

MOUNTING AND OPERATING INSTRUCTIONS



EB 8355-1 EN

Translation of original instructions



Type 3766 Pneumatic Positioner

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.

- 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 Department (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 > **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 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the device:

- The device is to be mounted, started up or operated only by trained and experienced personnel familiar with the product. 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 dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- Any hazards that could be caused in the valve by the process medium, the signal pressure or by moving parts are to be prevented by taking appropriate precautions. If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure level, it must be restricted using a suitable supply pressure reducing station.
- Explosion-protected versions of this device are to be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

To avoid damage to any equipment, the following also applies:

- Proper shipping and storage are assumed.

i Note

The device with a CE marking fulfills the requirements of the Directive 2014/34/EU and the Directive 2014/30/EU. The Declaration of Conformity is available on request.

ⓘ NOTICE

Models with index 3766-x...x.03 and higher are equipped with a hinged cover without their own exhaust air port.

The required exhaust air connection is now included in the mounting accessories.

If these positioners are mounted on older actuator models, make sure that there is an exhaust air connection. If necessary, replace the mounting accessories as well.

2 Design and principle of operation

The pneumatic positioner is used to assign the valve position (controlled variable) to the input signal (reference variable). The positioners compare the control signal of a control system to the travel of the control valve and issues a signal pressure (output variable) for the pneumatic actuator.

The positioner consists of a lever for travel pick-up, a measuring diaphragm and the pneumatic control system with nozzle, diaphragm lever (flapper plate) and booster.

The positioner is designed either for direct attachment to SAMSON Type 3277 Actuators or for attachment according to NAMUR (IEC 60534-6-1) with an adapter housing.

The positioner can be additionally equipped with either inductive limit contacts and/or a solenoid valve or position transmitter.

The positioner operates according to the force-balance principle. The valve travel, i.e. the valve position, is transmitted to the pick-up lever (1) over the pin (1.1) and determines the force of the range spring (4). This force is compared to the positioning force generated by the pressure p_e at the measuring diaphragm (5).

If either the control signal or the valve position changes, the diaphragm lever (3) moves, altering the distance to the nozzle (2.1 or 2.2), depending on the adjusted direction of action of the positioner.

The supply air is supplied to the booster (10) and the pressure regulator (9). The controlled supply air flows through the X_p restriction (8)

and the nozzle (2.1, 2.2) and hits the diaphragm lever (flapper plate).

Any change in the reference variable or the valve position causes the pressure to change upstream or downstream of the booster.

The air controlled by the booster (signal pressure p_{st}) flows through the volume restriction (11) to the pneumatic actuator, causing the plug stem to move to a position corresponding to the reference variable.

The adjustable X_p restriction (8) and volume restriction (11) are used to optimize the positioner control loop.

The pick-up lever (1) and the range spring (4) must be selected to match the rated valve travel and the nominal span of the reference variable.

Positioner with inductive limit contacts

In this version, the rotary shaft of the positioner carries two adjustable tags which actuate the built-in proximity switches.

Positioner with solenoid valve

When the positioner is equipped with a solenoid valve, the valve can be moved to the fail-safe position, regardless of the positioner's output signal. If a control signal corresponding to the binary signal '0' (OFF) is applied to the input, the signal pressure p_{st} is shut off and the actuator is vented. The actuator springs move the valve to its fail-safe position.

When a control signal corresponding to the binary signal '1' (ON) is applied to the input, the signal pressure p_{st} is applied to the actuator, allowing the valve to move according to the input signal issued by the control equipment.

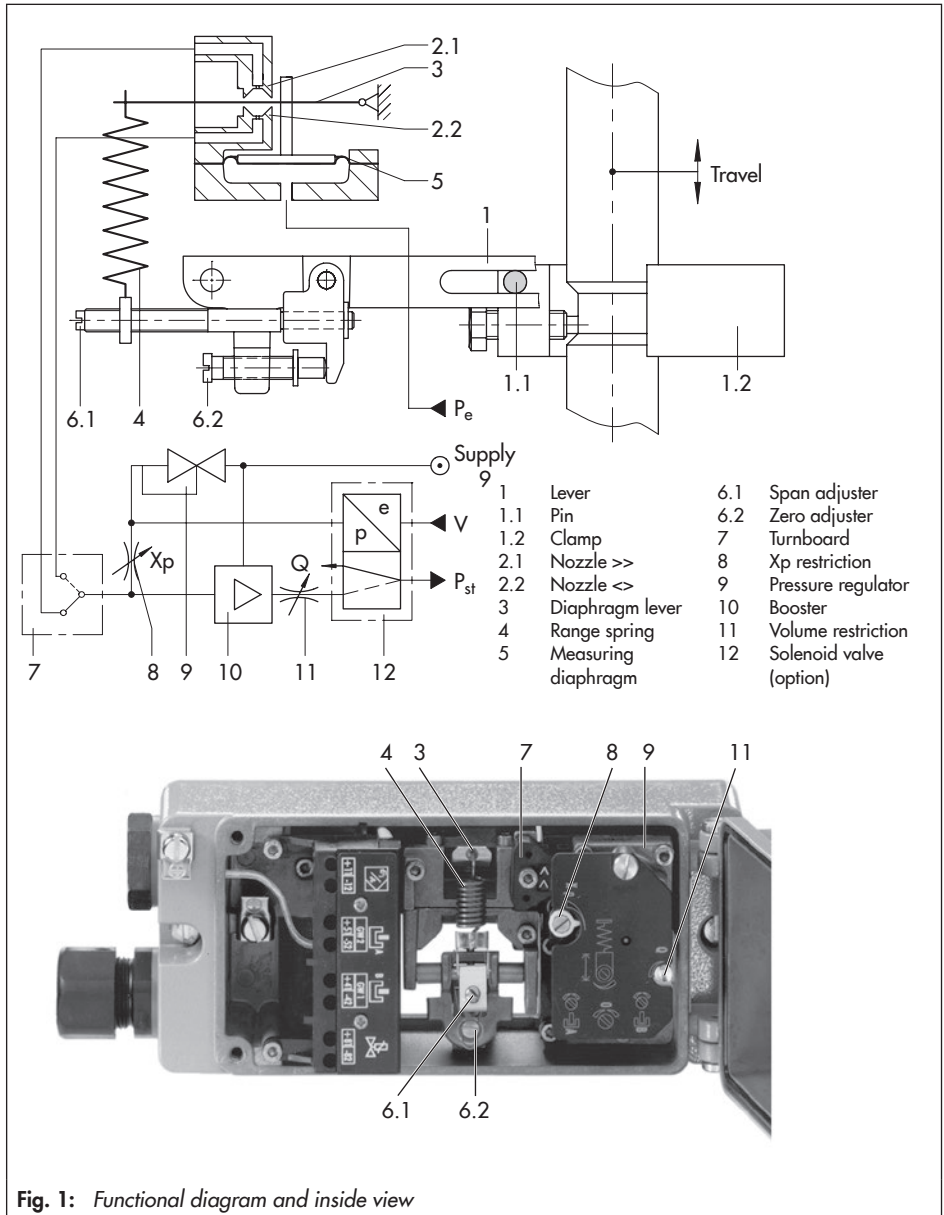


Fig. 1: Functional diagram and inside view

Design and principle of operation

Positioner with position transmitter

A positioner containing a position transmitter cannot be equipped with integrated limit contacts or an integrated solenoid valve since the position transmitter requires most of the space inside.

The position transmitter is used to assign the valve position, i.e. the valve travel, to an output signal of 4 to 20 mA.

The tuning of the position transmitter ensures that both end positions "valve CLOSED" or "valve OPEN" as well as all intermediate positions can be signalized. Since the valve position is signalized independently of the input signal to the positioner, the position transmitter is a suitable option for checking the actual valve position.

2.1 Versions and article code

| Pneumatic positioner | Type 3766- | x | x | x | 0 | 1 | x | x | x | x | 1 | x | 0 | x | 0 | |
|--|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Explosion protection | | | | | | | | | | | | | | | | |
| Without | | 0 | | | | | | 2 | | | | | | | | |
| ⊕ II 2G Ex ia IIC T6 according to ATEX | | 1 | | | | | | | | | | | | | | |
| CSA/FM intrinsically safe/non incendive | | 3 | | | | | | | | | | | | | | |
| Ex ia/Ex n I/IIC T6 IP 65 IECEx TSA Australia | | 6 | | | | | | | | | | | | | | |
| ⊕ II 3G Ex nA II T6 acc. to ATEX | | 8 | | | | | | | | | | | | | | |
| Additional equipment | | | | | | | | | | | | | | | | |
| Without | | 0 | | | | | | | | | | | | | | |
| Inductive limit contacts 2x SJ2-SN | | 2 | | | | | | | | | | | | | | |
| (Analog position transmitter 4 to 20 mA) ¹⁾ | | 6 | 0 | | | | | | | | | 0 | | | | |
| 3/2-way solenoid valve | | | | | | | | | | | | | | | | |
| Without | | | 0 | | | | | | | | | | | | | |
| 6 V DC | | | 2 | | | | | | | | | | | | | |
| 12 V DC | | | 3 | | | | | | | | | | | | | |
| 24 V DC | | | 4 | | | | | | | | | | | | | |
| Pneumatic connections | | | | | | | | | | | | | | | | |
| ¼-18 NPT | | | | | | 1 | | | | | | | | | | |
| ISO 228/1-G ¼ | | | | | | 2 | | | | | | | | | | |
| Electrical connections | | | | | | | | | | | | | | | | |
| Without (no additional equipment or solenoid valve) | | 0 | 0 | | | 0 | 0 | | | | | | | | | |
| Plastic cable gland M20x1.5, blue | | | | | | 1 | 0 | | | | | 0 | | | | |
| Plastic cable gland M20x1.5, black | | | | | | 2 | 0 | | | | | 0 | | | | |
| Cable gland M20x1.5, nickel-plated brass | | | | | | 2 | 1 | | | | | 3 | | | | |
| Housing version | | | | | | | | | | | | | | | | |
| Die-cast aluminum | | | | | | | | | | 0 | | | | | | |
| CrNiMo steel ²⁾ | | | | | | | | | | 2 | | | | | | |
| Temperature range | | | | | | | | | | | | | | | | |
| Standard | | | | | | | | | | | | | 0 | | | |
| Low-temperature version | | | | | | | | | | | | | | | | |
| T _{min} ≥ -50 °C; optional limit contacts, solenoid valve | | | | | | 2 | 1 | | | | | 3 | | | | |
| Special versions | | | | | | | | | | | | | | | | |
| Without | | | | | | | | | | | | | | 0 | 0 | 0 |
| GOST Ex approval 0Ex ia IIC T8 X | | 1 | | | | | | | | | | | | 0 | 1 | 0 |


¹⁾ Not available since March 2011

Device functioning only as analog position transmitter: 3766-x60 000xxx00 000 0

²⁾ Not available since April 2020

2.2 Technical data

| Type 3766 Positioner | | | |
|---|---------------------------|--|--|
| Travel range | | 7.5 to 30 mm | Direct attachment to Type 3277 Actuator |
| | | 7.5 to 120 mm | Attachment acc. to IEC 60534 (NAMUR) |
| Opening angle | | 70°, 75° or 90° depending on the cam disk | |
| Reference variable w | Signal range | 0.2 to 1 bar (3 to 15 psi) | |
| | Span | 0.4 to 0.8 bar (6 to 12 psi) | |
| | Overloadable Max. | 2 bar (29 psi) | |
| Supply air | | 1.4 to 6 bar (20 to 90 psi) | |
| Air quality acc. to ISO 8573-1, edition 2001-02 | | Maximum particle size and density: Class 4 · Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected. | |
| Signal pressure p_{st} (output) | | Can be limited between: 0 to approx. 2.5 bar and 0 to 6 bar (0 to approx. 35 psi and 0 to 90 psi) | |
| Characteristic | | Linear characteristic · Deviation from terminal-based conformity: $\leq 1\%$ | |
| Hysteresis | | $\leq 0.6\%$ | |
| Sensitivity | | $\leq 0.1\%$ | |
| Direction of action | | Reversible | |
| Proportional band X_p | | 0.5 to 2.5 % (proportional-action coefficient K_p : > 200 to 40) | |
| Air consumption | | At 1.4 bar supply pressure | At 6 bar supply pressure |
| | | $\leq 230 \text{ l}_n/\text{h}$ | $\leq 230 \text{ l}_n/\text{h}^{1)}$ |
| Air output capacity | To fill actuator with air | $3.0 \text{ m}_n^3/\text{h} \cdot K_{V_{\max}(20^\circ\text{C})} = 0.09$ | $8.5 \text{ m}_n^3/\text{h} \cdot K_{V_{\max}(20^\circ\text{C})} = 0.09$ |
| | To vent actuator | $4.5 \text{ m}_n^3/\text{h} \cdot K_{V_{\max}(20^\circ\text{C})} = 0.15$ | $14.0 \text{ m}_n^3/\text{h} \cdot K_{V_{\max}(20^\circ\text{C})} = 0.15$ |
| Permissible ambient temperature ²⁾ | Standard | -20 to 80 °C: | Optional limit contacts/solenoid valve/position transmitter with plastic cable gland |
| | Low-temperature version | -40 to 80 °C: | Optional limit contacts/solenoid valve with metal cable gland |
| | | -50 to 80 °C: | Optional limit contacts/solenoid valve with metal cable gland |
| | | Technical data in test certificates additionally apply to explosion-protected devices | |
| Influence | | Temperature: $\leq 0.3\%/10 \text{ K}$ Supply air: $\leq 1\%$ between 1.4 and 6 bar | |
| Electromagnetic compatibility | | According to EN 61000-6-2, EN 61000-6-3 and NAMUR Recommendation NE 21 | |

| | |
|----------------------|---|
| Effect of vibration | None between 10 and 150 Hz and 4 g |
| Explosion protection | Refer to article code or list of approvals in Data Sheet ► T 8355 |
| Degree of protection | IP 54 (IP 65 and NEMA 4X possible by fitting a filter check valve. See table on accessories on page 19) |
| Compliance |  |
| Weight | Approx. 1 kg |

- 1) With lowest setting of pressure regulator
- 2) The limits in the type examination certificate additionally apply to explosion-protected versions.

2.3 Additional equipment

| Limit contacts | | | | | |
|--|--------------------|---|---------------------|--|---------------------|
| 2 inductive proximity switches | | SJ2-SN | | | |
| Control circuit | | Values according to downstream transistor relay | | | |
| Hysteresis at rated travel | | ≤ 1 % | | | |
| Solenoid valve | | | | | |
| Input | | Binary DC voltage signal | | | |
| Nominal signal | | 6 V DC | 12 V DC | 24 V DC | |
| Signal '0' (no response) ²⁾ | | ≤ 1.2 V | ≤ 2.4 V | ≤ 4.7 V | |
| Signal '1' (response) ³⁾ | | ≥ 5.4 V | ≥ 9.6 V | ≥ 18.0 V | |
| Maximum permissible signal | | 28 V | 25 V | 32 V | |
| Coil resistance R _i at 20 °C | | 2909 Ω | 5832 Ω | 11714 Ω | |
| Air consumption in steady state | | In addition to that of the positioner: OFF ≤ 60 l _n /h · ON ≤ 10 l _n /h ¹⁾ | | | |
| Closing time for rated travel and signal pressure range (K _{VS} 0.13) | Type 3277 Actuator | ≤ 120 cm ² | 240 cm ² | 350 cm ² | 700 cm ² |
| | 0.2 to 1 bar | ≤ 0.5 s | ≤ 0.8 s | ≤ 1.1 s | ≤ 4 s |
| | 0.4 to 2 bar | ≤ 0.5 s | ≤ 2 s | ≤ 2.5 s | ≤ 8 s |
| | 0.6 to 3 bar | ⁵⁾ | ≤ 1 s | ≤ 1.5 s | ≤ 5 s |
| Analog position transmitter ⁶⁾ | | | | | |
| Output | | Two-wire connection 4 to 20 mA | | | |
| Auxiliary power | | Minimum terminal voltage: 12 V, max.: 45 V | | The position transmitter must only be connected to a certified intrinsically safe circuit. ⁴⁾ | |

¹⁾ With lowest setting of pressure regulator

²⁾ DC voltage signal at 25 °C

³⁾ DC voltage signal at +80 °C

⁴⁾ e.g. using a SAMSOMATIC Type 994-0103-KFD2-STC4-Ex1 Loop Isolator

⁵⁾ 120 cm² actuator in all signal pressure ranges: ≤ 0.5 s

⁶⁾ Not available since March 2011

2.4 Summary of explosion protection approvals

| Type | Certification | | Type of protection | | |
|--------|---------------|-------------|--------------------|---|-------------------|
| 3766-1 | ATEX | Number | PTB 01 ATEX 2171 | II 2G Ex ia IIC T6 | |
| | | Date | 2001-11-26 | | |
| 3766-1 | EAC | Number | RU C DE.08.00697 | Type 3766-1: 1Ex ia IIC T6/T5/T4 Gb X | |
| | | Date | 2014-12-15 | Type 3766-8: 2Ex nA IIC T6/T5/T4 Gc X | |
| | | Valid until | 2019-12-14 | | |
| 3766-3 | CSA | Number | 1607848 | Ex ia IIC T6; Class I Zone 0; Class I, II, Div. 1, Groups A, B, C, D, E, F, G; Class I, II, Div. 2, Groups A, B, C, D, E, F, G; | |
| | | Date | 2005-09-16 | | |
| 3766-3 | FM | Number | 3020228 | Class I, Zone 0 AEx ia IIC Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2 Groups F, G; Class III; | |
| | | Date | 2005-02-28 | | |
| 3766-6 | IECEX | Number | IECEX TSA 05.0004X | Ex ia I/IIC T6 IP 65, Ex nI/IIC T6 IP 65 | |
| | | Date | 2005-05-24 | | |
| 3766-8 | EAC | Number | RU C DE.08.00697 | Type 3766-1: 1Ex ia IIC T6/T5/T4 Gb X | |
| | | Date | 2014-12-15 | | |
| 3766-8 | EAC | Valid until | 2019-12-14 | Type 3766-8: 2Ex nA IIC T6/T5/T4 Gc X | |
| | | ATEX | Number | PTB 01 ATEX 2195 X | II 3G Ex nA II T6 |
| | | | Date | 2002-03-07 | |

3 Mounting on control valves

The positioner can be mounted either directly to SAMSON Type 3277 Actuator or to control valves with cast yokes or rod-type yokes according to IEC 60534-6 (NAMUR).

Combined with an intermediate piece, the positioner can also be mounted on rotary actuators. The standard positioner is delivered without accessories. Any additionally required accessories are listed together with their order numbers in the following tables. Do not remove the protective cover on the back of the positioner until you actually start to attach the positioner.

Mounting position and operating direction

The operating direction of the positioner also determines its mounting position on the actuator as illustrated in Fig. 2, Fig. 3 and Fig. 5. The turnboard (7 in Fig. 1) at the positioner must be mounted correspondingly.

For an increasing input signal (reference variable), the signal pressure p_{st} can either be increasing (direct action \gg) or decreasing (reverse action $\langle \rangle$). Similarly, as the reference variable decreases, the signal pressure can either decrease (direct action \gg) or increase (reverse action $\langle \rangle$).

On the turnboard (7), the operating direction is indicated by symbols (direct \gg , reverse $\langle \rangle$). Depending on the position of the turnboard, the adjusted operating direction and the associated symbol become visible.

If the required operating direction does not correspond to the visible symbol or if you want to change the operating direction, remove the fastening screw at the turnboard, turn the board by 180° and refasten the turnboard. Make sure the three rubber gaskets inserted in the housing remain in position.

i NOTICE

When any subsequent changes are made, e.g. reversing the operating direction of the positioner control loop or changing the actuator fail-safe action from "actuator stem extends" to "actuator stem retracts" or vice versa, the positioner's mounting position must be changed accordingly.

3.1 Direct attachment to Type 3277 Actuator

i Note

The required accessories are listed in Table 1 to Table 4 on page 18.

The attachment of the positioner either on the left or right side of the actuator (always looking onto the signal pressure connection or switchover plate) is determined by the required operating direction of the positioner, i.e. \gg or $\langle \rangle$.

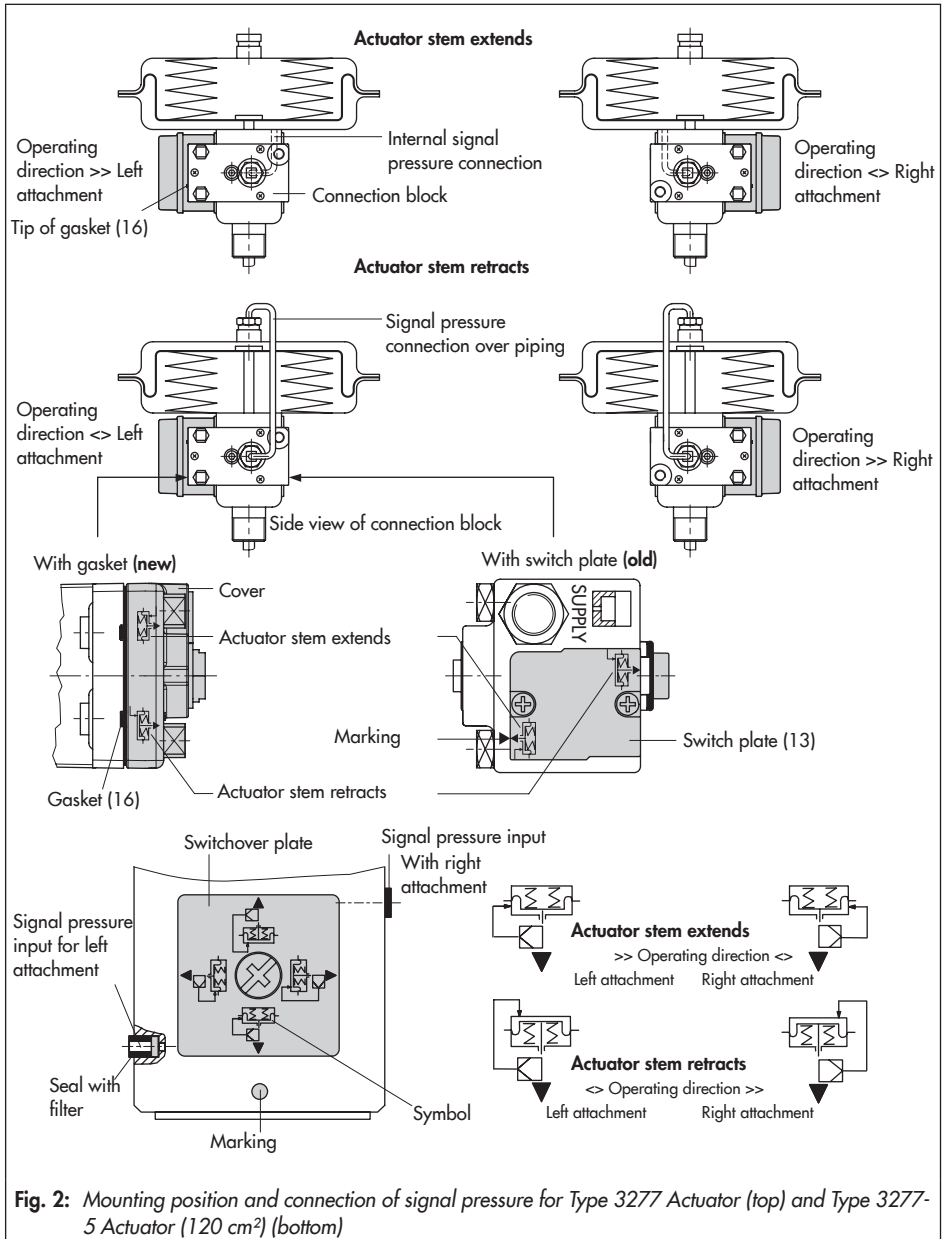


Fig. 2: Mounting position and connection of signal pressure for Type 3277 Actuator (top) and Type 3277-5 Actuator (120 cm²) (bottom)

Mounting on control valves

1. Fasten the clamp (1.2) to the actuator stem, making sure that the fastening screw rests in the groove of the actuator stem.
2. Fasten the associated pick-up lever D1 or D2 (with 355/700 cm² actuators) to the feedback lever of the positioner.
3. Secure the intermediate plate (15) with the gasket facing towards the actuator yoke.
4. Position the positioner such that the pick-up lever slides in line over the pin (1.1) of the clamp (1.2). Fasten the positioner to the intermediate plate (15).
5. Mount cover (16).
6. Check whether the correct range spring has been installed as listed in Table 4! Range spring 1 is installed as standard. If necessary, replace it with range spring 2 included in the accessories and fix it at the outer hook-in holes.

Actuators with 240, 350, 355 and 700 cm² diaphragm areas

7. Make sure that the tip of the gasket (16) projecting from the side of the connection block (Fig. 2, middle) is positioned to match the actuator symbol for the actuator's fail-safe action "actuator stem extends" or "actuator stem retracts". If this is not the case, unscrew the three fastening screws and lift off the cover. Turn the gasket (16) by 180° and re-insert it.
The old connection block version requires the switch plate (13) to be turned to align

the actuator symbol with the arrow marking.

8. Place the connection block with the associated gaskets against the positioner and the actuator yoke. Fasten it using the screw.
For actuators with fail-safe action "actuator stem retracts", additionally mount the external signal pressure pipe.

Actuator (120 cm²)

The signal pressure is transmitted to the diaphragm chamber over the switchover plate (Fig. 2 and Fig. 3, bottom).

7. Remove screw plug on the back of the positioner (Fig. 4) and seal the side signal pressure output with the stopper included in the accessories.
8. Mount the positioner so that the hole in the intermediate plate (15) covers the seal in the hole of the actuator yoke.
9. Align the switchover plate with the corresponding actuator symbol. Fasten it to the actuator yoke.

NOTICE

*If a solenoid valve or a similar device is additionally mounted onto a 120 cm² actuator, do not remove the M3 screw plug at the back of positioner. In this case, the signal pressure must be transmitted from the signal pressure output to the actuator over an additional **connecting plate** (Table 2). The switchover plate is not used in this case.*

Air purging of the spring chamber

If the spring chamber of the actuator is to be purged with the exhaust air from the positioner, use piping (Table 3) to connect the spring chamber (with "actuator stem extends" version) to the connection block. To do so, remove the stopper from the connection block. For an actuator with fail-safe action "actuator stem retracts" and in

Type 3277-5 Actuators with an effective diaphragm area of 120 cm², the exhaust air from the positioner is connected to the spring chamber over an internal hole.

NOTICE

When the valve is installed, the side cover of the actuator must be mounted such that the vent plug points downward.

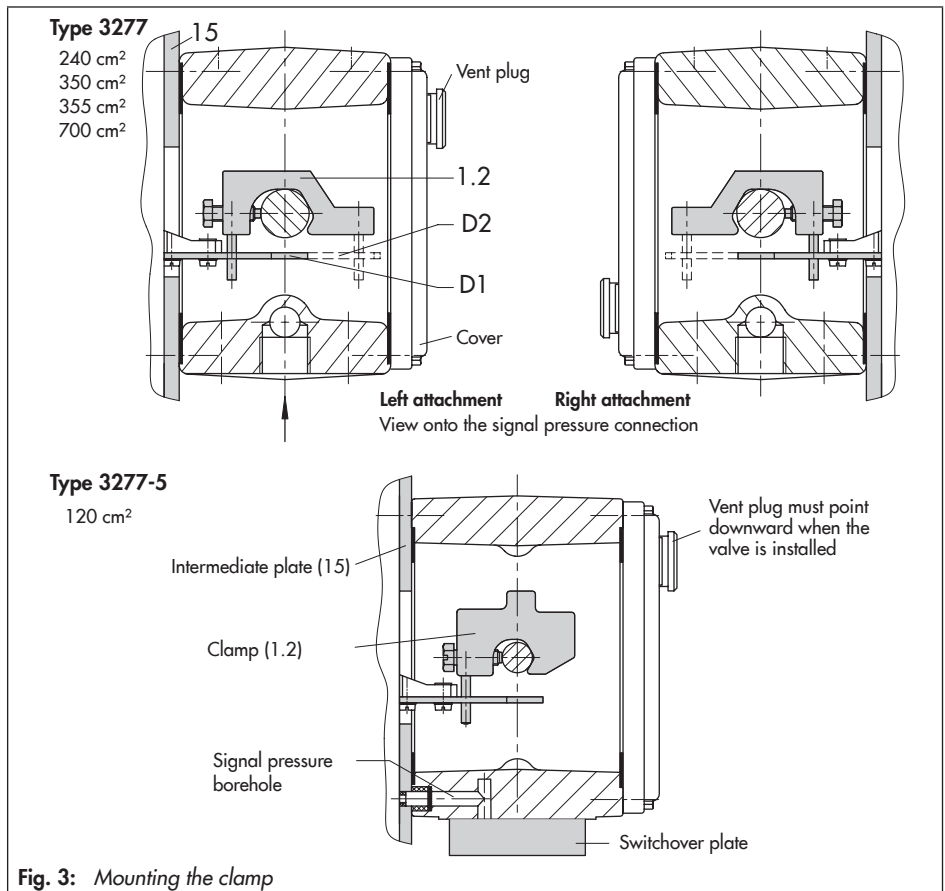


Fig. 3: Mounting the clamp

Mounting on control valves

| Table 1: Lever (see Fig. 3) | | | Mounting kit |
|---|--|----------------------------------|---------------------|
| Actuator size | Lever with associated clamp and intermediate plate | | Order no. |
| 120 cm ² | D1 lever with stopper for output (38) | Standard version | 1400-7116 |
| | | Version compatible with paint | 1402-0944 |
| 240/350 cm ² | D1 lever (33 mm long with 17 mm clamp) | Standard version | 1400-6370 |
| | | Version compatible with paint | 1402-0942 |
| 355/700 cm ² | D2 lever (44 mm long with 13 mm clamp) | Standard version | 1400-6371 |
| | | Version compatible with paint | 1402-0943 |
| Table 2: Switchover plates and connecting plates | | | Order no. |
| Switchover plate (for 120 cm ² actuator) | Type 3277-5xxxxx. 00 Actuator (old) | | 1400-6819 |
| New switchover plate | Type 3277-5xxxxx. 01 Actuator (new) or higher | | 1400-6822 |
| Connecting plate for additional attachment of, e.g. a solenoid valve | Type 3277-5xxxxx. 00 Actuator (old), G 1/8 | | 1400-6820 |
| | Type 3277-5xxxxx. 00 Actuator (old), 1/8 NPT | | 1400-6821 |
| New connecting plate | Type 3277-5xxxxx. 01 Actuator (new) or higher G 1/8 and 1/8 NPT | | 1400-6823 |
| Note: Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable. | | | |
| Required connection block for 240, 350, 355 and 700 cm ² actuator (including gaskets and fastening screw) | G 1/4 | | 1400-8819 |
| | 1/4 NPT | | 1402-0901 |
| Table 3: Pipe connection | Material | Actuator size [cm ²] | Order no. |
| Required pipe connection including screw fitting | Steel | 240 | 1400-6444 |
| | Stainless steel | 240 | 1400-6445 |
| For actuator with "actuator stem retracts" or with air purging of the top diaphragm chamber | Steel | 350 | 1400-6446 |
| | Stainless steel | 350 | 1400-6447 |
| | Steel | 355/700 | 1400-6448 |
| | Stainless steel | 355/700 | 1400-6449 |
| Table 4: Range spring | Travel [mm] | Actuator size [cm ²] | Order no. |
| 2 (4.5 coils) | 7.5 | 120, 240 | 1400-6443 |
| 1 (9.5 coils, installed as standard) | 10 to 15 | 120, 240 and 350 | 1400-6442 |
| 2 | 15 | 355/700 | 1400-6443 |
| 1 | 30 | 355/700 | 1400-6442 |

| Accessories | | Order no. |
|--|---|-----------|
| Pressure gauge mounting block (only for 120 cm ²) | G ¼ | 1400-7458 |
| | ¼ NPT | 1400-7459 |
| Pressure gauge mounting kit for supply pressure and signal pressure | Stainless steel/brass | 1400-6950 |
| | Stainless steel/stainless steel | 1400-6951 |
| Filter check valve, replaces vent plug and increases the degree of protection to IP 65 | | |
| Filter check valve in housing with G ¼ thread | Polyamide, IP 65 degree of protection | 1790-7408 |
| | 1.4301, IP 65 degree of protection | 1790-7253 |
| | Polyamide, NEMA 4 degree of protection | 1790-9645 |
| | 1.4301, NEMA 4 degree of protection | 1790-9646 |
| Assortment of spare parts including gaskets and diaphragms | | 1400-9895 |

3.2 Attachment according to IEC 60534-6

Required mounting parts are listed in Table 5. The rated travel of the valve determines which lever and range spring (Table 6) are required.

An adapter housing is used for attachment (Fig. 6). The valve travel is transmitted by the lever (18) and the shaft (25) to the bracket (28) of the adapter housing and then passed on to the pin (27a) on the lever of the positioner. To ensure that the pin (27a) is properly located in the bracket (28), fix the spring included in the accessories at the back of the positioner housing as illustrated in Fig. 4.

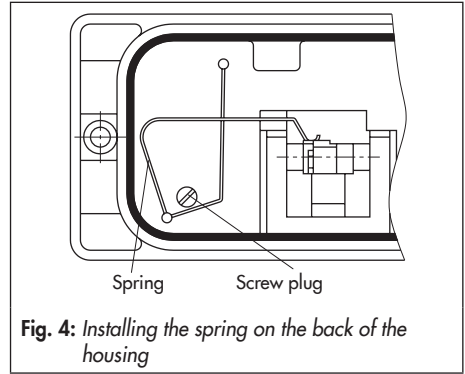


Fig. 4: Installing the spring on the back of the housing

The positioner can be mounted either on the left or right side of the control valve (Fig. 5 and Fig. 6). Turn the positioner at the adapter housing by 180° to determine or change the operating direction of the positioner/control valve unit.

| Left attachment | | Right attachment | |
|---|----------------------------|---------------------------|----------------------------|
| Mounting position on the plate looking onto the travel pick-up (20), actuator facing upward (see also Fig. 6) | | | |
| Actuator with "actuator stem extends" (FA) fail-safe action | | | |
| Direct oper. direction >> | Reverse oper. direction << | Direct oper. direction >> | Reverse oper. direction << |
| | | | |
| Input | Output and supply | Input | |
| Actuator with "actuator stem retracts" (FE) fail-safe action | | | |
| Direct oper. direction >> | Reverse oper. direction << | Direct oper. direction >> | Reverse oper. direction << |
| | | | |
| Output and supply | Input | Output and supply | |

Fig. 5: Attachment to the left or right of the valve for NAMUR attachment (IEC 60534-6)

3.2.1 Mounting sequence

➔ Mounting parts and range spring: see Table 4/Table 5; mounting according to Fig. 6.

Valve with cast yoke

1. Screw the plate (20) to the stem connector of the actuator and plug stems using the countersunk screws.
Use the additional bracket (32) for 2100 and 2800 cm² actuators with 120 mm travel.
2. Remove the rubber stopper from the adapter housing and fasten the adapter housing either on the left or right of the NAMUR rib using the hexagon head screw as shown in Fig. 5.

Valve with rod-type yoke

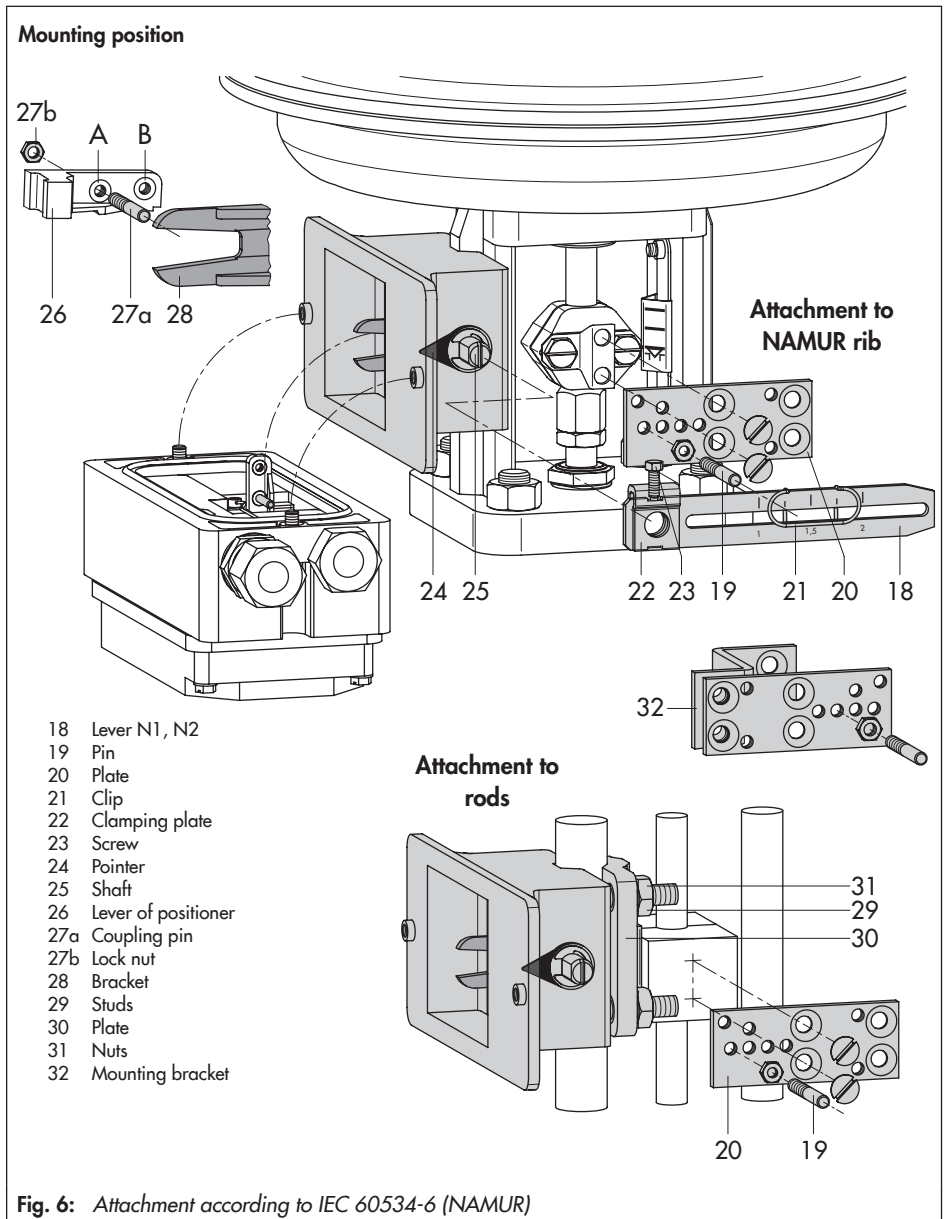
1. Screw the plate (20) to the follower clamp of the plug stem.
2. Screw the studs (29) into the adapter housing.
3. Place the adapter housing with the plate (30) onto either the left or right valve rod and screw tight using the nut (31). Make sure that the adapter housing is at the correct height to mount the lever (18) so that it is in a horizontal position when the valve is at mid-travel.
4. Screw the pin (19) into the middle row of holes on the plate (20) and lock it into position over the correct lever marking (1 or 2) as indicated in Table 6.
5. Clamp the clip (21) onto the lever (18). The clip must be clamped onto the lever (18) with the open side facing down-

ward when the positioner is attached with the air connection at the front.

6. Attach the lever (18) including clamping plate (22) to the shaft (25), making sure that the clip clasps the pin (19).

3.2.2 Initial adjustment of travel

1. Move the valve to 50 % travel.
2. Move the shaft (25) in the adapter housing so that the black pointer (24) matches the cast marking on the adapter housing.
3. Fasten the clamping plate (22) in this position using the screw (23).
4. Screw the pin (27a) into the positioner lever on the side where the press nut is located. Lock it in position with the hex nut on the other side, observing the mounting position **A** or **B** according to Table 6 and Fig. 6.
5. Place the positioner on the adapter housing, taking into account the mounting direction. Fasten it, making sure that the pin (27a) rests against the bracket (28). The pin must not slip out of the bracket once installed.
6. Check whether the correct range spring has been installed as listed in Table 6. Range spring 1 is installed as standard. If necessary, replace it with range spring 2 included in the accessories and fix it at the outer hook-in holes.
7. Perform positioner setting as described in section 5.1.



Mounting on control valves

| Table 5: Mounting kits | | Control valve | | Travel [mm] | With lever | Order no. | |
|--|--|---|--|-------------|-------------|-------------------------------|--|
| NAMUR mounting kit, See Fig. 6 for parts | Valve with cast yoke | | 7.5 to 60 | | N1 (125 mm) | 1400-6787 | |
| | | | 22.5 to 120 | | N2 (212 mm) | 1400-6789 | |
| | Rod diameter [mm] of rod-type yoke | 20 to 25 | | | N1 | 1400-6436 | |
| | | 20 to 25 | | | N2 | 1400-6437 | |
| | | 25 to 30 | | | N1 | 1400-6438 | |
| | | 25 to 30 | | | N2 | 1400-6439 | |
| | | 30 to 35 | | | N1 | 1400-6440 | |
| | | 30 to 35 | | | N2 | 1400-6441 | |
| Attachment to Fisher and Masoneilan linear actuators (one of each mounting kits is required per actuator) | | | | | | 1400-6771 and 1400-6787 | |
| Additional range spring acc. to Table 6 | | Range spring 1 (9.5 coils, installed as standard) Range spring 2 (4.5 coils) | | | | 1400-6442 1400-6443 | |
| Accessories | | | | | | Order no. | |
| Pressure gauge mounting block | | | G ¼ | | 1400-7458 | | |
| | | | ¼ NPT | | 1400-7459 | | |
| Pressure gauge kit | | | Stainless steel/brass | | 1400-6950 | | |
| | | | Stainless steel/stainless steel | | 1400-6951 | | |
| Filter check valve, replaces vent plug and increases the degree of protection to IP 65 | | | | | | | |
| Filter check valve in housing with G ¼ thread | | | Polyamide, IP 65 deg. of protection | | | 1790-7408 | |
| | | | 1.4301, IP 65 degree of protection | | | 1790-7253 | |
| | | | Polyamide, NEMA 4 degree of protection | | | 1790-9645 | |
| | | | 1.4301, NEMA 4 degree of protection | | | 1790-9646 | |
| Assortment of spare parts including gaskets and diaphragms | | | | | | 1400-9895 | |

| Table 6: Mounting position | | | | | | | | | | |
|--|------------------|----|----|----|----|----|------------------|----|----|-----|
| Travel [mm] ¹⁾ | 7.5 | 15 | 15 | 30 | 30 | 60 | 30 | 60 | 60 | 120 |
| Pin at marking ¹⁾ | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Distance between pin and lever fulcrum | 42 to 84 mm | | | | | | 84 to 168 mm | | | |
| With lever | N1 (125 mm long) | | | | | | N2 (212 mm long) | | | |
| Pin (27a) at position | A | | A | | B | | A | | B | |
| Required range spring (see Table 5) | 2 | | 1 | | 1 | | 1 | | 1 | |

¹⁾ Calculate intermediate values

3.3 Attachment to rotary actuators

The positioner can also be mounted on rotary actuators according to VDI/VDE 3845 (September 2010) using the mounting parts listed in Table 7.

pneumatic control unit of the positioner using the cam disk of the actuator shaft and a feeler roll on the positioner lever.

The rotary motion of these actuators is converted into a linear motion required by the

| Table 7: Complete mounting parts, including range spring 2, but not including the cam disk | | Order no. |
|---|---|-----------|
| Actuator acc. to VDI/VDE 3845 (September 2010), level 2 | | 1400-8815 |
| SAMSON Type 3278 Actuator VETEC Type S | 160 cm ² | 1400-7103 |
| | 320 cm ² | 1400-7104 |
| VETEC Type R | R 110 to R 250 | 1400-7117 |
| Attachment Masoneilan | Camflex I, DN 25 to 100 | 1400-7118 |
| | Camflex I, DN 125 to 250 | 1400-7119 |
| | Camflex II | 1400-7120 |
| Required range spring | | Order no. |
| Standard operation of reference variable, range spring 2 (4.5 coils) | | 1400-6443 |
| Split-range operation, range spring 1 (9.5 coils, installed as standard) | | 1400-6442 |
| Cam disk with accessories | | Order no. |
| ~, linear basic characteristic ³⁾ | (0050-0072), 0 to 90° opening angle, also for Type 3310 | 1400-6664 |
| ~, equal percentage basic characteristic ³⁾ | (0050-0073), 0 to 90° opening angle | 1400-6665 |
| ~, linear ¹⁾ | (0050-0080), 0 to 70° opening angle, for control butterfly valves | 1400-6774 |
| ~, equal percentage ²⁾ | (0050-0081), 0 to 70° opening angle, for control butterfly valves | 1400-6775 |
| ~, linear ¹⁾ | (0050-0074, VETEC), 0 to 75° opening angle | 1400-6666 |
| ~, equal percentage ²⁾ | (0050-0075, VETEC), 0 to 75° opening angle | 1400-6667 |
| ~, linear ¹⁾ | (0059-0007, Camflex) to be set between 0 and 55° | 1400-6637 |
| ~, equal percentage ²⁾ | (0059-0008, Camflex) to be set between 0 and 55° | 1400-6638 |
| Accessories | | |
| See list on page 24 | | |

¹⁾ Linearizes the flow characteristic

²⁾ Creates an equal percentage flow characteristic

³⁾ Based on opening angle

! NOTICE

Check whether the correct range spring has been installed as listed in Table 7. Range spring 1 is installed as standard. If necessary, replace it with range spring 2 included in the accessories and fix it at the outer hook-in holes.

Double-acting springless rotary actuators require the use of a **reversing amplifier** on the connection side of the positioner housing (see section 3.3.4).

When using a reversing amplifier, the pressure regulator (9, Fig. 1) must be turned clockwise as far as it will go (also see section 4.1.2).

When attaching the positioner to the SAMSON Type 3278 Rotary Actuator (Fig. 7, left), the inside of the actuator and the unused reverse side of the diaphragm are purged with the positioner's exhaust air. Additional piping is not required.

When attaching the positioner to actuators from other manufacturers (Fig. 7, right), the reverse side of the diaphragm can be purged with air over a pipe connection installed between the actuator and intermediate piece.

3.3.1 Mounting the lever with feeler roll

1. Place the lever with feeler roll (35) on the side of the lever (37) opposite to where the press nuts are located and secure it using the supplied screws (38) and washers.

! NOTICE

To ensure a close physical contact between the lever with feeler roll and the cam disk, attach the spring contained in the accessories kit (order no. 1400-6660) to the back of the positioner housing (see Fig. 4).

3.3.2 Mounting the intermediate piece

SAMSON Type 3278 Actuator

1. Fasten the adapter (36) to the free shaft end of the rotary actuator.
2. Fasten the intermediate piece (34) to the actuator housing using two screws. Align the intermediate piece so that the air connections of the positioner point toward the diaphragm case side.
3. Align the cam disk (40) and scale (39) as described in section 3.3.3 and fasten.

Actuators according to VDI/VDE 3845 (09/2010) (fixing level 2)

1. Place the assembled intermediate piece (34, 44, 45 and 42) onto the mounting bracket included in the scope of actuator delivery and fasten.
2. Align the cam disk (40) and scale (39) as described in section 3.3.3 and fasten.

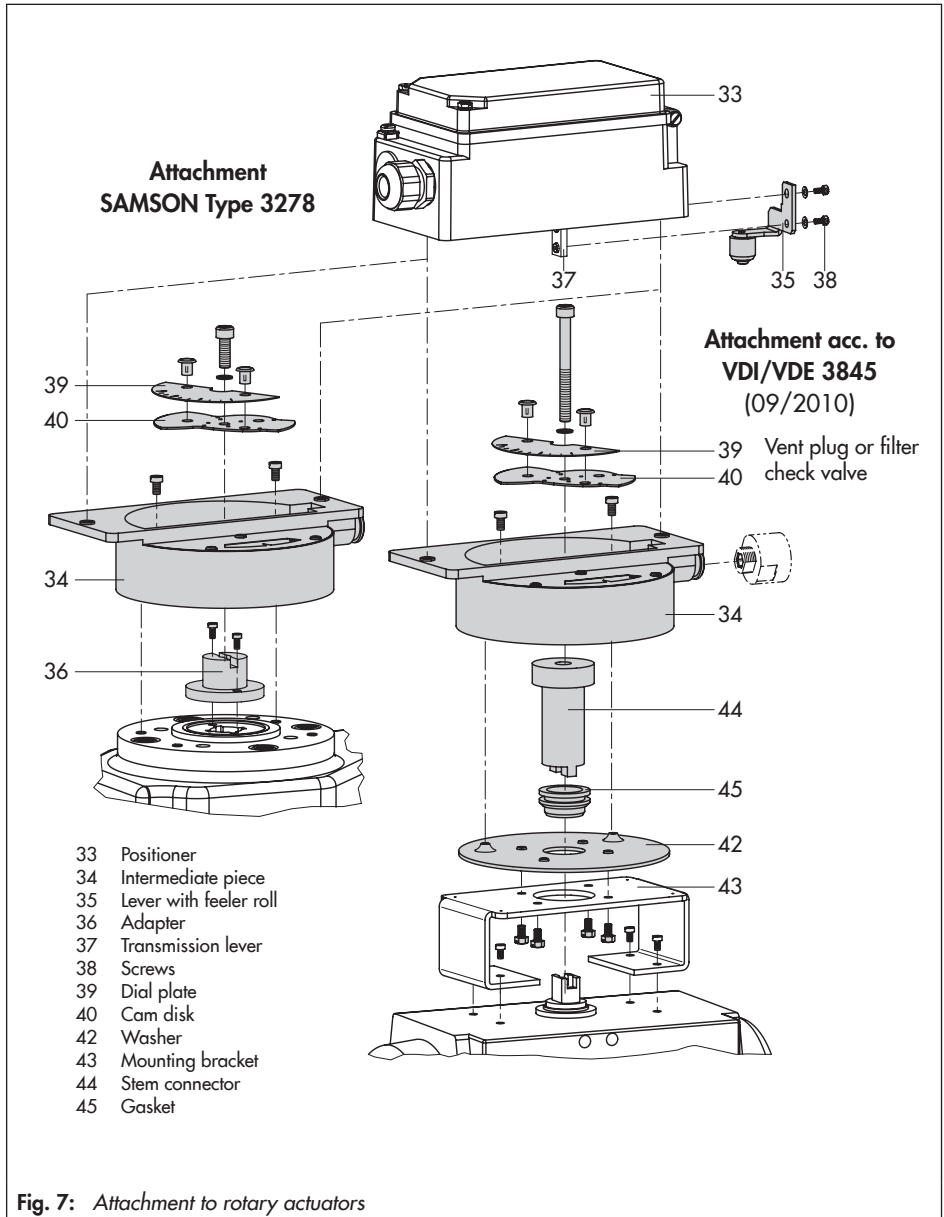


Fig. 7: Attachment to rotary actuators

3.3.3 Basic setting of the cam disk

The valve model used determines the basic setting of the cam disk.

! NOTICE

Cam disks tailored to the special characteristic of a valve cause the valve to open in a non-linear or non-equal percentage way. The visible difference between the set point (4 to 20 mA) and the actual position (opening angle) does not constitute a system deviation of the positioner.

Fig. 8 and Fig. 9 show linear cam disks.

Fig. 8 illustrates a control valve assembly with a rotary actuator with spring-return mechanism that opens counterclockwise. The arrangement of the springs in the actuator determines the fail-safe position of the valve.

Fig. 9 shows how to adjust the cam disk when a double-acting springless rotary actuator is used. The direction of rotation (either counterclockwise or clockwise) depends on the actuator and valve model used. The cam disk must be set when the valve is closed.

Use the turnboard (7) to adjust the operating direction of the positioner, i.e. whether the valve opens or closes when the reference variable increases (direct >> or reverse <>).

Each cam disk carries two cam sections whose starting points are indicated by small holes. Depending on the operating direction of the rotary actuator (air-to-open or air-to-close), the starting point of the cam, either marked **N** (standard characteristic) or **I** (reverse characteristic), must point towards the lever with feeler roll. When the starting point is located on the back of the cam disk, turn over the cam disk.

! NOTICE

The starting point (hole) of the selected cam must be aligned so that the fulcrum of the cam disk and 0° position on the scale as well as the arrow on the window are in line with each other.

When aligning the cam disk, clip the double-sided scale disk on the cam disk, while making sure that the value on the scale matches the valve's direction of rotation.

! NOTICE

Make sure the 0° position of the scale always corresponds to CLOSED position. Therefore, for fail-open actuators and for springless actuators, the maximum supply pressure needs to be applied to the actuator before aligning the cam disk.

Single-acting rotary actuator with spring-return mechanism

Linear cam disk (equal percentage cam disk is represented by a broken and dotted line)

Control valve opens counterclockwise

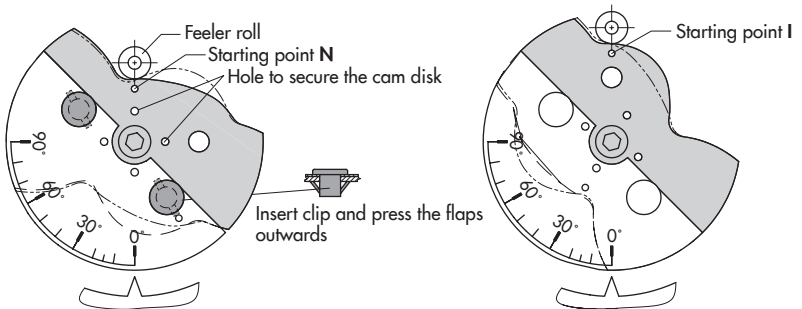
For valves that open clockwise, the cam disk must be turned over so that lever with feeler roll moves over the same disk segments as shown in the images below, but with the cam disk turning clockwise.

Fail-safe position: **Fail-close valve**

Direct operating direction >>

Reverse operating direction <<

| Ref. variable | Sig. pressure | Valve | Characteristic | Ref. variable | Sig. pressure | Valve | Characteristic |
|---------------|---------------|-------|----------------|---------------|---------------|-------|----------------|
| increases | increases | opens | N | decreases | increases | opens | I |



Fail-safe position: **Fail-open valve**

Direct operating direction >>

Reverse operating direction <<

| Ref. variable | Sig. pressure | Valve | Characteristic | Ref. variable | Sig. pressure | Valve | Characteristic |
|---------------|---------------|-------|----------------|---------------|---------------|-------|----------------|
| decreases | decreases | opens | I | increases | decreases | opens | N |

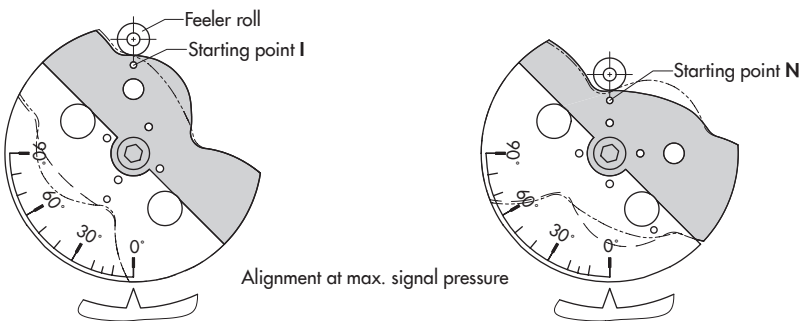


Fig. 8: Cam disk settings for single-acting actuators

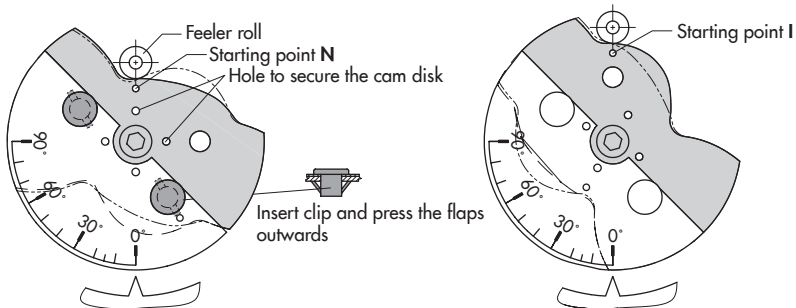
Mounting on control valves

Double-acting, springless rotary actuator with reversing amplifier

Linear cam disk (equal percentage cam disk is represented by a broken and dotted line)

View from the positioner onto the actuator shaft
Control valve opens counterclockwise – Based on a closed valve

| Direct operating direction >> | | | | Reverse operating direction << | | | |
|-------------------------------|----------------------------|-------|----------------|--------------------------------|----------------------------|-------|----------------|
| Ref. variable | Signal pressure | Valve | Characteristic | Ref. variable | Signal pressure | Valve | Characteristic |
| increases | A1 increases, A2 decreases | opens | N | decreases | A1 increases, A2 decreases | opens | I |



View from the positioner onto the actuator shaft
Control valve opens counterclockwise – Based on a closed valve

| Direct operating direction >> | | | | Reverse operating direction << | | | |
|-------------------------------|----------------------------|-------|----------------|--------------------------------|----------------------------|-------|----------------|
| Ref. variable | Signal pressure | Valve | Characteristic | Ref. variable | Signal pressure | Valve | Characteristic |
| increases | A1 increases, A2 decreases | opens | N | decreases | A1 increases, A2 decreases | opens | I |

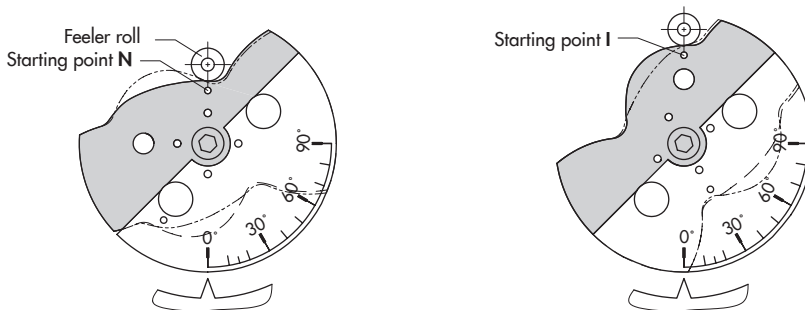


Fig. 9: Cam disk settings for double-acting actuators

Securing the aligned cam disk

To prevent the cam disk from turning, drill a hole into the adapter (36) or coupling (44) to allow a 2 mm dowel pin to be inserted.

Select one of the four holes located around the center hole of the cam disk to secure the cam disk in position.

3.3.4 Reversing amplifier for double-acting actuators

For the use with double-acting actuators, the positioner must be fitted with a reversing amplifier, e.g. the SAMSON Type 3710 Reversing Amplifier (see Mounting and Operating Instructions ► EB 8392).

The signal pressure of the positioner is supplied at the output A_1 of the reversing amplifier. An opposing pressure, which equals the required supply pressure Z when added to the pressure at A_1 , is applied at output A_2 . The rule $A_1 + A_2 = Z$ applies.

If a different reversing amplifier (item no. 1079-1118 or 1079-1119) is used, follow the mounting instructions described below:

Mounting

NOTICE

When using a reversing amplifier, the pressure regulator (9) must be turned as far as it will go in the clockwise direction. Remove the sealing plug (1.5) before mounting the reversing amplifier. The rubber seal (1.4) must remain installed.

1. Screw the special nuts (1.3) from the accessories of the reversing amplifier into the threaded connections of the positioner.
2. Insert the gasket (1.2) into the recess of the reversing amplifier and slide both the hollowed special screws (1.1) into the connecting boreholes A_1 and Z .

3. Place the reversing amplifier onto the positioner and screw tight using the two special screws (1.1).
4. Use a screwdriver (8 mm wide) to screw the enclosed filters (1.6) into the connecting boreholes A_1 and Z .

Signal pressure connections

A₁: Connect output A_1 to the signal pressure connection on the actuator that causes the valve to open when the pressure rises.

A₂: Connect output A_2 to the signal pressure connection on the actuator that causes the valve to close when the pressure rises.

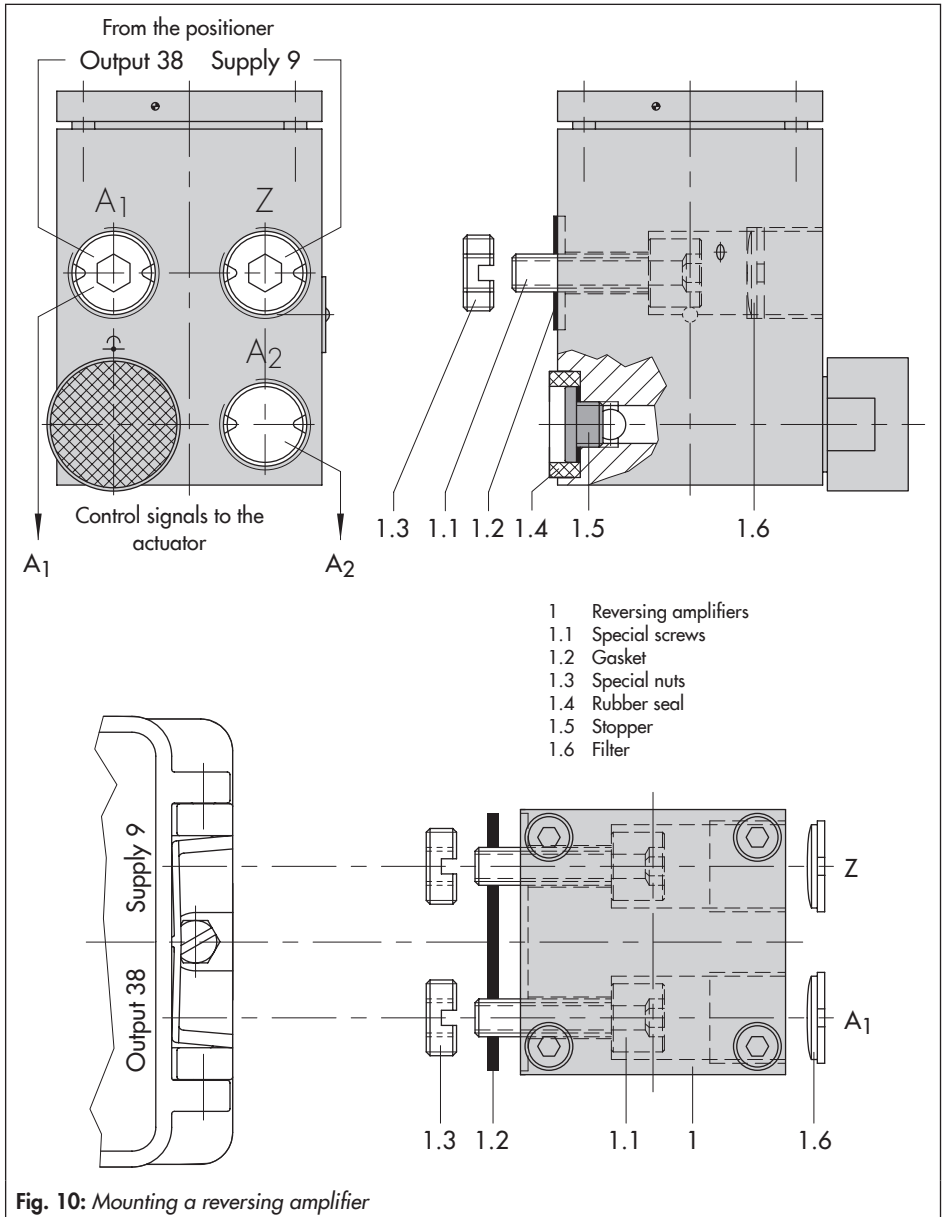
Pressure gauge attachment

The mounting sequence shown in Fig. 10 remains unchanged. Screw a pressure gauge bracket onto the connections A_1 and Z .

Pressure gauge bracket:

- G 1/4: 1400-7106
- 1/4 NPT: 1400-7107

Pressure gauges for supply air Z and output A_1 as listed in Table 4, Table 5 and Table 7.



4 Connections

4.1 Pneumatic connections

The pneumatic connections are optionally designed as a bore with $\frac{1}{4}$ NPT or G $\frac{1}{4}$ thread. Customary fittings for metal or copper tubing or plastic hoses can be used.

! NOTICE

The supply air must be dry and free from oil and dust. The maintenance instructions for upstream pressure reducing stations must be observed.

Blow through all air pipes and hoses thoroughly before connecting them.

If the positioner is attached directly to the Type 3277 Actuator, the connection of the positioner's output pressure to the actuator is fixed. For attachment according to IEC 60534-6 (NAMUR), the signal pressure can be routed to either the top or bottom diaphragm chamber of the actuator, depending on the actuator's fail-safe action "actuator stem extends" or "actuator stem retracts".

Exhaust air

Models with index 3766-x...x.03 and higher are equipped with a hinged cover without its own exhaust air port. The exhaust air connections for these models are included in the accessories.

The vent plug is located on the plastic cover of the actuator for direct attachment, whereas for NAMUR attachment, it is located on the adapter housing. The vent plug is located on the intermediate piece or reversing amplifier for attachment to rotary actuators.

! NOTICE

If you intend to replace older models with index 3766-x...x.02 or lower, the mounting parts may need to be replaced as well.

4.1.1 Pressure gauges

To precisely tune the positioner, we recommend installing pressure gauges for the supply air and signal pressure.

The required parts are listed as accessories in Table 4, Table 5 and Table 7.

4.1.2 Supply pressure

The required supply air pressure depends on the bench range and the actuator's operating direction (fail-safe action).

The bench range is written on the nameplate either as the bench range or signal pressure range. The operating direction is marked **FA** or **FE** or by a symbol.

Actuator stem extends (FA):

Fail-close

(for globe and angle valves)

Required supply pressure =
Upper bench range value + 0.2 bar,
at least 1.4 bar.

Actuator stem retracts (FE):**Fail-open**

(for globe and angle valves)

For tight-closing valves, the maximum signal pressure $p_{st_{max}}$ is roughly estimated as follows:

$$p_{st_{max}} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} \text{ [bar]}$$

d = Seat diameter [cm]

Δp = Differential pressure across the valve [bar]

A = Actuator area [cm²]

F = Upper bench range value of the actuator [bar]

If there are no specifications, calculate as follows:

Required supply pressure =

Upper bench range value + 1 bar

Pressure regulator

After tilting the cover plate back, the pressure regulator (9) can be continuously adjusted. When the adjuster is turned counterclockwise as far as it will go, signal pressures for spring ranges up to 2.5 bar are controlled. When the adjuster is turned clockwise all the way, signal pressures for spring ranges up to 6.0 bar are controlled.

If the signal pressure must not exceed a certain value, this limit can be adjusted using a pressure gauge (accessories).

4.2 Electrical connections

⚠ DANGER

For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use. In Germany, these are the VDE regulations and the accident prevention regulations of the employers' liability insurance.

The following regulations apply to installation in hazardous areas: EN 60079-14: 2008 (VDE 0165, Part 1) Explosive Atmospheres – Electrical Installations Design, Selection and Erection.

Adhere to the terminal assignment. Switching the assignment of the electrical terminals may cause the explosion protection to become ineffective. Do not loosen enameled screws in or on the housing. The maximum permissible values specified in the EC-type examination certificates apply when interconnecting intrinsically safe electrical equipment (U_i or U_o , I_i or I_o , P_i or P_o , C_i or C_o and L_i or L_o).

Selecting cables and wires

Observe **clause 12 of EN 60079-14: 2008** (VDE 0165, Part 1) for installation of the intrinsically safe circuits.

Clause 12.2.2.7 applies when running multi-core cables and wires with more than one intrinsically safe circuit.

The radial thickness of the insulation of a conductor for common insulating materials

(e.g. polyethylene) must not be smaller than 0.2 mm.

The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm. Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

When two separate cables are used for connection, an additional cable gland can be installed.

Seal cable entries left unused with plugs.

Fit equipment used in ambient temperatures **below -20 °C** with metal cable entries.

Zone 2/Zone 22

In equipment operated according to type of protection Ex nA II (non-sparking equipment) according to EN 60079-15:2003, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

Equipment connected to energy-limited circuits with type of protection Ex nL according to EN 60079-15:2003 may be switched under normal operating conditions.

The maximum permissible values specified in the statement of conformity and its addenda apply when interconnecting the equipment with energy-limited circuits in type of protection Ex nL IIC.

The wires for the reference variable must be connected to the terminals 11 and 12 located in the housing.

In general, it is not necessary to connect the positioner to a bonding conductor. Should this be required, however, this conductor can be connected inside the device or outside on the device.

Depending on the version, the positioner is equipped with inductive limit switches and/or a solenoid valve.

Versions with position transmitter do not permit the connection of additional equipment.

The position transmitter is operated on a two-wire circuit. The usual supply voltage is 24 V DC.

Taking the resistance of the supply leads into account, the voltage at the position transmitter terminals can be between 12 and 45 V DC.

Refer to Fig. 11 or to the label on the terminal block.

Accessories:

Cable gland M20x1.5:

| Version | Order no. | Clamping range |
|---------------------|-----------|----------------|
| Black plastic | 1400-6985 | 5.5 to 13 mm |
| Blue plastic | 1400-6986 | 5.5 to 13 mm |
| Nickel-plated brass | 1890-4875 | 6 to 12 mm |

Adapter M20x1.5 to ½ NPT:

Powder-coated aluminum,
order no. 0310-2149

4.2.1 Switching amplifier

The operation of the inductive limit contacts requires switching amplifiers in accordance with EN 60947-5-6 to be connected in the output circuit. Observe the relevant regulations for installation in hazardous areas.

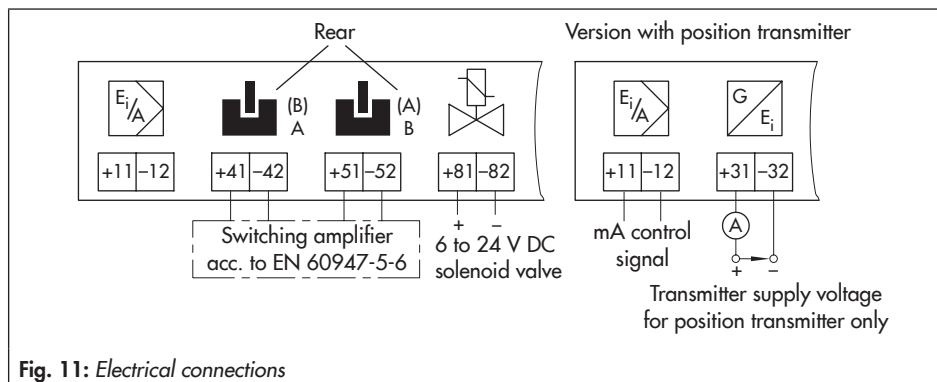


Fig. 11: Electrical connections

5 Operation

5.1 Tuning the positioner mounted onto the control valve

Starting point and reference variable

When adjusting the positioner directly at the control valve, the travel (opening angle) must be adapted to the reference variable.

With a reference variable, for example 0.2 to 1 bar, the valve must move through its entire travel range from 0 to 100 % (Fig. 12, left).

For positioners for rotary actuator, an opening angle, for example 0 to 70° must be assigned to the reference variable.

The starting point is based on the CLOSED position of the valve.

Depending on the actuator version ("actuator stem extends" or "actuator stem retracts") and the operating direction of the positioner

(> or <), this starting point can be either the lower or upper range value (0.2 or 1 bar) of the reference variable.

The reference variable range and thus the upper range value determine the travel of the valve.

In split-range operation (Fig. 12, right), the control valves work with smaller reference variable ranges. The controller output signal is used to control two control valves, dividing it such that the valves move through their entire travel range at half the input signal range each (e.g. first valve set to 0.2 to 0.6 bar, second valve set to 0.6 to 1 bar). To avoid overlapping, allow for a dead band of ± 0.05 bar as shown in Fig. 12.

The **starting point** (zero) is adjusted at the zero adjuster (6.2); the span, i.e. the upper range value, is adjusted at the span adjuster (6.1).

During the adjustment, connect a suitable pressure adjuster to the signal input and apply air to the supply air input.

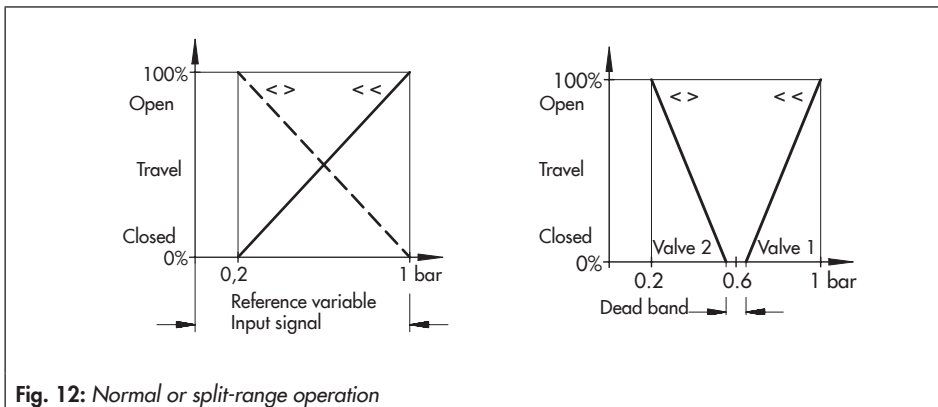


Fig. 12: Normal or split-range operation

5.1.1 Adjusting the proportional band Xp and air delivery Q

1. Close the volume restriction (11) as far as the required positioning speed permits.
Check the positioning speed by pushing the diaphragm lever (3) as far it will go.
2. Adjust the reference variable at the input to approx. 50 % of its range.
3. Turn the zero adjuster (6.2) until the valve has reached approx. mid-travel.
4. Use the adjuster (8) to set the proportional band Xp to a value half way (half turn).
5. Check the valve's tendency to hunt and the positioning speed by briefly tapping the diaphragm lever (3).
The Xp value is to be adjusted to be as small as possible, without considerable overshooting occurring.

NOTICE

*Always adjust the Xp restriction before setting the starting point.
Changing it later will cause the zero point to be shifted!*

5.1.2 Settings for actuator with "actuator stem extends" fail-safe action

NOTICE

To allow the valve to close with full force, the diaphragm chamber must be fully vented when the reference variable reaches its lower value (operating direction <<) or upper value (operating direction <>).

As a result, adjust the input signal to a slightly increased starting point of 0.23 bar for direct operating direction <<; for reverse operating direction <>, adjust the input signal to a slightly reduced starting point of 0.97 bar.

Starting point (e.g. 0.23 bar)

1. Adjust the input signal to 0.2 bar at the pressure adjuster.
2. Turn the zero adjuster (6.2) until the valve just starts to move from its initial position.
3. Reduce the input signal to 0 bar and slowly increase it again. Check whether the valve starts to move at exactly 0.23 bar.
Correct any deviation at the zero adjuster (6.2).

Upper range value (span) e.g. 1 bar

1. Once the starting point has been set, increase the input signal to 1 bar at the pressure adjuster.

At exactly 1 bar, the plug stem must stand still, having moved through 100 % travel (watch the travel indicator at the valve).

Operation

If the upper range value is incorrect, turn the span adjuster (travel). Four turns correspond to a travel change of 10 % in standard operation. In split-range operation, this value is reduced by half.

Turn the adjuster clockwise to reduce the travel and counterclockwise to increase it.

2. After the correction has been completed, reduce the input signal and slowly increase it again.
Check the starting point and the upper range value.
Repeat the correction procedure until both values are correct.

5.1.3 Settings for actuator with "actuator stem retracts" fail-safe action

NOTICE

When using an actuator with fail-safe action "actuator stem retracts", the diaphragm chamber must be pressurized with a signal pressure that is high enough to tightly close the valve against the upstream pressure in the plant. This applies to an upper range value of the reference variable (1 bar) with operating direction >> as well as a lower range value of the reference variable (0.2 bar) with operating direction <>.

The **required signal pressure** is either indicated on the positioner label or the required supply pressure can be roughly calculated as described in section 4.1.2.

Starting point (e.g. 1 bar)

1. Adjust the input signal to 1 bar at the pressure adjuster.
2. Turn the zero adjuster (6.2) until the valve just starts to move from its initial position.
3. Increase the input signal and slowly reduce it again to 1 bar. Check whether the valve starts to move at exactly 0.1 bar.
4. Correct any deviation at the zero adjuster (6.2). Turning the adjuster counterclockwise causes the valve to move from its end position earlier; turning clockwise causes the valve to move from its end position later.

Upper range value (span) e.g. 0.2 bar

1. Once the starting point has been set, increase the input signal to 0.2 bar at the pressure adjuster.
At exactly 0.2 bar, the plug stem must stand still, having moved through 100 % travel (watch the travel indicator at the valve).
2. If the upper range value is incorrect, turn the span adjuster (travel). Four turns correspond to a travel change of 10 % in standard operation. In split-range operation, this value is reduced by half.
Turn the adjuster clockwise to reduce the travel and counterclockwise to increase it.
3. After the correction has been completed, set the input signal to 1 bar again.

4. Turn the zero adjuster (6.2) again until the pressure gauge indicates the required signal pressure (see section 4.1.2).
5. If no pressure gauge has been installed, set the starting point to 0.97 bar instead.

! NOTICE

After attaching and tuning of the positioner, make sure that the vent plug of the housing cover faces downward when the valve is installed.

5.2 Changing the operating direction

If the operating direction of directly attached positioners (Fig. 2) is to be changed after they have been installed, turn the turnboard (7) and change the position of the connection block, positioner and clamp (1.2).

For attachment according to IEC 60534-6 (NAMUR), turn the turnboard (7) and the positioner on the adapter housing (Fig. 5).

In **positioners for rotary actuators**, reassign the cam disk as shown in Fig. 8 and Fig. 9.

For details on changing the turnboard (7) refer to section 3.

5.3 Adjusting the limit contacts

The positioner version with inductive limit contacts has two adjustable tags mounted on a rotary shaft which operate the associated proximity switches (50).

The operation of the inductive limit contact requires switching amplifiers to be connected in the output circuit. Refer to section 4.2.1. When the tag (51) is located in the inductive field of the switch, the switch assumes a high resistance. When it moves outside the field, the switch assumes a low resistance.

The limit contacts are usually adjusted to issue a signal for both end positions. The switching points can also be adjusted to indicate intermediate positions.

The switches **A** and **B** must be assigned to the end positions of the control valve (valve OPEN or CLOSED) depending on the operating direction and the mounting position according to Table 8 and Table 9.

The terminals 41/42 and 51/52 can optionally be assigned to the switches **A** and **B** by turning the associated label on the terminal block (also see Fig. 11).

NOTICE

The tags of the limit contacts cannot be turned by 360°. As a result, it is important to observe the correct assignment of switches A and B to the valve positions (valve CLOSED and valve OPEN), especially when the limit contacts are to be connected in safety circuits.

The required switching function, i.e. whether the output relay is to be picked up or released when the tag enters the field, must be determined by jumpers for either load current or no-load current at the switching amplifier.

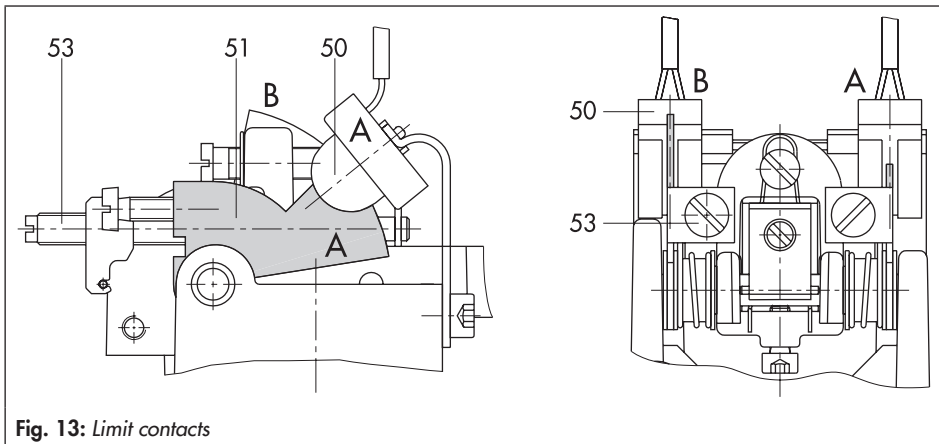


Fig. 13: Limit contacts

Adjusting the switching point

Move the valve to the switching point and adjust the tag by turning the adjustment screw (53) so that the switching point is reached and indicated by the LED on the switching amplifier.

To guarantee the switching under all ambient conditions, adjust the switching point approx. 2 % before the mechanical stop (OPEN/CLOSED).

NOTICE

After tuning the positioner, make sure that the vent plug of the housing cover faces downward when the valve is installed.

Table 8: Direct attachment to Type 3277 Actuator (Fig. 2)

| | Left attachment | | Right attachment | |
|----------------|-----------------------------|----------------------------|-----------------------------|----------------------------|
| | Switch | | | |
| Valve position | Tag outside inductive field | Tag inside inductive field | Tag outside inductive field | Tag inside inductive field |
| Closed | B | A | A | B |
| Open | A | B | B | A |

Table 9: Right or left attachment according to NAMUR (Fig. 5) and attachment to rotary actuators (Fig. 7)

| Direction of action | Valve position | Actuator stem extends (FA) | | Actuator stem retracts (FE) | |
|---------------------|----------------|----------------------------|------------------------|-----------------------------|------------------------|
| | | Switch Tag | | Switch Tag | |
| | | Outside inductive field | Inside inductive field | Outside inductive field | Inside inductive field |
| >> | Closed | B | A | A | B |
| | Open | A | B | B | A |
| << | Closed | A | B | B | A |
| | Open | B | A | A | B |

5.4 Adjusting the position transmitter

NOTICE

The starting point (zero) and upper range value (span) must be set before adjusting the position transmitter.

Depending on the position of the multi-pin connector (symbol on connector: >> or <<), the feedback signal can be set to either a range of 4 to 20 mA or 20 to 4 mA for 0 to 100 % travel.

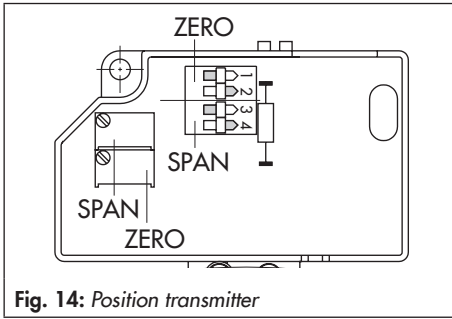


Fig. 14: Position transmitter

Zero point

Use the switches 1 and 2 to roughly set the zero point and the ZERO potentiometer for fine-tuning. The adjusted value is always based on a 4 mA signal.

Span

Use the switches 3 and 4 to roughly set the span, i.e. the upper range value and the SPAN potentiometer for fine-tuning. The adjusted value is always based on a 20 mA signal.

Example:

Move the valve to the open position while observing the position transmitter signal. If the signal does not move in the desired direction, change the position of the multi-pin connector.

Adjust the zero point (4 mA) and span (20 mA) for the valve positions according to Table 10.

Table 10: Position transmitter

| Valve movement | Observed feedback signal | Direction of signal | Set zero/span to |
|---------------------|--------------------------|---|---------------------------------------|
| Open ↑ Closed | Signal increases ↑ | OK | 20 mA Valve OPEN 4 mA Valve CLOSED |
| | | Not OK → Change connector's position | 4 mA Valve OPEN 20 mA Valve CLOSED |
| | Signal drops ↓ | OK | 4 mA Valve OPEN 20 mA Valve CLOSED |
| | | Not OK → Change connector's position | 20 mA Valve OPEN 4 mA Valve CLOSED |

Zero point adjustment

1. Use the input signal of the positioner to move the valve to closed position (valve CLOSED, travel 0 %).
2. The ammeter must now indicate approx. 4 mA.
3. Correct smaller deviations at the ZERO potentiometer until the meter shows exactly 4 mA.
For larger deviations that cannot be corrected using the potentiometer (adjustment range of approx. 20 turns), set the switches 1 and 2 to indicate an mA value which is within the adjustment range of the ZERO potentiometer.
4. Set the zero point to exactly 4 mA using the ZERO potentiometer.

Adjusting the span

1. Use the input signal of the positioner to move the valve to closed position (valve CLOSED, travel 100 %).
2. The ammeter must now indicate approx. 20 mA.
3. Correct smaller deviations at the SPAN potentiometer until the meter shows exactly 20 mA. If deviations are too high, set the switches 3 and 4 to indicate an mA signal which is within the adjustment range of the SPAN potentiometer.
4. Turn the SPAN potentiometer until the ammeter shows exactly 20 mA.
Since the zero point and span have a mutual influence on each other, repeat the correction procedure at both potentiometers until both values are correct.

i Note

The following applies to positioners with adapter housing for NAMUR attachment:

When the positioner and the position transmitter signal have different operating directions (<< and <>), it may be impossible to adjust the zero point of the transmitter signal due to the additional deflection caused by the bracket (28) of the adapter housing.

In this case, readjust the black pointer (section 3.2.2 on page 22) so that the sensor of the position transmitter reaches the control range.

Unscrew the clamp. For "actuator stem extends" (FA), shift the pointer upward towards the actuator; for "actuator stem retracts" (FE), shift the pointer downward towards the valve. For valves with rod-type yoke, slightly shift the positioner on the rod in the downward (FE) or upward (FA) direction.

! NOTICE

Every time you make a change as described above, the zero point and span of the positioner must be readjusted before adjusting the position transmitter.

After tuning the positioner, make sure that the vent plug of the housing cover faces downward when the valve is installed.

6 Upgrading the positioner

The pneumatic positioner (3766-x...x.04 and higher) can be converted to form a Type 3767 Electropneumatic Positioner.

NOTICE

Upgrade of explosion-protected versions only on request.

Besides the Type 6112 i/p Module (see-Table 11), the associated conversion kit (including cable gland, fastening screw, clamps and cables) must be ordered.

1. Remove the holder with the terminal block (if used).
2. Unscrew the connecting plate (3) and remove the silicone hose (2). Remove the guard plate (4) and pneumatic screw fitting (1).
3. Connect the connecting cable to the terminal block and the i/p module (6). Lead the blue cable to the minus side and the red cable to the plus side. Fasten the cables with terminal screws.
4. Check whether the seals (7, 8) are properly inserted on the bottom section of the i/p module. When the module is installed (broken line in Fig. 16), the seal including restriction and filter must be located on the right above the inner hole (supply).
5. Fasten the i/p module and terminal block holder each with two screws.
6. Seal the housing on the side using the cable gland (5) or a stopper with seal.

7. Change model index on the nameplate to Type 3767 i/p Positioner.

Note

For details on Type 3767 Positioners, refer to *Mounting and Operating Instructions*

► EB 8355-2.

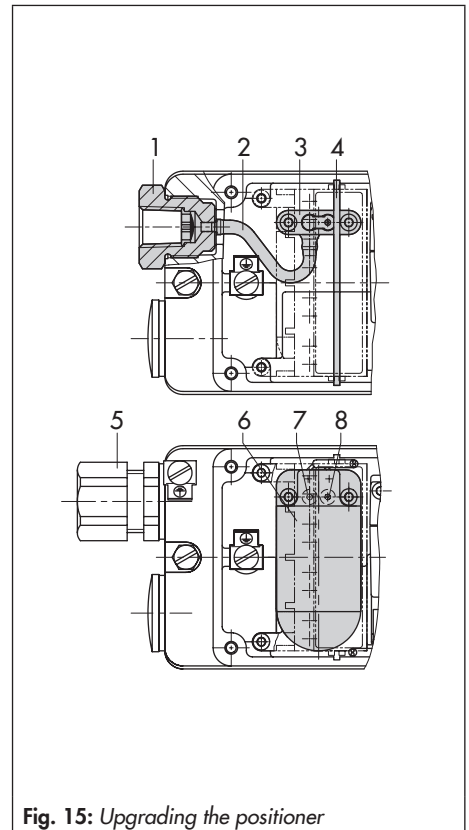


Fig. 15: Upgrading the positioner

Upgrading the positioner

Table 11: *Conversion kits*

| Required input signal (reference variable) | Required i/p module (order no.) | Required upgrade kit (order no.) |
|---|------------------------------------|-------------------------------------|
| 4 to 20 mA | 6112-041110 | 1400-7574 |
| 0 to 20 mA | 6112-042110 | |
| 1 to 5 mA | 6112-043110 | |

7 After-sales service

7.1 Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity.

Inspection by a qualified inspector is not required if the manufacturer performs a routine test on the device before putting it back into operation. Document the passing of the routine test by attaching a mark of conformity to the device.

Replace explosion-protected components only with original, routine-tested components by the manufacturer.

Devices that have already been used outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being operated inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices. Observe EN 60079-17 during servicing.

7.2 Maintenance and calibration

Interconnection with intrinsically safe circuits to check or calibrate the equipment inside or outside hazardous areas is to be performed only with intrinsically safe current/voltage calibrators and measuring instruments to rule out any damage to components relevant to explosion protection.

Observe the maximum permissible values specified in the certificates for intrinsically safe circuits.

9 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.

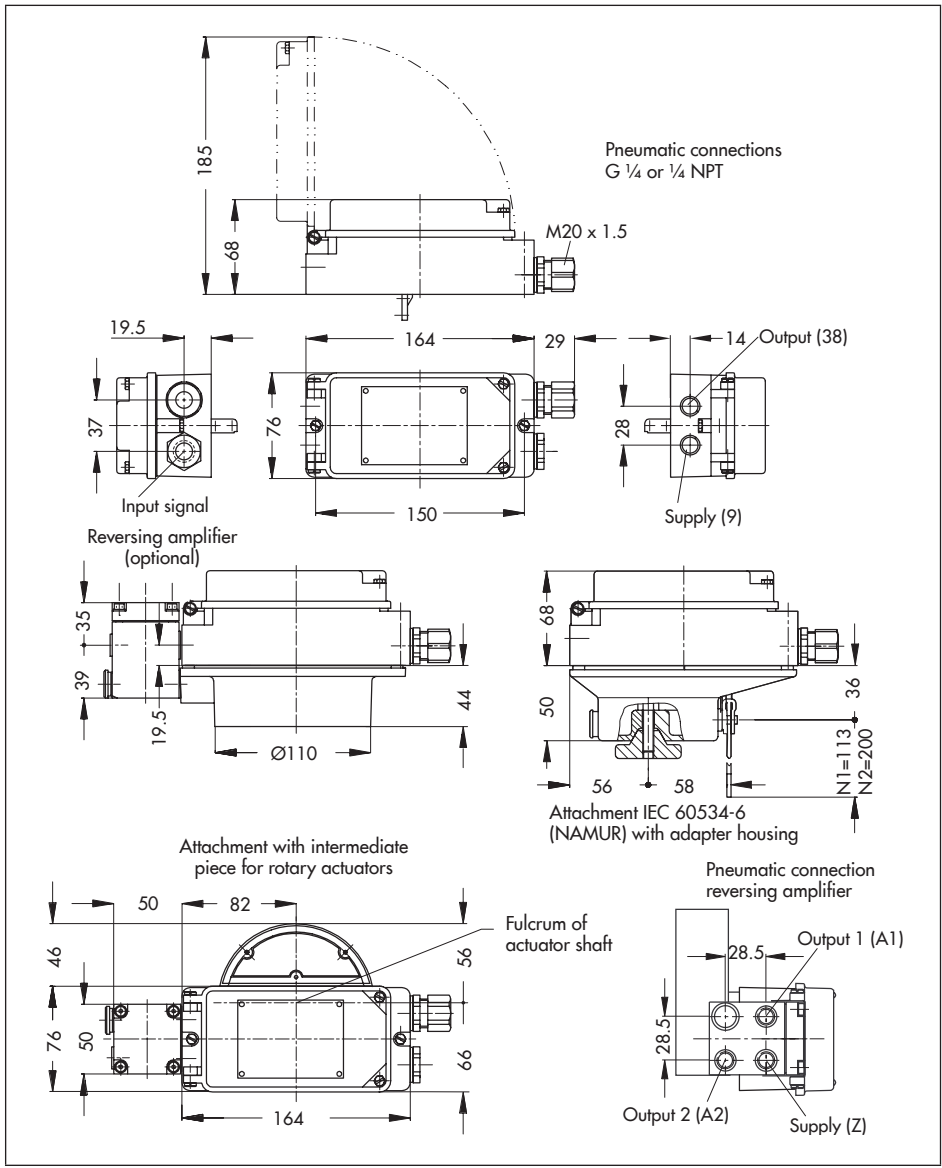
i Note

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

Tip

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

8 Dimensions in mm



TRANSLATION

(1) **EC TYPE EXAMINATION CERTIFICATE**

(2) Equipment and Protective
Atmospheres – Part 1

(3) EC Type Examination

(4) Equipment:

(5) Manufacturer:

(6) Address:

(7) The equipment
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(12) The marking of the equipment shall include the following:



Zertifiziert
By order

(Signature)

Dr. Ing. U. Jol
Regierungsdir

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EC TYPE EXAMI

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Dr. Ing. U. Johans
Regierungsdirek



TRANSLATION

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- (4)
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(12) The marking of the equipment shall include the following:



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Dr. Ing. U. J.
Regierungsdi



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Statement of Con

(15) **Description**

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- a.) With dual inductive limit (terminals 4)
- b.) With positive signal circuit (terminals)
- c.) With sole signal circuit (terminal)

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(17) Special conditions for safe use

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By order

(Signature)

Dr. Ing. U

Installation Manual for apparatus certified by CSA for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

| | Position-indicator | Limit switches (inductive) | Solenoid valve |
|--------------------|--------------------|----------------------------|----------------|
| Circuit No. | 1 | 2 and 3 | 4 |
| Terminal No. | 31 / 32 | 41 / 42 and 51 / 52 | 81 / 82 |
| U_i or V_{max} | 28V | 16V | 28V |
| I_i or I_{max} | 115mA | 25/52 mA | 115mA |
| P_i or P_{max} | 1W | 64/169mW | 250mW (##) |
| C_i | 5.3nF | 30nF | 0nF |
| L_i | 0 μ H | 100 μ H | 0 μ H |

Notes: Entity parameters must meet the following requirements:

(##) Solenoid valve 12V and 24V version P_i or P_{max} no limited

U_o or $V_{oc} \leq U_i$ or V_{max} / I_o or $I_{oc} \leq I_i$ or I_{max} / $P_o \leq P_i$ or P_{max} ; $C_o \geq C_i$ and $L_o \geq L_i$

Table 2: CSA- certified barrier parameters of circuit 1 and 4

| Barrier | Supply barrier | | Evaluation barrier | |
|----------------|----------------|------------------|--------------------|--------------|
| | V_{max} | R_{min} | V_{max} | |
| circuit 1 | $\leq 28V$ | $\geq 280\Omega$ | $\leq 28V$ | Diode Return |
| circuit 4 (##) | $\leq 28V$ | $\geq 280\Omega$ | $\leq 28V$ | Diode Return |
| circuit 4(###) | $\leq 28V$ | $\geq 280\Omega$ | $\leq 28V$ | Diode Return |

circuit 4 (##) = 12V and 24V version; (###) = 6V version.

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

| Temperature class | Permissible ambient temperature range |
|-------------------|---------------------------------------|
| T6 | - 45°C ... 60°C |
| T5 | - 45°C ... 70°C |
| T4 | - 45°C ... 80°C |

Table 4: For the Model 3766– 3 Positioner the correlation between temperature classification, permissible ambient temperature ranges and maximum short-circuit current is shown in the table below:

| Temperature class | Permissible ambient temperature range | Maximum short-circuit current |
|-------------------|---------------------------------------|-------------------------------|
| T6 | - 45°C ... 45°C | 52mA |
| T5 | - 45°C ... 60°C | |
| T4 | - 45°C ... 75°C | |
| T6 | - 45°C ... 60°C | 25mA |
| T5 | - 45°C ... 80°C | |
| T4 | - 45°C ... 80°C | |

Intrinsically safe if installed as specified in manufacturer’s installation manual.

CSA- certified for hazardous locations

Ex ia IIC T6; Class I, Zone 0

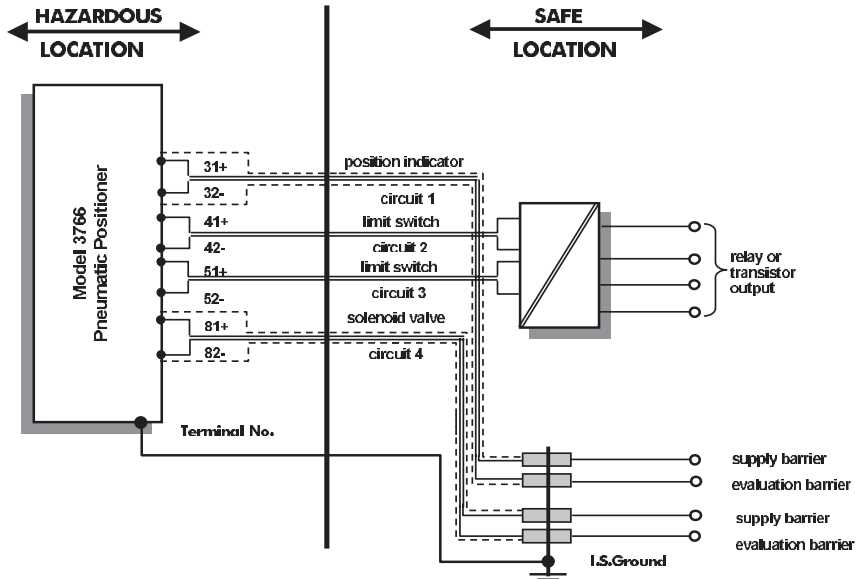
Class I; Groups A, B, C, D

Class II; Groups E, F + G; Class III

Type 4 Enclosure

Notes:

- 1.) Max. two cable entries per positioner
- 2.) Each pair of wire shall be provided with a grounded shield. The shield shall extend as close to the terminal as possible. Each shield shall be grounded as the I.S. barrier ground.
- 3.) The installation shall be in accordance with the Canadian Electrical Code Part 1.
- 4.) Each pair of I.S. wires must be protected by a shield that is grounded at the I.S. Ground. The shield shall extend as close to terminals as possible.



Version: Model 3766-3 with inductive limit switch(es) and solenoid valve.
 Model 3766-36 with position indicator

Relay or transistor output 2 or channel(s) resp. CSA certified.

Supply and evaluation barrier CSA- certified

Position indicator channel 1 only version 3766-36

For the permissible maximum values for the intrinsically safe circuits see Table 1

For the permissible barrier parameters for the circuits 1 and 4 see Table 2

Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T

On interconnection to form ground- free signal circuits, only evaluation barriers shall be installed in the return line. Correct polarity shall be ensured.

Revisions Control Number: 1 May.05

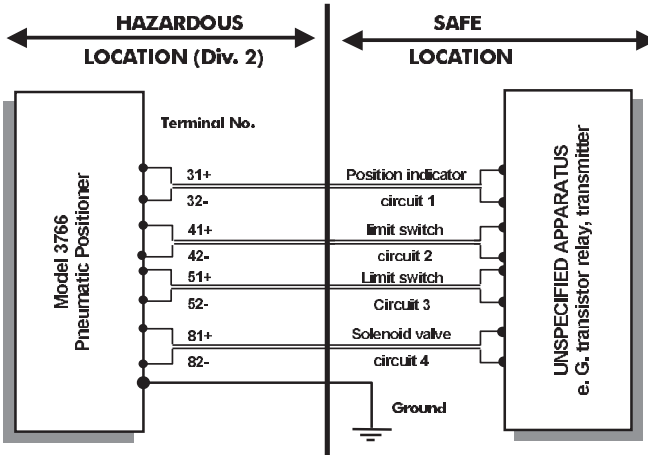
Addendum to EB 8355-1 EN

CSA- certified for hazardous locations

Class I; Div. 2, Groups A, B, C, D
Class II; Div. 2, E, F + G, Class III

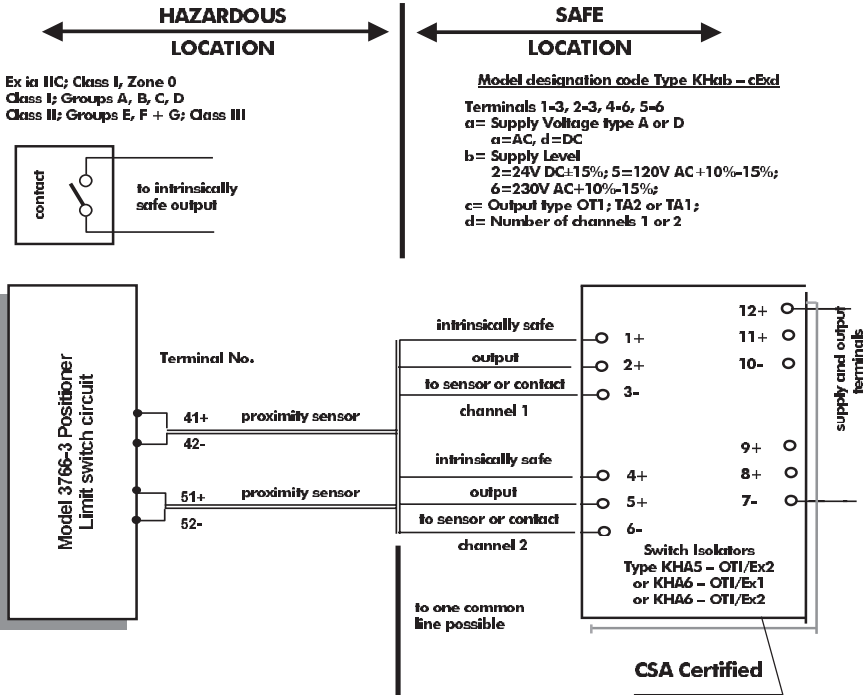
Type 4 Enclosure

Positioner with position indicator, solenoid valve and limit switches.



- 1.) The installation shall be in accordance with the Canadian Electrical Code Part 1.
- 2.) For the maximum values for the individual circuits see Table 1 and 2.
- 3.) The cables shall be protected by conduits.
- 4.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

Installation drawing Control Relay KHA5-OTI/Ex2, KHA6-OTI/Ex1 or KHA6-OTI/Ex2 with Model SJ-b-N Proximity Sensors



The total series inductance and shunt capacitance of shield wiring shall be restricted to the following maximum values

maximum capacitance of each inductive sensor 30nF
maximum inductance of each inductive sensor 100µH

System parameters

| Control Relay Terminal No. | Groups | L [mH] | C [µF] | Voc [V] | Isc [mA] | Vmax [V] | Rmin [Ω] |
|----------------------------|---------|--------|--------|---------|----------|----------|----------|
| 1-3; 2-3 4-6; 5-6 | A + B | 84.88 | 1.273 | ↑ | ↑ | ↑ | ↑ |
| | C + D | 298.7 | 3.82 | 12.6 | 19.8 | 12.6 | 650 |
| | E, F, G | 744.4 | 10.18 | ↓ | ↓ | ↓ | ↓ |

Division 2 wiring method shall be in accordance to the Canadian Electrical Code Part 1.

Revisions Control Number: 1 May.05

Addendum to EB 8355-1 EN

Installation Manual for apparatus approved by FM for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

| | Position-indicator | Limit switches inductive | Solenoid valve |
|---|---------------------------|---------------------------------|-----------------------|
| Circuit No. | 1 | 2 and 3 | 4 |
| Terminal No. | 31 / 32 | 41 / 42 and 51 / 52 | 81 / 82 |
| U_i or V_{max} | 28V | 16V | 28V |
| I_i or I_{max} | 115mA | 25/52 mA | 115mA |
| P_i or P_{max} | 1W | 64/169mW | 250mW (##) |
| C_i | 5.3nF | 30nF | 0nF |
| L_i | 0μH | 100μH | 0μH |

Notes: Entity parameters must meet the following requirements:

(##) Solenoid valve 12V and 24V version P_i or P_{max} no limited

(##) Solenoid valve 6V version P_i or P_{max} 250mW

U₀ or V_{oc} or V_i ≤ U_i or V_{max} / I₀ or I_{sc} or I_i ≤ I_i or I_{max} / P₀ or P_{max} ≤ P_i or P_{max}

C_a ≥ C_i + C_{cable} and L_a ≥ L_i + L_{cable}

Table 2: FM – approved barrier parameters of circuit 1 and 4

| Barrier | Supply barrier | | | | Evaluation barrier | | |
|-----------------------|-----------------------|------------------------|-----------------------|------------------------|---------------------------|------------------------|-----------------------|
| | V_{oc} | R_{min} | I_{sc} | P_{max} | V_{oc} | R_{min} | I_{sc} |
| circuit 1 | ≤ 28V | ≥ 196Ω | ≤ 115mA | ≤ 1W | ≤ 28V | # | 0mA |
| circuit 4 (#) | ≤ 28V | ≥ 200Ω | ≤ 115mA | (#) | ≤ 28V | # | 0mA |
| circuit 4 (##) | ≤ 28V | ≥ 785Ω | ≤ 115mA | (##) | ≤ 28V | # | 0mA |

circuit 4: (#) = 12V and 24V version; (##) = 6V version.

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

| Temperature class | Permissible ambient temperature range |
|--------------------------|--|
| T6 | 60°C |
| T5 | - 40°C ≤ ta ≤ 70°C |
| T4 | 80°C |

Table 4: For the Model 3766 – 3 Positioner the correlation between temperature classification, permissible ambient temperature ranges and maximum short-circuit current is shown in the table below:

| Temperature class | Permissible ambient temperature range | Maximum short-circuit current |
|--------------------------|--|--------------------------------------|
| T6 | 45°C | 52mA |
| T5 | - 40°C ≤ ta ≤ 60°C | |
| T4 | 75°C | |
| T6 | 60°C | 25mA |
| T5 | - 40°C ≤ ta ≤ 80°C | |
| T4 | 80°C | |

Intrinsically safe if installed as specified in manufacturer’s installation manual.

FM- approved for hazardous locations

Class I, Zone 0 A Ex ia IIC T6

Class I, II, III Division 1, Groups A, B, C, D; E, F + G

NEMA Type 4X

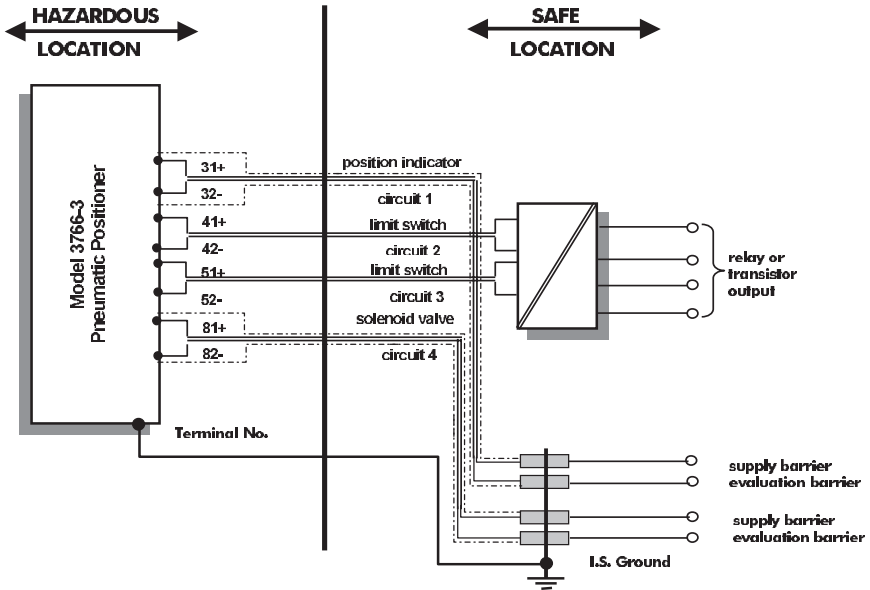
Notes:

- 1.) The apparatus may be installed in intrinsically safe circuits only when used in conjunction with the FM approved apparatus. For maximum values of U_i or V_{max} ; I_i or I_{max} ; P_i or P_{max} ; C_i and L_i of the various apparatus see Table 1.
- 2.) The apparatus may be installed in intrinsically safe circuits only when used in conjunction with the FM approved intrinsically safe barrier. For barrier selection see Table 2.
- 3.) Installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01

Revisions Control Number: 1 August 2004

Addendum to EB 8355-1 EN

4.) Use only supply wires suitable for 5°C above surrounding temperature.



Version: Model 3766-3 with solenoid valve and inductive limit switch(es.)
 Model 3766-36 with position indicator.

Relay or transistor output 2 or 3 channel(s) resp. FM/CSA approved.

Supply and evaluation barrier FM/CSA- approved.

Position indicator channel 1 only version 3766-36

For the permissible maximum values for the intrinsically safe circuits see Table 1

For the permissible barrier parameters for the circuits 2 and 4 see Table 2

Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T
 or 1050 – 0540 T

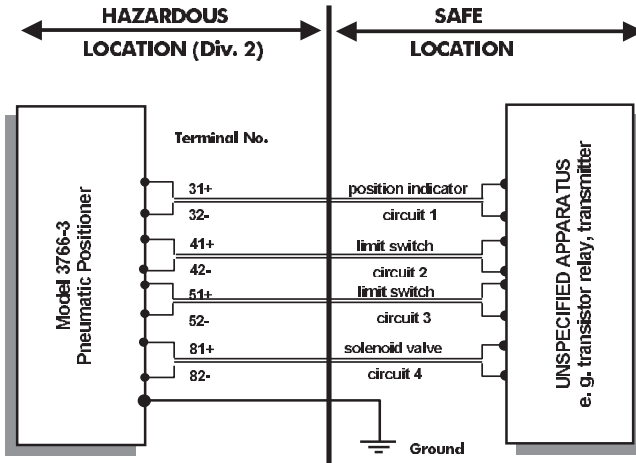
FM- approved for hazardous locations

Class I, Division 2, Groups A, B, C, D.

Class II Division 2, Groups F + G; Class III

NEMA Type 4X

pneumatic positioner with position indicator, solenoid valve and limit switches.



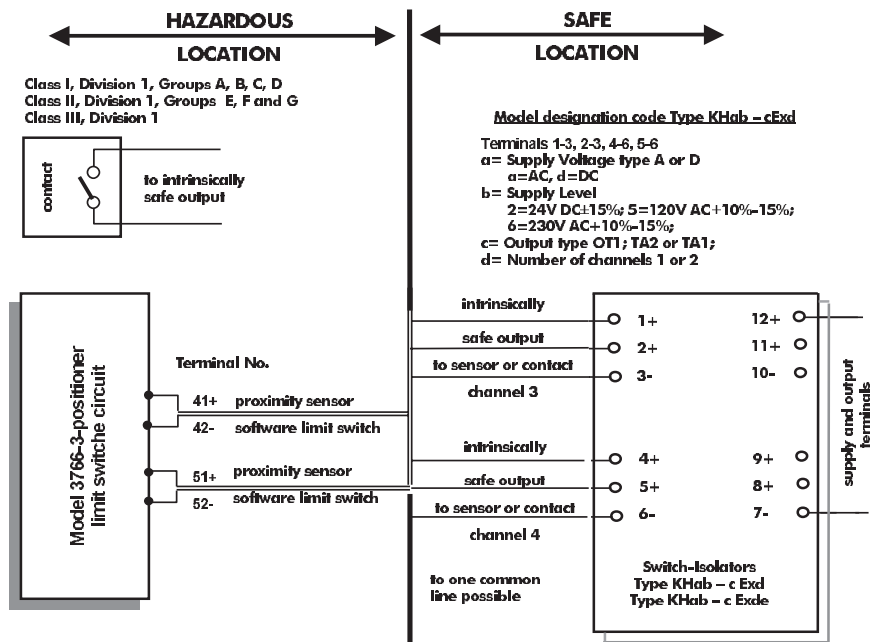
Notes:

- 1.) The installation must be in accordance with the National Electrical Code ANSI/NFPA 70
- 2.) For the maximum values for the individual circuits see Table 1 and 2.
- 3.) The cables shall be protected by conduits.
- 4.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

Revisions Control Number: 1 August 2004

Addendum to EB 8355-1 EN

Installation drawing Control Relay Hab – cEx de with proximity sensors typ SJ-b-N



maximum capacitance of each inductive sensor 30nF
 maximum inductance of each inductive sensor 100µH

The total series inductance and shunt capacitance of shield wiring must be restricted to the following maximum values

| Control Relay Terminal No. | Groups | L [mH] | C [µF] | V0C [V] | ISC [mA] |
|----------------------------|---------|--------|--------|---------|----------|
| 1-3; 2-3 4-6; 5-6 | A + B | 84,8 | 1,27 | 12,9 | 19,8 |
| | C + E | 299 | 3,82 | | |
| | D, F, G | 744 | 10,2 | | |

Model designation code Type KHab – cExd
 Terminals 1-3, 2-3, 4-6, 5-6
 a= Supply Voltage type A or D
 a=AC, d=DC
 b= Supply Level
 2=24V DC±15%; 5=120V AC+10%/-15%;
 6=230V AC+10%/-15%;
 c= Output type OT1; TA2 or TA1;
 d= Number of channels 1 or 2

Model designation code Type KHab – cExde
 a= Supply Voltage type A or D
 a=AC, d=DC
 b= Supply Level
 2=24V DC±15%; 5=120V AC+10%/-15%;
 6=230V AC+10%/-15%;
 c= Output type RTA;/ RW1;/ SS1;/ SS2;/ RS1;/
 SR;/ ST-or SOT
 d= Number of channels 1 or 2
 e= Power rail designation, P, 2S,P or GS,P
 (includes Model KHD2-EB-PB Power Feed Module) or Blank



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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

Pneumatischer Stellungsregler / Pneumatic Positioner / Positionneur électropneumatique Typ/Type/Type 3766

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 61000-6-3:2007
+A1:2011, EN 61326-1:2013

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.

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

Dirk Hoffmann
Zentralabteilungsleiter/Head of Department/Chef du département
Entwicklungsorganisation/Development Organization



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Pneumatischer Stellungsregler / Pneumatic Positioner / Positionneur électropneumatique Typ/Type/Type 3766-1...

entsprechend der EU-Baumusterprüfbescheinigung PTB 01 ATEX 2171 ausgestellt von der/
according to the EU Type Examination PTB 01 ATEX 2171 issued by/
établi selon le certificat CE d'essais sur échantillons PTB 01 ATEX 2171 émis par:

Physikalisch Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig

Benannte Stelle/Notified Body/Organisme notifié 0102

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 61000-6-3:2007
+A1:2011, EN 61326-1:2013

Explosion Protection 94/9/EC (bis/to 2016-04-19)
Explosion Protection 2014/34/EU (ab/from 2016-04-20)

EN 60079-0:2009, EN 60079-11:2012

RoHS 2011/65/EU

EN 50581:2012

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Responsable de l'assurance de la qualité

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Für das folgende Produkt / For the following product / Nous certifions que le produit

Pneumatischer Stellungsregler / Pneumatic Positioner / Positionneur électropneumatique Typ/Type/Type 3766-8...

- entsprechend der EU-Baumusterprüfbescheinigung PTB 01 ATEX 2195 X ausgestellt von der/
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+A1:2011, EN 61326-1:2013

Explosion Protection 94/9/EC (bis/to 2016-04-19)
Explosion Protection 2014/34/EU (ab/from 2016-04-20)

EN 60079-0:2009, EN 60079-15:2010

RoHS 2011/65/EU

EN 50581:2012

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