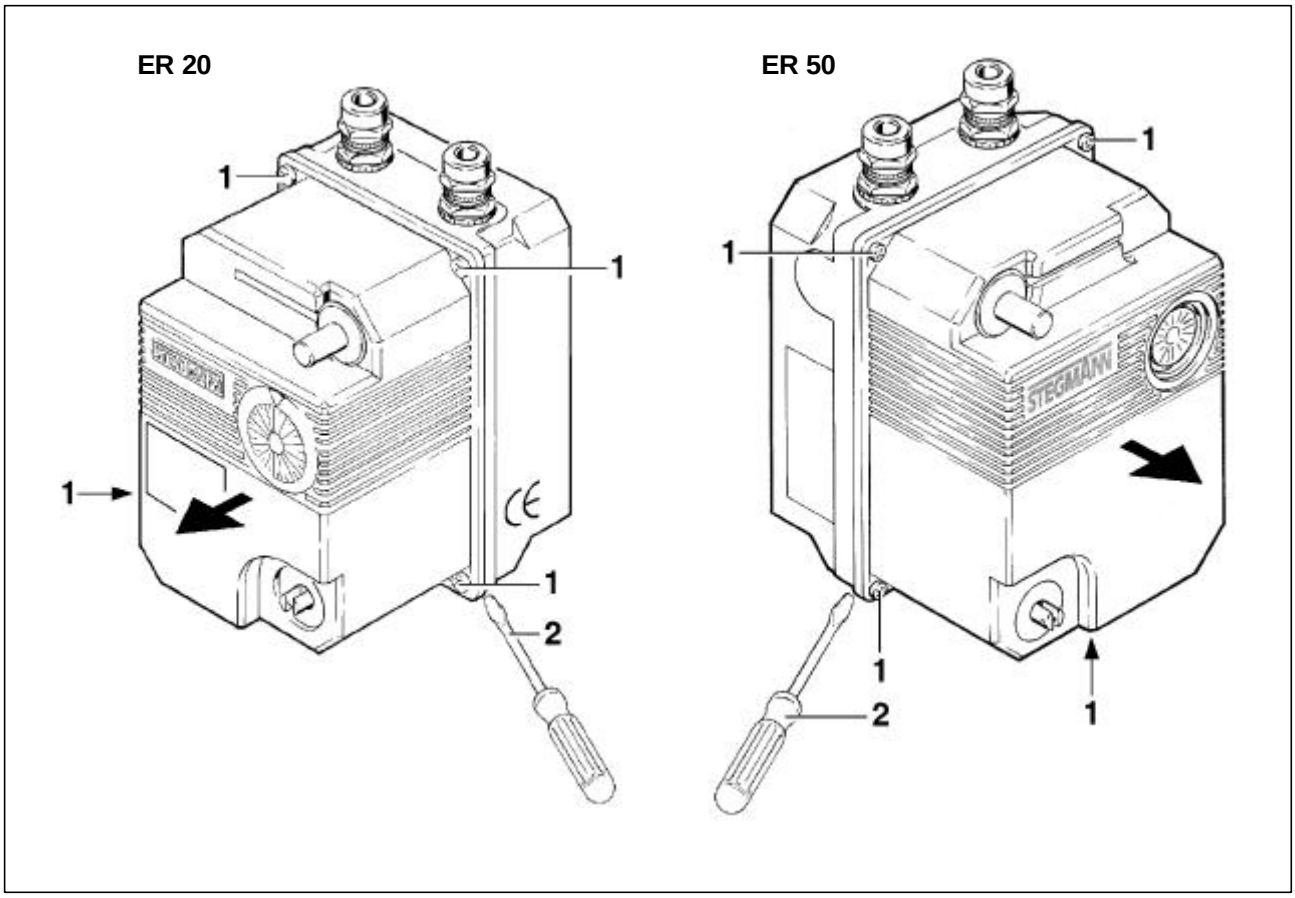


Fig. 8-2 Removing the housing cover

8.2.1 Removing the housing cover

- Loosen the four cross-point screws (1) and pull the housing cover **hard** to remove it!
  To help with this, it is possible to insert a screwdriver (2) a few millimetres between housing cover and housing at the position shown in the figure, and to lever the cover open.

- **When doing this, do not damage the cover and/or the rubber sealing strip. In this case, the IP 65 degree of protection would no longer be guaranteed.**

- Hold the opened position controller only by the metal housing and not by the electronic circuit boards or the other components.
  By holding the opened position controller wrongly, it is possible to upset the position of the cam disc and/or to short-circuit the bare connecting wires of the electronic circuit boards.

8.2.2 Stripping the cables/leads

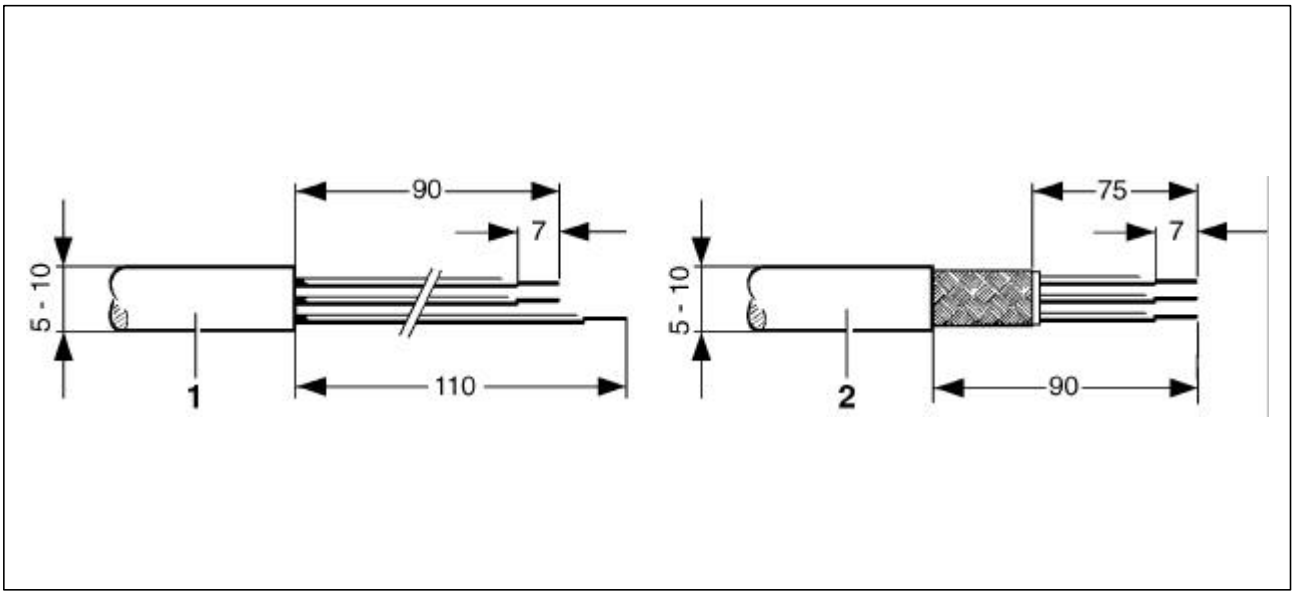


Fig. 8-3 Dimensional information on stripping the cables/leads

STOP

In order to avoid a electric shock or a short circuit, begin with the electrical installation of the position controller. Connect the cables to the position controller first and then to the controller and to the power supply.

- **For the electrical installation of the ER 20/ER 50, use the prescribed cable types (corresponding to the environmental conditions and the EMC measures). The setpoint/actual value cable must be screened.**
- Remove the sheaths of the power supply cable (1) and of the setpoint/actual value cable (2) and remove the insulation of the leads in accordance with Figure 8-3.

STOP

- **Note that the earth wire of the power supply line (ye/gn) must be 2 cm longer than the power-carrying lines, for safety reasons.**
- In the case of leads with stranded conductors, provide the ends in each case with a wire end sleeve.

8.2.3 Connecting the cables/leads

STOP

The **Position controllers ER 20/ER 50** have been produced and tested in accordance with the European guidelines EN 50081-1 and 50082-2. These guidelines define limiting values for the line-conducted and non-line-conducted electromagnetic interference immunity or interference emission.

- In order to comply with the guidelines, it is essential to make the earth and screening connections according to Figures 8-3, 8-4 and 14-5.

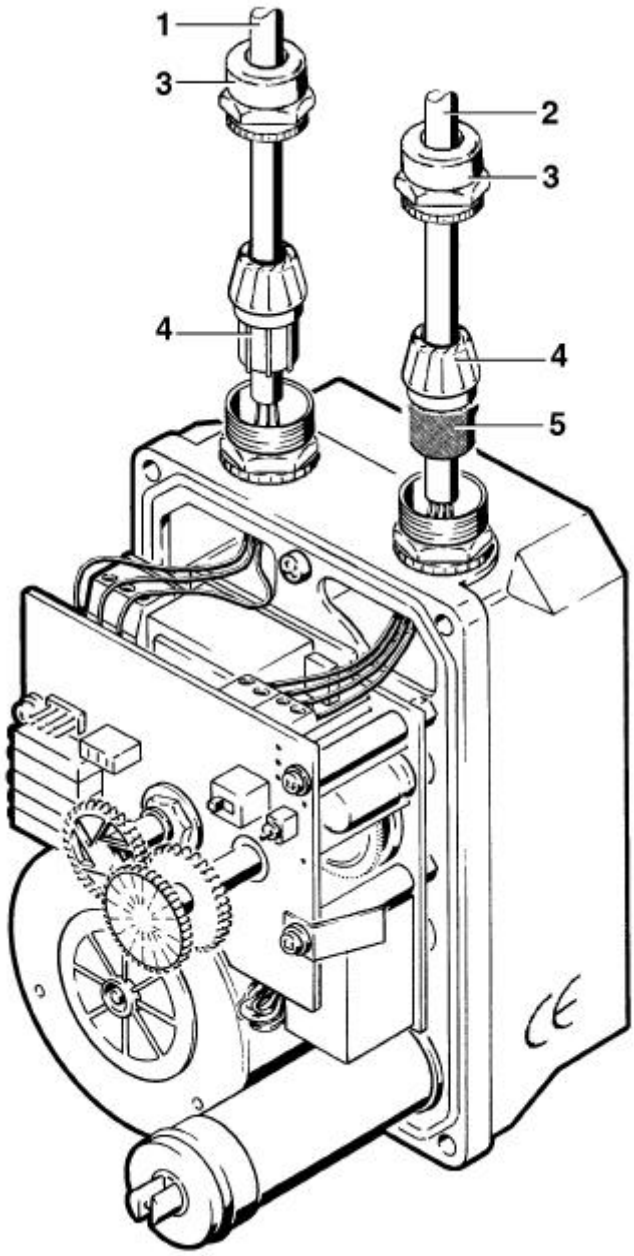


Fig. 8-4 Connecting the cables/leads - for example to the ER 20

- Push the power supply cable (1) through the unscrewed union nut (3) and the plastic support sleeve (4) and insert the cable into the left-hand PG screw fitting in accordance with Figure 8-4. Tighten the union nut, so that the strain relief is effective and the cable lead-through corresponds to the predefined degree of protection (IP 65).
- Push the setpoint/actual value cable (2) through the unscrewed union nut (3) and plastic support sleeve (4), spread out the screen (5) and distribute the wires around the plastic support sleeve in accordance with Figure 8-4. Insert the setpoint/actual value cable into the right-hand PG screw fitting. Tighten the union nut so that the screen is electrically connected to the housing, the strain relief is effective and the cable lead-through corresponds to the predefined degree of protection.
- Feed the stripped ends of the leads into the terminals as far as the stop and then tighten these.

  The assignment of the connections can be seen from the wiring diagrams on pages 41/42 of these mounting and operating instructions.

- **Ensure that no bare wires protrude from the terminals and thus produce the risk of a shock or of a short circuit.**

- Bend the leads such that they are not trapped when the housing cover is fitted.
- Lay the cables to their starting positions (as appropriate, in conduits or cable ducts).
- Ensure that the cables are not crushed or sheared and that they are not under presure or tension.
- Connect the setpoint/actual value cables to the controller first and then connect the power supply cable to the power supply.

- **In the case of a position controller which is open and ready to operate, when tools are being used (for example small screwdrivers, forceps etc.), there is the risk that you may touch live parts (230 V AC~) on the supply board and thus receive a shock.**

- Immediately after installation, carry out the commissioning; for this please observe chapter

  9. Commissioning/readjustment.

  Otherwise re-close the position controller.
- Ensure that the circumferential rubber sealing ring in the housing is not damaged and is correctly seated in the groove.
- Fit the housing cover, push it over the rubber seal of the manual adjuster and screw it tight using the four screws.

This completes the mounting and the electrical installation of the position controller.

8.3 Disassembly

Although the disassembly of a position controller in principle proceeds in the reverse sequence to the mounting, some essential points should be clarified beforehand.

In order, for example, for the operational chemical plant which was mentioned at the beginning to remain in operation:

– Will the position controller to be disassembled be replaced immediately by another (of equal value)? If not, in which position should the actuating element be, following the disassembly?

– **Must the actuating element be fixed in its intended position?**

– If appropriate, does the production process of the plant need to be stopped?

– Is it necessary to inform specific personnel about the disassembly?

8.3.1 Electrical disassembly

- **Using the position controller, rotate the actuating element into the intended position.**

- **Switch off first the power supply and then the controller of the position controller. If the control voltage is switched off and the power supply (230 V AC~) is still present on the position controller, the actuater will rotate the output shaft into the minimum position.**

- **If necessary, set up warning signs in order to prevent**
  - **the inadvertent starting up of the part of the devices/machines/plant which is affected by the disassembly, or**
  - **the switching on of the power supply/the controller of the position controller.**

- Open the housing cover by loosening the four cross-point screws and pulling the housing cover hard to remove it. On this point, see

  8.2.1 Removing the housing cover

- Loosen the screws of the terminals and pull the leads out of the terminals. On this point, see Figure 8-4.

- **Insulate the bare lead ends** if the cables are not also being disassembled or are not to be immediately reconnected to another position controller.

- Loosen the PG screw fittings and pull the cable out of the device.

8.3.2 Mechanical disassembly

- Unscrew the four fastening screws of the position controller and pull the position controller from the mounting position. For this, see Figure 8-1.

- If appropriate, screw the housing cover back on.

This completes the disassembly of the position controller.

9. Commissioning/Readjustment

As already described in the chapter

4.4 Installation-specific conditions

each position controller is preadjusted at the manufacturer for its use.

In the ”normal case”, the position controller can be commissioned following mounting and installation, without the housing having to be opened and readjustment having to be carried out.

9.1 Commissioning

- **Before you commission the position controller, you must have read Chapter**

  3. Safety advice

  completely. If you have not yet done so, read this important advice now and then return to this point.

The commissioning of a position controller which is mounted on a plant that is ready to operate (for example in a refinery or in a plant in the chemical industry) must be carried out only in compliance with the plant-specific regulations.

- Switch on the power supply to the position controller, drive it via the controller using the minimum and maximum setpoint and check the correct functioning of the position controller:
  - If the position controller is connected only to the power supply (230 V AC~) and no setpoint or the minimum setpoint is applied, the output drive shaft is moved into its minimum position.
  - When the maximum setpoint is applied, the motor moves the output drive shaft into the maximum position.
- Check whether the minimum position of the output drive shaft is also the minimum position of the actuating element (for example, at the minimum position of the output drive shaft, is the flow of the medium actually 100 % interrupted?).
- If appropriate, check the maximum position.

– If the end positions of the actuating element are not reached because one or both microswitches (limit switch) has or have been actuated, the position controller is not correctly adjusted for this use and must be readjusted by the manufacturer (with information about the correct conditions). Slight deviations from the correct minimum or maximum positions of the actuating element may be readjusted as described below.

9.2 Readjustment

The **position controller ER 20/ER 50** offers the capability

– of setting the minimum and maximum position of the position potentiometer P1 and

– of setting the minimum and maximum value of the actual value output.

These settings

– **should be carried out only if particular reasons require it.**

– **may be carried out only by a person who has good electrotechnical knowledge.**

– require the use of a high-resistance multimeter, small, self-locking test prods, a 240 ohm measuring resistor (only if the position controller is driven via a current interface) and a small screwdriver.

A wrong setting may cause the position controller to malfunction.

· **Before you open and readjust the position controller, you must have read Chapter**

3. Safety advice

completely. If you have not yet done so, read this important advice now and then return to this point.

Take care that no liquid, moisture and no foreign bodies (sand, dust or the like) get into the opened position controller.

The following descriptions are based on the assumption that

– the position controller is connected to the device or the part of the plant which contains the actuating element, and to the power supply (230 V AC~),

– the housing cover is fastened to the position controller.

In order to carry out the readjustment

– you must remove the housing cover. For this, see

8.2.1 Removing the housing cover.

– please take note of the wiring diagrams on pages 41/42 of these mounting and operating instructions.

· **In the case of a position controller which is open and ready to operate, when tools are being used (for example small screwdrivers, forceps, etc.), there is the risk that you may touch live parts (230 V AC~) on the supply board and thus receive a shock.**

9.2.1 Setting the position potentiometer P1 minimum position ER 20/ER 50

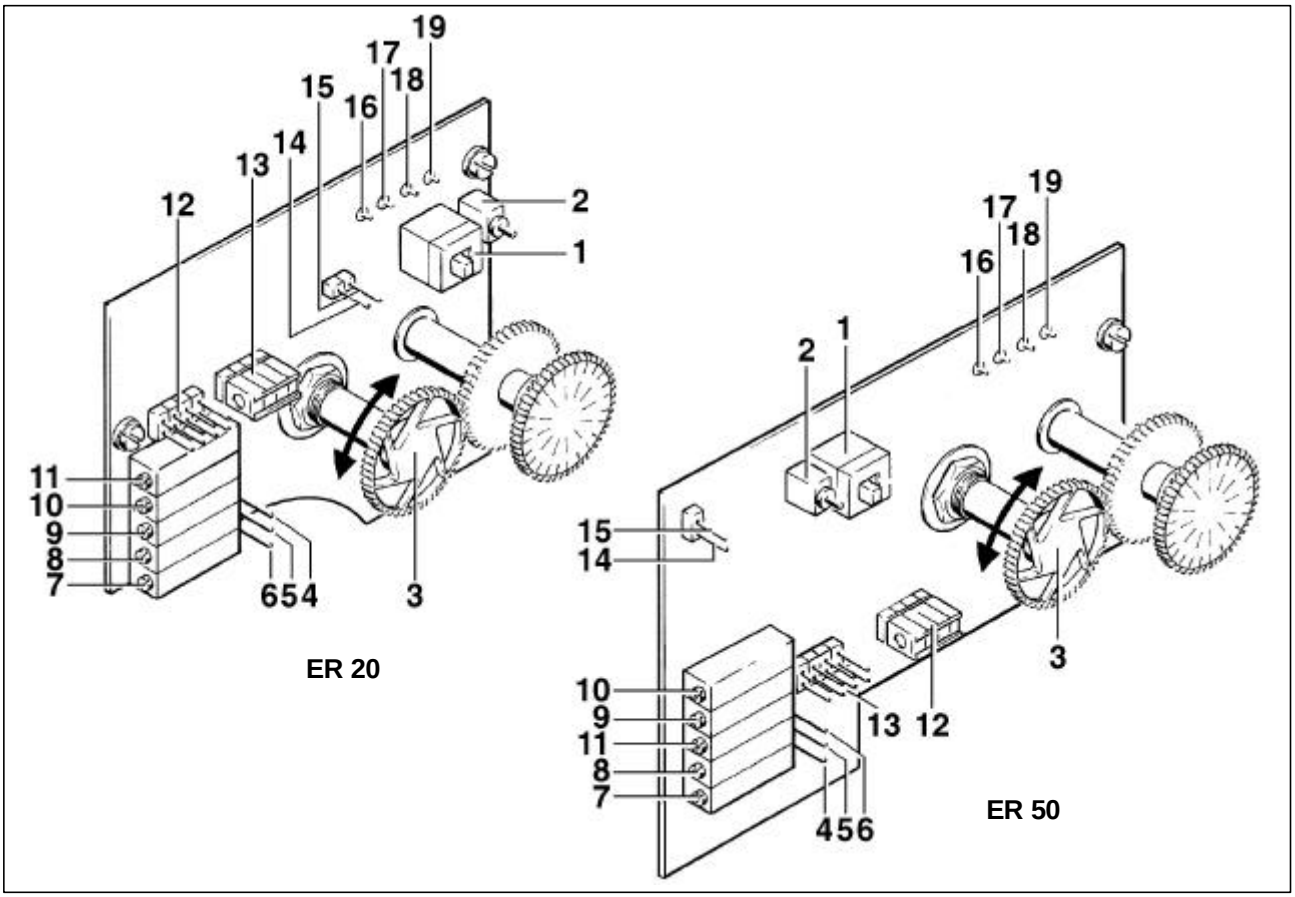


Fig. 9-1 Position controller ER 20/ER 50 - Control circuit board

- Slide the switch S1 (1) into the **right-hand** position (manual operation).
- Connect the earth terminal of the multimeter to pin (6) and the plus terminal to pin (5).
- Press the reversible switch S2 (2)
  - **downwards** in the case of **right-operating** reduction gear boxes,
  - **upwards** in the case of **left-operating** reduction gear boxes

  until the actuating element is in the desired minimum position.
- If appropriate, rotate the gear wheel (3) of the position potentiometer P1 so that the instrument indicates about 60 mV (40 - 80 mV).
- Connect the earth terminal of the voltmeter to pin (4).
- Use a small screwdriver to rotate the potentiometer P5 (8) until the instrument indicates 0 V (0.00X V).

This completes the adjustment of the minimum position of the position potentiometer P1.

9.2.2 Setting the actual value output minimum value

- Please refer to Figure 9-1.
- The switch S1 (1) must be in the **right-hand** position (manual operation).
- In the case of
  - a **current interface** drive variant, connect an ammeter in series with a measuring resistor (240 ohm) ...
  - a **voltage interface** drive variant, connect a voltmeter ...

  ... to terminal strip X2-3 and X2-4 (18 and 19). Terminal (19) is the earth terminal.
- If the jumper
  - is fitted to position J1 (12), rotate potentiometer P6 (7) until the instrument indicates 4 mA or 2 V,
  - is fitted to position J2 (13), the instrument shows 0.0X mA or 0.0X V.

This completes the setting of the actual value output minimum value.

9.2.3 Setting the position potentiometer P1 maximum position

- Please refer to Figure 9-1.
- The switch S1 (1) must be in the **left-hand** position (automatic operation).
- Apply earth to the terminal X2-1 (16) and the maximum setpoint (20 mA or 10 V) to terminal X2-2 (17).
  - The motor rotates the output drive shaft and the position potentiometer P1 until the actuating element is in the desired maximum position.
- Connect the voltmeter to the row of pins ST2, pins 1 and 2 (14 and 15).
- Use a small screwdriver to rotate the potentiometer P2 (11) until the instrument indicates 0 V (0.00X V).

This completes the setting of the position potentiometer P1 maximum position.

9.2.4 Setting the actual value output maximum value

- Please refer to Figure 9-1.
- The switch S1 (1) must be in the **left-hand** position (automatic operation).
- In the case of
  - a **current interface** drive variant, connect an ammeter in series with a measuring resistor (240 ohm) ...
  - a **voltage interface** drive variant, connect a voltmeter ...

  ... to terminal strip X2-3 and X2-4 (18 and 19). Terminal (19) is the earth terminal.

- If the jumper
  - is fitted to position J1 (12), rotate potentiometer P3 (10) until the instrument indicates 20 mA or 10 V.
  - is fitted to position J2 (13), rotate potentiometer P4 (9) until the instrument indicates 20 mA or 10 V.

This completes the setting of the actual value output maximum value.

Both end positions of the actual value output must always be set (minimum and maximum value).

9.2.5 Checking automatic operation

- Please refer to Figure 9-1.

The switch S1 (1) must be in the **left-hand** position (automatic operation).

- In the case of
  - a **current interface** drive variant, connect an ammeter in series with a measuring resistor (240 ohm) …
  - a **voltage interface** drive variant, connect a voltmeter …

  … to terminal strip X2-3 and X-2-4 (18 and 19). Terminal (19) is the earth terminal.
- Input the minimum input setpoint via terminals X2-1 and X2-2 (16 and 17).
  - The position controller must rotate to the minimum position and remain in this position without the minimum position microswitch being opened.
  - The actual value (indicated on the instrument) and the setpoint must agree (control deviation < $\pm$ 1 %).
- Enter the maximum input setpoint via terminals X2-1 and X2-2 (16 and 17).
  - The position controller must rotate to the maximum position and remain in this position without the maximum position microswitch being opened.
  - It is possible to follow on the instrument how the actual value rises proportionally to the angular position of the output drive shaft.

Once the maximum position has been reached, the actual value must agree with the setpoint (control deviation $\pm$ 0.5 %).

If the actual values correspond to the setpoints in both measurements, the settings have been carried out correctly and the position controller is operating over the set rotational angle range.

9.2.6 Checking for a line break in the setpoint cable

If the position controller is connected to the power supply (230 V AC~), and if the output drive shaft is at any position greater than the minimum position, the position controller rotates the output drive shaft to the minimum position if the input setpoint is interrupted.

9.2.7 Direction of rotation of the shafts ER 20/ER 50

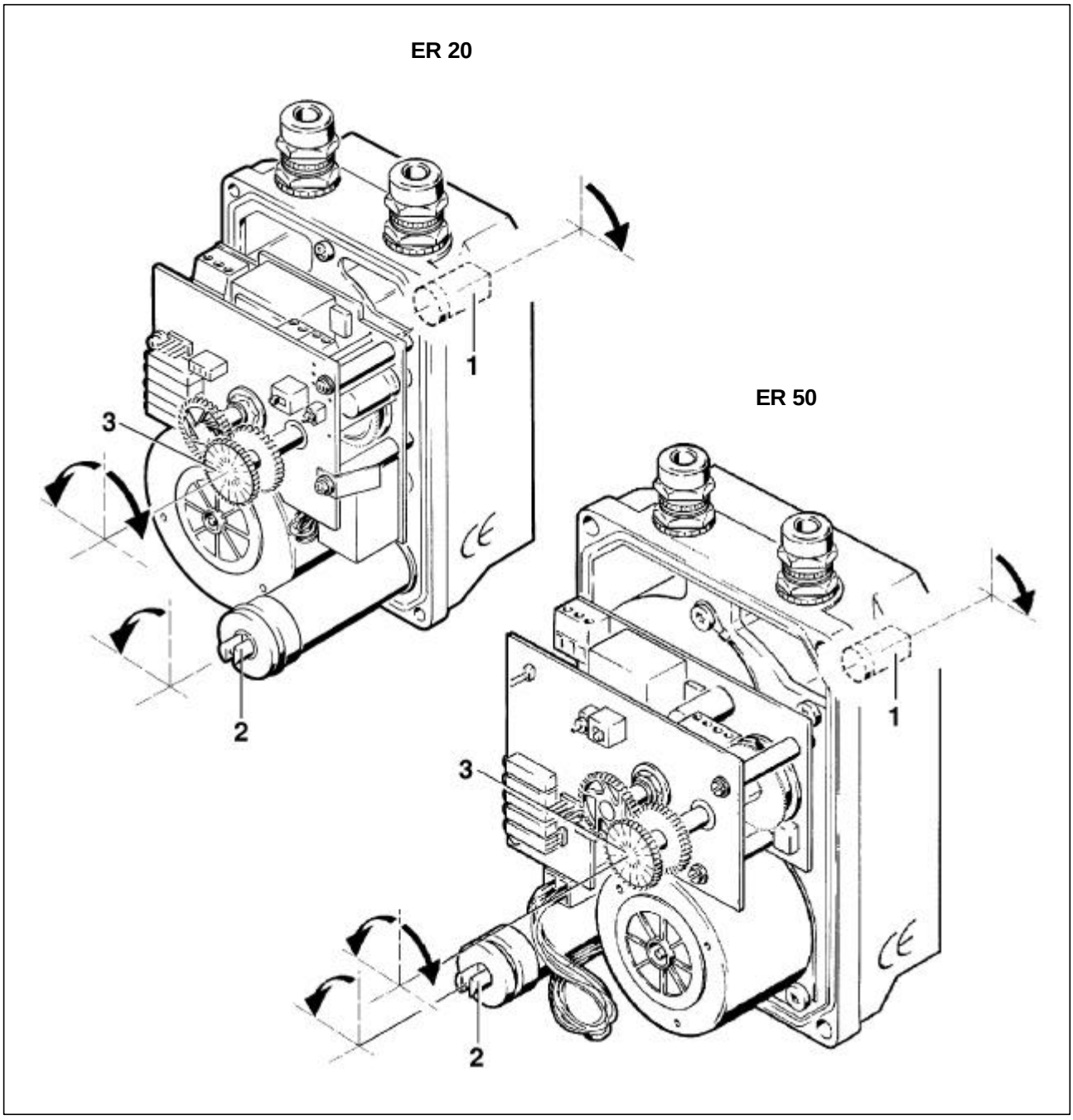


Fig. 9-2 Position controller ER 20/ER 50 - Directions of rotation for manual adjustment (option)

As the figure shows, the output drive shaft (1) and the shaft for manual adjustment of the output drive shaft (2, option) rotate in opposite directions.

In order to adjust the output drive shaft (1) by hand (e.g. in emergency operation), the shaft (2) must always be moved in the direction **counter** to the intended direction of rotation of the output drive shaft (irrespective of the type of reduction gear box).

The position indicator (3) has either the same or the opposite direction of rotation, depending on the reduction gear box installed.

9.2.8 Adjusting the position indicator - Example ER 20/ER 50

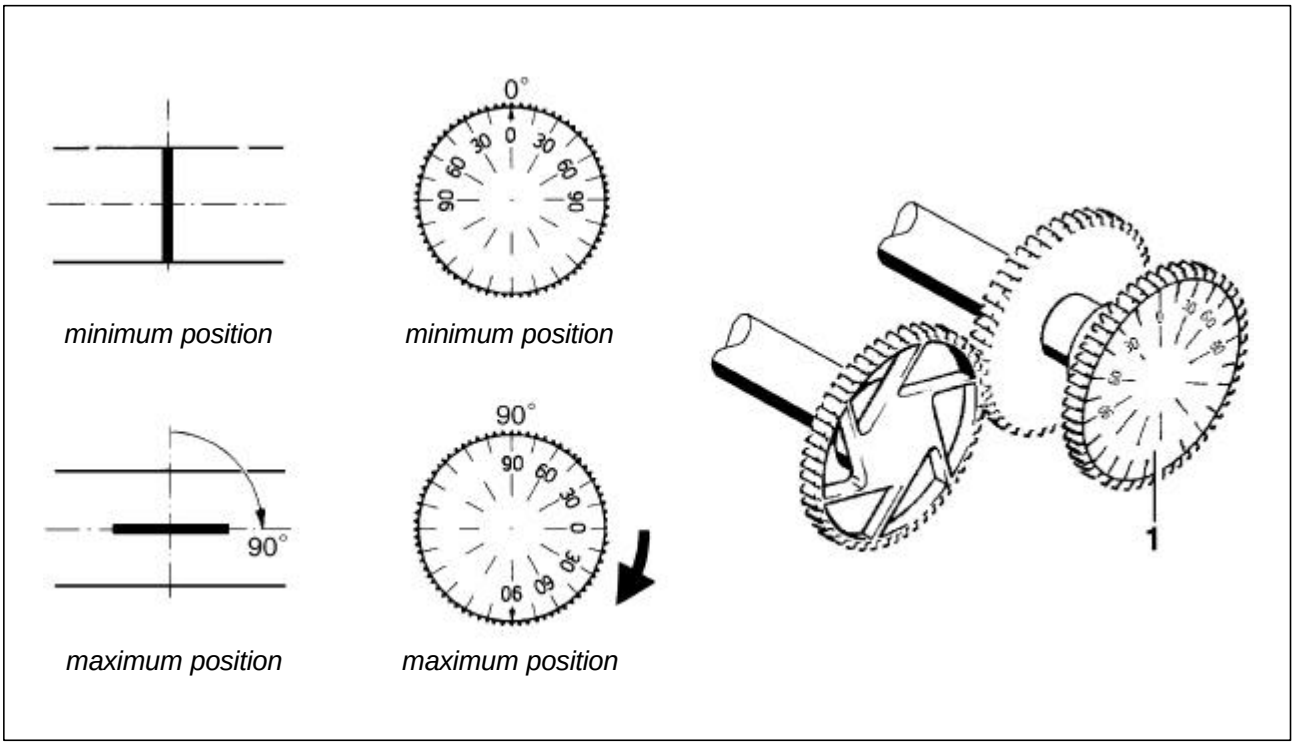


Fig. 9-3 Position controller ER 20/ER 50 - Position indicator

In the case of a position controller which is open and ready to operate, when tools are being used (for example small screwdrivers, forceps etc.), there is the risk that you may touch parts carrying mains voltage (230 V AC~) on the rear circuit board and thus receive a shock.

The position indicator (1) on the front side of the position controller shows - when correctly adjusted - the position of the actuating element. If this indication is important for operation, carry out the adjustment now.

- Slide the switch S1 (item 1, Figure 9-1) into the **right-hand** position (manual operation).
- Press the rocker switch S2 (item 2, Figure 9-1)
  - **downwards** in the case of a **right-operating** reduction gearbox,
  - **upwards** in the case of a **left-operating** reduction gearbox,

  until the actuating element is in its minimum position.
- Rotate the position indicator (1) into the position shown in Figure 9-3 (minimum position).
- Press the rocker switch S2 in the opposite direction until the actuating element is in its maximum position. The position indicator shows the angular range through which the actuating element has rotated.
- Slide the switch S1 (item 1, Figure 9-1) back into the left-hand position (automatic operation).

This completes the readjustments, checks and settings.

10. Fit housing cover

- Before you fit the housing cover onto the position controller, check the following:
  - The connecting leads are correctly screwed tightly in the terminals.
  - The switch S1 (item 1, Figure 9-1) is in the **left-hand** position (automatic operation).
  - The jumper is correctly fitted on the right-hand row of pins J1 or J2 (item 12 or 13, Figure 9-1).
  - The connecting wires between the power supply and control circuit boards are not bent or short-circuited.
  - There are no foreign bodies in the position controller.
- Ensure that
  - the leads are not trapped between the housing and the housing cover and
  - the circumferential rubber sealing ring in the housing is not damaged and is correctly seated in the groove.
- Place the housing cover onto the position controller and push it over the rubber seal of the manual adjuster.
- Screw the housing cover tight using the four screws.

11. Emergency operation

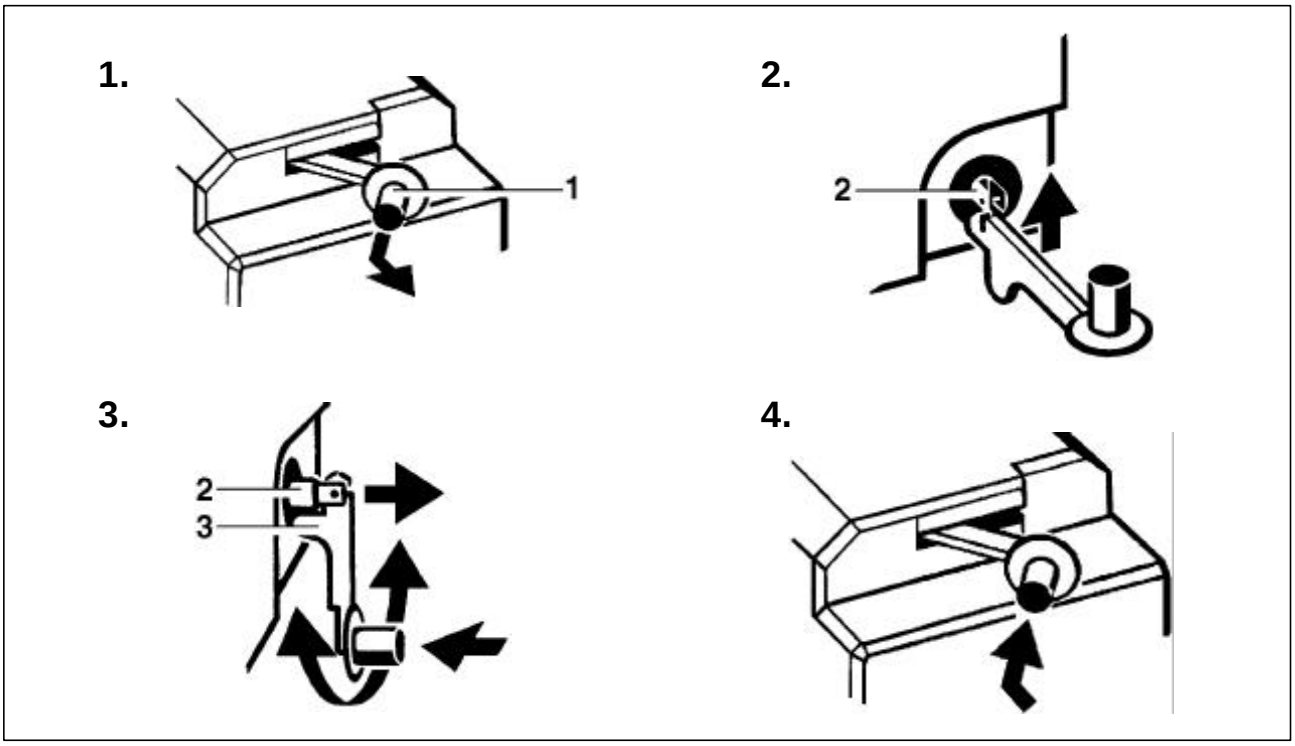


Fig. 11-1

In the case of power or controller failure or a fault in the position controller, in order to be able to adjust the actuating element in an emergency, the position controller has the capability for manual adjustment (option).

- Withdraw the manual adjusting lever (1) from its retainer in the housing cover.
- Fit the manual adjusting lever into the groove in the shaft (2).
- Press the manual adjusting lever downwards in the direction of the arrow over the cam (3).

– This causes the shaft (2) to be pushed out counter to the spring force.

- Rotate the manual adjusting lever **(whilst simultaneously pressing it down to the stop)** to the left or to the right.

– The output shaft of the position controller is simultaneously moved in the opposite direction of rotation.

- Following the manual adjustment, withdraw the manual adjusting lever and press it back once more into its retainer.
- Take note also of the graphic for emergency operation on the housing lid.

STOP

- **If necessary, inform the shift manager/safety engineer or the manager about the disturbance without delay in order, for example, to avoid an outflow/overflow of chemicals or a discharge of gases in good time by means of suitable measures.**

12. Faults

If, during the test run or during operation, a functional fault of the position controller should occur, you are requested to carry out the adjustment of the actuating element (in an emergency) by hand.

For this, observe

11. Emergency operation

and the corresponding graphic on the housing cover.

- **If necessary, inform the shift manager/safety engineer or the manager about the fault without delay in order, for example, to avoid an outflow/overflow of chemicals or a discharge of gases in good time by means of suitable measures.**
- Next, using the following list, attempt to find the reason for the causes of the fault and, if it lies within your capabilities, to correct this.

- **Do not, however, carry out any repairs on the position controller.**
- **Isolate the defective position controller from the power supply.**
- **In the case of a defect in the position controller, make contact with the manufacturer. The telephone number will be found on the inside front cover of these mounting and operating instructions.**

12.1 Fault causes

- Is the power supply to the position controller and to the controller switched on?
- Are the leads from the controller to the position controller undamaged?
- Is the position controller correctly flange-mounted to the actuating element?
- Does the actuating element move freely?
- Is the switch S1 in the correct position (automatic/manual operation)?
- Is the jumper fitted correctly to the correct row of pins?
- Has the position controller been correctly preadjusted by the manufacturer for the in stallation-specific conditions?
- Has the wrong position controller possibly been mounted?
- Is is possible to move the position controller into the end positions under manual operation?
- Is the setpoint correct?

13. Maintenance/Cleaning

13.1 Maintenance

The **Stegmann ER 20/ER 50 position controller** is maintenance-free.

- In the event that the position controller is being used outside, check, on an approximately six-monthly cycle, that the device is dry inside.

In the case of a position controller which is open and ready to operate, when tools are being used (for example small screwdrivers, forceps etc.), there is the risk that you may touch live parts (230 V AC~) on the supply board and thus receive a shock.

- In the case of a defect in the position controller, make contact with the manufacturer. The telephone number will be found on the inside front cover of these mounting and operating instructions.
- Remove the housing cover by loosening the four cross-point screws and pulling the housing cover hard to remove it. In this context, see Figure 8-2.
- To help with this, it is possible to insert a screwdriver (2) a few millimetres between housing cover and housing at the position shown in the figure, and to lever the cover open.

- **When doing this, do not damage the cover and/or the rubber sealing strip. In this case, the IP 65 degree of protection would no longer be guaranteed.**
- Hold the opened position controller only by the metallic housing and not by the electronic circuit boards or other components. Erroneous handling of the opened position controller may change the setting of the cam disc and/or short-circuit the bare connecting wires of the electronic circuit boards.
- If you find moisture in the interior of the device, attempt to find the cause for this and to eliminate it.
  - Is the moisture condensation?
  - Is the circumferential rubber sealing ring damaged?
  - Does the PG screw fitting leak?
  - Are there cracks in the housing or the housing cover?

- **If you determine that there is damage to the position controller, isolate the device from the power supply and from the controller.**

  However, before doing this, it is essential to refer to Chapter

  3. Safety advice.

13.2 Cleaning

- Clean the housing of the position controller as required using a slightly moistened, soft cloth and a normal household cleaner.

- **Do not use any abrasive, corrosive or flammable cleaning agents.**
- **Do not use any high-pressure cleaning devices.**
- **Prevent moisture or liquid penetrating into the interior of the device.**

14. Technical data

14.1 Technical data - electrical position controller Series ER 20 (standard design)

		ER 20-01	ER 20-02	ER 20-03	ER 20-04
Speed of output drive shaft	min^{-1}	2	1	0.5	0.25
Actuating time for 90 º	s	7.5	15	30	60
Nominal torque	Nm	18	20	20	20
Holding torque	Nm	6	12	20	20
Number of revolutions at output drive shaft		0.25 revolutions 0.5 revolutions 1 revolution 5 revolutions			
Nominal voltage	V	115/230 ± 10 %			
Frequency	Hz	50/60 Hz			
Nominal power consumption	VA	18	18	6.5	6.5
Emergency end position detection		2 microswitches			
Degree of protection		IP 65			
Installation position		Any			
Ambient temperature	º C	0 to + 40 at 100 % duty cycle, 0 to + 60 in S3 operation (10 min cycle, 1 min on)			
Relative humidity		90 %, non-condensing			
Cable connection		Terminal blocks for 0.4 - 2 mm^2, entry via 2 PG11 with screen connection Cable diameter 5 - 10 mm			
Lubricant		Silicone grease			
Weight	kg	1.9			
Setpoint input Current (selectable via plug-in links)	mA	0/4 - 20			
Input resistance	Ω	120			
Setpoint input Voltage (selectable via plug-in links)	V	0/2 - 10			
Input resistance	kΩ	6.25			
Actual value output Current (selectable via plug-in links)	mA	0/4 - 20			
Load resistance	Ω	100 - 470			
Actual value output Voltage (selectable via plug-in links)	V	0/2 - 10			
Load resistance	Ω	> 500			
Position error on reversing direction of rotation	º	< ± 1,5			
Max. control deviation		< ± 0.5 % of the final value			
Interfering emissions		To EN 50081-1			
Interference immunity		To EN 50082-2			

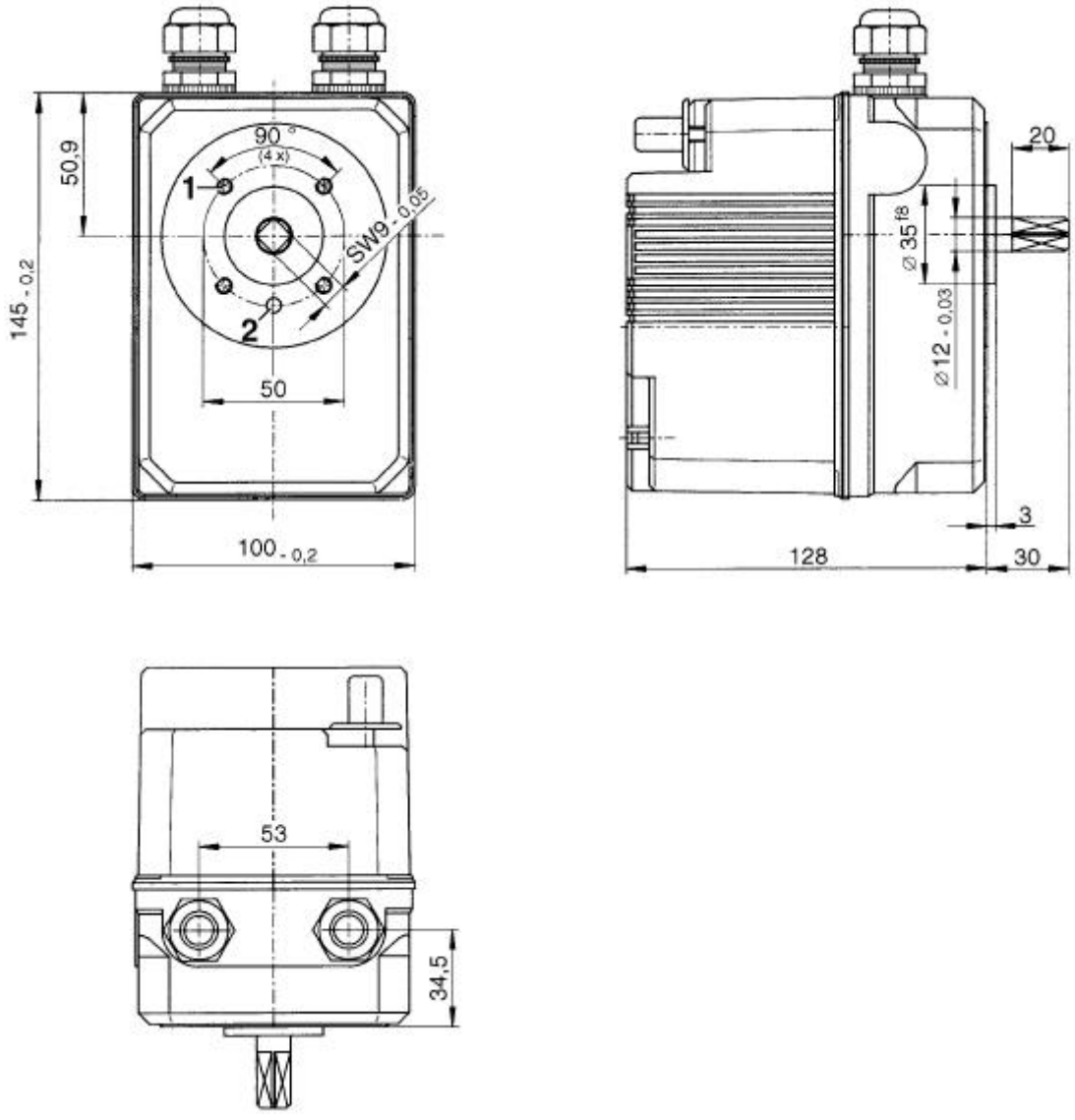
In the event of wire breakage in the setpoint cable, the position controller rotates into its minimum position.

14.2 Technical data - electrical position controller Series ER 50 (standard design)

		ER 50-02	ER 50-03	ER 50-04
Speed of output drive shaft	min^{-1}	1	0.5	0.25
Actuating time for 90 °	s	15	30	60
Nominal torque	Nm	38	50	50
Holding torque	Nm	10	25	50
Number of revolutions at output drive shaft		0.25 revolutions 0.5 revolutions 1 revolution 5 revolutions		
Nominal voltage	V	115/230 ± 10 %		
Frequency	Hz	50/60 Hz		
Nominal power consumption	VA	18	18	6,5
Emergency end position detection		2 microswitches		
Degree of protection		IP 65		
Installation position		Any		
Ambient temperature	° C	0 to + 40 at 100 % duty cycle, 0 to + 60 in S3 operation (10 min cycle, 1 min on)		
Relative humidity		90 %, non-condensing		
Cable connection		Terminal blocks for 0.4 - 2 mm^2, entry via 2 PG11 with screen connection Cable diameter 5 - 10 mm		
Lubricant		Silicone grease		
Weight	kg	2.45		
Setpoint input Current (selectable via plug-in links)	mA	0/4 - 20		
Input resistance	Ω	120		
Setpoint input Voltage (selectable via plug-in links)	V	0/2 - 10		
Input resistance	kΩ	6.25		
Actual value output Current (selectable via plug-in links)	mA	0/4 - 20		
Load resistance	Ω	100 - 470		
Actual value output Voltage (selectable via plug-in links)	V	0/2 - 10		
Load resistance	Ω	> 500		
Position error on reversing direction of rotation	°	< ± 1,5		
Max. control deviation		< ± 0.5 % of the final value		
Interfering emissions		To EN 50081-1		
Interference immunity		To EN 50082-2		

In the event of wire breakage in the setpoint cable, the position controller rotates into its minimum position.

14.3 Dimensional drawing ER 20

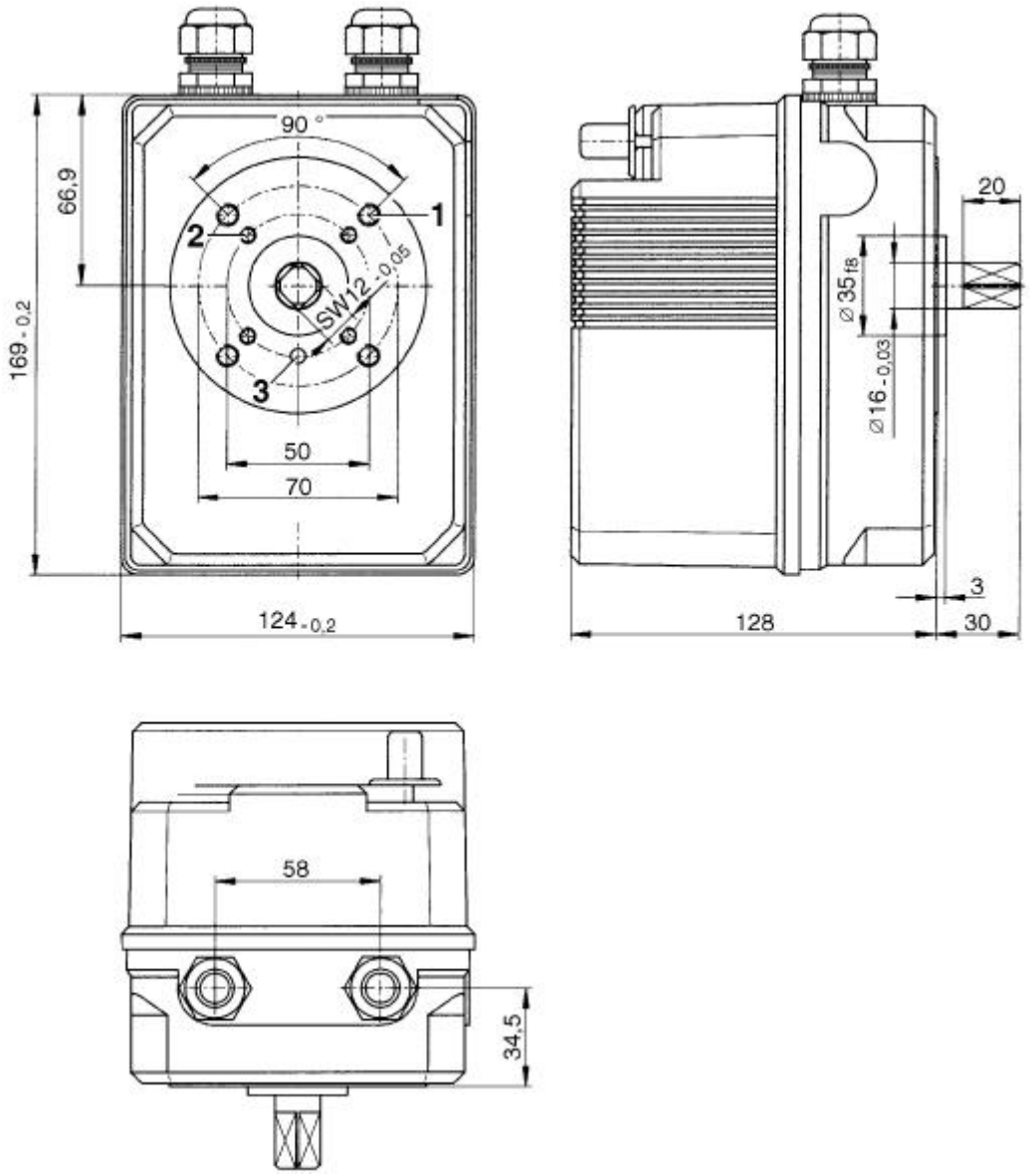


1 *Fastening hole M6; 13 deep (4 x)*

2 *Index hole Æ 6 $_{h9}$; 2 deep*

Fig. 14-1

14.4 Dimensional drawing ER 50



1 *Fastening hole M8; 13 deep (4 x)*
2 *Fastening hole M6; 13 deep (4 x)*
3 *Index hole Æ 6_{h9}; 2 deep*

Fig. 14-2

14.5 Wiring diagram ER 20

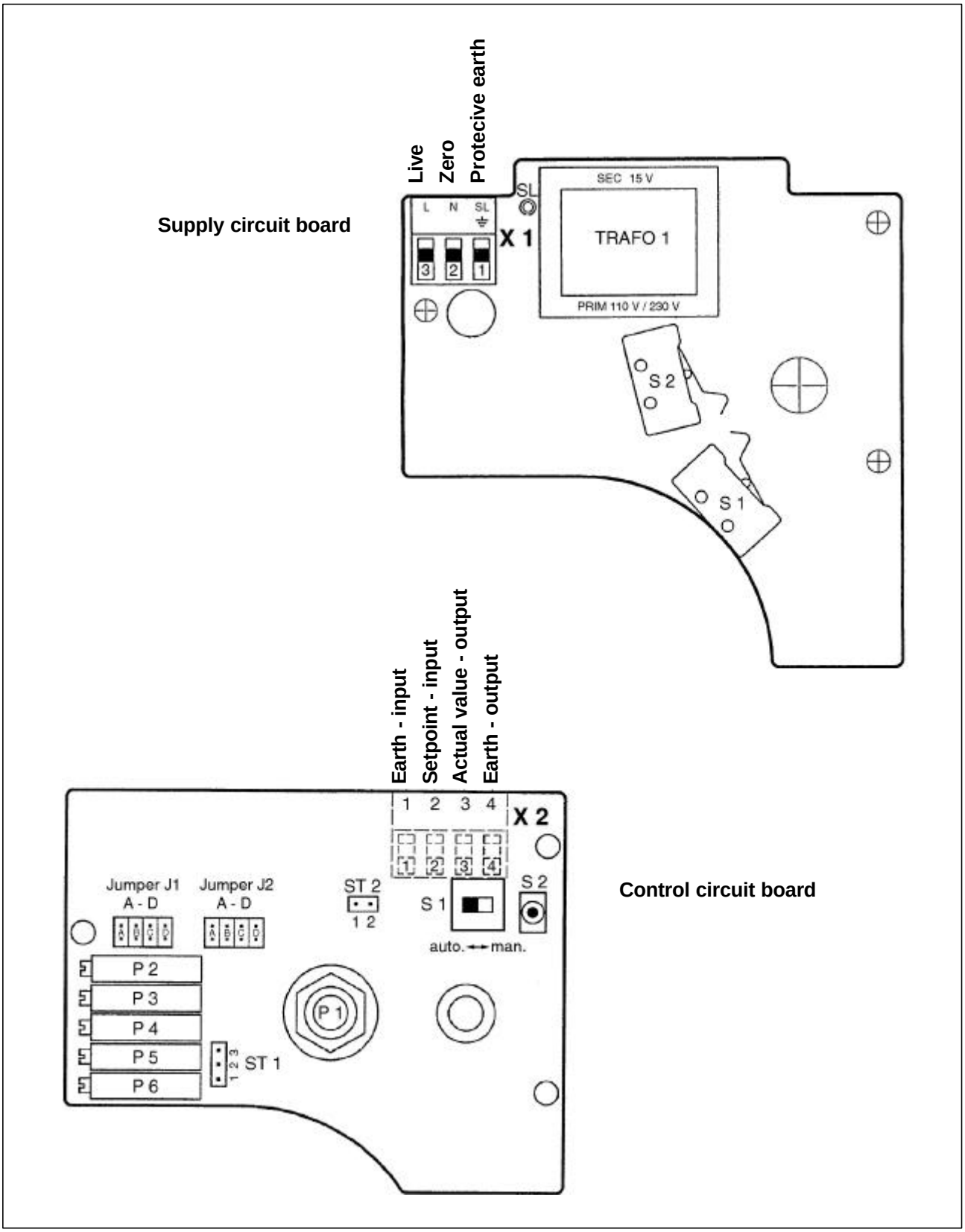


Fig. 14-3 Position controller ER 20 - Supply/control circuit board

14.6 Wiring diagram ER 50

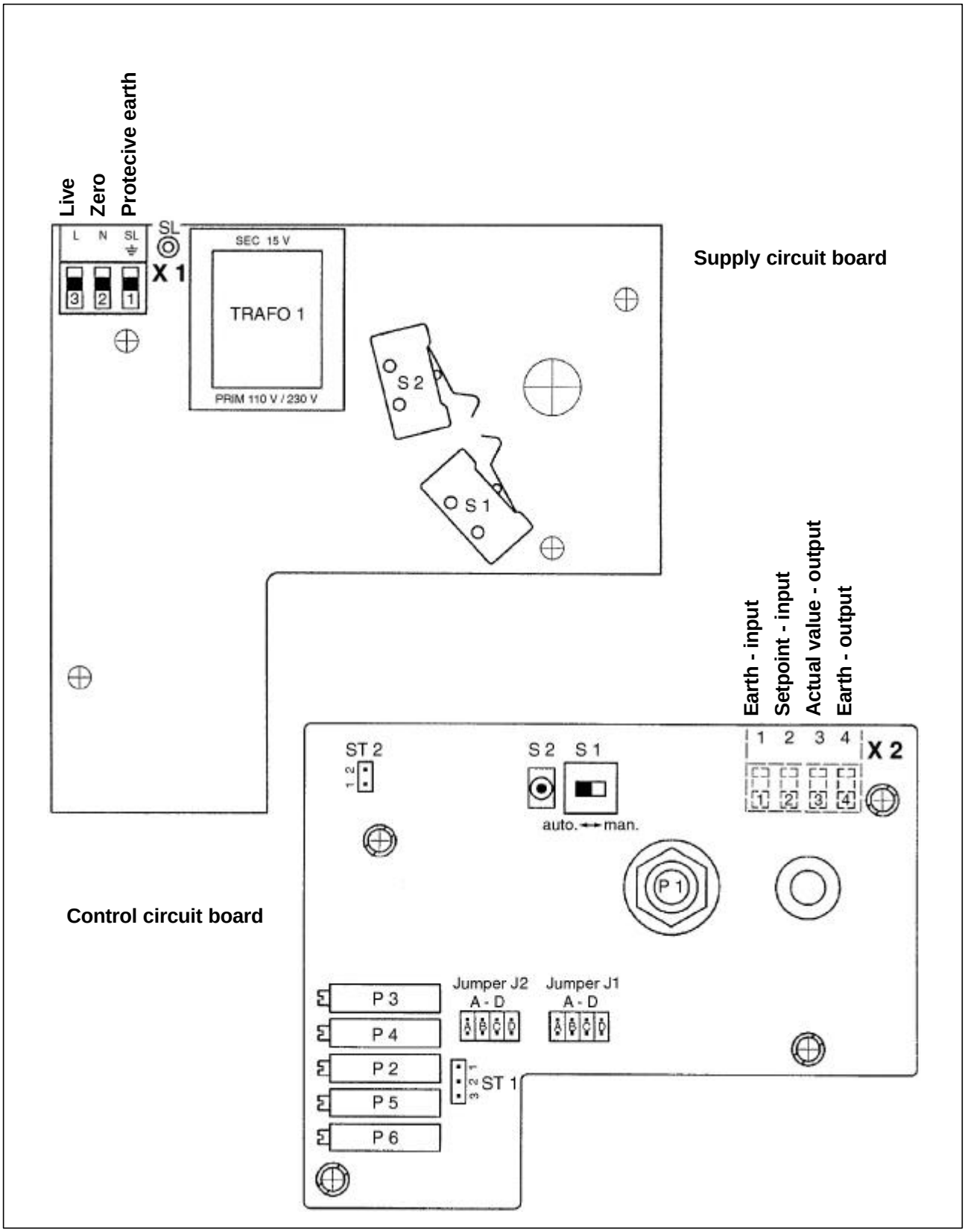


Fig. 14-4 Position controller ER 50 - Supply/control circuit board

14.7 Terminal connection diagram ER 20/ER 50

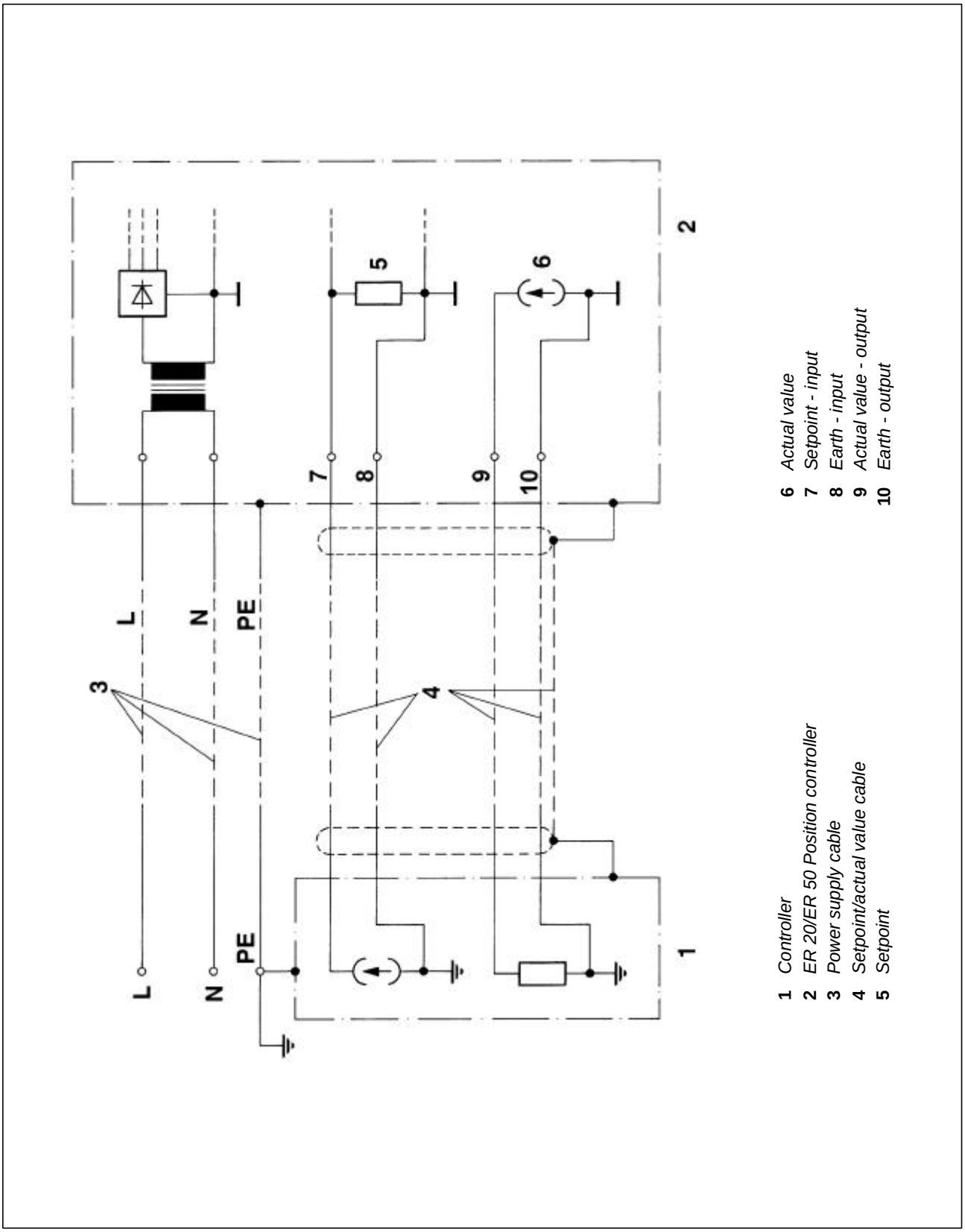


Fig. 14-5 Terminal connection diagram: power supply and setpoint/actual value cables ER 20/ER 50

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