Series 3730
Electropneumatic Positioner
Type 3730-0

Mounting and Operating Instructions

EB 8384-0 EN (1300-1609)
Edition November 2010
Definitions of the signal words used in these instructions

⚠️ DANGER!
indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ WARNING!
indicates a hazardous situation which, if not avoided, could result in death or serious injury.

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NOTICE
indicates a property damage message.

Note: Supplementary explanations, information and tips
1 Important safety instructions

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

- The positioner 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.
- Explosion-protected versions of this positioner may only be operated by personnel who have undergone special training or instructions or who are authorized to work on explosion-protected devices in hazardous areas. Refer to section 9.
- Any hazards that could be caused by the process medium, the operating pressure, the signal pressure or by moving parts of the control valve are to be prevented by means of the appropriate measures.
- If inadmissible motions or forces are produced in the actuator as a result of the supply pressure, the supply pressure must be restricted by means of a suitable supply pressure reducing station.

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

- Proper shipping and appropriate storage are assumed.
- Do not ground electric welding equipment near to the positioner.

Note: The device with a CE marking fulfills the requirements of the Directives 94/9/EC (ATEX) and 89/336/EEC (EMC). The Declaration of Conformity is available on request.
## 2 Article code

<table>
<thead>
<tr>
<th>Article code</th>
<th>Type 3730-0</th>
<th>0 0 0 0 0 0 0 0 x 0 0 0 x x</th>
</tr>
</thead>
</table>

### Explosion protection

<table>
<thead>
<tr>
<th>Without</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX: II 2G Ex ia IIC T6, II 2D Ex tb III C T 80 °C IP 66</td>
<td>1</td>
</tr>
<tr>
<td>FM/CSA:</td>
<td>3</td>
</tr>
<tr>
<td>Class I, Zone 0 AEx ia IIC; Class I, II, III, Div. 1, Groups A–G; Class I, Div. 2, Groups A–D; Class II, Div. 2, Groups F, G; Ex ia IIC T6; Class I, Zone 0; Class II, Groups E–G; Ex nA II T6; Class I, Zone 2; Class II, Division 2, Groups E–G</td>
<td></td>
</tr>
<tr>
<td>JIS: Ex ia IIC T6</td>
<td>7</td>
</tr>
<tr>
<td>ATEX: II 3G Ex nA II T6, II 3G Ex ic IIC T6, II 3D Ex tc III C T80°C IP 66</td>
<td>8</td>
</tr>
</tbody>
</table>

### Housing material

| Aluminum | 0 |
| Stainless steel 1.4581 | 1 |

### Special applications

| Without | 0 |
| Compatible with paint | 1 |
| Exhaust air with ¼ NPT connection, back of housing sealed | 2 |

### Special versions

| Without | 0 0 |
| GOST: 1 Ex ia IIC T6 X, DIP A21 Ta80°C, IP 65; Ex nA II T6, Ex nL IIC T6, DIP A22 Ta80°C, IP 65 | 1 4 |
3  Design and principle of operation

The electropneumatic positioner is mounted to pneumatic control valves and is used to assign the valve position (controlled variable x) to the control signal (reference variable w). The DC control signal received from a control unit is compared to the travel of the control valve and issues a signal pressure (output variable y).

A supply pressure between 1.4 to 6 bar is required. The electric input signal is a reference variable between 4 to 20 mA.

The positioner is designed depending on the corresponding accessories for direct attachment to Type 3277 Actuators or for attachment to actuators according to IEC 60534-6 (NAMUR).

The positioner basically consists of a travel sensor system which is proportional to resistance, an analog i/p converter with downstream air capacity booster, and analog controller electronics.

The position of the valve is transmitted as linear travel motion via pick-up lever and travel sensor (2) to an analog PD controller (3). The PD controller compares this actual position to the 4 to 20 mA DC control signal received from a control unit. In case of a system deviation, the operation of the i/p converter (6) is changed so that the actuator (1) is filled or vented via the downstream air capacity booster (7). This causes the valve plug to move to the position determined by the reference variable.

The pneumatic air capacity booster (7) and the pressure regulator (8) are provided with supply air. An intermediate flow regulator (9) with fixed settings is used to purge the positioner and also guarantees trouble-free operation of the pneumatic booster. The output signal pressure supplied by the booster can be limited over the DIP switch S5.

The volume restriction Q (10) and the switch S6 are used to optimize the positioner by adapting it to the actuator size and changing the gain factor.

Tight-closing function:
After activating the tight-closing function (refer to section 7.12), the pneumatic actuator is completely filled with air or vented as soon as the reference variable falls below or exceeds the corresponding deactivating point of 4.5 mA or 19.5 mA.

In the case of three-way valves, the function allows the plug move to the end position with full actuator force.
3.1 Technical data

<table>
<thead>
<tr>
<th>Positioner (technical data in test certificates additionally apply for explosion-protected devices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal travel, adjustable</td>
</tr>
<tr>
<td>Travel range</td>
</tr>
<tr>
<td>Reference variable w</td>
</tr>
<tr>
<td>Minimum current</td>
</tr>
</tbody>
</table>

Fig. 2 · Functional diagram
### Design and principle of operation

**Positioner** *(technical data in test certificates additionally apply for explosion-protected devices)*

<table>
<thead>
<tr>
<th>Load impedance</th>
<th>Version without explosion protection: ≤ 6 V (corresponding to 300 Ω at 20 mA), explosion-protected version: ≤ 6 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply air</td>
<td><strong>Supply pressure</strong> 1.4 to 7 bar (20 to 105 psi) <strong>Air quality acc. to ISO 8573-1</strong> Max. 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</td>
</tr>
<tr>
<td>Signal pressure (output)</td>
<td>0 bar up to supply pressure, can be limited to approx. 2.4 bar over DIP switch</td>
</tr>
<tr>
<td>Characteristic</td>
<td>Linear; Deviation from terminal-based conformity ≤ 1 %</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ 1 %</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>≤ 0.1 %</td>
</tr>
<tr>
<td>Direction of action</td>
<td>Selectable over DIP switch</td>
</tr>
<tr>
<td>Air consumption, st. state</td>
<td>Independent of supply pressure approx. 120 l/h</td>
</tr>
<tr>
<td>Air delivery</td>
<td><strong>Actuator pressurized</strong> At Δp = 6 bar: 8.5 m₃/h, at Δp = 1.4 bar: 3.0 m₃/h ( K_{V_{\text{max}}(20,^\circ\text{C})} = 0.09 ) ( K_{V_{\text{max}}(20,^\circ\text{C})} = 0.15 ) <strong>Actuator vented</strong> At Δp = 6 bar: 14.0 m₃/h, at Δp = 1.4 bar: 4.5 m₃/h</td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>−20 to +80 °C, with metal cable gland −45 to +80 °C The limits in the test certificate additionally apply for explosion-protected devices.</td>
</tr>
<tr>
<td>Influences</td>
<td>Temperature: ≤ 0.15 %/10 K Supply air: None Vibration: ≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770</td>
</tr>
<tr>
<td>Electromagnetic compatibility</td>
<td>Complying with requirements specified in EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21</td>
</tr>
<tr>
<td>Explosion protection</td>
<td><strong>ATEX</strong> Type 3730-01: II 2G Ex ia IIC T6, II 2D Ex tb IIIC T80 °C IP 66 <strong>FM</strong> Type 3730-08: II 3G Ex na II T6, II 3G Ex ic IIC T6, II 3D Ex tc III C T80 °C IP 66 <strong>Type 3730-03: Class I, Zone 0 AEx ia IIC; Class I, II, III, Div.1, Groups A–G; Class I, Div. 2, Groups A–D; Class II, Div.2, Groups F, G</strong> <strong>CSA</strong> Type 3730-03: Ex ia IIC T6; Class I, Zone 0; Class II, Groups E–G; Ex nA II T6; Class I, Zone 2; Class II, Division 2, Groups E–G <strong>JIS</strong> Type 3730-07: Ex ia IIC T6 <strong>GOST</strong> Type 3730-x000000000x00x014: 1 Ex ia IIC T6 X, DIP A21 Ta80°C, IP 65; Ex nA II T6, Ex nL IIC T6, DIP A22 Ta80°C, IP 65</td>
</tr>
<tr>
<td>Use in safety-instrumented systems acc. to IEC 61508</td>
<td>Suitable for use in safety instrumented systems up to SIL 2 (single device) and SIL 3 (redundant configuration), safety shutdown at a reference variable 0 mA</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 66</td>
</tr>
<tr>
<td>Materials</td>
<td>Die-cast aluminum EN AC-Al Si12(Fe) (EN AC-44300) acc. to DIN EN 1706, chromated and plastic coated External parts: Stainless steel 1.4571 and 1.4301</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 1 kg</td>
</tr>
</tbody>
</table>
4 Attachment to the control valve – Mounting parts and accessories

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

For attachment to the various actuators, corresponding mounting parts and accessories are required. These are listed with their order numbers in Tables 1 to 4.

On attaching the positioner, it is important to observe the assignment between lever and pin position according to the travels listed in the travel tables.

The travel that can be achieved at the valve is restricted by the pin position used and additionally by the selected fail-safe action and the actuator spring compression required.

The positioner is standard equipped with the lever M (pin position 35).

Note:
If the standard mounted lever M (pin position 35) is replaced, the newly mounted lever must be moved once all the way as far as it will go in both directions to adapt it to the internal measuring lever.
Attachment to the control valve – Mounting parts and accessories

### Travel table for direct attachment to Type 3277 Actuator

<table>
<thead>
<tr>
<th>Actuator size cm²</th>
<th>Rated travel mm</th>
<th>Adjustment range at positioner Min.</th>
<th>Travel Max.</th>
<th>Required lever</th>
<th>Assigned pin position</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>7.5</td>
<td>5.0</td>
<td>25.0</td>
<td>M</td>
<td>25</td>
</tr>
<tr>
<td>120/240/350</td>
<td>15</td>
<td>7.0</td>
<td>35.0</td>
<td>M</td>
<td>35</td>
</tr>
<tr>
<td>355/700</td>
<td>30</td>
<td>10.0</td>
<td>50.0</td>
<td>M</td>
<td>50</td>
</tr>
</tbody>
</table>

### Travel table for attachment according to IEC 60534-6 (NAMUR)

<table>
<thead>
<tr>
<th>SAMSON valves</th>
<th>Other valves/actuators</th>
<th>Required lever</th>
<th>Assigned pin position</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm²</td>
<td>Rated travel mm</td>
<td>Min.</td>
<td>Travel</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>60 and 120 with Type 3510 Valve</td>
<td>7.5</td>
<td>3.6</td>
<td>18.0</td>
</tr>
<tr>
<td>120</td>
<td>7.5</td>
<td>5.0</td>
<td>25.0</td>
</tr>
<tr>
<td>120/240/350</td>
<td>15</td>
<td>7.0</td>
<td>35.0</td>
</tr>
<tr>
<td>355/700</td>
<td>7.5</td>
<td>10.0</td>
<td>50.0</td>
</tr>
<tr>
<td>1000/1400/2800</td>
<td>30</td>
<td>14.0</td>
<td>70.0</td>
</tr>
<tr>
<td>1000/1400/2800</td>
<td>60</td>
<td>20.0</td>
<td>100.0</td>
</tr>
<tr>
<td>1400/2800</td>
<td>120</td>
<td>40.0</td>
<td>200.0</td>
</tr>
</tbody>
</table>

### Table 1

<table>
<thead>
<tr>
<th>Mounting parts</th>
<th>Accessories for the actuator</th>
<th>Accessories for the positioner</th>
</tr>
</thead>
<tbody>
<tr>
<td>For actuators with 120 cm² effective diaphragm area, see Fig. 4</td>
<td>Switchover plate old for Actuator Type 3277-5xxxxxx.00 (old)</td>
<td>G ¼ and ¼ NPT: 1400-7461</td>
</tr>
<tr>
<td></td>
<td>Switchover plate new for Actuator Type 3277-5xxxxxx.01 (new)</td>
<td>¼ NPT: 1400-7462</td>
</tr>
<tr>
<td></td>
<td>Connecting plate new for Actuator Type 3277-5xxxxxx.01 (new)</td>
<td>G ¼: 1400-7458</td>
</tr>
<tr>
<td></td>
<td>Connecting plate old for Actuator Type 3277-5xxxxxx.00 (old): G ¼</td>
<td>¼ NPT: 1400-7459</td>
</tr>
<tr>
<td></td>
<td>Connecting plate old for Actuator Type 3277-5xxxxxx.00 (old): ¼ NPT</td>
<td>1400-6821</td>
</tr>
<tr>
<td></td>
<td>Note: Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connecting plate (6)</td>
<td>G ¼: 1400-7461</td>
</tr>
<tr>
<td></td>
<td>or pressure gauge bracket (7)</td>
<td>G ¼: 1400-7458</td>
</tr>
<tr>
<td></td>
<td>Pressure gauge mounting kit (8)</td>
<td>Stainless steel/Brass: 1400-6950</td>
</tr>
</tbody>
</table>

10 EB 8384-0 EN
**Table 2** Direct attachment to Type 3277 Actuator

<table>
<thead>
<tr>
<th>Travel in mm</th>
<th>Lever</th>
<th>For actuators</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>S</td>
<td>Type 3271-5 Actuator with 60/120 cm² on Type 3510 Valve, see Fig. 8</td>
<td>1400-7457</td>
</tr>
<tr>
<td>5 to 50</td>
<td>Without (lever M on basic model)</td>
<td>Actuators from other manufacturers and Type 3271 with 120 to 700 cm²</td>
<td>1400-7454</td>
</tr>
<tr>
<td>14 to 100</td>
<td>L</td>
<td>Actuators from other manufacturers and Type 3271, versions 1000 and 1400-60</td>
<td>1400-7455</td>
</tr>
<tr>
<td>40 to 200</td>
<td>XL</td>
<td>Actuators from other manufacturers and Type 3271, versions 1400-120 and 2800 cm² with 120 mm travel</td>
<td>1400-7456</td>
</tr>
<tr>
<td>30 or 60</td>
<td>L</td>
<td>Type 3271 Actuator, versions 1400-120 and 2800 cm² (30 or 60 mm travel)</td>
<td>1400-7466</td>
</tr>
</tbody>
</table>

Mounting brackets for Emerson and Masoneilan linear actuators
In addition, a mounting kit acc. to IEC 60534-6 is required depending on the travel. See row above.

**Table 3** Attachment to NAMUR ribs or control valves with rod-type yokes (20 to 35 mm rod diameter) according to IEC 60534-6, see Fig. 6

<table>
<thead>
<tr>
<th>Travel in mm</th>
<th>Lever</th>
<th>For actuators</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>S</td>
<td>Type 3271-5 Actuator with 60/120 cm² on Type 3510 Valve, see Fig. 8</td>
<td>1400-7457</td>
</tr>
<tr>
<td>5 to 50</td>
<td>Without (lever M on basic model)</td>
<td>Actuators from other manufacturers and Type 3271 with 120 to 700 cm²</td>
<td>1400-7454</td>
</tr>
<tr>
<td>14 to 100</td>
<td>L</td>
<td>Actuators from other manufacturers and Type 3271, versions 1000 and 1400-60</td>
<td>1400-7455</td>
</tr>
<tr>
<td>40 to 200</td>
<td>XL</td>
<td>Actuators from other manufacturers and Type 3271, versions 1400-120 and 2800 cm² with 120 mm travel</td>
<td>1400-7456</td>
</tr>
<tr>
<td>30 or 60</td>
<td>L</td>
<td>Type 3271 Actuator, versions 1400-120 and 2800 cm² (30 or 60 mm travel)</td>
<td>1400-7466</td>
</tr>
</tbody>
</table>

**Table 4** General accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Type 3710</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic reversing amplifier for double-acting actuators</td>
<td>1890-4875</td>
</tr>
<tr>
<td>Cable gland M20 x 1.5 Nickel-plated brass</td>
<td>0310-2149</td>
</tr>
<tr>
<td>Adapter M 20 x 1.5 to ½ NPT, aluminum</td>
<td>German/English (standard)</td>
</tr>
<tr>
<td>Cover plate with list of parameters and operating instructions</td>
<td>English/Spanish</td>
</tr>
<tr>
<td></td>
<td>English/French</td>
</tr>
<tr>
<td></td>
<td>1990-3528</td>
</tr>
<tr>
<td></td>
<td>1990-5769</td>
</tr>
<tr>
<td></td>
<td>1990-5768</td>
</tr>
</tbody>
</table>
4.1 Direct attachment

4.1.1 Type 3277-5 Actuator

Refer to Table 1 on page 10 for the required mounting parts and the accessories with their order numbers as well as to the travel table on page 10!

**Actuator with 120 cm²**

Depending on the type of positioner attachment, the signal pressure is routed either left or right of the yoke through a bore to the actuator diaphragm. Depending on the fail-safe action of the actuator "Actuator stem extends" or "Actuator stem retracts" (valve closes or opens if the supply air fails), the switchover plate (9) must first be attached to the actuator yoke. Align the switchover plate with the corresponding symbol for left or right attachment according to the marking (view looking onto the switchover plate).

1. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges onto the positioner, making sure both seal rings (6.1) are seated properly.
2. Remove screw plug (4) on the back of the positioner and close the signal pressure output "Output 38" on the connecting plate (6) or on the pressure gauge bracket (7) with the stopper (5) included in the accessories.
3. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.
4. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 4, on the left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.
5. **15 mm travel:** Keep the follower pin (2) at lever M (1) on the back of the positioner in the pin position 35 (delivered state).
6. **7.5 mm travel:** Remove the follower pin (2) from the pin position 35, reposition it in the bore for pin position 25 and screw tight.
7. Insert formed seal (15) in the groove of the positioner casing.
8. Insert formed seal (15) in the groove of the positioner casing.
9. Mount the follower pin (2) on the back of the positioner in the pin position 35.
10. Reposition it in the bore for pin position 25 and screw tight.
11. Mount the positioner on the cover plate (10) using the two fixing screws. During the installation make sure that the seal ring (10.1) is inserted in the bore of the intermediate plate.
12. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.
Attachment to the control valve – Mounting parts and accessories

**Symbols**

- **Actuator stem extends**
- **Left attachment**
- **Actuator stem retracts**
- **Right attachment**

**Switchover plate (9)**

- **Marking**
- **Signal pressure input for left attachment**
- **Signal pressure input for right attachment**

**Fig. 4 · Direct attachment – Signal pressure connection for Type 3277-5 Actuator with 120 cm²**

**Note:**
Always use the connecting plate (6) included in the accessories to connect supply and output.
Never screw threaded parts directly into the housing.
4.1.2 Type 3277 Actuator

Refer to Table 2 on page 11 for the required mounting parts and the accessories with their order numbers as well as to the travel table on page 10!

Actuators with 240 to 700 cm²

Mount the positioner on the yoke as shown in Fig. 5. The signal pressure is routed to the actuator over the connection block (12), for actuators with fail-safe action "Actuator stem extends" internally through a bore in the valve yoke and for "Actuator stem retracts" through external piping.

1. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.

2. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 5, on the left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.

3. For actuators with 355/700 cm², remove the follower pin (2) at lever M (1) on the back of the positioner from pin position 35, reposition it in the bore for pin position 50 and screw tight. For actuators 240 and 350 cm² with 15 mm travel, the follower pin (2) remains in pin position 35.

4. Insert formed seal (15) in the groove of the positioner casing.

5. Place positioner on the cover plate in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or the switch. The lever (1) must rest on the follower clamp with spring force. Mount the positioner on the cover plate (10) using the two fixing screws.

6. Make sure that the tip of the gasket (16) projecting from the side of the connection block (12) is positioned above the actuator symbol that corresponds with the actuator with fail-safe action "Actuator stem extends" or "Actuator stem retracts." If necessary, remove the three fixing screws and the cover. Then reposition the gasket (16) turned by 180°. The previous version of the connection block (Fig. 5, bottom) requires the switch plate (13) to be turned such that the corresponding actuator symbol points to the marking.

7. Place the connection block (12) with the associated seal rings against the positioner and the actuator yoke. Screw it tight using the fixing screw (12.1). For actuators with fail-safe action "Actuator stem retracts", additionally remove the stopper (12.2) and fit on the external signal pressure piping.

8. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.
Fig. 5 · Direct attachment – Signal pressure connection for Type 3277 Actuator with 240, 350 and 700 cm²
4.2 Attachment according to IEC 60534-6

The positioner is attached to the control valve with a NAMUR bracket (10).

Refer to Table 3 on page 11 for the required mounting parts and the accessories with their order numbers as well as to the travel table on page 10!

1. Screw the two bolts (14) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (14.1) to tighten.

Actuator size 2800 cm² and 1400 cm² with 120 mm travel:
For a travel of 60 mm or smaller, screw the longer follower plate (3.1) directly to the stem connector (9). For a travel exceeding 60 mm, mount the bracket (16) first and then the follower plate (3) to the bracket together with the bolts (14) and screws (14.1).

2. Mount NAMUR bracket (10) to the control valve as follows:
For attachment to the NAMUR rib, use an M8 screw (11) and toothed lock washer directly in the yoke bore.
For attachment to valves with rod-type yokes, use two U-bolts (15) around the yoke.
Align the NAMUR bracket (10) according to the embossed scale so that the slot of the follower plate (3) is centrally aligned with the NAMUR bracket at mid valve travel.

3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges (8) on the positioner, making sure both seal rings (6.1) are seated properly.

4. Select required lever size (1) M, L or XL and pin position according to the actuator size and valve travels listed at the bottom of the table.
Should you require a pin position other than position 35 with the standard installed lever M, or require a lever size L or XL, proceed as follows:
5. Screw the follower pin (2) in the assigned lever bore (pin position) as listed in the table. Only use the longer follower pin (2) included in the mounting kit.
6. Place lever (1) on the positioner shaft and screw tight using the disk spring (1.2) and nut (1.1).

Note: If you have mounted a new lever (1), you must move it once all the way as far as it will go in both directions.

7. Place positioner on the NAMUR bracket in such a manner that the follower pin (2) rests in the slot of the follower plate (3, 3.1). Adjust the lever (1) correspondingly.
Screw the positioner to the NAMUR bracket using both its fixing screws.
Attachment to the control valve – Mounting parts and accessories

Note:
Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

Fig. 6 · Attachment according to IEC 60534-6 (NAMUR)
4.3 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 EN).

If a different reversing amplifier (item no. 1079-1118 or 1079-1119) is used, follow the mounting instructions described in section 4.3.1.

4.3.1 Reversing amplifier (1079-1118 or 1079-1119)

The output signal pressure of the positioner is supplied at the output A1 of the reversing amplifier. An opposing pressure, which equals the required supply pressure when added to the pressure at A1, is applied at output A2. The rule A1 + A2 = Z applies.

Mounting

1. Mount the connecting plate (6) from the accessories in Table 4 to the positioner. Make sure that both O-rings (6.1) are seated correctly.
2. Thread the special nuts (1.3) from the accessories of the reversing amplifier into the boreholes of the connecting plate.
3. Insert the gasket (1.2) into the recess of the reversing amplifier and push both the special hollow screws (1.1) into the connecting boreholes A1 and Z.
4. Place the reversing amplifier onto the connecting plate (6) and screw tight using both the special screws (1.1).
5. Use a screwdriver (8 mm wide) to screw the enclosed filters (1.6) into the connecting boreholes A1 and Z.

**NOTICE**
The sealing plug (1.5) should not be unscrewed out of the reversing amplifier. The rubber seal (1.4) is not required and can be removed when the sealing plug is used.

Signal pressure connections

A1: Output A1 leading to the signal pressure connection at the actuator which opens the valve when the pressure increases
A2: Output A2 leading to the signal pressure connection at the actuator which closes the valve when the pressure increases

- Position the DIP switch S1 according to the symbol AIR TO OPEN as described in section 7.2.

Pressure gauge attachment

The mounting sequence shown in Fig. 7 remains unchanged. Screw a pressure gauge bracket onto the connections A1 and Z.

Pressure gauge G ¼ 1400-7106  
Pressure gauge bracket ¼ NPT 1400-7107

Pressure gauges for supply air Z and output A1 as listed in Tables 1 to 3.
Fig. 7 · Mounting a reversing amplifier (1079-1118 or 1079-1119)
4.4 Attachment to Type 3510 Micro-flow Valve

The positioner is attached to the valve yoke using a bracket.

Refer to Table 3 on page 11 for the required mounting parts and the accessories with their order numbers as well as to the travel table on page 10!

1. Place clamp (3) on the valve stem connector, align at a right angle and screw tight.
2. Screw bracket (10) to the valve yoke using two screws (11).
3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges to the positioner, making sure both O-rings (6.1) are seated properly.
4. Unscrew the standard installed lever M (1) including follower pin (2) from the positioner shaft.
5. Take lever S (1) and screw follower pin (2) in the bore for pin position 17.
6. Place lever S on the positioner shaft and screw tight using the disk spring (1.2) and nut (1.1). Move lever once all the way as far as it will go in both directions.
7. Place positioner on the bracket (10) in such a manner that the follower pin slides into the groove of the clamp (3). Adjust the lever (1) correspondingly. Screw the positioner to the bracket (10) using both its screws.
1. Lever
1.1 Nut
1.2 Disk spring
2. Follower pin
3. Clamp
6. Connecting plate
6.1 Seal rings
7. Pressure gauge bracket
8. Pressure gauge mounting kit
10. Bracket
11. Screw

**Note:**
Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

*Fig. 8: Attachment to Type 3510 Micro-flow Valve*
4.5 Attaching positioners with stainless steel housings

Positioners with stainless steel housings require mounting parts that are completely made of stainless steel or free of aluminum.

**Note:**
The pneumatic connecting plate and pressure gauge bracket are available in stainless steel (order numbers listed below). The Type 3710 Pneumatic Reversing Amplifier is also available in stainless steel.

<table>
<thead>
<tr>
<th>Connecting plate (stainless steel):</th>
<th>G ¼</th>
<th>1400-7476</th>
</tr>
</thead>
<tbody>
<tr>
<td>(¼ NPT)</td>
<td></td>
<td>1400-7477</td>
</tr>
</tbody>
</table>

| Pressure gauge bracket (st. steel): | Only in ¼ NPT | 1400-7108 |

The Tables 1 to 4 (pages 10 and 11) apply for attaching positioners with stainless steel housings with the following restrictions:

**Direct attachment**
All mounting kits from Tables 1 and 2 can be used. The connection block is not required. The stainless steel version of the pneumatic connecting plate routes the air internally to the actuator.

**Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes)**
All mounting kits from Table 3 can be used. Connecting plate in stainless steel.

4.6 Air purging function for single-acting actuators

The exhaust air from the positioner is diverted to the actuator spring chamber to provide corrosion protection inside the actuator. The following must be observed:

**Direct attachment to Type 3277-5 (stem extends FA/stem retracts FE)**
The air purging function is automatically provided.

**Direct attachment to Type 3277, 240 to 700 cm²**
FA: Remove the stopper 12.2 (Fig. 5 on page 15) at the connection block and make a pneumatic connection to the spring chamber on the vented side.

**NOTICE**
The method described does not apply to old connection blocks in powder-paint-coated aluminum. In this case, follow the instructions for attachment described below in “Attachment acc. to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes) and to rotary actuators”.

FE: The air purging function is automatically provided.

**Attachment acc. to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes)**
The positioner requires an additional port for the exhaust air that can be connected over piping. An adapter available as an accessory is used for this purpose:
Threaded bushing \( G_{1/4} \) 0310-2619
(M20 x 1.5): \( 1/4 \) NPT 0310-2550

NOTICE
The adapter uses one of the M20 x 1.5 connections in the housing which means just one cable gland can be installed.

Should other valve accessories be used which vent the actuator (e.g. solenoid valve, volume booster, quick exhaust valve), this exhaust air must also be included in the purging function. The connection over the adapter at the positioner must be protected with a check valve (e.g. check valve \( G_{1/4} \), order no. 8502-0597) mounted in the piping. Otherwise the pressure in the positioner housing would rise above the ambient pressure and damage the positioner when the exhausting components respond suddenly.

5 Connections

WARNING!
Mount the positioner, keeping the following sequence:
1. Remove the protective film from the pneumatic connections
2. Mount the positioner on the control valve
3. Connect the supply air
4. Connect the electrical power
5. Perform the start-up settings

The connection of the electrical auxiliary power may cause the actuator stem to move, depending on the operating mode. Do not touch the actuator stem or obstruct it to avoid risk of injury to hands or fingers.

5.1 Pneumatic connections

NOTICE
Follow the instructions below to avoid damaging the positioner:
- The threaded connections in the positioner housing are not designed direct air connection!
- 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 prior to connecting them.

The screw glands must be screwed into the connecting plate, the pressure gauge mounting block or the connection block from the accessories. The air connections are option-
ally designed as a bore with ¼ NPT or G ¼ thread.
The customary fittings for metal and copper pipes or plastic hoses can be used.

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".

### 5.1.1 Signal pressure gauges

To monitor the supply air (Supply) and signal pressure (Output), we recommend that pressure gauges be attached (see accessories in Tables 1 to 4).

### 5.1.2 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 registered on the nameplate either as spring range or signal pressure range. The direction of action is marked FA or FE, or by a symbol.

**Actuator stem extends FA** (Air to open ATO)

Fail-safe position "Valve CLOSED"
(for globe and angle valves):
Required supply pressure = Upper bench range value + 0.2 bar, minimum 1.4 bar.

**Actuator stem retracts FE** (Air to close ATC)

Fail-safe position "Valve OPEN"
(for globe and angle valves):
For tight-closing valves, the maximum signal pressure $pst_{\text{max}}$ is roughly estimated as follows:

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

$d$ = Seat diameter [cm]
$\Delta p$ = Differential pressure across the valve [bar]
$A$ = Actuator diaphragm area [cm²]
$F$ = Upper bench range of the actuator [bar]

**If there are no specifications, calculate as follows:**

Required supply pressure = Upper bench range value + 1 bar

**Note:**

The signal pressure at the output (Output 38) of the positioner can be limited to approx. 2.4 bar by setting the DIP switch $S5$. 
5.2 Electrical connections

DANGER!
Risk of electric shock and/or the formation of an explosive atmosphere!

- For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.
- The following regulations apply to mounting and installation in hazardous areas: EN 60079-14: 2008 Explosive atmospheres – Part 14: Electrical installations design, selection and erection (or VDE 0165 Part 1).

NOTICE
- 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 national EC type examination certificates apply when interconnecting intrinsically safe electrical equipment \( (U_i \text{ or } U_o, I_i \text{ or } I_o, P_i \text{ or } P_o, C_i \text{ or } C_o, \text{ and } L_i \text{ or } L_o) \).

Selecting cables and wires:

Observe Clause 12 of EN 60079-14: 2008 when installing intrinsically safe circuits. The Subclause 12.2.2.7 applies when running multi-core cables containing more than one intrinsically safe circuit.

In particular, the radial thickness of the conductor insulation for common insulation materials, such as polyethylene, must have a minimum radial thickness of 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.

Devices used at ambient temperatures below \(-20 ^\circ C\) must be fitted with metal cable glands.

Equipment for use in zone 2/zone 22

In equipment operated with type of protection Ex nA II (non-sparking equipment) according to EN 60097-15: 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 (energy-limited equipment) according to EN 60097-15: 2003 may be switched under normal operating conditions.

The maximum permissible values specified in the Statement of Conformity or its addenda apply when interconnecting the equipment with energy-limited circuits in type of protection Ex nL IIC.
Cable entries

The cable entry with M20x1.5 cable gland, 6 to 12 mm clamping area. There is a second M20x1.5 threaded hole in the housing that can be used for additional connection, when required.

The screw terminals are designed for wire cross-sections of 0.2 to 2.5 mm². Tighten by at least 0.5 Nm.

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.

**NOTICE**
The minimum permissible reference variable should not fall below 3.8 mA for operating the positioner.

### Accessories:
- Plastic cable gland M20x1.5:
  - Black Order no. 8808-1011
  - Blue Order no. 8808-1012
  - Ni-plated brass Order no. 1890-4875
  - Stainless steel 1.4305 Order no. 8808-0160
- Adapter M20x1.5 to ½ NPT:
  - Aluminum, powder-coated Order no. 0310-2149
  - Stainless steel Order no. 1400-7114

**Fig. 9 · Electrical connection**
6  Operation

6.1  Operator controls

DIP switches S1 to S10

The positioner is mainly operated via the DIP switches, which allow you to set the most important functions.

ZERO and SPAN adjusters

The ZERO and SPAN potentiometers are used to adjust the starting point (zero) and the upper range value (span) of the reference variable.

Volume restriction Q

The volume restriction is used to adapt the air supply to the actuator size. Depending on the air passage at the actuator, two fixed settings are available.

<table>
<thead>
<tr>
<th>DIP switches and their functions</th>
<th>S5</th>
<th>Limit output signal pressure to 2.4 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 Fail-safe action of the actuator</td>
<td>S6</td>
<td>Change gain factor</td>
</tr>
<tr>
<td>S2/S3 Rated travel of the control valve</td>
<td>S7/S8</td>
<td>Set range of reference variable</td>
</tr>
<tr>
<td>S4 Direction of action w/x</td>
<td>S9/S10</td>
<td>Activate tight-closing function</td>
</tr>
</tbody>
</table>

Fig. 10 · Operator controls
7  Start-up and settings

7.1 Default switch positions

After the positioner has been mounted on the valve, all switches S1 to S10 must be set to OFF.

7.2 Fail-safe position

The switch position of switch S1 depends on the fail-safe position of the valve:

- **AIR TO OPEN** - Upon air supply failure, the valve is completely closed by the actuator. As the signal pressure increases at the output of the positioner (OUTPUT 38), the valve opens.
- **AIR TO CLOSE** - Upon air supply failure, the valve is completely opened by the actuator. As the signal pressure increases at the output of the positioner, the valve closes.

To determine the switch position, read the associated switch position S1 = ON or OFF from the cover plate at the actuator symbols. The symbols are read properly when the symbol shows the actuator on top of the valve; symbols upside down do not apply.

**AIR TO OPEN**: Pneumatic connections point to the right S1 = ON. Pneumatic connections point to the left S1 = OFF.

**AIR TO CLOSE**: Pneumatic connections point to the right S1 = OFF. Pneumatic connections point to the left S1 = ON.

**AIR TO OPEN** always applies for double-acting actuators. Proceed as described in section 4.3 to connect the reversing amplifier.

7.3 Volume restriction Q

The volume restriction Q is used to adapt the air delivery to the size of the actuator:

- Actuators with a transit time \(< 1 \text{ s}\), e.g. linear actuators with an effective area smaller than 240 cm², require a restricted air flow rate (MIN).
- Actuators with a transit time \(\geq 1 \text{ s}\) do not require the air flow rate to be restricted (MAX).

The position of volume restriction Q also depends on how the signal pressure is routed at the actuator in **SAMSON actuators**:

- The “SIDE” position applies for actuators with a loading pressure connection at the side, e.g. Type 3271-5.
- The “BACK” position applies for actuators with a loading pressure connection at the back, e.g. in Type 3277-5.

The “SIDE” restriction position always applies for **non-SAMSON actuators**.

| Signal pressure | Transit time | \(< 1 \text{ s}\) | \(\geq 1 \text{ s}\) |
|-----------------|--------------|----------------|----------------|---|
| Connection at the side | MIN SIDE | MAX SIDE |
| Connection at the back | MIN BACK | MAX BACK |

* Intermediate positions are not permitted.
7.4 Presetting the travel

At switches S2 and S3, select the travel that comes closest to the rated valve travel, taking into account the pin position. If necessary, perform a final adaptation as described in section 7.11.

<table>
<thead>
<tr>
<th>Pin position</th>
<th>Travel when span adjuster is set to 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S2</td>
</tr>
<tr>
<td>OFF OFF</td>
<td></td>
</tr>
<tr>
<td>ON OFF</td>
<td></td>
</tr>
<tr>
<td>OFF ON</td>
<td></td>
</tr>
<tr>
<td>ON ON</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.3</td>
</tr>
<tr>
<td>25</td>
<td>5.3</td>
</tr>
<tr>
<td>35</td>
<td>7.5</td>
</tr>
<tr>
<td>50</td>
<td>10.6</td>
</tr>
<tr>
<td>70</td>
<td>15</td>
</tr>
<tr>
<td>100</td>
<td>21.2</td>
</tr>
<tr>
<td>200</td>
<td>42.4</td>
</tr>
</tbody>
</table>

7.5 Direction of action

At switch S4, set the direction of action w/x.

- >> The valve travel x increases as the reference variable w increases.
- << The valve travel decreases when the reference variable increases.

| Fail-safe action AIR TO OPEN | >> | S4 | ON |
|                            | << | S4 | OFF |
| Fail-safe action AIR TO CLOSE | >> | S4 | OFF |
|                            | << | S4 | ON |

7.6 Limiting the signal pressure

Set switch S5 to ON to limit the output signal pressure to 2.4 bar if required by the actuator.

7.7 Reference variable

Use switches S7 and S8 to determine the input signal, i.e. the range of the reference variable.

<table>
<thead>
<tr>
<th>Switches</th>
<th>S7</th>
<th>S8</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td></td>
</tr>
</tbody>
</table>

In split-range operation (Fig. 12, below), the control valves work with smaller reference variable ranges. The signal to control two control valves is divided such that both valves move through their full travel range at 50% of the input signal (e.g. first valve set to 4 to 11.9 mA and second valve adjusted to 12.1 to 20 mA).

To avoid overlapping, a dead band of ±0.1 mA is to be observed.

![Diagram](Fig. 12 · Standard and split-range operation)
7.8 Connecting the positioner

Apply the supply air to the pneumatic connection (Supply 9). Make sure to use the appropriate pressure as specified in section 5.1.2.

Apply the electric reference variable (ammeter at terminals 11 and 12).

WARNING!
Upon connection of the electric reference variable, the signal pressure may cause the plug stem to move, risk of injury!

7.9 Setting zero

Note: Before setting zero, settings using switches S1 to S5 as well as switches S7 and S8 must be made first. Refer to sections 7.1 to 7.8.

Set SPAN adjuster to 0.
Adjust the input signal according to the table below using an ammeter.
Turn ZERO adjuster until the plug stem just starts to move from its initial position.

<table>
<thead>
<tr>
<th>Direction of action</th>
<th>Reference variable [mA]</th>
<th>Input signal for zero [mA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt;</td>
<td>4 to 20</td>
<td>4</td>
</tr>
<tr>
<td>&gt;&gt;</td>
<td>4 to 12</td>
<td>4</td>
</tr>
<tr>
<td>&gt;&gt;</td>
<td>12 to 20</td>
<td>12</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td>4 to 20</td>
<td>20</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td>4 to 12</td>
<td>12</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td>12 to 20</td>
<td>20</td>
</tr>
</tbody>
</table>

7.10 Gain factor

Move the valve in small steps. If the valve tends to hunt, set switch S6 to ON to reduce the gain of the control loop.

7.11 Adapting the travel

In case the rated travel of the control valve does not correspond with the selected travel according to the table in section 7.4:

- Adjust the upper range value of the input signal (e.g. 4, 12 or 20 mA) using the ammeter.
- Turn the SPAN adjuster until the plug stem moves as far as it will go to the end position.

7.12 Activate the tight-closing function

Having adjusted zero and span, the tight-closing function (description on page 6) must be activated at switches S9 and S10 to ensure a tight valve shut-off.

<table>
<thead>
<tr>
<th>AIR TO OPEN</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR TO CLOSE</td>
<td>S9</td>
<td>S10</td>
</tr>
<tr>
<td>Three-way valve</td>
<td>S9</td>
<td>S10</td>
</tr>
</tbody>
</table>
8 Maintenance

The positioner does not require any maintenance.

There are filters with a 100 μm mesh size in the pneumatic connections for supply and output which can be removed and cleaned, if required.

The maintenance instructions of any upstream supply air pressure reducing stations must be observed.

9 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 prior to putting it back into operation. The passing of the routine test must be documented by attaching a mark of conformity to the device. Replace explosion-protected components only by original, routine-tested components from the manufacturer.

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

Dimensions in mm

Direct attachment

M20 x 1.5

Supply (Z)

Output (A2)

Attachment acc. to IEC 60534-5 (NAMUR)

Pressure gauge bracket

or connecting plate

Lever mm
S = 17
M = 50
L = 100
XL = 200

Reversing amplifier
(1079-1118 or 1079-1119)
(option)

Output (A1)

Supply (Z)

Output (A2)
Type 3710 Reversing Amplifier (optional)
Test report for Information of the Applicant

Testing of the Degree of Protection on enclosures of Type 3730 and Type 3731 Positioners

This test report contains the result of a single investigation carried out on the product submitted. A sample of this product was tested to find the compliance with the previously listed standards resp. parts of standards.

The test report does not entitle to use a VDE Certification mark and the “GS-gewährte Sicherheit (test safety)” and does not refer to all VDE specifications applicable to the tested product.

This report may only be passed to a third party in its complete wording including this preamble and the date of issue.

Any publication or reproduction requires the prior written approval of the VDE Testing and Certification Institute.

1 Assignment

The samples described in 2 below were tested for compliance with the IP 66 degree of protection.

2 Samples

2.1 Type 3730 Positioner

2.2 Type 3731 Positioner

3 Basis of assessment

DIN EN 60529/VDE 0410 Part 1/2000-09

Degree of protection provided by enclosures (IP Code)

German version EN 60529:1999+A1:2000

4 Execution of the tests

The dust test had already been carried out on the Type 3730 Positioner under the reference number: 479000-9010-0001/32/752 and on the Type 3731 Positioner under the reference number: 479000-9010-0001/32/768 with result as per category 1 at the connecting enclosures of the positioners and solvent valves. The under pressure was 2 kPa and the test lasted 8 hours.

5 Test results

The testing of the samples described in 2 above yielded the following results:

- Protecting against access to hazardous parts and against ingress of solid foreign objects according to DIN EN 60529/VDE 0410 Part 1/2000-09
- Protecting against ingress of water according to DIN EN 60529/VDE 0410 Part 1/2000-09
- IP6X satisfied
- IPX6 satisfied

The positioner enclosures in the versions submitted meet the requirements of IP 66 degree of protection.

There was no ingress of either dust or water.

VDE-Prüf- und Zertifizierungsinstitut

Fachgebiet FG3

(Signature)

(Signature)

Gerhard Biehler
TRANSLATION

EC TYPE EXAMINATION CERTIFICATION


2. EC Type Examination Certificate Number

PTB 03 ATEX 2099

3. Equipment: Model 3730-01...Positioner

4. Manufacturer: SAMSON AG Mess- und Regeltechnik

5. Address: Weismullerstr. 3, 60314 Frankfurt, Germany

6. This equipment and any acceptable variation thereof are specified in the schedule to this certificate.

The Physikalisch-Technische Bundesanstalt, notified body number 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirement relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report PTB Ex 03-23199

The essential health and safety requirements are satisfied by compliance with EN 50014: 1997+A1+A2, EN 50020: 2002

6. If the sign “X” is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

7. This EC Type Examination Certificate relates only to the design and examination of the specified equipment in compliance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of the equipment. These requirements are not covered by this Certificate.
(13) Schedule

EC TYPE EXAMINATION CERTIFICATE No. PTB 03 ATEX 2009

(14) Description of Equipment

The Model 3730-01 . . Positioner is a single- or double-acting positioner for attachment to linear or rotary actuators. It serves for translating control signals into valve stem positions.

The Model 3730-01 . . Positioner is a passive two-terminal network which may be connected to any certified intrinsically safe circuit, provided the permissible maximum values of UI, Ii and Pi are not exceeded.

For air supply non-combustible media are used.

The device is intended for use inside and outside of hazardous locations.

The correlation between temperature classification and permissible temperature ranges is shown in the table below.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40°C . . . . +50°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C . . . . +70°C</td>
</tr>
<tr>
<td>T4</td>
<td>-40°C . . . . +80°C</td>
</tr>
</tbody>
</table>

(15) Electrical data

Signal circuit: Type of protection: Intrinsic safe EEEx ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:

UI = 28 V
Ii = 115 mA
Pi = 1 W
Ci = 5,3 nF; Ui negligible

(16) Test Report PTB Ex 03-23199
ADDENDUM No. 1

In compliance with Directive 94/9/EC Annex III Clause 6 to the Type Examination Certificate PTB 03 ATEX 2099

Equipment: 3730-01, Positioner

Marking: Ex II 2GD Ex ia IIC T6

Manufacturer: SAMSON AG, Mess- und Regeltechnik

Address: Weismüllerstraße 3, 60314 Frankfurt am Main, Germany

Description of the additions and modifications:
The Model 3730-01, Positioner satisfies the requirements of EN 50811-1-1:1998 for electrical equipment with protection by the enclosure and according to this standard shall be provided with the following additional marking:

(Ex) II D Ex i T80 °C or II D Ex ia i IIC T80 °C

All the other data apply without changes also to this Amendment No. 1

Standard applied:
EN 50811-1-1:1998

Test report: PTB 4 x 06 36 140

Zertifizierungsstelle Explosionsschutz

By order

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

Physikalisch-Technische Bundesanstalt
Braunschweig, 30. September 2003

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungspräsident

Physikalisch-Technische Bundesanstalt
Braunschweig, 25 August 2006

Hy. order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Director and Professor
TRANSLATION

(1) Statement of Conformity


(3) EC Type Examination Certificate Number

PTB 03 ATEX 2179 X

(4) Equipment: Model 3730-08, e/p Positioner

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, 60314 Frankfurt am Main, Germany

(7) The equipment and any acceptable variation thereof are specified in the schedule to this certificate and the documents referred to therein.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres specified in Annex II to the Directive.

The examination and test results are recorded in confidential report.

PTB Ex 03-23300

(9) The essential health and safety requirements are satisfied by compliance with

EN 50021: 1999

(10) If the sign “X” is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use as specified in the schedule to this certificate.

(11) In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the design and construction of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of this equipment.
**Schedule**

(14) Statement of Conformity PTB 03 ATEX 2179 X

(15) Description of Equipment

The Model 3730-08../p Positioner is a single- or double-acting positioner for attachment to linear or rotary actuators. It serves for translating control signals into valve stem positioners.

For pneumatic auxiliary power non-combustible media are used.

The device is intended for use inside and outside of hazardous locations.

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

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C ... 50 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C ... 70 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C ... 80 °C</td>
</tr>
</tbody>
</table>

**Electrical data**

Signal circuit (terminals 11/12)

Type of protection Ex nA II

(16) Test report PTB Ex 03-23300

(17) The signal circuit (terminals 11/12) shall be preceded by a fuse installed outside of the hazardous location. This fuse shall comply with IEC 60127-2/II, 250 V F, or with IEC 50127-2/VI, 250 V T with a maximum fuse nominal current IN ≤ 80 mA.

The cable entries of the enclosure for the Model 3730-08../p Positioner shall provide at least Degree of Protection IP 54 in compliance with EN 60529. The wiring shall be connected in such a manner that the connection facilities are not subjected to pull and twisting.

Zertifizierungsstelle Explosionschutz

Braunschweig, 30. September 2003

By order

[Signature] (seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

Statement of Conformity, without signature and seal are invalid. This Statement of Conformity may be reproduced only in its entirety without any changes. Erase or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.
TRANSLATION

ADDENDUM No.: 1

to the Statement of conformity PTB 03 ATEX 2179 X

Equipment:  Model 3730-08, e/p Positioner

Marking:  II 3 G  EEx nA II T6

Manufacturer:  SAMSON AG, Mess- und Regeltechnik

Address:  Wielmüllerstr. 3, D-60314 Frankfurt, Germany

Description of the additions and modifications

The Model 3730-08, e/p Positioner may be connected in future also to energy-limited circuits with type of protection EEx nL IIC T6. The electrical data are complemented as follows:

Electrical data

<table>
<thead>
<tr>
<th>Signal circuit (terminals 11/12)</th>
<th>Type of protection EEx nA II or Type of protection EEx nL IIC</th>
</tr>
</thead>
</table>

Maximum Values:
- Ua = 28V
- ia = 115mA
- Pi = 1 W
- Ci = 5.3nF
- Li = negligible

or
- Ua = 30V
- ia = 100mA
- Pi = 1 W
- Ci = 5.3nF
- Li = negligible

The equipment is mounted in a metallic enclosure which ensures at least degree of protection IP 54.

The marking of the Model 3730-08 e/p Positioner is complemented as follows:

II 3 G  EEx nA II T6 or II 3 G  EEx nL IIC T6
II 3 D  IP 54 T 80 °C or II 3 D  IP 65 T 80 °C

The special conditions are complemented as follows:

If the signal circuit of the Model 3730-08 e/p Positioner is to be connected to a circuit with type of protection EEx nA II, the signal circuit shall be preceded by a fuse complying with IEC 60127-2/III, 250 V Y F or IEC 60127/VI, 250 V Y T with a maximum current rating of IN ≤ 80 mA. The fuse shall be installed outside of the hazardous location.

If the signal circuit is to be connected to a circuit with type of protection EEx nL IIC, no preceding fuse need be provided.

The manufacturer shall ensure and supply documentary evidence that the equipment enclosure including and cable entries provides either degree of protection IP54 or IP65 according to EN 60529, depending on the application.

All the other data apply unaltered also to this Addendum No. 1

Test report:  PTB Ex-04-24290

Zertifizierungsstelle Explosionsschutz  Braunschweig, 9. December 2004

By order

(Signature)  (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

Pbh37Add-1.doc
Addendum Page 1


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

Table 1: Maximum values of signal circuit (terminations 11 and 12)

<table>
<thead>
<tr>
<th>Signal circuit</th>
<th>U or ( V_{\text{max}} )</th>
<th>( I_{\text{or} \text{max}} )</th>
<th>( R \text{ or} \text{F}_{\text{max}} )</th>
<th>( Q )</th>
<th>( h )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply circuit</td>
<td>28V</td>
<td>115mA</td>
<td>1W</td>
<td>5.3nF</td>
<td>0V/F</td>
</tr>
</tbody>
</table>

Notes: \( U \leq U_{\text{or} \text{max}} / I \leq I_{\text{or} \text{max}} \)

Table 2: CSA certified barrier parameters of signal circuit (terminations 11 and 12)

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Supply barrier</th>
<th>Evaluation barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( V_{\text{dc}} )</td>
<td>( R_{\text{min}} )</td>
</tr>
<tr>
<td>Signal circuit</td>
<td>( \leq 28V )</td>
<td>( \geq 3000 )</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>50°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C ( \leq t \leq 70°C )</td>
</tr>
<tr>
<td>T4</td>
<td>80°C</td>
</tr>
</tbody>
</table>

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

 CSA certified for hazardous locations.

Ex [a] IIC Tc: Class I, Zone 0
Class II Div. 1, Groups E, F, G, and Class III.

Type 4 Enclosure

Notes:
1.) The apparatus may be installed in intrinsically safe circuits only when used in conjunction with CSA certified apparatus. For maximum values of \( U \) or \( V_{\text{max}} \), \( I_{\text{or} \text{max}} \), \( R \text{ or} \text{F}_{\text{max}} \), \( Q \) and \( h \) of the various apparatus see Table 1.

2.) For barrier section see Table 2.

3.) The installation must be in accordance with the C.E.C., Part 1.

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

5.) For CSA Certification, Safety Barrier must be CSA Certified and installed in accordance with C.E.C., Part 1. Each pair of ES wires must be protected by a shield that is grounded at the ES Ground. The shield must extend as close as the terminations as possible.

Addendum Page 2

Controller CSA certified.

Supply and evaluation barrier CSA certified.

For the permissible maximum values for the intrinsically safe circuit see Table 1 or for the permissible barrier parameters for the circuit see Table 2.

Ex [a] IIC Tc: Class I, Zone 2
Class II Div. 1, Groups E, F, G, and Class III.

Type 4 Enclosure

Notes:
1.) The installation must be in accordance with the Canadian Electrical Code, Part 1

2.) For the maximum values for the signal circuit see Table 1 and 2.

3.) The cable must be protected by a shield.

4.) Cable entry on rigid metal conduit according to drawing No. 1050-0540 T

Revision Control Number 1 February 05 Addendum to EB8384-0 EN
Addendum Page 3


Electrical rating of potentially safe apparatus and apparatus for installation in hazardous areas.

Table 1: Maximum values

<table>
<thead>
<tr>
<th>Signal circuit</th>
<th>U or Vmax</th>
<th>I or Imax</th>
<th>R or Pmax</th>
<th>G</th>
<th>Ia</th>
</tr>
</thead>
<tbody>
<tr>
<td>28V</td>
<td>115mA</td>
<td>1W</td>
<td>5.3nF</td>
<td>60μH</td>
<td></td>
</tr>
</tbody>
</table>

Notes: U or Vc or I ≤ U or Vmax; I or Ic or I1 ≤ I1 or Imax; R or Pmax ≤ R or Pmax

Table 2: FM - approved barrier parameters of solenoid valve circuit

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Supply barrier</th>
<th>Evaluation barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal circuit</td>
<td>≤ 28V</td>
<td>≥ 3000</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
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<tbody>
<tr>
<td>T6</td>
<td>50°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C ≤ 50°C ≥ 70°C</td>
</tr>
<tr>
<td>T4</td>
<td>80°C</td>
</tr>
</tbody>
</table>

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 II, Division 1, Groups A, B, C, D, E, F, G

Notes:
1.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with a barrier approved apparatus, for maximum values of U or Vmax; I or Imax; R or Pmax; G and Ia of the various apparatus see Table 1.
2.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with a FM approved intrinsically safe barrier. For barrier selection see Table 2.
3.) Intrinsically safe in accordance with the National Electric Code ANSI/NFPA 70 and ANSI/USA RP 12.06.01
4.) Use only supply wires suitable for 5°C above surrounding temperature.

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Addendum Page 4

HAZARDOUS LOCATION

SAFE LOCATION

Controller/Supply

Supply and evaluation barrier FM/CSA-approved.

For the permissible maximum values for the intrinsically safe circuit see Table 1.

For the permissible barrier parameters for the circuit see Table 2.

Class I: Division 2, Groups A, B, C, D
Class II: Division 2, Groups F, G, Class III

NEMA 4X Enclosure

Version: Model 3730-03 e/p Positioner.

Notes:
1.) For the maximum values for the circuit see Tables 1 and 2.
2.) Cable entry or rigid metal conduit according to drawing and 1050-0540 T
3.) The installation shall be in accordance with the National Electric Code ANSI/NFPA 70

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