

# MOUNTING AND OPERATING INSTRUCTIONS



## EB 8330 EN

Translation of original instructions



## Type SAM Electric Actuator

Edition July 2022



## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersaleservice@samsongroup.com).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website at [www.samsongroup.com](http://www.samsongroup.com) > **Service & Support** > **Downloads** > **Documentation**.

## Definition of signal words

### **DANGER**

*Hazardous situations which, if not avoided, will result in death or serious injury*

### **WARNING**

*Hazardous situations which, if not avoided, could result in death or serious injury*

### **NOTICE**

*Property damage message or malfunction*

### **Note**

*Additional information*

### **Tip**

*Recommended action*

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# 1 Safety instructions and measures

## Intended use

The Type SAM Electric Actuator is designed to operate a mounted globe valve used in industrial applications as well as in heating, ventilation and air-conditioning systems. Three-step control or the positioner ensures a predetermined assignment of the valve position to the input signal. The actuator is designed to operate under exactly defined conditions (e.g. thrust, travel). Therefore, operators must ensure that the actuator is only used in operating conditions that meet the specifications used for sizing the actuator at the ordering stage. In case operators intend to use the actuator in applications or conditions other than those specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

➔ Refer to the technical data for limits and fields of application as well as possible uses. See the 'Design and principle of operation' section.

## Reasonably foreseeable misuse

The actuator is not suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing service and repair work not described

## Qualifications of operating personnel

The actuator must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices must be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

## **Safety instructions and measures**

### **Personal protective equipment**

No personal protective equipment is required for the direct handling of the electric actuator. Work on the control valve may be necessary when mounting or removing the device.

- Observe the requirements for personal protective equipment specified in the valve documentation.
- Check with the plant operator for details on further protective equipment.

### **Revisions and other modifications**

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

### **Safety devices**

The actuator is deactivated when it reaches the end positions. This requires the connection and correct adjustment of the associated switches.

The actuator has an internal anti-rotation fixture.

### **Warning against residual hazards**

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

### **Responsibilities of the operator**

Operators are responsible for proper use and compliance with the safety regulations.

Operators are obliged to provide these mounting and operating instructions to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

### **Responsibilities of operating personnel**

Operating personnel must read and understand these mounting and operating instructions as well as the specified hazard statements, warning and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

### Referenced standards, directives and regulations

The Type SAM Electric Actuator fulfills the requirements of the Directives 2014/30/EU and 2014/35/EU. The declaration of conformity includes information about the applied conformity assessment procedure. This declaration of conformity is included in the annex of these instructions.

The Type SAM Electric Actuator is designed for use in low-voltage installations.

➔ For wiring, maintenance and repair, observe the relevant safety regulations.

### Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

- Mounting and operating instructions of the valve on which the electric actuator is mounted, e.g. for SAMSON valves:
  - ▶ EB 8012 for Type 3241 Globe Valve, ANSI and JIS version
  - ▶ EB 8015 for Type 3241 Globe Valve, DIN version
  - ▶ EB 8026 for Type 3244 Three-way Valve
  - ▶ EB 8051 for Type 3251 Globe Valve, DIN version
  - ▶ EB 8052 for Type 3251 Globe Valve, ANSI version

## 1.1 Notes on possible severe personal injury

### DANGER

#### **Risk of fatal injury due to electric shock.**

- Before connecting wiring, performing any work on the device or opening the device, disconnect the supply voltage and protect it against unintentional reconnection.
- Only use power interruption devices that can be protected against unintentional reconnection of the power supply.
- Do not remove any covers to perform adjustment work on live parts.

## 1.2 Notes on possible personal injury

### WARNING

#### **Crush hazard arising from moving parts.**

The electric actuator contains moving parts (actuator and plug stems), which can injure hands or fingers if inserted into the actuator.

- Do not insert hands or finger into the yoke while the valve is in operation.
- Do not touch any moving or rotating parts.
- Disconnect the supply voltage and protect it against unintentional reconnection before performing any work on the control valve.
- Do not impede the movement of the actuator or plug stem by inserting objects into their path.
- Do not operate the actuator without its cover except while testing it or adjusting the electric components.

**⚠ WARNING**

**Risk of personal injury through incorrect operation, use or installation as a result of information on the actuator being illegible.**

Over time, markings, labels and nameplates on the actuator may become covered with dirt or become illegible in some other way. As a result, hazards may go unnoticed and the necessary instructions not followed. There is a risk of personal injury.

- Keep all relevant markings and inscriptions on the device in a constantly legible state.
- Immediately renew damaged, missing or incorrect nameplates or labels.

### 1.3 Notes on possible property damage

**ⓘ NOTICE**

**Risk of damage to the electric actuator due to the supply voltage exceeding the permissible tolerances.**

The Type SAM Electric Actuator is designed for use according to regulations for low-voltage installations.

- Observe the permissible tolerances of the supply voltage.

**Risk of damage to the electric actuator due to incorrect operation of the mechanical override.**

The actuator stem of the electric actuator can be adjusted manually.

- Do not operate the manual override while the actuator is in operation or while the voltage supply is still connected.

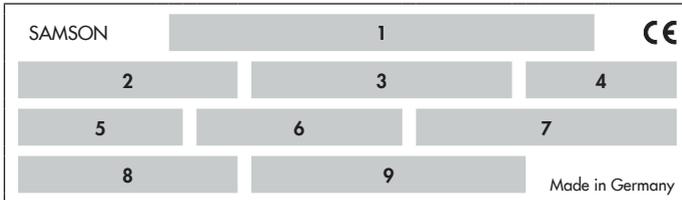
### NOTICE

#### **Risk of actuator damage due to the actuator moving past the end positions.**

- Only move the actuator stem when the actuator is mounted on the valve.
- Do not retract or extend the actuator stem beyond the specified limits (see the 'Design and principle of operation' section).
- Wire limit switches if a reversing contactor is installed.
- Check the wiring of the torque switches before starting up the actuator for the first time.
- Check the switch position of the travel-dependent limit switches before starting up the actuator for the first time.
- Check in which direction the actuator stem moves.

## 2 Markings on the device

### 2.1 Nameplate



- 1 Thrust with type designation
- 2 Power supply, frequency
- 3 Power consumption
- 4 Degree of protection
- 5 Rated travel
- 6 Stroking speed
- 7 Serial number
- 8 Electrical equipment
- 9 Configuration ID



### 3 Design and principle of operation

The electric actuator is a linear actuator. It is suitable for mounting on Series 240, 250 and 280 Valves with 15 to 120 mm travel.

The actuator is fastened to the valve bonnet with a ring nut. The actuator and plug stems are fastened together by a stem connector. Depending on the version, the Type SAM Electric Actuator has a reversible DC, AC or three-phase motors. It has an internal anti-rotation fixture.

#### Principle of operation

The rotary motion of the motor is transmitted to the nut-threaded gear via a spur gear. The actuator stem, which is protected against rotation, has a male thread that engages the nut thread.

The actuator stem performs a linear motion when the nut-threaded gear is turned by the gear of the motor.

The axial motion of the actuator stem is transferred via the adjusting lever and slider to the driving lever. The driving lever produces a proportional rotary motion using a gear wheel as a measure for the two potentiometers R1 and R2 or the position transmitter (ESR). The cam disks located on the gear wheel operate the switches **WE-S3**, **WE-S4**, **WE-S5**, and **WE-S6**.

The electrical components are housed beneath the sealed actuator cover in a compartment where they are separated from the gearing. They are protected against dust in this compartment and can be easily accessed after lifting off the actuator cover.

### 3.1 Torque switches and travel switches

#### Torque switches

- Two torque switches **DE-S1** and **DE-S2** (designed as changeover switches) They switch off the motor when the force acting on the actuator is counterbalanced by a corresponding force. As a result, they protect the valve from damage and the actuator from overload.

The **DE-S1** switch deactivates the motor based on the torque when the actuator reaches the lower end position (valve closed).

The **DE-S2** switch deactivates the motor based on the torque when the actuator reaches the top end position.

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#### **!** NOTICE

#### **Risk of valve damage due to retracting actuator stem.**

*The motor can only be deactivated by the **DE-S2** switch when a force-dependent deactivation with a retracted actuator stem is possible with the valve used (see valve documentation).*

- ➔ *Check whether a force-dependent deactivation of the actuator is permissible with a retracting actuator stem.*
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#### **i** Note

*The **switching points** of the **DE-S1** and **DE-S2** switches are preset by SAMSON and cannot be changed.*

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## Design and principle of operation

### Travel switches

- One travel-dependent changeover switch **WE-S3** to limit the travel when the stem retracts
- Two travel-dependent switches **WE-S4** and **WE-S5** to indicate the intermediate and end positions of the actuator stem

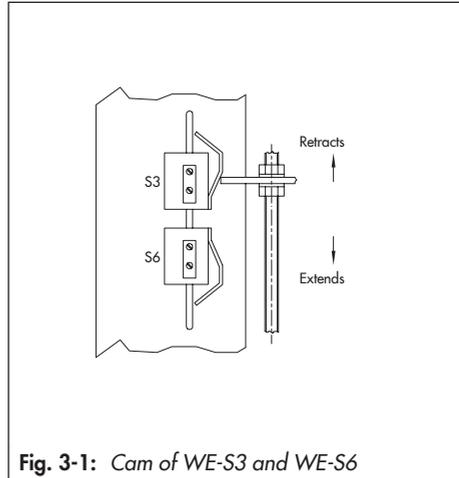
The **WE-S3** switch deactivates the motor depending on the travel when the actuator stem retracts (provided the actuator stem has completed the travel specified in the order).

The travel-dependent switches **WE-S4**, **WE-S5** and **WE-S6** (if installed) are not preset. They can be adjusted to indicate the end position or an intermediate position, if required (see the 'Start-up' section).

The travel-dependent limit switches **WE-S3** and **WE-S6** in Types SAM-01 to SAM-11 Actuators are mounted on a side mounting plate. They are operated by the cam mounted on the top end of the actuator stem.

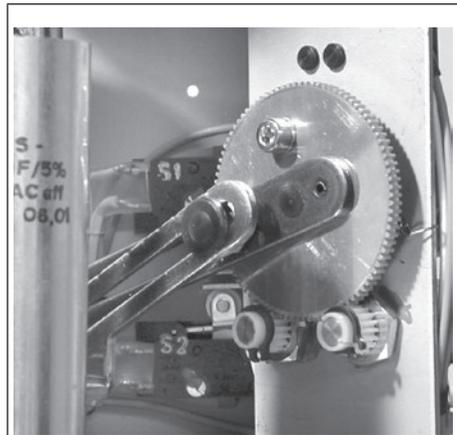
#### **i** Note

If a fourth travel-dependent switch **WE-S6** is installed, only one potentiometer R1 can be installed in the actuator version with plug connector.



**Fig. 3-1:** Cam of **WE-S3** and **WE-S6**

Depending on the actuator movement to extend or retract the actuator stem, the associated switch deactivates the actuator depending on the travel.



**Fig. 3-2:** Function of switches and potentiometers, travel transmission

## 3.2 Additional equipment

- 1 positioner **PEL 100**
- 1 position transmitter (electronic position transmitter **ESR**)
- Travel-dependent switches **WE-S4**, **WE-S5** and **WE-S6**
- 2 potentiometers **R1** and **R2** functioning as resistance transmitters **POT R1** and **POT R2**
- 1 heating

### 3.2.1 Positioner PEL 100

The positioner compares the control signal issued by the controller with the position of a potentiometer which is proportional to the travel. When the actual value deviates from the set point, a signal (manipulated variable) is issued to control the actuator.

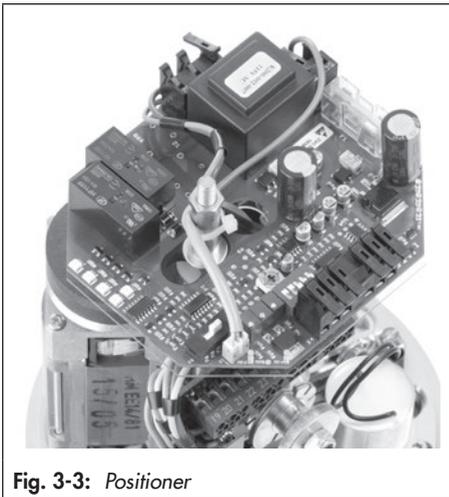


Fig. 3-3: Positioner

The positioner can be adjusted in such a way that the actuator is deactivated either by the switches (DE, WE) or by the positioner itself when the actuator reaches the end positions.

The actuator is either preset to 0 to 10 V, 0 to 20 mA, 2 to 10 V or 4 to 20 mA.

To determine the position of the actuator stem, the potentiometer R1 to track the actuator's travel movement is required in the actuator.

The travel calibration, split-range operation, reversed direction of action and dead band settings are changed using the potentiometers and switches (see Annex A).

The **dead band** determines how sensitive the actuator reacts (see Annex A).

The **wire breakage detection** function allows input signal failures to be detected (see Annex A).

### 3.2.2 Position transmitter (ESR)

The position transmitter (ESR) is used for remote analog transmission of the valve stem position. A potentiometer is used to issue a current signal, which is proportional to the travel.

The position transmitter is adjusted to the required travel. Readjustment is possible (see the 'Start-up' section).

The transmitter indicates the current travel position by issuing an output current between 0/4 and 20 mA. As a result, it is particularly suitable for remote transmission of the valve position.

## Design and principle of operation

The position transmitter can be operated in normal operation or with reversed direction of action (see the 'Start-up' section).

### 3.2.3 Travel-dependent switch WE-S6

A fourth travel-dependent switch **WE-S6** allows additional indication of valve stem positions.



Fig. 3-4: Switches and resistance transmitters

### 3.2.4 Resistance transmitters

Optionally, the actuator can be equipped with one or two resistance transmitters. They are linked to the gear of the actuator. They consist of one potentiometer, which produces a resistance signal proportional to the travel.

It can be used to assess the process of the actuator stem.

The axial motion of the actuator stem is transferred via the adjusting lever and slider to the driving lever. The driving lever produces a proportional rotary motion using a gear wheel as a measure for the two potentiometers POT R1 and POT R2 (see Fig. 3-4).

The potentiometers are preset to the required travel. Readjustment is possible (see the 'Start-up' section).

### 3.2.5 Heating

A heating resistor serves to prevent condensate from forming underneath the actuator cover, e.g. when the humidity is high, when the ambient temperatures fluctuate considerably or when the actuator is installed outdoors.

The heating resistor is controlled by a temperature switch TW (bimetallic contact). A constant supply voltage (to be specified at the ordering stage) is required to operate the heating.

The deactivation temperature is approx. 60 °C and the reactivation temperature approx. 40 °C.

### 3.2.6 Reversing contactor

For actuators for multi-phase operation or operation with a 24 V DC supply, a reversing contactor is required to be able to change the direction of the actuator stem. It can be ready installed on delivery or connected through external wiring.

### 3.3 Technical data

Table 3-1: Mechanical and general data

Type SAM ...	-01	-10	-11	-12	-13	-20	-21	-22	-23	-30	-31	-32	-33	-40	-41	-42	-50	-51	-52
Thrust	2	2	3.5	4.5	6	6	8	12	15	6	8	12	15	15	20	25	15	20	25
Rated travel	mm									15 · 30 · 60									
Stroking speed <sup>1)</sup>	15	17 · 25 · 50			17	13.5 · 25 · 50			13.5	13.5 · 25 · 50			22	15 · 25		25	15 · 25		25
		34			34	40			40	40		40	50		50	50		50	
Mounting orientation	Any mounting position, however, not with the motor suspended																		
Actuator stem	No mechanical travel stops, protected against being rotated by tongue and groove																		
Manual override	Side-mounted handwheel																		
Attachment	M30x1.5									M60x1.5									
Degree of protection	IP 65 according to DIN EN 60529																		
Protection class	I according to DIN EN 61140																		
Permissible ambient temperature range	-20 to +60 °C																		
Conformity <sup>1)</sup>	<b>CE</b>																		

<sup>1)</sup> With 50 Hz power line frequency; stroking speed increased by 20 % with 60 Hz power line frequency

<sup>2)</sup> Others on request

Table 3-2: Technical data · AC supply voltage

Type SAM ...	-01	-10	-11	-12	-13	-20 -30	-21 -31	-22 -32	-23 -33	-23 -33	-23 -33	-20 -30	-21 -31	-22 -32	-23 -33	-40 -50	-41 -51	-42 -52	
Electrical connection	Terminal block inside or in terminal box, mounted onto the actuator or as compact connector																		
Supply voltage	230 V, 50/60 Hz · 400 V, 50/60 Hz <sup>1)</sup>																		
Power consumption in VA	6.6	36.8	41.4	36.8	41.4	23	51.8	33.3	51.8	51.8	161	161	161	161	161	152	214	152 · 214	
		44	32	44	32	24.8	44	340	44	44	116	116	116	116	116	160	280	160 · 280	
Stroking speed in mm/min <sup>2)</sup>	15	17 · 25 · 50		17		13.5 · 25 · 50		13.5 · 22 · 40		22		13.5 · 25 · 50		40		15 · 25 · 50		25 · 50	
		34		34		40		40		40		40		40		40		50	
<b>Motor type</b> (depending on the stroking speed)																			
Synchronous motor	•	-	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	-
Asynchronous motor with brake	-	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asynchronous motor (optional brake, required with positioner)	-	-	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Temperature monitoring	Not required, on request only										Bimetallic switch								
Operating mode according to DIN VDE 0530 part 1, section 4	Intermittent periodic duty S4-30 % ED-600 c/h																		

1) Others on request

2) With 50 Hz power line frequency; specifications 20 % higher with 60 Hz power line frequency

**Table 3-3:** *Technical data · DC supply voltage*

Type SAM ...	-01 to -13		-20 to -33		-40 to -52	
Electrical connection	Terminal block inside or in terminal box, mounted onto the actuator or as compact connector					
Supply voltage	24 V DC					
Power consumption in W <sup>1)</sup>	8.5	16.8	26.5	64.8	48	118
Stroking speed in mm/min <sup>2)</sup>	30	50	25	60	30	60
Operating mode according to DIN VDE 0530 part 1, section 4	Intermittent periodic duty S4-30 % ED-600 c/h					

- 1) The power consumption of actuators with positioners is 1.8 W higher.  
2) The stroking speed varies depending on the load acting on the actuator.

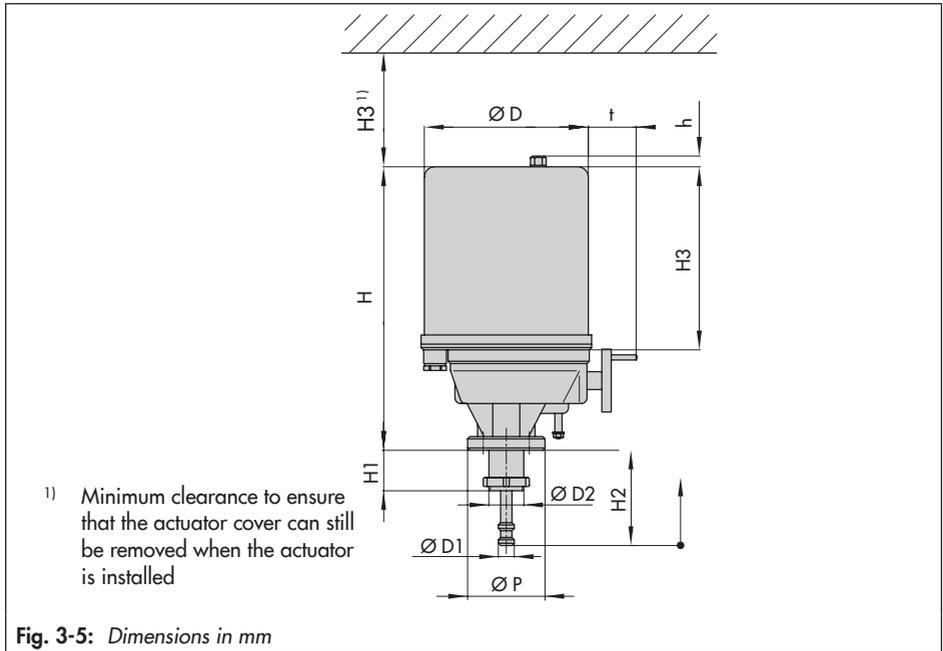
## Design and principle of operation

**Table 3-4:** Electrical equipment

Torque switches DE		
Switch DE-S ... <sup>1)</sup>	Two switches S1 and S2, max. 250 V AC	
Travel switches WE-...		
Switch WE-S... <sup>1)</sup>	One switch S3 for direction of action "retracting" and "extending" Two switches S4 and S5 for indication of intermediate positions or end positions One switch S6 as indication switch (optional)	
Load	$\cos \varphi = 1$ : max. 5 A · $\cos \varphi = 0.8$ : max. 3 A · Light bulbs: max. 2 A	
Additional electrical equipment		
Resistance transmitters POT R ...		
Potentiometer R ...	One or two potentiometers R1 and R2: 100 $\Omega$ , 200 $\Omega$ , 1 k $\Omega$	
Load	Max. 1.5 W · Sliding contact current max. 30 mA	
Position transmitter (ESR)		
Connection	Three/four-wire connection	Two-wire connection
Supply voltage $U_H$	18 to 30 V DC	18 to 30 V DC
Max. load $R_L$	$50 \times (U_H - 2.5) \Omega$	$50 \times (U_H - 12) \Omega$
Output signal	0 to 20 mA or 4 to 20 mA	4 to 20 mA
Current draw	Max. 30 mA	
Positioner (PEL 100)		
Input and output signal	0/4 to 20 mA or 0 to 10 V	
Current input impedance	50 $\Omega$	
Voltage input impedance	20 k $\Omega$	
Fuse with 230 V supply	250 mA	
Fuse with 24 V supply	1 A	
Heating		
Heating resistor	With temperature switch 24 V, 110 V or 230 V (AC/DC), 15 W	

<sup>1)</sup> Not wired upon delivery when actuators have an external reversing contactor unit

### 3.4 Dimensions



**Table 3-5: Dimensions in mm and weights**

Type	SAM-01 to SAM-13	SAM-20 to SAM-23	SAM-30 to SAM-33	SAM-40 to SAM-42	SAM-50 to SAM-52
Rated travel	15/30	30	60	60	120
H <sup>1)</sup>	268 (283)	334 (357)	334 (357)	413 (452)	448 (487)
H1	34	34	54	54	92
H2 min.	60/75	60	105	165	195
H2 max.	75/90	90	165	225	315
H3 <sup>1)</sup>	156 (171)	174 (197)	174 (197)	197(226)	187 (226)
Ø D	144	188	188	216	216
Ø D1	16	16	22	22	40
Ø D2 Thread	M30x1.5	M30x1.5	M60x1.5	M60x1.5	M100x2
Ø P	74	130	140	140	158
t	42	62	62	70	70
h	10	15	15	15	15
Approx. weight	5 kg	6 kg	7 kg	15 kg	19 kg

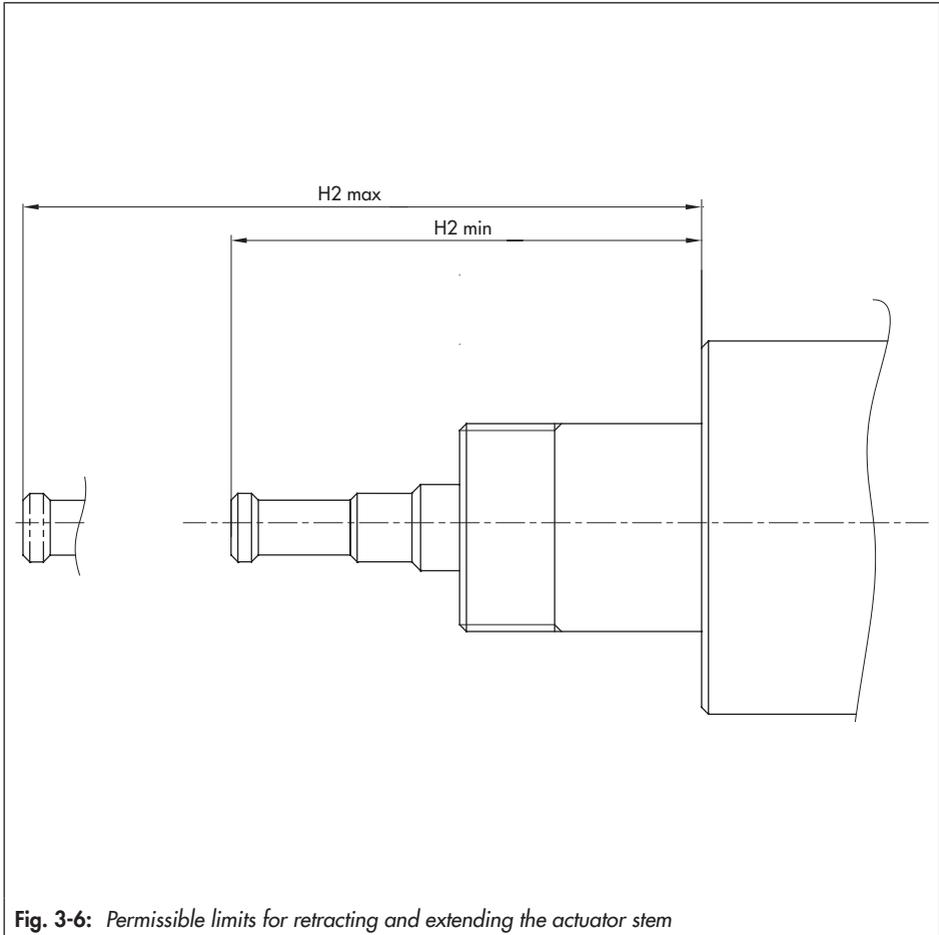
1) Dimensions in parentheses apply to actuator with positioner

### 3.5 Permissible limits

**NOTICE**

*Risk of damage to the anti-rotation fixture through extending or retracting the actuator stem too far.*

→ *Do not extend the actuator stem beyond the 'H2 min' or 'H2 max' dimensions (see Table 3-5 for dimensions).*



**Fig. 3-6:** Permissible limits for retracting and extending the actuator stem

## 4 Shipment and on-site transport

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### 4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

2. Compare the shipment received with the delivery note.
3. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).

### 4.2 Removing the packaging from the actuator

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#### **i** Note

*Do not remove the packaging until immediately before mounting and start-up.*

---

1. Remove the packaging from the electric actuator.
2. Check scope of delivery (see Fig. 4-1).
3. Dispose of the packaging in accordance with the valid regulations.

<p>1x Type SAM Electric Actuator          1x Document IP 8340          (Important Product Information)</p>
--

**Fig. 4-1:** *Scope of delivery*

### 4.3 Transporting the actuator

- Protect the actuator against external influences (e.g. impact).
- Protect the actuator against moisture and dirt.
- Observe the permissible transportation temperature of  $-20$  to  $+60$  °C.

### 4.4 Lifting the actuator

- Use suitable equipment to lift the actuator.

### 4.5 Storing the actuator

---

#### **!** NOTICE

***Risk of electric actuator damage due to improper storage.***

- *Observe the storage instructions.*
  - *Avoid long storage times.*
  - *Contact SAMSON in case of different storage conditions or longer storage times.*
- 

#### **i** Note

*We recommend regularly checking the electric actuator and the prevailing storage conditions during long storage periods.*

---

## Shipment and on-site transport

### Storage instructions

- Protect the electric actuator against external influences (e.g. impact).
- Protect the electric actuator against moisture and dirt.
- Make sure that the ambient air is free of acids or other corrosive media.
- Observe the permissible storage temperature from  $-20$  to  $+60$  °C.
- Do not place any objects on the electric actuator.

## 5 Installation

### 5.1 Installation conditions

#### Work position

If not described otherwise in the valve documentation, the work position for the control valve is the front view looking onto the operating controls.

#### Mounting orientation

Any mounting position may be used, however, the actuator must not be installed in a suspended position.

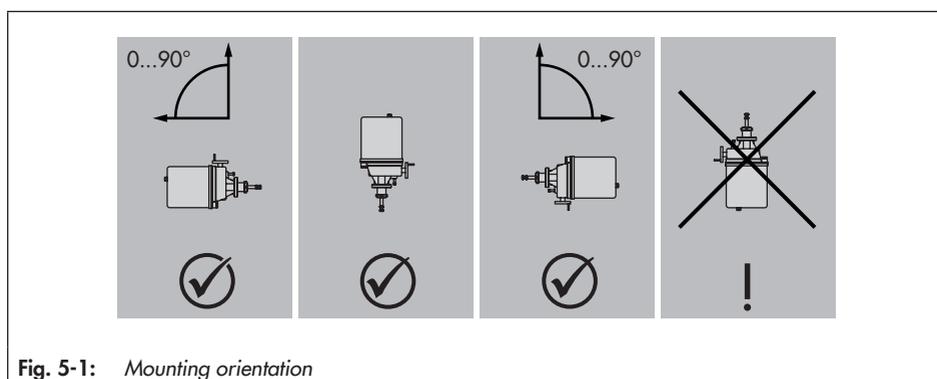


Fig. 5-1: *Mounting orientation*

When the actuator is installed with the actuator stem in horizontal position, mount the yoke such that its two rods are positioned on top of each other in the vertical plane.

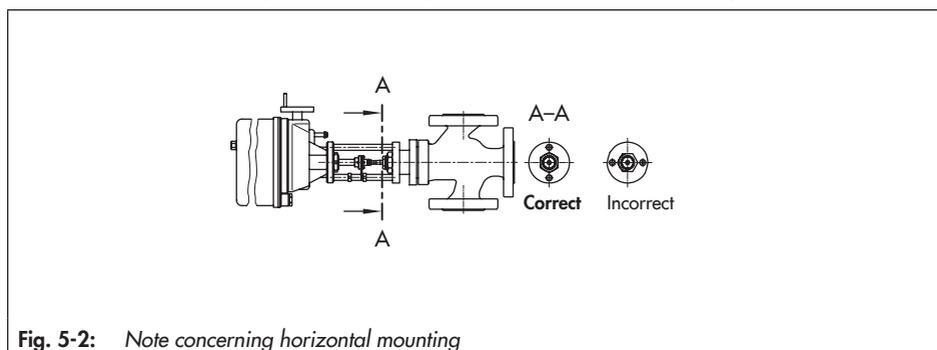


Fig. 5-2: *Note concerning horizontal mounting*

---

**i Note**

*The mounting position of the valve determines how the actuator is mounted (see associated valve documentation).*

---

**💡 Tip**

*We recommend installing valves in sizes larger than DN 100 upright with the actuator on top of the valve to facilitate valve maintenance.*

---

- Observe the clearance required to remove the actuator cover or entire actuator (see dimensional drawings in the 'Design and principle of operation' section).

## 5.2 Preparation for installation

Before installation, make sure the following conditions are met:

- The actuator is not damaged.

Proceed as follows:

- Lay out the necessary material and tools to have them ready during mounting.
- Checking the mounting conditions

### Mounting conditions

- The voltages and input signals required to operate the actuator are available.
- The electrical lines are de-energized.
- The pipelines are depressurized and cold.
- The actuator can be accessed easily after it is mounted on the valve.

- There is sufficient space to remove the actuator cover.
  - The actuator is protected against excessive heat radiation.
  - The ambient temperature range is between  $-20$  and  $+60$  °C.
  - The technical data of the actuator match the operating conditions.
  - The valve is complete (including yoke).
  - The connecting parts are suitable.
- 

**i Note**

*The fastening nut required for mounting is not included in the scope of delivery.*

---

- Any additional accessories are already installed in the actuator.
- The supply voltage on site is suitable to operate the actuator.
- The specifications on the nameplate match the motor specifications.
- The actuator travel (not yet) adjusted matches the valve travel.

### 5.3 Mounting the actuator

Upon delivery, the actuator stem is extended to the lower end position.

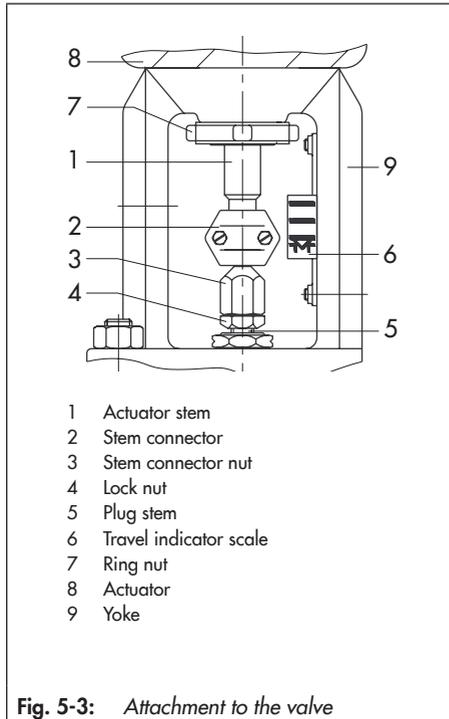


Fig. 5-3: Attachment to the valve

#### ! NOTICE

**Risk of damage to the anti-rotation fixture through extending or retracting the actuator stem too far.**

➔ Do not retract or extend the actuator stem beyond the 'min' and 'max' specifications (see 'Permissible limits' in the 'Design and principle of operation' section).

1. Push the plug stem (5) all the way into the valve.
2. Move the actuator stem (1) to its mid-position (see the 'Operation' section).
3. Place the actuator (8) onto the valve bonnet and secure using the ring nut (7).  
➔ Let the ring nut slide onto the valve stem while placing on the actuator on the bonnet.
4. Push the plug stem (5) upward. Connect the stem connector nut (3) and actuator stem (1) using the clamps of the stem connector (2) and fasten together using the screws.
5. Turn the handwheel clockwise to move the actuator stem (1) to its end position.
6. Align travel indicator scale (6) with the tip of the stem connector (2) and screw tight.
7. Use the lock nut (4) to lock the plug stem (5) against the stem connector nut (3).

#### ! NOTICE

**Risk of damage to the seat and plug of the valve and actuator by pressing or turning them too far.**

➔ Do not press or turn the plug on the seat.

#### i Note

Proceed in a similar way when attaching the actuator to other valve types (e.g. butterfly valves with mounting block).

## Installation

If the actuator is installed outdoors, it must be protected by an additional cover, e.g. against humidity (rain, snow), heat (direct sunlight), frost, strong drafts, dust etc.

If the actuator is exposed to high humidity and ambient temperatures that fluctuate considerably, we recommend installing a heating resistor to minimize condensate formation in the housing (see the 'Design and principle of operation' section).

If the actuator is installed in ambient conditions with high concentrations of pollutants (e.g. areas with a high traffic volume, industrial areas, coastal regions), the external actuator parts must be made of stainless steel and have a special paint coating.

### 5.4 Retrofitting a heating resistor

1. Take off the actuator cover.
2. Fasten the heating resistor at the intended location (see Fig. 5-4) using the two supplied self-tapping screws.
3. Fasten the temperature switch in the hole of the mounting bracket using a nut with width across flats SW 7.
4. Connect the wires of the temperature switch and the heating resistor to terminals 7 and 8.
5. Route and secure the wires in the actuator in such a way that they are protected against moving or rotating parts and cannot be damaged while removing or replacing the actuator cover.



**Fig. 5-4:** Heating resistor (bottom), temperature switch (top)

### 5.5 Electrical connection

The wiring diagram inside the actuator cover applies for electrical connection.

#### **⚠ DANGER**

**Risk of fatal injury due to electric shock.**

- Upon installation of the electric cables, you are required to observe the regulations concerning low-voltage installations according to DIN VDE 0100 as well as the regulations of your local power supplier.
- Use a suitable voltage supply which guarantees that no dangerous voltages reach the device in normal operation or in the event of a fault in the system or any other system parts.

- Only connect the actuator to the power supply after switching off the supply voltage. Make sure the supply voltage cannot be switched on again unintentionally.
- Select the wire cross-section of the lines to match the actuator's power consumption and the required line length.
- Minimum wire cross-section: 1.5 mm<sup>2</sup> (or as specified in the local regulations).
- Circuit breaker installed in the plant: max. 6 A
- Make sure controllers or switchgear connected in front of the actuator are sized sufficiently. If required, install a coupling relay between them.
- Make sure that sufficiently large wire cross-sections and reserve capacities for the transformer are used especially for 24 V actuators.

---

**i Note**

Special motor electronics ensures that the contacts of the controller's output relay (e.g. for three-step control) are protected and only loaded with relatively low control capacities when the actuator is wired according to the circuit diagrams.

The power switching is performed by a TRIAC and a relay in the motor electronics.

---



---

**! NOTICE**

**Risk of actuator damage due to the motor not being deactivated on reaching the end positions.**

- Wire the limit switches.

When an external reversing contactor unit is used, the limit switches are not wired (upon delivery). The switches must be wired on connecting the external reversing contactor unit. The actuator will be destroyed if it reaches the end stops and the motor cannot be switched off by the limit switches.

---



---

**! DANGER**

**Risk of electric shock on touching exposed live parts.**

- Switch off the supply voltage and protect it against unintentional reconnection before removing the actuator cover and when performing calibration or maintenance work.
- 

---

**! WARNING**

**Risk of personal injury due to exposed, moving or rotating parts.**

- Do not touch moving or rotating parts while performing calibration work.
  - Only operate the actuator briefly without the actuator cover while testing it or calibrating electric components (e.g. potentiometers, travel-dependent switches or positioner).
-

### ⚠ NOTICE

#### **Risk of wire damage.**

- ➔ Route and secure the wires in the actuator in such a way that they are protected against moving or rotating parts and cannot be damaged while removing or replacing the actuator cover.

#### **Actuator cover**

1. Screw off the acorn nut.
2. Remove washer.
3. Hold the actuator cover at the bottom and slightly squeeze it while pulling it off.
4. Remount the actuator cover after wiring is completed.

### 5.5.1 Three-step version



Fig. 5-5: Terminal blocks for electrical connection

#### **Connections for three-step control**

##### **Single-phase operation (AC)**

N = terminal 1

L = terminal 3

The actuator stem extends out of the actuator.

N = terminal 1

L = terminal 2

The actuator stem retracts into the actuator.

##### **Three-phase operation (AC)**

Connect a reversing contactor in series.

L1 = Terminal 1

L2 = Terminal 2

L3 = Terminal 3

##### **Operation with 24 V DC supply**

Connect a reversing contactor in series.

+ = Terminal 1

- = Terminal 2

The actuator stem extends out of the actuator.

+ = Terminal 2

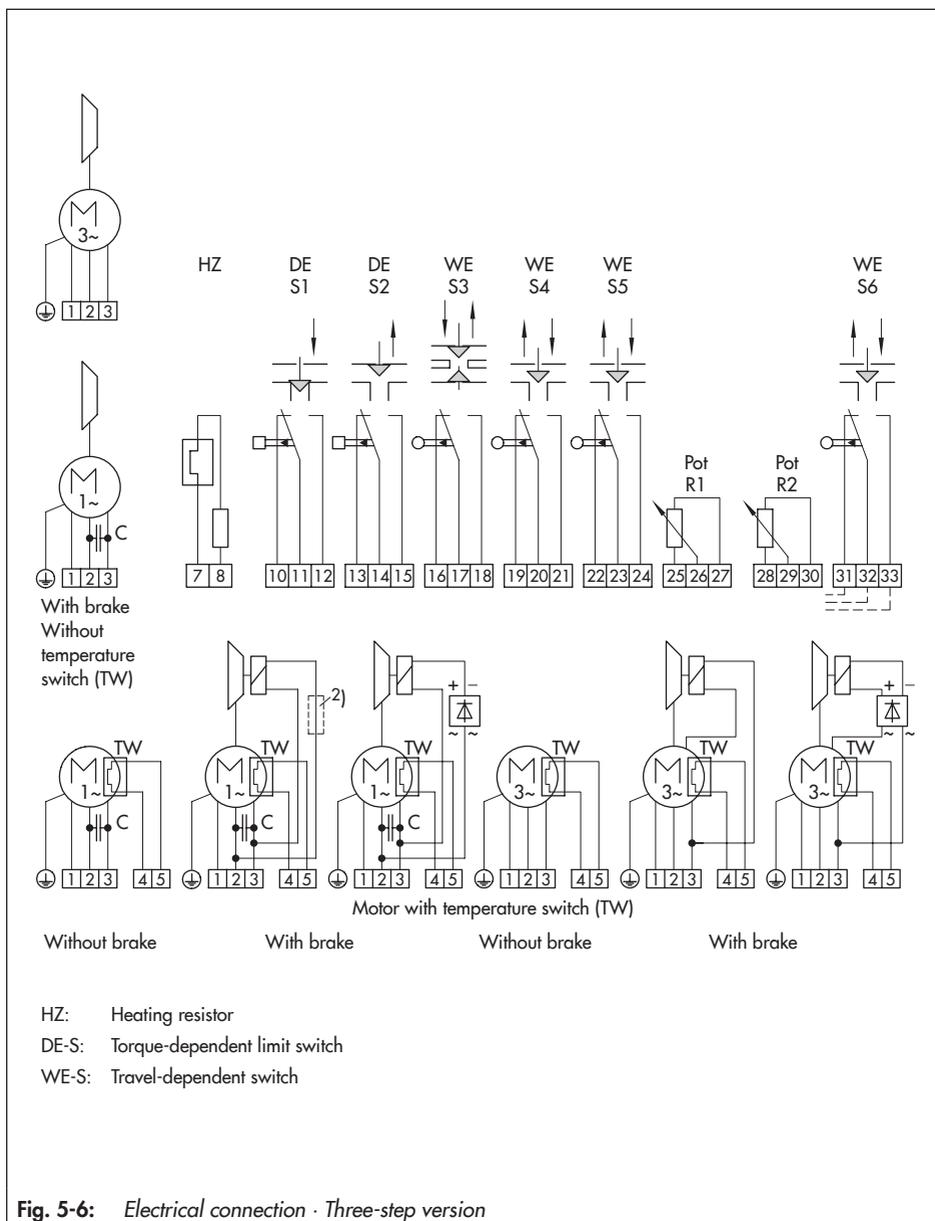
- = Terminal 1

The actuator stem retracts into the actuator.

### ⚠ NOTICE

#### **Risk of actuator damage due to incorrect direction of rotation of the motor.**

- ➔ Pay attention to the correct connection for "retracting" and "extending".



## 5.5.2 Connecting the positioner (PEL 100)

### Terminal assignment

→ See the 'Start-up' section.

To avoid interference, route the signal line separately from the voltage supply line. Particularly when using voltage signals, we recommend using a shielded cable and connecting the shield to the protective grounding (PE) connection on the actuator housing.

**Table 5-6:** *Terminal X2*

Terminal	Function
54	L (supply voltage)
55	N (supply voltage)

**Table 5-7:** *Terminal X3*

Terminal	Function
51	L ↑ (connection for actuator stem retracts)
52	N (supply voltage)
53	L ↓ (connection for actuator stem extends)

**Table 5-8:** *Terminal X4*

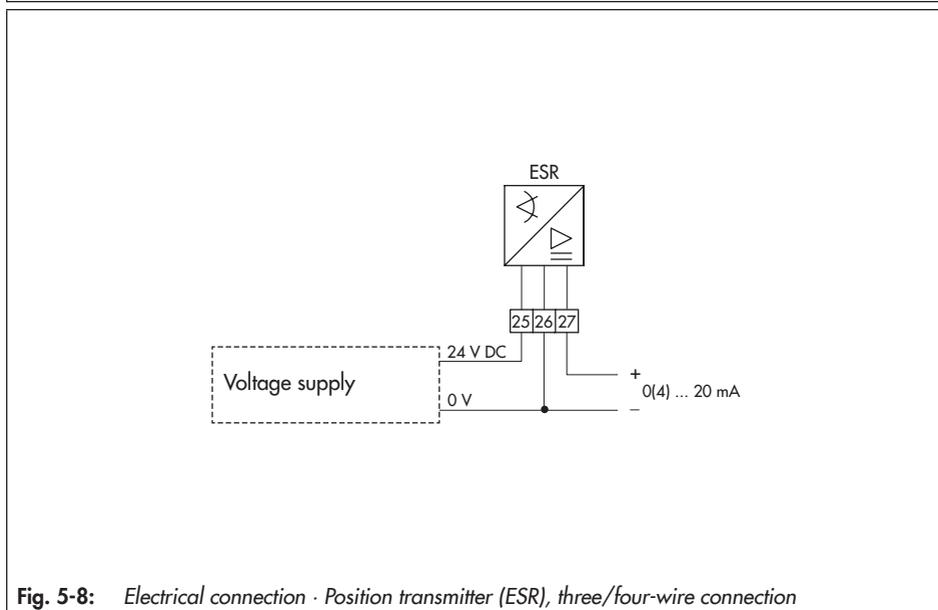
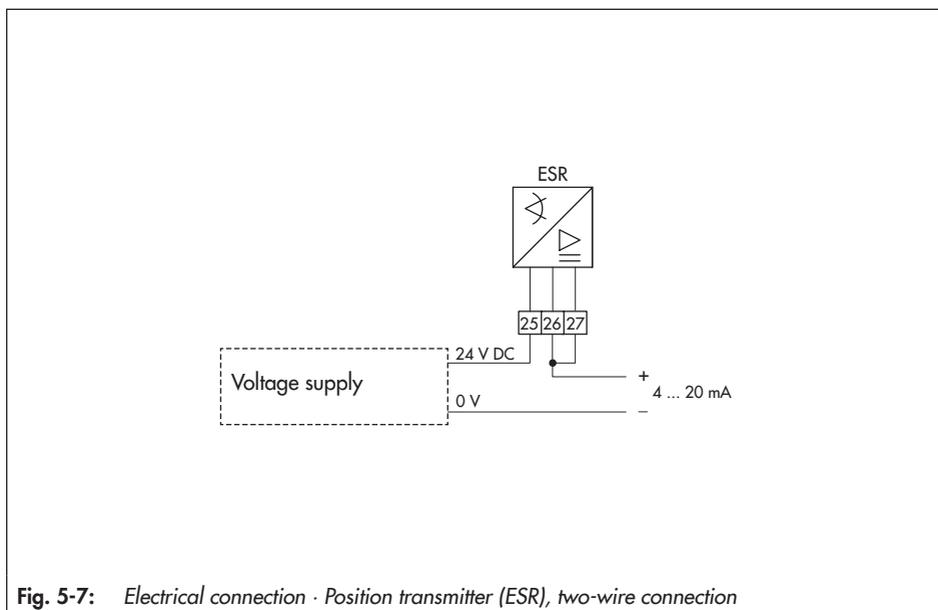
Terminal	Function
60	0/4 to 20 mA current output
61	0/2 to 10 V voltage output
58	GND
57	GND
56	0/2 to 10 V voltage input
59	0/4 to 20 mA current input

**Table 5-9:** *Connector X4*

Pin	Function	Color code
1	Max. value	Blue
2	Sensing at the slider	Red
3	Zero point	Green

## 5.5.3 Connecting the position transmitter (ESR)

The position transmitter must be powered externally with a 24 V DC supply voltage. It can be operated in a two-wire, three-wire or four-wire circuit.



### 5.5.4 Connecting the heating

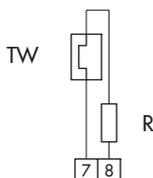


Fig. 5-9: Electrical connection · Heating resistor with temperature switch

➔ Connect the heating resistor R with temperature switch TW at terminals 7 and 8.

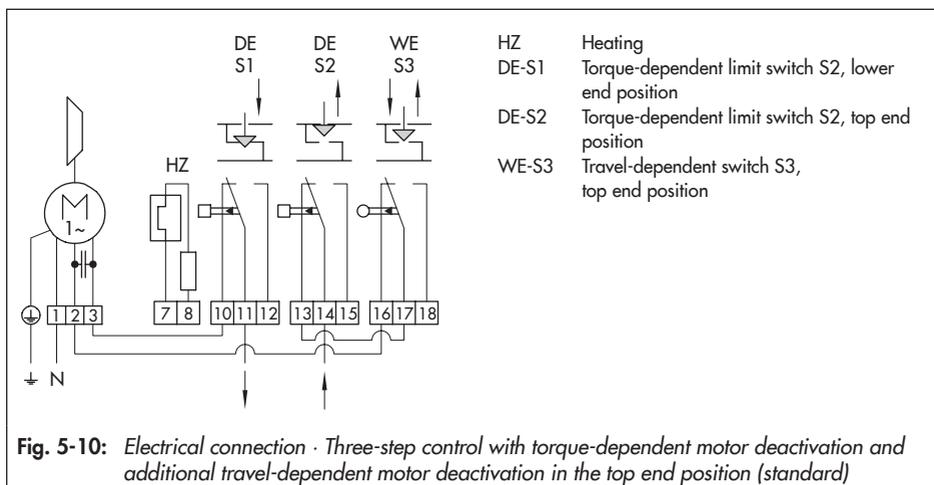
### 5.5.5 Connection examples

**Connection example 1: three-step control, torque-dependent motor deactivation in the "extending" direction, travel-dependent motor deactivation in the "retracting" direction**

- Operated using single-phase AC motor (three-step control)
- Force-dependent deactivation of the motor by switch **DE-S1** when the lower end position is reached
- Force-dependent deactivation of the motor when the top end position is reached by switch **DE-S2** connected in series with switch **WE-S3**

#### Connection

1. Connect the protective earth of the connecting line (green/yellow wire) to the ground terminal.
2. Connect N of the connecting line to terminal 1, the pulse line for actuator stem extends to terminal 11 and the pulse line for actuator stem retracts to terminal 14.
3. Install the jumpers between terminals 10 and 3, terminals 16 and 2 as well as between terminals 13 and 17.



### Connection example 2: three-step control, torque-dependent motor deactivation in the "extending" and "retracting" direction

#### NOTICE

**Risk of valve damage due to torque-dependent motor deactivation in the end positions.** If the actuator is to be used with only two torque-dependent switches **DE-S1** and **DE-S2**, the associated valve must be designed to withstand the actuator thrust.

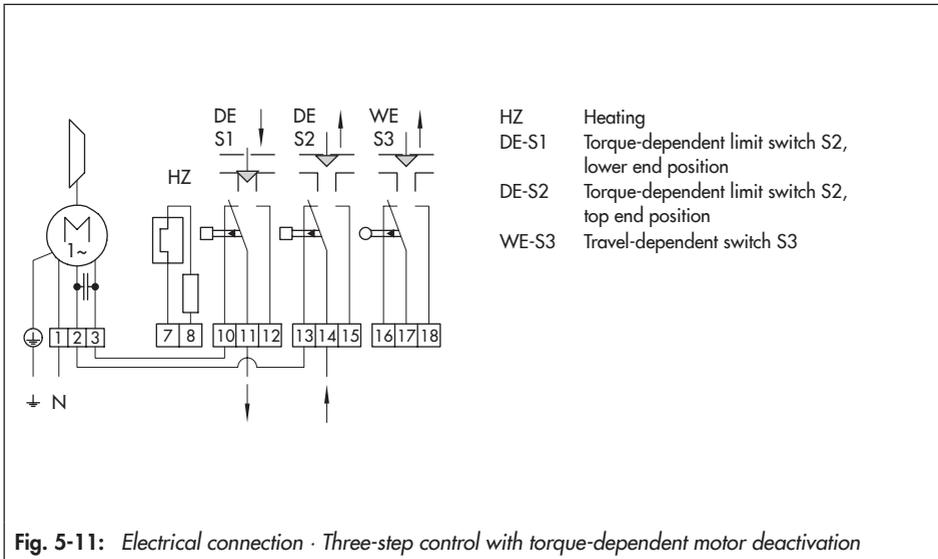
➔ Refer to the technical details in the valve documentation. If in doubt, contact SAMSON.

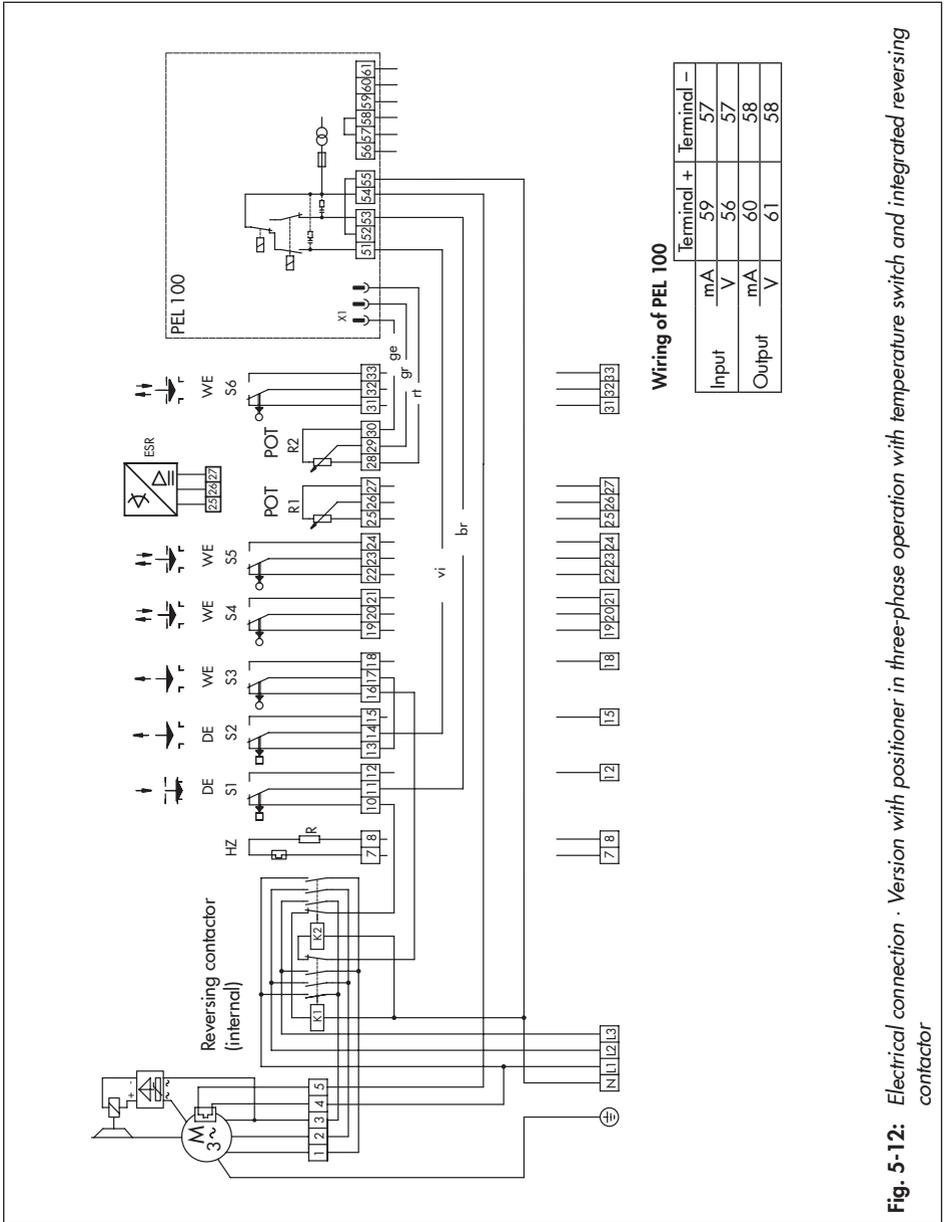
- Operated using single-phase AC motor (three-step control)
- Force-dependent deactivation of the motor by switch **DE-S1** when the lower end position is reached
- Force-dependent deactivation of the motor by switch **DE-S2** when the top end position is reached

## Installation

### Connection

1. Connect the protective earth of the connecting line (green/yellow wire) to the associated ground terminal.
2. Connect N of the connecting line to terminal 1, the pulse line for actuator stem extends to terminal 11 and the pulse line for actuator stem retracts to terminal 14.
3. Install the jumpers between terminals 10 and 3 as well as between terminals 13 and 2.

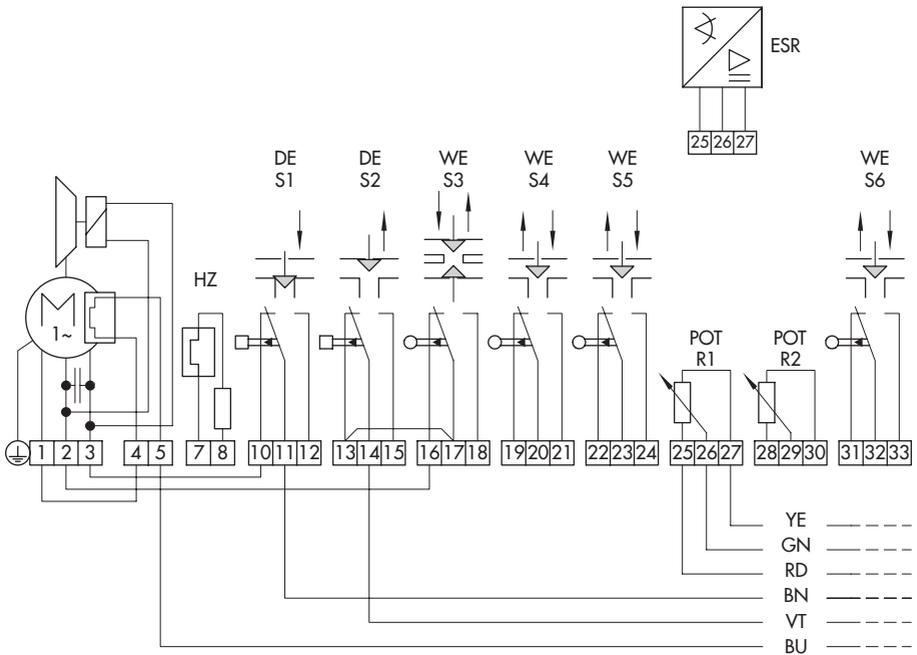




**Wiring of PEL 100**

	Terminal +	Terminal -
Input	mA 59	57
	V 56	57
Output	mA 60	58
	V 61	58

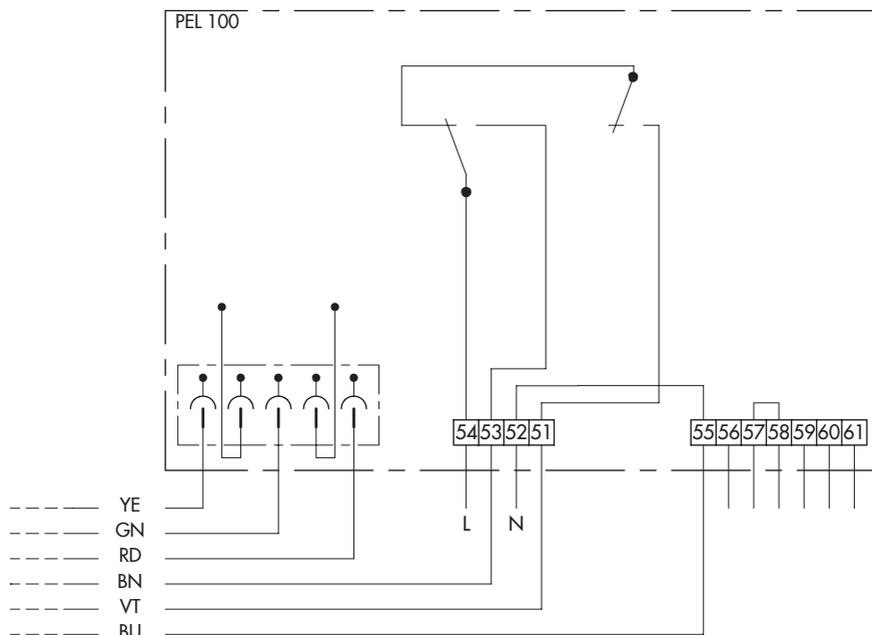
**Fig. 5-12:** Electrical connection · Version with positioner in three-phase operation with temperature switch and integrated reversing contactor



**i Note**

- The connection diagram shows maximum equipping options.
- Input 0/4 to 20 mA or 0/2 to 10 V fixed by SAMSON depending on the order specifications

Fig. 5-13: Electrical connection · Version with positioner in single-phase operation

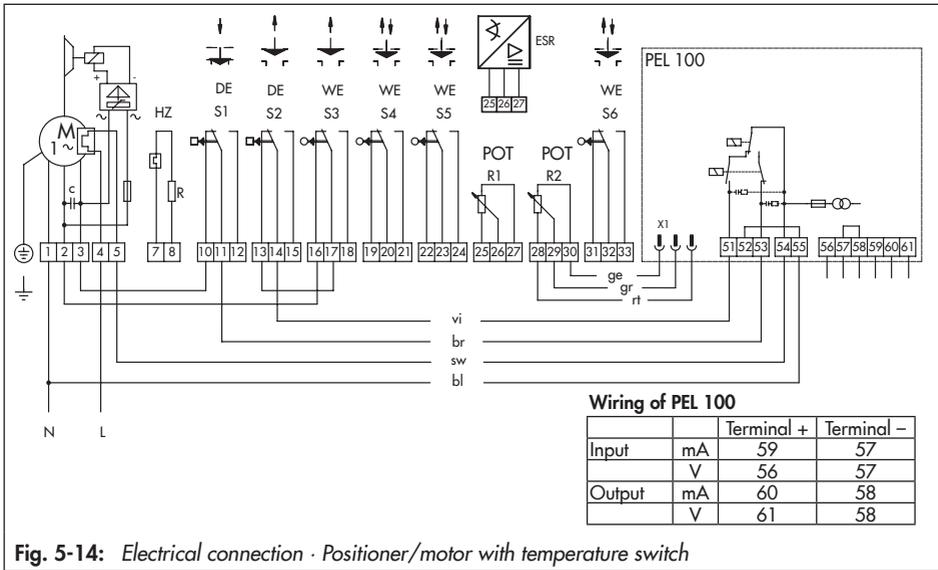


- DE Torque-dependent switch
- WE Travel-dependent switch
- S3 for travel stop
- S4 to S6 for indication of intermediate positions
- POT R1/2 Resistance transmitter
- HZ Heating (heating resistor with thermocouple)
- ESR Position transmitter
- PEL 100 Positioner

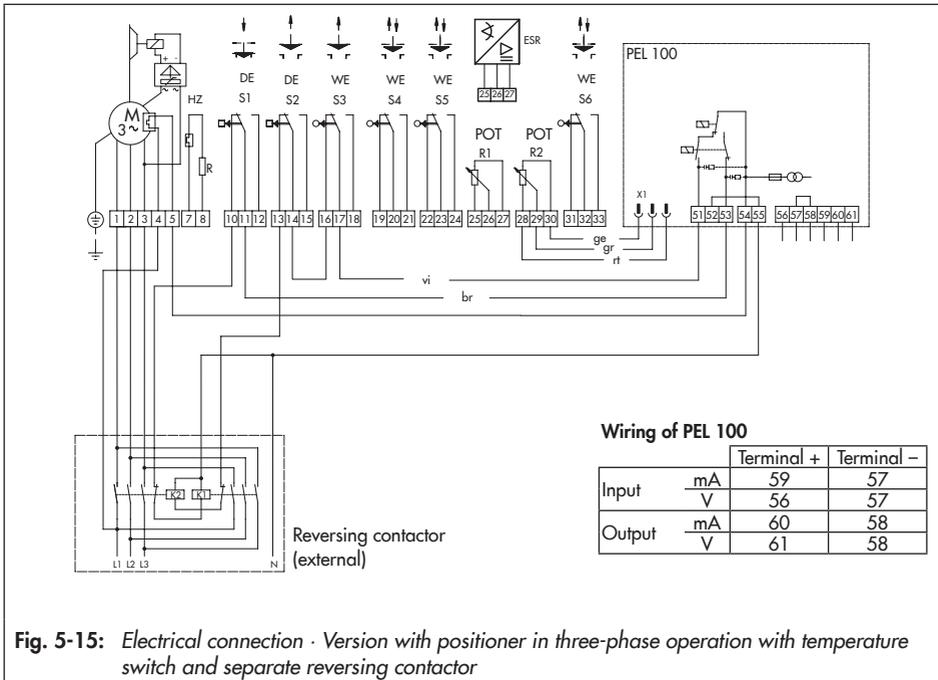
**Wiring of PEL 100**

		Terminal +	Terminal -
Input	mA	59	57
	V	56	57
Output	mA	60	58
	V	61	58

# Installation



**Fig. 5-14:** Electrical connection · Positioner/motor with temperature switch



**Fig. 5-15:** Electrical connection · Version with positioner in three-phase operation with temperature switch and separate reversing contactor

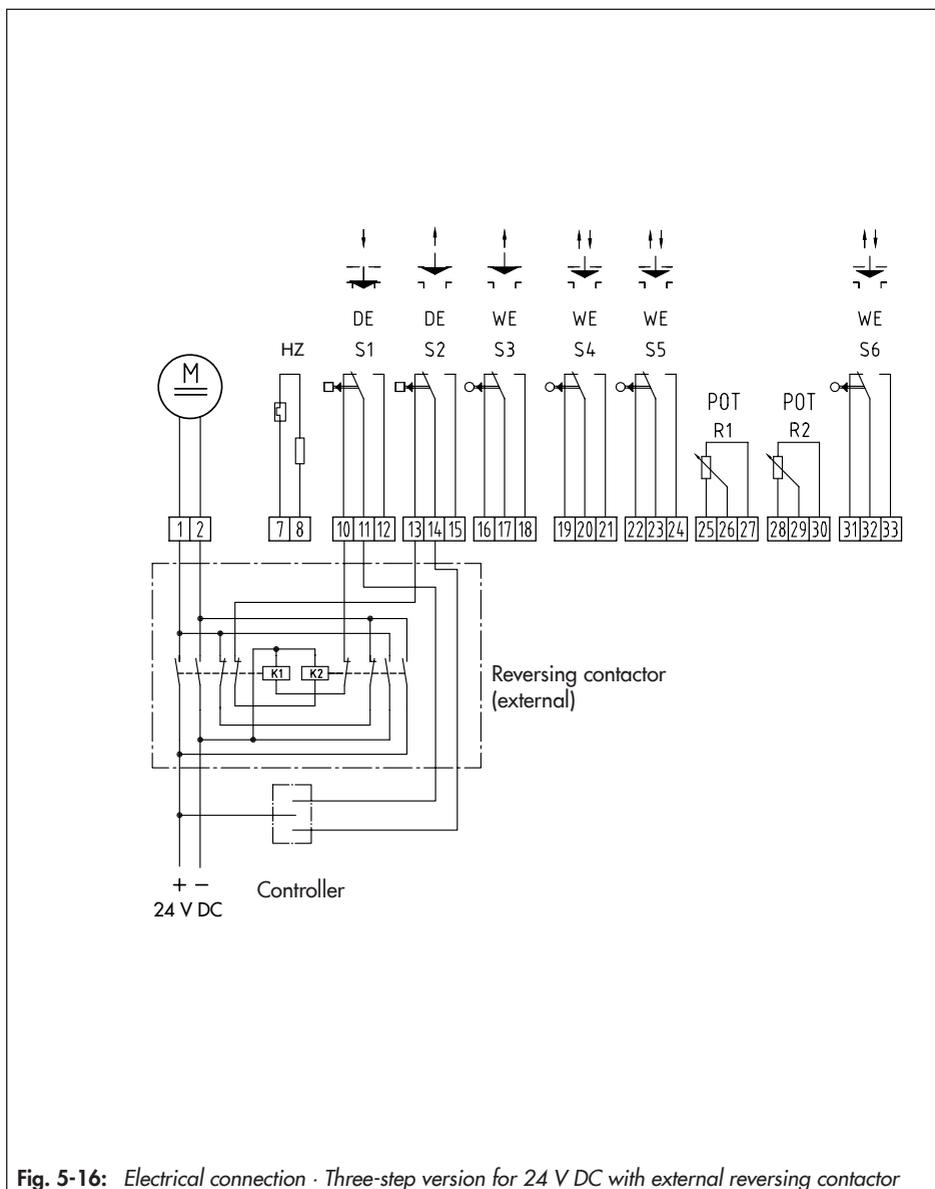


Fig. 5-16: Electrical connection · Three-step version for 24 V DC with external reversing contactor

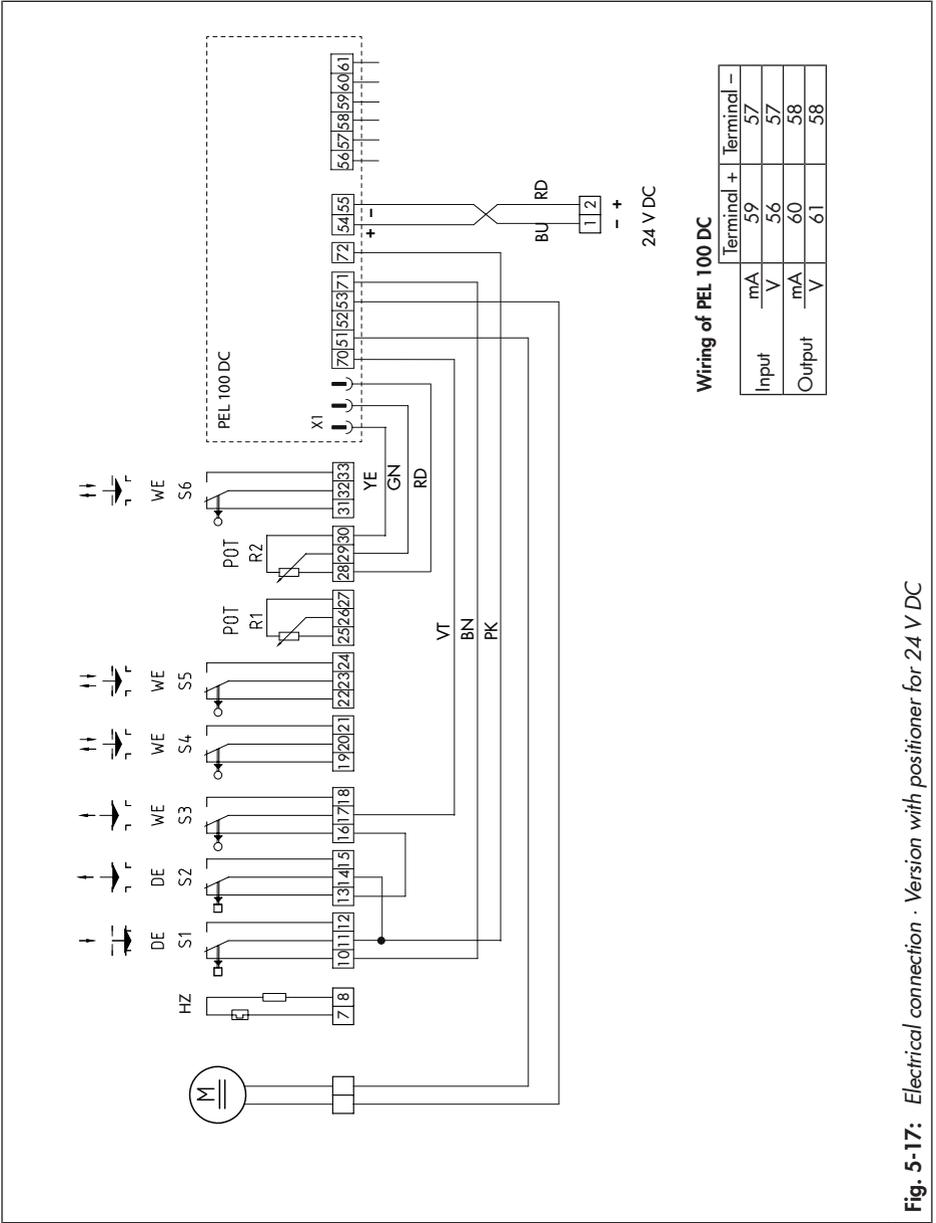


Fig. 5-17: Electrical connection · Version with positioner for 24 V DC

**Color code for Fig. 5-12 to Fig. 5-17**

YE = Yellow  
GY = Gray  
RD = Red  
VT = Violet  
BN = Brown  
BK = Black  
BU = Blue  
PK = Pink



## 6 Operation

### 6.1 Device overview and operating controls

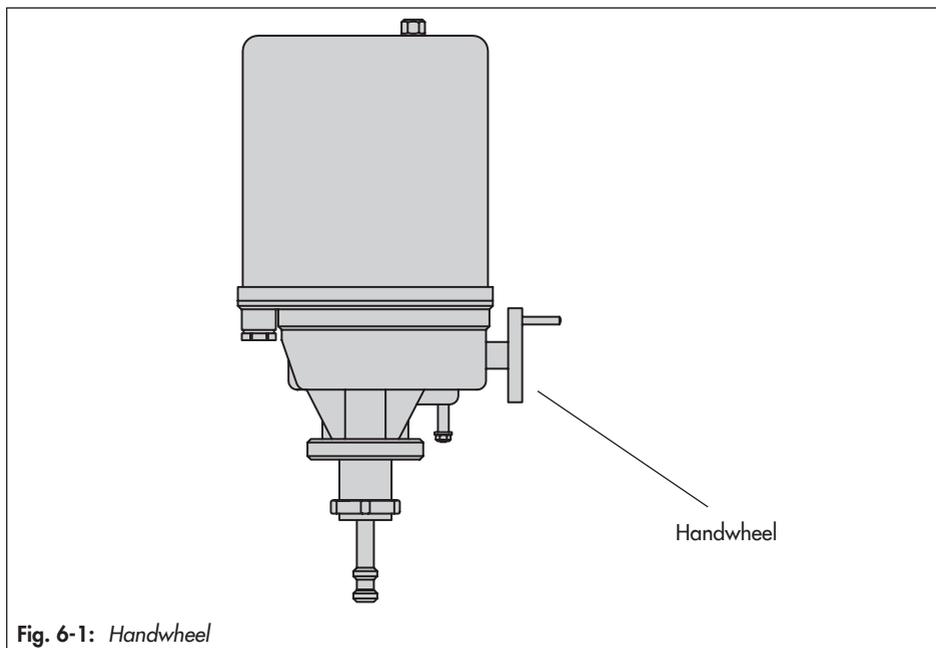


Fig. 6-1: *Handwheel*

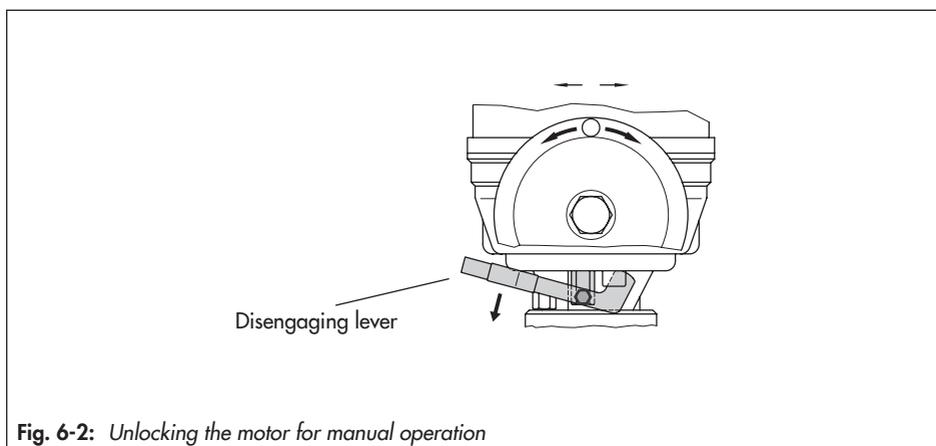


Fig. 6-2: *Unlocking the motor for manual operation*

### 6.2 Manual override

The actuator stem can be extended or retracted manually using the handwheel in the event of a power supply failure or when installing or adjusting the actuator (see the 'Operation' section).

---

#### **!** NOTICE

***Risk of actuator damage due to incorrect use of the handwheel.***

- *Do not operate the handwheel while the motor is in motion.*
  - *Do not move the stem with the handwheel beyond the adjusted travel range (see "Permissible limits" in the "Design and principle of operation" section).*
- 

#### **Unlocking the motor**

Before the handwheel can be used to move the actuator stem, the motor must be unlocked mechanically using the disengaging lever (see Fig. 6-2 and the 'Operation' section). The actuator returns to motor operation automatically as soon as the disengaging lever is released.

## 7 Start-up

### Adjusting the travel

Upon delivery, the actuator is adjusted to the travel specified in the order.

→ If required, this default travel can be changed or adjusted.

The slotted lever connected to the actuator stem has travel markings. The adhesive scale indicates adjustable travel values.

---

#### **!** NOTICE

***Risk of actuator damage due to the actuator stem being moved outside the permissible range.***

→ *Observe the permissible limits on retracting or extending the actuator stem (see the 'Design and principle of operation' section).*

*This applies to all operations in which the actuator stem is moved manually.*

---

#### **How to proceed:**

1. Extend the actuator stem to the lower end position. The two positioning levers are parallel to each other (travel indicator at the bottom marking).
2. Use an open-end wrench with width across flats (SW) 10 to remove the flat nut from the slider.
3. Move the slider between the two slotted levers to set the desired travel according to the travel markings.
4. Secure the slider again using the flat nut.
5. Move the position indicators on the yoke to the new end positions.

---

#### **i** Note

*The travel can be adjusted continuously as specified on the nameplate (see the 'Markings on the device' section). Remember to readjust the travel-dependent switch **WE-53** as well after the travel has been changed.*

---

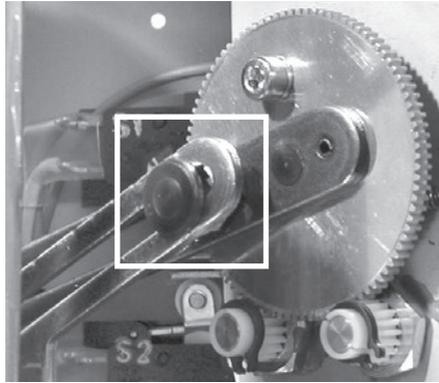


Fig. 7-1: Travel adjustment

## 7.1 Three-step version

1. Make sure that the supply voltage is connected to the terminals.
2. Use the handwheel to move the actuator stem to 50 % of the travel range (see the 'Operation' section).

---

### ⚠ NOTICE

**Risk of actuator damage due to the actuator stem being moved outside the permissible range.**

→ Observe the permissible limits on retracting or extending the actuator stem (see the 'Design and principle of operation' section).

3. Briefly apply the supply voltage separately to each terminal for the direction of action **extending** and **retracting**.

---

### ⚠ NOTICE

**Risk of actuator damage due to incorrect direction of rotation of the motor.**

→ Pay attention to the correct connection for "retracting" and "extending".

---

4. Check whether the actuator stem moves in the right direction. If this is not the case, exchange the connections as described in the 'Installation' section.
5. Use an insulated screwdriver to operate the switching rollers of the switches and check whether the switches really deactivate the motor:
  - When the actuator stem extends:  
top switch **DE-S1**
  - When the actuator stem retracts:  
bottom switch **DE-S2**
  - If required, switch the motor supply jumpers at terminals 2 and 3.

## 7.2 Positioner

### 7.2.1 Calibrating the travel

The positioner is adjusted by SAMSON for the specified travel. As a result, only slight calibrations are necessary.

1. Apply the lower value of the input signal range (0 or 4 mA, 0 or 2 V).
2. Turn potentiometer P1 counterclockwise until the actuator is deactivated by the associated switch and LED V19 just remains illuminated.
  - Check the switching behavior by turning the potentiometer.
3. Apply the higher value of the input signal range.
4. When the switch is deactivated, turn potentiometer P2 clockwise until the LED V18 blanks out. Then turn potentiometer P2 counterclockwise until the LED reilluminates.

---

**i Note**

*If the potentiometer's full angle of rotation cannot be used when the travel is very small, use the spreading function to adapt the input range. Activate this function by setting switch **S1.2** to OFF (see Table 7-2).*

---

5. If required, turn potentiometer P4 counterclockwise to shift the top deactivation point.

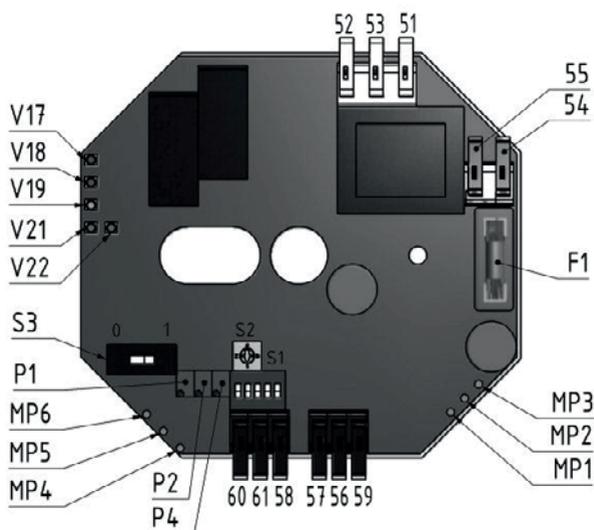


Fig. 7-2: Printed circuit board of PEL 100, viewed from the top

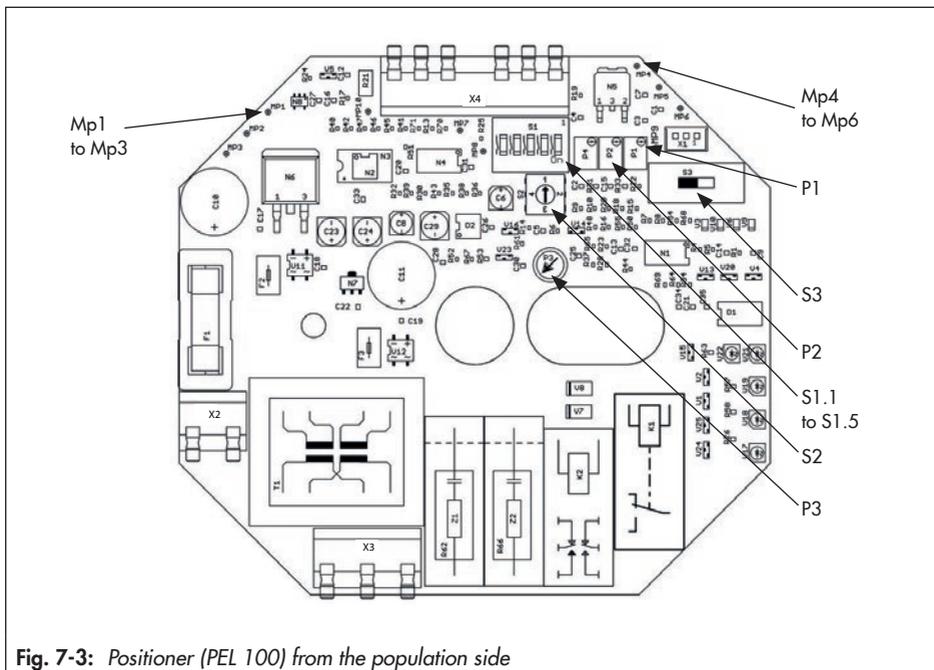


Fig. 7-3: Positioner (PEL 100) from the population side

Table 7-1: Potentiometers

Potentiometer P1	
Function	Lower limit adjustment
Action	Turn clockwise to lower the limit
Potentiometer P2	
Function	Upper limit adjustment
Action	Turn clockwise to lower the limit
Potentiometer P3	
Function	Span adjustment
Action	Turn counterclockwise to spread the resistance signal range of the potentiometer.

Table 7-2: Switches

Switch	Function	ON	OFF
S1.1	Preset zero	0 mA	4 mA
S1.2	Spreading	Off	On
S1.3	Fail-safe action: actuator stem extends	On	Off
S1.4	Fail-safe action: actuator stem retracts	On	Off
S1.5	Fail-safe action	On	Off
Switch	Description	Position	Action
S2	Dead band	1	1.5 %
		2	1.0 %
		3	0.5 %
		4	0.25 %
S3	Reversal of the direction of action	0	Off
		1	On

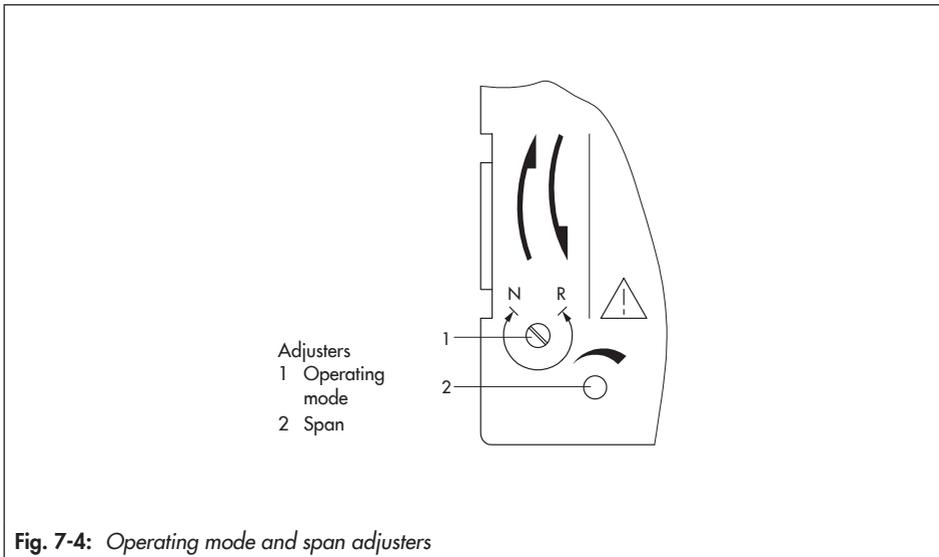
## Start-up

**Table 7-3:** *Measuring points*

Point	Description	Action	Signal
Mp1	+15 V supply voltage		+15 V
Mp2	Supply voltage -5 V		-5 V
Mp3	Ground		
Mp4	Voltage at max. value (actual value)	At 0 to 10 V or 0 to 20 mA	10.1 V
Mp5	Voltage coming from potentiometer slider		
Mp6	Voltage at min. value (actual value)	At 0 to 10 V or 0 to 20 mA At 2 to 10 V or 4 to 20 mA	0 V 2 V

## 7.3 Adjusting the position transmitter

- ➔ For **normal operation**, set the mode switch to **N**.
- ➔ For **reverse operation**, set the mode switch to **R**.



### NOTICE

**Risk of malfunction of the position transmitter due to incorrect switch setting.**

- ➔ *Do not set the adjuster in an intermediate setting.*

## Select the operating mode

### Normal mode

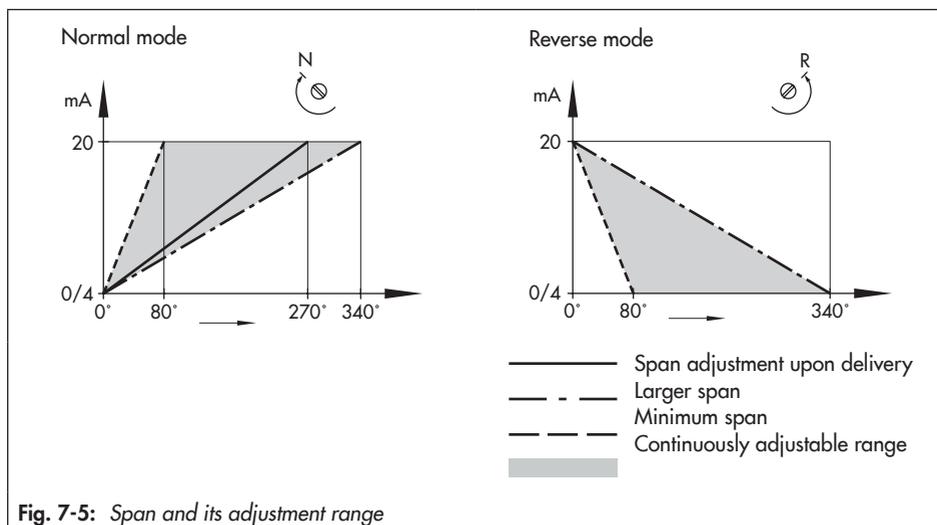
Increasing characteristic for a retracting actuator stem (the actuator gearwheel turns clockwise)

Decreasing characteristic for an extending actuator stem (the actuator gearwheel turns counterclockwise)

### Reverse mode

Increasing characteristic for an extending actuator stem (the actuator gearwheel turns counterclockwise)

Decreasing characteristic for a retracting actuator stem (the actuator gearwheel turns clockwise)



---

**i Note**

*In actuators with reverse mode, the position with the actuator stem fully extended corresponds to the top end position.*

---

### Adjusting an output signal of 0 or 4 mA

1. Move the actuator stem to the position at which the output signal is to be 0 or 4 mA.
  2. Turn the black adjustment wheel against the white actuator gearwheel to adjust the output current:
    - set between 3.98 and 4.02 mA  
in two-wire connection
    - set between 0.01 and 0.02 mA  
in three-wire connection
- 

**i Note**

*In three-wire connection, the plus or minus sign is not changed during zero passage. The actuator indicates 0 mA across a range of 8°. Therefore, the smallest possible value yet still deviating from zero must be set (e.g. +0.01 mA).*

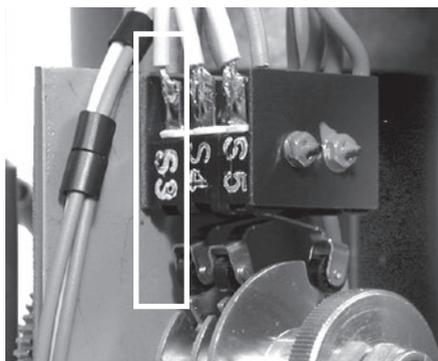
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### Adjusting an output signal of 20 mA

1. Move the actuator stem to the position at which the output signal is to be 20 mA.
2. Use the span adjuster (see Fig. 7-4) to set the output current to  $20 \pm 0.02$  mA.
3. Check the output signal adjustment for 0 or 4 mA and repeat the adjustment, if necessary.

## 7.4 Adjusting travel-dependent switches

### Switch WE-S3 for Types SAM-20 to SAM-52



**Fig. 7-6:** Switch WE-S3 with associated cam disk

4. Readjust the cam disk associated with WE-S3 so that the actuator is switched off after performing the required travel.
5. Move the actuator stem to the top end position.
6. Slightly loosen the knurled nut to allow the cam disk to move.

---

**i Note**

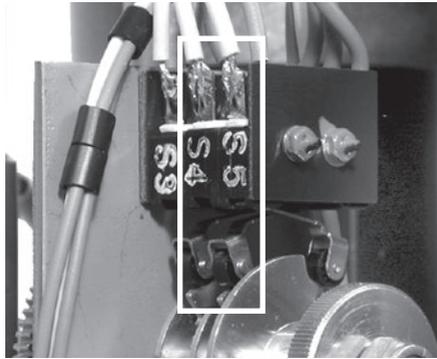
When the knurled nut is loosened, the cam disks may come loose unintentionally and thus change the associated switching position.

---

## Start-up

7. Adjust the cam disk for WE-S3 in the opening direction so that the switch deactivates the actuator. Check with a continuity tester.
8. Keep the cam disk in its current position and retighten the knurled nut by hand.
9. Test-run the actuator to check the switching position.

### Switches WE-S4 to WE-S6 for Types SAM-20 to SAM-52



**Fig. 7-7:** Switches WE-S4 and WE-S5; switch WE-S6 not installed

1. Move the actuator stem to the required position for each switch.
2. Loosen the knurled nut.
3. Adjust the cam disk of each switch as described. Check with a continuity tester.
4. Keep the cam disk in its current position and retighten the knurled nut by hand.
5. Test-run the actuator to check the switching position.

## Switches WE-S3 and WE-S6 for Types SAM-01 to SAM-11

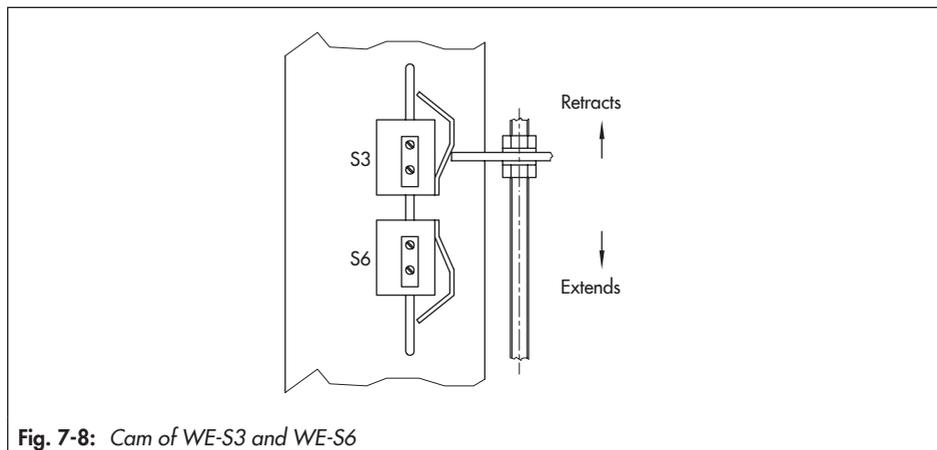


Fig. 7-8: Cam of WE-S3 and WE-S6

The switching position is continuously adjustable. Push the corresponding switch along the oblong hole and fix it into position with the screw.

### Switch WE-S3

#### ⚠ NOTICE

**The actuator will be destroyed if the switch settings are incorrect.**

- Set the switch WE-S3 in such a way that the valve travel is restricted in the opening direction by deactivating the motor.
- Do not exceed the travel adjusted at the actuator.

1. Use the handwheel to move the actuator stem to the top end position.

#### **i** Note

*In this case, the switch WE-S3 must be above the contact cam.*

2. Slightly loosen the mounting screws at the back of the switch so that the switch can be moved.
3. Push the switch up or down until the contact cam deactivates the actuator depending on the travel. Check with a continuity tester.
4. Retighten the mounting screws.

## Start-up

5. Test-run the actuator to check the switching position.

### Switch WE-S6

1. Use the handwheel to move the actuator stem to the lower end position.
- 

#### **i** Note

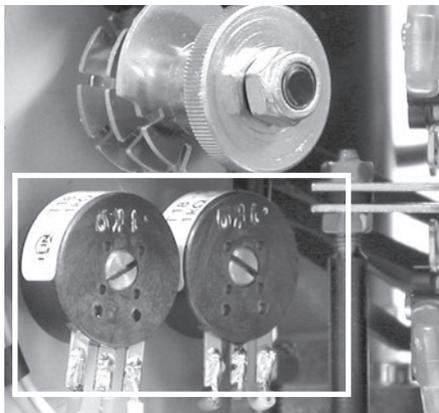
*In this case, the switch WE-S6 must be below the contact cam.*

---

2. Slightly loosen the mounting screws at the back of the switch so that the switch can be moved.
3. Push the switch up or down until the contact cam deactivates the actuator depending on the travel. Check with a continuity tester.
4. Retighten the mounting screws.
5. Test-run the actuator to check the switching position.

## 7.5 Adjusting the resistance transmitter

The potentiometers **R1** and **R2** must be set in the corresponding end position depending on their function.



**Fig. 7-9:** Potentiometers R1 and R2

1. Use the handwheel to move the actuator stem to the lower end position until **DE-S1** switches.

---

**i Note**

*Make sure the adjusting lever and driving lever are parallel in their tilted position.*

---

2. Use a suitable screwdriver to move the potentiometers' slider to its end position. To do so, turn the potentiometer shaft counterclockwise until the stop can be felt slightly.
3. Move the actuator stem over the adjusted travel to the top end position. The potentiometers move in the opposite direction.
4. Use an ohmmeter to monitor the potentiometer movement and check whether the potentiometer is moved through its entire resistance range.

**i Note**

*If the potentiometers reach their stops when moving to their end positions, the sliding clutch between potentiometer and pinion is activated and prevents the potentiometers from being damaged. This means, however, that the measurement results can no longer be reproduced clearly. In this case, adjust a larger travel using the slider and positioning lever (see Fig. 7-1).*

---

**i Note**

*If the actuator is fitted with a positioner, the resistance transmitter POT R1 is used as internal position feedback. Its signal is not issued. In this case, only POT R2 is only available as a resistance transmitter.*

---

## 8 Operation

### 8.1 Three-step control

The actuator stem of the version with three-step signal is moved in the corresponding direction (retracting or extending) by applying a signal to the terminal as specified in the corresponding wiring diagram.

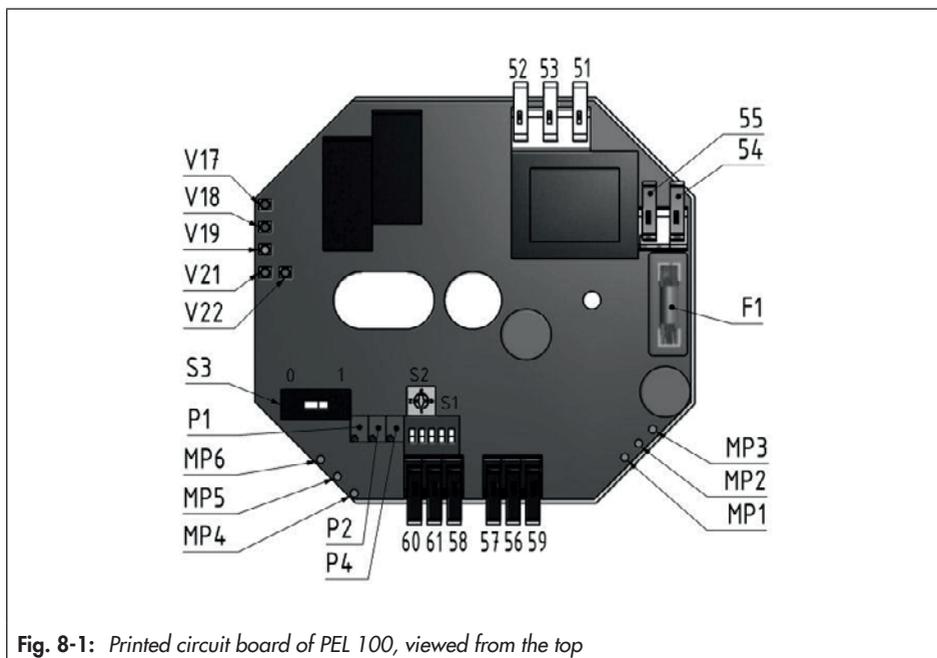
### 8.2 Positioner

The positioner ensures a predetermined assignment of the valve position to the input signal. The position feedback is issued as a current or voltage signal at the corresponding terminals (see the 'Installation' section).

The characteristic of the output signal is the same as that of the input signal (e.g. both 4 to 20 mA).

**Table 8-4:** LED blinking pattern

LED	Meaning	Indicator
V17	Supply voltage OK	Green LED
V18	Actuator stem retracts	Green LED
V19	Actuator stem extends	Yellow LED
V21	Dead time active	Red LED
V22	E1 < 4 mA	Red LED



**Fig. 8-1:** Printed circuit board of PEL 100, viewed from the top

## 8.3 Manual mode

The actuator stem can be extended or retracted manually in the event of a power supply failure or when installing or adjusting the actuator.

### ⚠ NOTICE

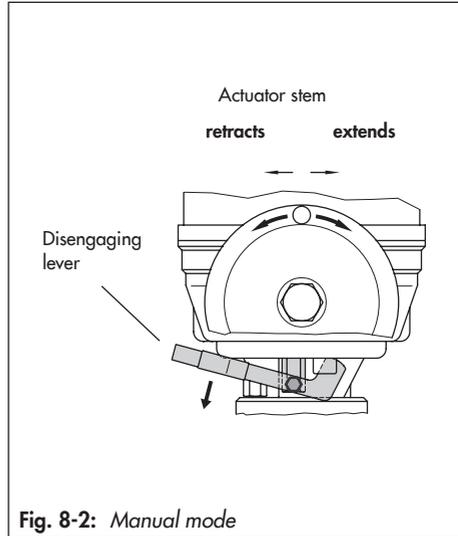
**Risk of actuator damage due to improper use of the handwheel.**

- ➔ Do not operate the handwheel while the motor is in motion.
- ➔ Do not move the actuator past the adjusted travel range during manual operation (observe dimensions).

1. Unlock the motor and actuator stem using the disengaging lever:
  - ➔ Push down the disengaging lever in the direction of the extending actuator stem (when the actuator is installed in the upright position). At the same time, turn the handwheel clockwise and counterclockwise alternately until it noticeably engages.
2. Move the actuator stem by turning the side-mounted handwheel:
  - ➔ Turn clockwise to extend the actuator stem.
  - ➔ Turn counterclockwise to retract the actuator stem.

### **i** Note

The actuator returns to motor operation automatically as soon as the disengaging lever is released.



**Fig. 8-2:** Manual mode

## 9 Malfunctions

→ Troubleshooting (see Table 9-1).

### **i** Note

Contact SAMSON's After-sales Service for malfunctions not listed in the table.

**Table 9-1:** Troubleshooting

Malfunction	Possible reasons	Recommended action
Actuator stem does not move.	Actuator is blocked.	→ Check attachment. → Remove the blockage.
	No or incorrect supply voltage connected.	→ Check the supply voltage and connections.
Actuator stem does not move through the whole range.	No or incorrect supply voltage connected.	→ Check the supply voltage and connections.

### 9.1 Emergency action

Plant operators are responsible for emergency action to be taken in the plant.

### Tip

Emergency action in the event of valve failure is described in the associated valve documentation.



## 10 Servicing

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

---

### **i** Note

*The electric actuator was checked by SAMSON before it left the factory.*

- The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service.*
  - Only use original spare parts by SAMSON, which comply with the original specifications.*
- 

### 10.1 Servicing

- The gearing and actuator stem need to be lubricated after approx. 200,000 full travel cycles.
- 

### Tip

*We recommend using the following lubricant: **Klüber Microlube GL 261***

---

The actuator does not require any other maintenance.



## 11 Decommissioning

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### DANGER

**Risk of fatal injury due to electric shock.**

- Before disconnecting live wires, switch off the supply voltage at the actuator and protect it against unintentional reconnection.

### WARNING

**Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- Wear protective clothing, safety gloves and eye protection.

### WARNING

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

To decommission the electric actuator for repair work or disassembly, proceed as follows:

- Put the control valve out of operation (see associated valve documentation).
- Disconnect the supply voltage and protect it against unintentional reconnection.
- Make sure that a signal from the controller cannot act upon the actuator.



## 12 Removal

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

---

**⚠ DANGER**

***Risk of fatal injury due to electric shock.***

→ *Before disconnecting live wires, switch off the supply voltage at the actuator and protect it against unintentional reconnection.*

---

1. Disconnect the supply voltage and protect it against unintentional reconnection.
2. Make sure that a signal from the controller cannot act upon the actuator. If necessary, disconnect the wires connecting the controller.
3. Disconnect the wires of the connecting lines at the actuator.
4. Remove the connecting lines.
5. Retract actuator stem as described in the 'Operation' section.
6. Undo the stem connector parts between the plug and actuator stems.
7. Unscrew the ring nut on the valve bonnet.
8. Lift the actuator off the valve.



## 13 Repairs

If the actuator does not function properly according to how it was originally configured or does not function at all, it is defective and must be exchanged.

---

**!** NOTICE

***Risk of actuator damage due to incorrect service or repair work.***

- Do not perform any repair work on your own.
  - Contact SAMSON's After-sales Service.
- 

### 13.1 Returning the actuator to SAMSON

Defective actuators can be returned to SAMSON for examination.

Proceed as follows to return devices:

1. Remove the electric actuator from the valve (see the 'Removal' section).
2. Continue as described on our website at
  - ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > After-sales Service > Returning goods.



## 14 Disposal



SAMSON is a producer registered at the following European institution

► <https://www.ewrn.org/national-registers/national-registers>.

WEEE reg. no.:  
DE 62194439/FR 025665

- Observe local, national and international refuse regulations.
- Do not dispose of components, lubricants and hazardous substances together with your other household waste.

---

### **i** Note

*We can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at [aftersaleservice@samsongroup.com](mailto:aftersaleservice@samsongroup.com) giving details of your company address.*

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### Tip

*On request, we can appoint a service provider to dismantle and recycle the product.*

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## 15 Certificates

The following certificate is shown on the next page:

– EU declaration of conformity

The certificate shown was up to date at the time of publishing. The latest certificate can be found on our website at:

▶ [www.samsongroup.com](http://www.samsongroup.com) > Products & Applications > Product selector > Actuators > SAM

EU declaration of conformity

SMART IN FLOW CONTROL.



**EU Konformitätserklärung / EU Declaration of Conformity /  
Déclaration UE de conformité**

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller/  
This declaration of conformity is issued under the sole responsibility of the manufacturer/  
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant.  
Für das folgende Produkt / For the following product / Nous certifions que le produit

**Elektrischer Stellantrieb / Electric Actuator / Servomoteur électrique  
Typ/Type/Type SAM**

wird die Konformität mit den einschlägigen Harmonisierungsrechtsvorschriften der Union bestätigt/  
the conformity with the relevant Union harmonisation legislation is declared with/  
est conforme à la législation d'harmonisation de l'Union applicable selon les normes:

EMC 2014/30/EU	EN 61000-6-2:2005, EN 61000-6-4:2007 +A1:2011
LVD 2014/35/EU	EN 60204-1:2006
RoHS 2011/65/EU	EN 50581:2012

Hersteller / Manufacturer / Fabricant:

SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3  
D-60314 Frankfurt am Main  
Deutschland/Germany/Allemagne

Frankfurt / Francfort, 2017-07-29

Im Namen des Herstellers/ On behalf of the Manufacturer/ Au nom du fabricant.

Gert Nahler  
Zentralabteilungsleiter/Head of Department/Chef du département  
Entwicklung Automation und Integrationstechnologien/  
Development Automation and Integration Technologies

Hanno Zager  
Leiter Qualitätssicherung/Head of Quality Management/  
Responsable de l'assurance de la qualité

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## 16 Annex A (adjustment instructions)

### 16.1 Changing positioner settings

Switches S2 and S3 as well as potentiometers P1, P2 and P4 allow the travel calibration, split-range operation, reversed direction of action and dead band settings to be changed (see Table 16-1 and Table 16-2).

The DIP switch settings of switch S1 allow additional functions to be adjusted (e.g. zero setting, spreading of the resistance signal for the potentiometer and behavior upon input signal failure). The positioner comes with a minimum dead band of 200 ms to prevent sudden changes in direction or the rapid activation and deactivation of the actuator.

By default, a position feedback signal is issued, which indicates the current position of the actuator stem. The signal range corresponds to the input signal range.

The position feedback signal is not isolated from the input.

The type of input signal (voltage or current) is determined by the terminal assignment. Switching or changes to the soldering connections are not necessary.

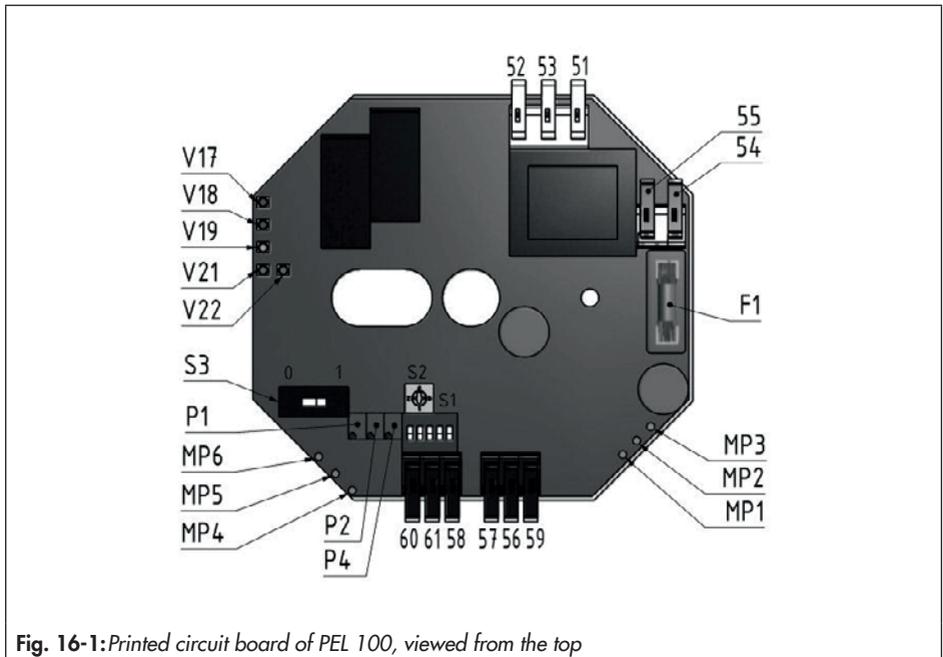


Fig. 16-1: Printed circuit board of PEL 100, viewed from the top

## Annex A (adjustment instructions)

**Table 16-1: Potentiometers**

Potentiometer P1	
Function	Lower limit adjustment
Action	Turn clockwise to lower the limit
Potentiometer P2	
Function	Upper limit adjustment
Action	Turn clockwise to lower the limit
Potentiometer P3	
Function	Span adjustment
Action	Turn counterclockwise to spread the resistance signal range of the potentiometer.

**Table 16-2: Switches**

Switch	Function	ON	OFF
S1.1	Zero point	0 mA	4 mA
S1.2	Spreading	Off	On
S1.3	Fail-safe action: actuator stem extends	On	Off
S1.4	Fail-safe action: actuator stem retracts	On	Off
S1.5	Fail-safe action	On	Off
Switch	Description	Position	Action
S2	Dead band	1	1.5 %
		2	1.0 %
		3	0.5 %
		4	0.25 %
S3	Reversal of the direction of action	0	Off
		1	On

### 16.1.1 Setting the input and output signals

The input and output signals are set to either 0 to 10 V, 0 to 20 mA or 2 to 10 V, 4 to 20 mA. Depending on the configuration, the lines for the input and output signals are connected to terminal X4. The configuration of the positioner can be changed as described in the 'Installation' section.

#### **i** Note

*Before changing the input signal, it may be necessary to change the terminal assignment as described in the 'Installation' section.*

**Setting the input signal: 4 to 20 mA or 2 to 10 V**

Configuration of DIP switch S1

						ON
						OFF
S1.1	S1.2	S1.3	S1.4	S1.5		

1. Apply voltage to terminals 54 and 55.
2. Measure the voltage between measuring point 3 and 6.
3. Use potentiometer P1 to adjust the voltage to 2.0 V.
4. Measure the voltage between measuring point 3 and 4.
5. Use potentiometer P2 to adjust the voltage to 10.0 V.

**Setting the input signal: 0 to 20 mA or 0 to 10 V**

Configuration of DIP switch S1

						ON
						OFF
S1.1	S1.2	S1.3	S1.4	S1.5		

1. Apply voltage to terminals 54 and 55.
2. Measure the voltage between measuring point 3 and 6.
3. Use potentiometer P1 to adjust the voltage to 0.0 V.
4. Measure the voltage between measuring point 3 and 4.
5. Use potentiometer P2 to adjust the voltage to 10.0 V.

**16.1.2 Adjusting the dead band**

The adjusted dead band depends on the actuator. It is preset by SAMSON and must not be changed.

➔ Set the switch S2 to required position (see Table 16-2).

**i Note**

*If the dead band is set too small, the actuator oscillates around the set point, causing premature wear of the positioner and actuator. If oscillations are detected, they can be reduced by increasing the dead band.*

*Make sure the adjusted values are retained when replacing the positioner.*

### 16.1.3 Reversing the direction of action

The actuator's direction of action can be reversed by changing the setting of switch S3. It may be necessary to adapt the end positions and travel (see the 'Start-up' section).

### 16.1.4 Activating the detection of wire breakage function

→ Activate or deactivate the **detection of wire breakage** function at switch **S1.5** (see Table 16-2).

#### **NOTICE**

**Risk of positioner malfunction due to incorrect settings.**

→ Set the input signal range 2 to 10 V or 4 to 20 mA.

#### **Note**

The fail-safe function (**FALL**) is triggered as soon as the input signal falls below 3.5 mA.

#### Actuator stem extends in the event of failure

→ Switch switch S1.3 ON and S1.4 OFF

#### Actuator stem retracts in the event of failure

→ Switch switch S1.4 ON and S1.3 OFF

Position of the DIP switches						Fail-safe function
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ON	Last travel value
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OFF	
S1.1	S1.2	S1.3	S1.4	S1.5		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ON	Retract actuator stem
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OFF	
S1.1	S1.2	S1.3	S1.4	S1.5		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	ON	Extend actuator stem
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OFF	
S1.1	S1.2	S1.3	S1.4	S1.5		

### 16.1.5 Setting split-range operation

1. Apply the input signal for the top end position (e.g. 12 mA).
  2. Turn potentiometer P2 until the travel corresponds to the top end position.
- 

**i Note**

*Turning the potentiometer P1 counterclockwise causes the actuator stem to retract. The lowest value adjustable for the top deactivation point is approx. 8 mA or 4 V.*

---

3. Apply the input signal for the lower end position (e.g. 6 mA). Turn potentiometer P1 counterclockwise to extend the actuator stem.
- 

**i Note**

*Turn potentiometer P1 counterclockwise to change the position of the actuator stem in the 'extending' direction.*

---

4. Check the adjustment by moving the actuator to its top and lower end positions again.
- 

**i Note**

The highest value adjustable for the lower deactivation point is approx. 13.2 mA or 6.6 V.

---

## 16.2 Abbreviations

- PEL 100: Positioning electronics (positioner)
- ESR: Electronic position transmitter (position transmitter)
  - R1: Potentiometer 1 for position feedback
  - R2: Potentiometer 2 for position feedback
- POT R1: Resistance transmitter 1
- POT R2: Resistance transmitter 2
  - DE: Torque-dependent limit switch
- WE: Travel-dependent switch
  - R: Heating resistor
- TW: Temperature switch (temperature monitor)
- HZ: Heating resistor with temperature monitor

## 17 Annex B

### 17.1 Accessories

	Material <sup>1)</sup>	Order no.
<b>SAM-01 to SAM-13 and SAM-20 to SAM-23 (for valves with stem ends Ø 16 mm)</b>		
Mounting set Consisting of: 1x Castellated nut M30x1.5 2x Clamps for stem ends Ø 16 mm 2x Screws M6x25	1.0727+C 1.4301 (SS304) A4-70	0900-2679
<b>SAM-01 to SAM-13 and SAM-20 to SAM-23 (for valves with stem ends Ø 10 mm)</b>		
1x Castellated nut M30x1.5	1.0727+C	0250-0615
1x Clamp for stem ends Ø 10/16 mm Consisting of: 2x Clamps for stem ends Ø 10/16 mm 2x Screws M5x25	1.4404 (SS316) A4-70	1990-8689
<b>SAM-30 to SAM-33 and SAM-40 to SAM-42</b>		
1x Castellated nut M60x1.5	1.0727+C	0250-0700
1x Clamp for stem ends Ø 22 mm	1.4301 (SS304)	0300-1084
1x Clamp for stem ends Ø 22 mm	1.4301 (SS304)	0300-1085
2x Screws M12x35	1.4301 (SS304)	8320-0884
<b>SAM-50 to SAM-52</b>		
1x Castellated nut M100x2	1.0727+C	0250-0701
1x Clamp for stem ends Ø 40 mm	1.4301 (SS304)	0300-1078
1x Clamp for stem ends Ø 40 mm	1.4301 (SS304)	0300-1079
2x Screws M16x50	1.4301 (SS304)	8320-0973

<sup>1)</sup> Other on request

## 17.1 Service

Contact SAMSON's After-sales Service for support concerning service or repair work or when malfunctions or defects arise.

### **E-mail address**

You can reach our after-sales service at [aftersaleservice@samsongroup.com](mailto:aftersaleservice@samsongroup.com).

### **Addresses of SAMSON AG and its subsidiaries**

The addresses of SAMSON, its subsidiaries, representatives and service facilities worldwide can be found on our website (▶ [www.samsongroup.com](http://www.samsongroup.com)) or in all SAMSON product catalogs.

### **Required specifications**

Please submit the following details:

- Type
- Configuration ID
- Production number







**EB 8330 EN**



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