Mounting and Operating Instructions

Limit Switch Type 3776

Fig. 1
Contents

General notes 3
Model number and device index 3

Mounting 3
Mounting to SAMSON Type 3278 Rotary Actuators 4
Mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 1 6
Mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 2 8
Mounting to SAMSON Type 3277 Linear Actuators 10
Mounting to SAMSON Type 3277-5 Linear Actuators 12
(external routing of the loading pressure)
Mounting to SAMSON Type 3277-5 Linear Actuators 14
(internal routing of the loading pressure)
Mounting to SAMSON Type 324X Control Valves with rib according to DIN EN 60534-6-1 16

Air connection 18
Air supply 18
Filter elements for air supply 19
Exhaust air filter and degree of protection 20
Restrictors 20

Electrical connection 21
Connecting cables 21
Equipment for use in zone 2/zone 22 21
Connection diagrams for terminal block 22
Connection diagrams for plug-type connectors according to EN 175301-803 23
Connection diagrams for plug-type connectors (manufactured by Harting) 24
Connection diagrams for round connectors (manufactured by Binder) 25
AS-Interface module (version 2011) 26
Pilot valve/manual override 28

Contacts 29
Switching point shift due to changes in temperature 29
Inductive pick-ups 30
Inductive double proximity switch 31
Electric microswitches 32

Servicing explosion-protected devices 33

Maintenance, calibration and work on equipment 33

Certifications 34
EC Type Examination Certificate PTB 98 ATEX 2072 34
Statement of Conformity PTB 02 ATEX 2007 X 46
Certificate of Compliance (FM Approvals) 50

Addendum 53
Installation manual for apparatus approved by FM for use in hazardous locations 53
General notes

The device is to be assembled, started up or operated only by trained and experienced personnel familiar with the product. According to these mounting and operating instructions, trained personnel is referred to as 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 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.

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 means of the appropriate measures.

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.

Proper shipping and appropriate storage are assumed.

For technical data, ordering data, spare parts and accessories see Data Sheet T 3776 EN.

Model number and device index

The model number and the device index are shown on the nameplate:

![Model number and device index]

Mounting

Before mounting to actuators, all relevant parts of the plant must be depressurized.

Due to the high surface resistance, avoid electrostatic charging when mounting and servicing the devices in hazardous areas.

Do not loosen enameled screws in or on the housing.

Using mounting kits, the devices can be mounted to rotary actuators, linear actuators and control valves with ribs. Then the relevant mounting instructions must be observed (see pages 3 to 17).

To prevent water from entering the device, do not mount the devices to rotary actuators or control valves with ribs with the bottom of the enclosure facing upwards. Install the exhaust air filter in the enclosure cover and the cable gland to face downwards or, if this is not possible, horizontally.

The devices can be mounted in any desired position to SAMSON Type 3277 Linear Actuators.

The required degree of protection according to IEC 60529:1989 can only be guaranteed when the enclosure cover is mounted, the exhaust air filters are installed and the connections are installed properly.

Note: Devices with index 1 or lower have a black enclosure cover with polyamide window. Devices with device index 2 and higher have a transparent polycarbonate enclosure cover.

On mounting make sure that at least 300 mm space is left above the enclosure cover.

In locations where there is a risk of mechanical damage to the enclosure, the enclosure must be fitted with additional protection to fulfill the requirements in clause 6 of EN 61241-0: 2006 “Electrical apparatus for use in the presence of combustible dust”.

- 3 -
Mounting to SAMSON Type 3278
Rotary Actuators

For mounting to SAMSON Type 3278 Rotary Actuators (see Data Sheet T 8321 EN and Mounting and Operating Instructions EB 8321 EN), a mounting kit is required (see Fig. 2).

On mounting, the following instructions must be observed.

- Devices with Type 3776-XXXXX10
  3/2-way Booster Valve
  The outlet bore on the bottom of the booster valve must be sealed by a threaded pin (delivered state).

- Devices with
  Types 3776-XXXXX10/-XXXXX12
  3/2-way Booster Valve
  The exhaust air feedback from the rotary actuator is implemented as follows:
  - Connect the spring chamber of the rotary actuator using a connecting line to the connection 4 of the booster valve.
  - If no exhaust air feedback is used, seal connection 4 of the booster valve using a threaded plug ④.

Mounting

1. Fasten plate ⑧ using two hexagon socket head screws ⑨ to the flange of the rotary actuator.
2. Insert O-rings ④ into the grooves of the threaded bolts of the flange plate ⑤.
3. Fasten flange plate ⑤ to the flange of the rotary actuator using four hexagon screws ⑥. Make sure the four hexagon screws ⑥ are only tightened slightly to allow the flange plate ⑤ to be aligned when attaching the enclosure.
4. Place follower clamp ⑦ through the flange plate ⑤ into the slot of the plate ⑥ on the rotary actuator.
5. Unscrew enclosure cover from the device.
6. Place the enclosure on the threaded bolts of the flange plate ⑤. Make sure that the shaft trunnion on the device is aligned so that it engages in the middle of the slot in the follower clamp ⑦.
7. Fasten flange plate ⑤ onto the flange of the rotary actuator by tightening the four hexagon screws ⑥.
8. Fasten the enclosure using two hexagon socket head screws ①, two split washers ② and two washers ③.
9. Place the indicating cap ⑩ on the cam holder and turn it until it engages.
10. Attach enclosure cover onto the device.
Mounting to SAMSON Type 3278 Rotary Actuators

Bottom view of the device

Mounting kit for SAMSON Type 3278 Rotary Actuators

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7216</th>
<th>1400-7217</th>
</tr>
</thead>
</table>
| ① 2 × Hexagon socket head screw  
  ISO 4762 – M 6 × 12 | Diaphragm area 160 cm² | Diaphragm area 320 cm² |
| ② 2 × Split washer – form B 6 | | |
| ③ 2 × Washer ISO 7089-6 – 6 | | |
| ④ 2 × O-ring 7.5 × 1.5 | | |
| ⑤ 1 × Flange plate | | |
| ⑥ 4 × Hexagon screw EN 24017 – M 5 × 12 | | |
| ⑦ 1 × Follower clamp | | |
| ⑧ 1 × Plate | | |
| ⑨ 2 × Hexagon socket head screw  
  ISO 4762 – M 4 × 10 | | |
| ⑩ 1 × Indicating cap | | |
| ⑪ 1 × Fixing ring (only for mounting kit 1400-7217) | | |
| ⑫ 1 × Threaded plug 1/4” | | |

Fig. 2
Mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 1

For mounting to rotary actuators according to VDI/VDE 3845 (2009-04) – fixing level 1, a mounting kit is required (see Fig. 3).

On mounting, the following instructions must be observed.

- Devices with Type 3776-XXXXXX10
  3/2-way Booster Valve
The outlet bore on the bottom of the booster valve must be sealed by a threaded pin (delivered state).

- Devices with
  Types 3776-XXXXXX10/-XXXXXX12
  3/2-way Booster Valve
The exhaust air feedback from the rotary actuator is implemented as follows:
  - Connect the spring chamber of the rotary actuator using a connecting line to the connection 4 of the booster valve.
  - If no exhaust air feedback is used, seal connection 4 of the booster valve using a threaded plug.

Mounting

1 Fasten bracket delivered by the actuator manufacturer using four hexagon screws to the flange of the rotary actuator. Make sure the four hexagon screws are only tightened slightly to allow the bracket to be aligned when attaching the enclosure.
2 Insert O-rings into the grooves of the threaded bolts of the flange plate.
3 Fasten flange plate to the bracket using two hexagon screws and two hexagon nuts.
4 Place follower clamp into the slot of the shaft trunnion on the rotary actuator.
5 Unscrew enclosure cover from the device.
6 Place the enclosure on the threaded bolts of the flange plate. Make sure that the shaft trunnion on the device is aligned so that it engages in the middle of the slot in the follower clamp.
7 Fasten bracket onto the flange of the rotary actuator by tightening the four hexagon screws.
8 Fasten enclosure using two hexagon socket head screws, two split washers and two washers.
9 Place indicating cap on the cam holder and turn it until it engages.
10 Attach the enclosure cover onto the device.
Mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 1

Order no. 1400-7041

1 2 × Hexagon socket head screw
   ISO 4762 – M 6 × 12
2 2 × Split washer – form B 6
3 2 × Washer ISO 7089-6 – 6
4 2 × O-ring 7.5 × 1.5
5 1 × Flange plate
6 1 × Follower clamp
7 2 × Hexagon screw EN 24017 – M 6 × 12
8 2 × Hexagon nut EN 24032 – M 6
9 1 × Indicating cap
10 1 × Threaded plug 1/4”

Fig. 3

Bottom view of the device
Mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 2

For mounting to rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 2, a mounting kit is required (see Fig. 4).

On mounting, the following instructions must be observed.

- Devices with Type 3776-XXXXXX10
  3/2-way Booster Valve
  The outlet bore on the bottom of the booster valve must be sealed by a threaded pin (delivered state).

- Devices with Types 3776-XXXXXX10/-XXXXXX12
  3/2-way Booster Valve
  The exhaust air feedback from the rotary actuator is implemented as follows:
  - Connect the spring chamber of the rotary actuator using a connecting line to the connection 4 of the booster valve.
  - If no exhaust air feedback is used, seal connection 4 of the booster valve using a threaded plug ⑧.

Mounting

1. Insert O-rings ④ into the grooves of the threaded bolts of the flange plate ⑤.
2. Fasten flange plate ⑤ to the flange of the rotary actuator using four hexagon screws ⑥. Make sure the four hexagon screws ⑥ are only tightened slightly to allow the flange plate ⑤ to be aligned when attaching the enclosure.
3. Unscrew enclosure cover from the device.
4. Place enclosure on the threaded bolts of the flange plate ⑤. Make sure that the shaft trunnion on the device is aligned so that it engages in the middle of the slot in the rotary actuator.
5. Fasten flange plate ⑤ onto the flange of the rotary actuator by tightening the four hexagon screws ⑥.
6. Fasten enclosure using two hexagon socket head screws ①, two split washers ② and two washers ③.
7. Place indicating cap ⑦ on the cam holder and turn it until it engages.
8. Attach the enclosure cover onto the device.
Mounting kit for rotary actuators according to VDI/VDE 3845 (2004-09) – fixing level 2

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7043</th>
<th>1400-7186</th>
<th>1400-7212</th>
<th>1400-7210</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hexagon socket head screw ISO 4762 – M 6 x 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Split washer – form B 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Washer ISO 7089-6 – 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>O-ring 6 x 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Flange plate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hexagon screw EN 24017 – M 5 x 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Indicating cap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Threaded plug 1/4&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hole spacing A:
- 80 mm
- 80 mm
- 130 mm
- 130 mm

Shaft trunnion length B:
- 20 mm
- 30 mm
- 30 mm
- 50 mm

Fig. 4

Bottom view of the device
Mounting to SAMSON Type 3277 Linear Actuators

For mounting to SAMSON Type 3277 Linear Actuators (see Data Sheet T 8310-1/-2 EN and Mounting and Operating Instructions EB 8310 -1/-2 EN), a mounting kit is required (see Fig. 5).

A SAMSON Type 373X, 376X or 378X Positioner can be mounted at the same time.

On mounting, the following instructions must be observed.

1. Devices with Type 3776-XXXXXX10
   3/2-way Booster Valve
   The outlet bore on the bottom of the booster valve must be sealed by a threaded pin (delivered state).
   Insert O-ring into the outlet bore on the bottom of the booster valve.

2. Devices with Types 3776-XXXXXX10/-XXXXXX12
   3/2-way Booster Valve
   The exhaust air feedback from the linear actuator is implemented as follows:
   - Connect the spring chamber of the linear actuator using a connecting line to the connection 4 of the booster valve.
   - If no exhaust air feedback is used, seal connection 4 of the booster valve using a threaded plug.

Mounting

1. Use a screwdriver to turn the threaded plug and break it out of the bottom of the enclosure.
2. Insert molded seal into the groove in the bottom of the enclosure.
3. Place follower clamp together with external spring onto shaft trunnion and secure in place using a snap ring.
4. Fasten flange plate together with stuck-on flat seal flush-right onto linear actuator yoke using two hexagon screws.
5. Place washer and O-ring under the left hexagon screw.
6. Unscrew enclosure cover from the device.
7. Place enclosure on the threaded bolts of the flange plate. Make sure that the shaft trunnion is aligned so that the follower pin of the clamp engages exactly into the slot in the follower clamp.
8. Fasten enclosure using two hexagon socket head screws, two split washers and two washers.
9. Attach the enclosure cover onto the device.
10. Mounting without positioner:
    Replace exhaust air filter in the enclosure cover with threaded plug as the air purging of the enclosure is performed over the cover on the linear actuator.
    Fasten the cover at the back of the linear actuator yoke and thread in exhaust air filter.
    Mount positioner onto the back of the linear actuator yoke as described in the mounting and operating instructions.
    The cover is not required.
Mounting to SAMSON Type 3277 Linear Actuators

Mounting kit for SAMSON Type 3277 Linear Actuators

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7220</th>
<th>1400-7221</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 x Molded seal</td>
<td>Diaphragm area 240/350 cm²</td>
</tr>
<tr>
<td>2</td>
<td>1 x Follower clamp</td>
<td>Diaphragm area 700 cm²</td>
</tr>
<tr>
<td>3</td>
<td>1 x Snap ring ø 5 x 0.8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 x Flange plate</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1 x Flat seal</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2 x Hexagon screw EN 24017 – M 5 x 12</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1 x Washer ISO 7089 – 5</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1 x O-ring 5 x 1.2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1 x Clamp (for mounting without positioner/with SAMSON Type 376X or 378X Positioner)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1 x Fixing screw and follower pin (for mounting with SAMSON Type 373X Positioner)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2 x Hexagon socket head screw ISO 4762 – M 6 x 12</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>2 x Split washer – form B 6</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2 x Washer ISO 7089 – 6</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>1 x Cover (for mounting without positioner)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>2 x Threaded plug 1/4”</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1 x O-ring 4 x 2</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5

Bottom view of the device

Exhaust air filter

 limite switch

Connection block/Booster valve

Type 3776-XXXXX10/-XXXXX12 Booster valve

Threaded plug

Spring

Threaded pin ISO 4029 – M 5 x 9

1 2 3

1 5 6

1 2

4 5

1 2
Mounting to SAMSON Type 3277-5
Linear Actuators
(external routing of the loading pressure)

For mounting to SAMSON Type 3277-5 Linear Actuators with external routing of the loading pressure (see Data Sheet T 8310-1/-2 EN and Mounting and Operating Instructions EB 8310 -1/-2 EN), a mounting kit is required (see Fig. 6).
A SAMSON Type 373X, 376X or 378X Positioner can be mounted at the same time.

On mounting, the following instructions must be observed.

1. Use a screwdriver to turn the threaded plug and break it out of the bottom of the enclosure.
2. Insert molded seal ① into the groove in the bottom of the enclosure.
3. Place follower clamp ② together with external spring onto the shaft trunnion and secure in place using a snap ring ③.
4. Fasten flange plate ④ together with stuck-on flat seal ⑤ flush-right onto the linear actuator yoke using two hexagon screws ⑥. Place washer ⑦ and O-ring ⑧ under the left hexagon screw ⑥.
5. Mounting without positioner/mounting with SAMSON Type 376X or 378X Positioner:
   Attach clamp ⑨ onto the linear actuator stem.
6. Mounting with SAMSON Type 373X Positioner:
   Fasten clamp from the positioner mounting kit together with fixing screw and follower pin ⑩ onto linear actuator stem.
7. Unscrew enclosure cover from the device.
8. Place enclosure on the threaded bolts of the flange plate ④. Make sure that the shaft trunnion is aligned so that the follower pin of the clamp ⑨/fixing screw ⑩ engages exactly into the slot in the follower clamp ②.
9. Fasten enclosure using two hexagon socket head screws ⑪, two split washers ⑫ and two washers ⑬.
10. Attach the enclosure cover onto the device.
11. Mounting without positioner:
    Replace exhaust air filter in the enclosure cover with the threaded plug ⑮ as air purging of the enclosure is performed over the cover ⑭ on the linear actuator. Fasten the cover ⑭ at the back of the linear actuator yoke and thread in exhaust air filter.
12. Mounting with SAMSON Type 373X, 376X or 378X Positioner:
    Mount the positioner onto the back of the linear actuator yoke as described in the mounting and operating instructions. The cover ⑭ is not required.
Mounting to SAMSON Type 3277-5 Linear Actuators (external) without positioner

Mounting kit for SAMSON Type 3277-5 Linear Actuators (external)

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7219</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 x Molded seal</td>
</tr>
<tr>
<td>2</td>
<td>1 x Follower clamp</td>
</tr>
<tr>
<td>3</td>
<td>1 x Snap ring Ø 5 x 0.8</td>
</tr>
<tr>
<td>4</td>
<td>1 x Flange plate</td>
</tr>
<tr>
<td>5</td>
<td>1 x Flat seal</td>
</tr>
<tr>
<td>6</td>
<td>2 x Hexagon screw EN 24017 – M 5 x 12</td>
</tr>
<tr>
<td>7</td>
<td>1 x Washer ISO 7089 – 5</td>
</tr>
<tr>
<td>8</td>
<td>1 x O-ring 5 x 1,2</td>
</tr>
<tr>
<td>9</td>
<td>1 x Clamp (for mounting without positioner/ with SAMSON Type 376X or 378X Positioner)</td>
</tr>
<tr>
<td>10</td>
<td>1 x Fixing screw and follower pin (for mounting with SAMSON Type 373X Positioner)</td>
</tr>
<tr>
<td>11</td>
<td>2 x Hexagon socket head screw</td>
</tr>
<tr>
<td></td>
<td>ISO 4762 – M 6 x 12</td>
</tr>
<tr>
<td>12</td>
<td>2 x Split washer – form B 6</td>
</tr>
<tr>
<td>13</td>
<td>2 x Washer ISO 7089 – 6</td>
</tr>
<tr>
<td>14</td>
<td>1 x Cover (for mounting without positioner)</td>
</tr>
<tr>
<td>15</td>
<td>2 x Threaded plug 1/4&quot;</td>
</tr>
<tr>
<td>16</td>
<td>1 x O-ring 4 x 2</td>
</tr>
</tbody>
</table>

Diaphragm area 120 cm²

Fig. 6
Mounting to SAMSON Type 3277-5 Linear Actuators
(internal routing of the loading pressure)

For mounting to SAMSON Type 3277-5 Linear Actuator with internal routing of the loading pressure (see Data Sheet T 8310-1/-2 EN and Mounting and Operating Instructions EB 8310-1/-2 EN), a mounting kit is required (see Fig. 7). A SAMSON Type 373X, 376X or 378X Positioner can be mounted at the same time.

On mounting, the following instructions must be observed.

Devices with Type 3776-XXXXX10 3/2-way Booster Valve
Only these devices can be mounted to SAMSON Type 3277-5 Linear Actuators with internal routing of the loading pressure. The loading pressure is routed over holes in the yoke and a switchover plate either to the top or bottom diaphragm chamber.
- Un螺丝 screw threaded pin out of the outlet bore on the bottom of the booster valve.
- Seal connection 2 of the booster valve using a screw plug and the O-ring.
- Seal connection 4 of the booster valve using a threaded plug.

Mounting
1 Use a screwdriver to turn the threaded plug and break it out of the bottom of the enclosure.
2 Insert molded seal into the groove in the bottom of the enclosure.
3 Place follower clamp together with the external spring onto the shaft trunnion and secure in place using a snap ring.
4 Fasten flange plate together with a screw plug and the O-ring under the left hexagon screw.
5 Place seal through the hole of the flange plate into the loading pressure connection.

6 Mounting without positioner/mounting with SAMSON Type 376X or 378X Positioner:
Attach clamp onto the linear actuator stem.

7 Un螺丝 screw enclosure cover from the device.
8 Place enclosure on the threaded bolts of the flange plate. Make sure that the shaft trunnion is aligned so that the follower pin of the clamp/fixing screw engages exactly into the slot in the follower clamp.
9 Fasten the enclosure using two hexagon socket head screws, two split washers and two washers.
10 Attach the enclosure cover onto the device.

11 Mounting without positioner:
Replace exhaust air filter in the enclosure cover with the threaded plug as air purging of the enclosure is performed over the cover on the linear actuator.
Fasten the cover at the back of the linear actuator yoke and thread in exhaust air filter.

Mounting with SAMSON Type 373X, 376X or 378X Positioner:
Mount the positioner onto the back of the linear actuator yoke as described in the mounting and operating instructions. The cover is not required.
Mounting to SAMSON Type 3277-5 Linear Actuators (internal) without positioner

Bottom view of the device

Mounting kit for SAMSON Type 3277-5 Linear Actuator (internal)

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7222</th>
<th>1400-7223</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 x Molded seal</td>
<td>Connection G 1/4</td>
</tr>
<tr>
<td>2</td>
<td>1 x Follower clamp</td>
<td>Connection NPT 1/4</td>
</tr>
<tr>
<td>3</td>
<td>1 x Snap ring Ø 5 x 0.8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 x Flange plate</td>
<td></td>
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<tr>
<td>5</td>
<td>1 x Flat seal</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2 x Hexagon screw EN 24017 – M 5 x 12</td>
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<tr>
<td>7</td>
<td>1 x Washer ISO 7098 – 5</td>
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<tr>
<td>8</td>
<td>1 x O-ring 5 x 1.2</td>
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<td>9</td>
<td>1 x Clamp (for mounting without positioner/with SAMSON Type 376X or 378X Positioner)</td>
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<td>10</td>
<td>1 x Fixing screw and follower pin (for mounting with SAMSON Type 373X Positioner)</td>
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<td>11</td>
<td>2 x Hexagon socket head screw ISO 4762 – M 6 x 12</td>
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<td>12</td>
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<td>2 x Washer ISO 7089 – 6</td>
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<tr>
<td>14</td>
<td>1 x Cover</td>
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<tr>
<td>15</td>
<td>2 x Threaded plug 1/4”</td>
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<tr>
<td>16</td>
<td>1 x Seal 13 mm</td>
<td></td>
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<tr>
<td></td>
<td>1 x Screw plug DIN 908 – 1/4”</td>
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<tr>
<td></td>
<td>1 x O-ring 14 x 1 (only for G 1/4)</td>
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</tbody>
</table>

Fig. 7
Mounting to SAMSON Type 324X Control Valves with rib according to DIN EN 60534-6-1

For mounting to SAMSON Type 324X Control Valves (see Data Sheet T 8015 EN and Mounting and Operating Instructions EB 8015 EN) a mounting kit is required (see Fig. 8).

Note: Mounting to SAMSON Types 324X, 325X and 328X Control Valves with nominal size above DN 100 can be done in the same way. For mounting to control valves with a travel above 5 mm special mounting kits are required. Therefore, type, nominal size and travel of the control valve must be specified in the order.

On mounting, the following instructions must be observed.

► Devices with Type 3776-XXXXXX10
  3/2-way Booster Valve
The outlet bore on the bottom of the booster valve must be sealed with a threaded pin (delivered state).

► Devices with
  Types 3776-XXXXXX10/-XXXXXX12
  3/2-way Booster Valve
The exhaust air feedback from the linear actuator is implemented as follows:

- Connect the spring chamber from the linear actuator using a connecting line to the connection 4 of the booster valve.
- If no exhaust air feedback is used, seal connection 4 of the booster valve using a threaded plug.

Mounting

1. Screw two bolts ⑥ into the stem connector between the actuator stem and plug stem.
2. Fasten follower plate ⑦ to the bolts ⑥ using two hexagon screws ⑧ and two disc springs ⑨.
3. Fasten bracket ⑩ to the rib of the control valve using a hexagon screw ⑪ and washer ⑫. Align the middle of the bracket ⑩ with the 50 % mark of the travel indicator scale.
4. Unscrew enclosure cover from the device.
5. Place bushing ① on the shaft trunnion of the device and fasten it using two self-tapping screws ②.
6. Insert follower pin in the follower clamp ③ depending on the valve travel (≤ 17/≤ 25/≤ 35 mm). Fasten it using a hexagon nut.
7. Place follower clamp ③ onto the threaded trunnion of bushing ①. Fasten it with hexagon nut ④ and split washer ⑤.
8. Align follower clamp ③ in the horizontal direction.
9. Place enclosure on the threaded bolts of the bracket ⑩. Make sure the pin engages exactly into the slot of the follower plate ⑦. If this is not possible, undo the hexagon screw ⑪ and realign the bracket ⑩.
10. Fasten enclosure using two hexagon socket head screws ⑬, two split washers ⑭ and two washers ⑮.
11. Attach the enclosure cover onto the device.
Mounting to SAMSON Type 324X Control Valves with ribs according to DIN EN 60534-6-1

Fig. 8

Mounting kit for SAMSON Type 324X Control Valves

<table>
<thead>
<tr>
<th>Order no.</th>
<th>1400-7730</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Number</td>
</tr>
<tr>
<td>1</td>
<td>1400-7730</td>
</tr>
<tr>
<td>2</td>
<td>1400-7730</td>
</tr>
<tr>
<td>3</td>
<td>1400-7730</td>
</tr>
<tr>
<td>4</td>
<td>1400-7730</td>
</tr>
<tr>
<td>5</td>
<td>1400-7730</td>
</tr>
<tr>
<td>6</td>
<td>1400-7730</td>
</tr>
<tr>
<td>7</td>
<td>1400-7730</td>
</tr>
<tr>
<td>8</td>
<td>1400-7730</td>
</tr>
<tr>
<td>9</td>
<td>1400-7730</td>
</tr>
<tr>
<td>10</td>
<td>1400-7730</td>
</tr>
<tr>
<td>11</td>
<td>1400-7730</td>
</tr>
<tr>
<td>12</td>
<td>1400-7730</td>
</tr>
<tr>
<td>13</td>
<td>1400-7730</td>
</tr>
<tr>
<td>14</td>
<td>1400-7730</td>
</tr>
<tr>
<td>15</td>
<td>1400-7730</td>
</tr>
</tbody>
</table>

- Bushing
- Self-tapping screw 2.5 x 10
- Follower clamp
- Hexagon nut ISO 4035 – M 6
- Split washer – form B 6
- Bolt
- Follower plate
- Hexagon screw ISO 4017 – M 4 x 8
- Disk spring DIN 2093 – form B 8
- Hexagon screw ISO 4017 – M 8 x 20
- Washer ISO 7089 – 9
- Hexagon socket head screw ISO 4762 – M 6 x 10
- Split washer – form B 6
- Washer ISO 7089 – 6

Fig. 8

Order no. 1400-7730 Nominal size DN 15 to 100
Air connection

For devices with pilot valve, the air supply pipes and screw joints may only be laid and assembled by experienced personnel. They must be regularly checked for leaks and damage and, if necessary, repaired. Before starting any repair work, all supply pipes which are to be opened must be depressurized. The air supply must not exceed the maximum permissible pressure.

The air connections on the connection block or booster valve are G (NPT) 1/4 tapped holes. To connect the actuator preferably angle connectors for pipe 6×1 or hose 4×1 shall be used. The exhaust air connection must be protected against water and dirt entering by using a filter or other suitable countermeasures.

Air supply

Medium
Instrument air, free of corrosive particles, or nitrogen

Pressure
2.2 to 6.0 bar

<table>
<thead>
<tr>
<th>Quality of compressed air according to ISO 8573-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle size and density</td>
</tr>
<tr>
<td>Class 4</td>
</tr>
<tr>
<td>≤ 5 µm and 1000/m³</td>
</tr>
</tbody>
</table>

Note for using nitrogen:

When the devices are to be mounted in closed, unventilated rooms, the exhaust air of pilot valves or booster valves must be vented to the outside over a central pipe.
Filter elements for air supply

To protect the pilot valve against dirt particles, connection 9 for air supply is equipped with a sieve, mesh size 100 µm, and a filter, pore size 30 µm. The filter elements must be cleaned or replaced when contaminated (see Fig. 9).

Cleaning/replacing the filter elements

1. Use a screwdriver (7 to 9 mm blade) to unthread the sieve 8 from the supply air connection 9.
2. Clean sieve 8 or replace it. Screw into the supply air connection 9.
3. Undo two hexagon socket head screws 6 and two split washers 7. Remove connection block/booster valve from enclosure.
4. Pull filter 4 out of connection bore.
5. Clean filter 4 or replace it. Insert it into connection bore. Make sure the seal 3 is correctly positioned.
6. Fasten connection block/booster valve to the enclosure using two hexagon socket head screws 6 and two split washers 7. Make sure that the seals 1 or 5 and two O-rings 2 are positioned correctly.

Air connection

<table>
<thead>
<tr>
<th>Spare parts</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Seal with restrictor</td>
<td>1890-3891</td>
</tr>
<tr>
<td>2 O-ring 6 x 1</td>
<td>0520-0496</td>
</tr>
<tr>
<td>3 Seal 12 x 2</td>
<td>0430-1134</td>
</tr>
<tr>
<td>4 Filter</td>
<td>0550-0653</td>
</tr>
<tr>
<td>5 Seal with ball</td>
<td>1890-3892</td>
</tr>
<tr>
<td>(only if one pilot valve is used)</td>
<td></td>
</tr>
<tr>
<td>6 Hexagon socket head screw</td>
<td>8333-1191</td>
</tr>
<tr>
<td>ISO 4762 – M 4 x 30</td>
<td></td>
</tr>
<tr>
<td>7 Split washer – form B 4</td>
<td>8392-0654</td>
</tr>
<tr>
<td>8 Sieve</td>
<td>0550-0213</td>
</tr>
</tbody>
</table>

Fig. 9
Exhaust air filter and degree of protection

The devices are equipped either with a filter (IP 54) or a filter check valve (IP 65) in the enclosure cover.

- Devices with
  Types 3776-XXXXXX10/-XXXXXX12
  -XXXXXX30/-XXXXXX31
  -XXXXXX40/-XXXXXX41
  -XXXXXX50/-XXXXXX51
  -XXXXXX60/-XXXXXX61
  -XXXXXX70/-XXXXXX71

Booster Valve
To prevent water or dirt entering the booster valve, use a filter or other suitable countermeasures.

Restrictors

- Devices with
  Types 3776-XXXXXX12/-XXXXXX31
  -XXXXXX41/-XXXXXX51
  -XXXXXX61/-XXXXXX71

Booster Valve
These devices are equipped with supply air restrictors/exhaust air restrictors (see Fig. 10). Use a screwdriver to turn the restrictor screws \( \textcircled{1} \) and \( \textcircled{2} \) clockwise to close and counterclockwise to open them to achieve different closing and opening times (e.g. for rotary actuators at a ratio of 1:15).

A minimum flow rate is provided when the restrictor screws are closed.

<table>
<thead>
<tr>
<th>Type 3776 Booster Valve</th>
<th>Connection</th>
<th>Restrictors</th>
<th>( K_{VS} ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-XXXXXX12</td>
<td>2</td>
<td>( \textcircled{1} ) Exhaust air</td>
<td>0.01 ... 0.18</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>( \textcircled{2} ) Supply air</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 3776 Booster Valve</th>
<th>Connection</th>
<th>Restrictors</th>
<th>( K_{VS} ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-XXXXXX31</td>
<td>4</td>
<td>( \textcircled{1} ) Exhaust air</td>
<td>0.01 ... 0.23</td>
</tr>
<tr>
<td>-XXXXXX41</td>
<td>2</td>
<td>( \textcircled{2} ) Exhaust air</td>
<td></td>
</tr>
<tr>
<td>-XXXXXX51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-XXXXXX61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-XXXXXX71</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 10
Electrical connection

For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations of the country of use. The following regulations apply to installation in hazardous areas: EN 60079-14:2008 (VDE 0165-1) “Explosive Atmospheres – Electrical Installations Design, Selection and Erection”.

For connection to certified intrinsically safe electric circuits, the EC Type Examination Certificate PTB 98 ATEX 2072 for zone 1 and Certificate of Conformity PTB 02 ATEX 2007 X for zone 2/zone 22 applies (see pages 34 ff.).

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 (Uᵢ or U₀, Iᵢ or I₀, Pᵢ or P₀, Cᵢ or C₀ and Lᵢ or L₀).

Connecting cables

The power supply is connected either through cable glands M 20 × 1.5 to a terminal in the enclosure or with plug-type connectors (see “Connection diagrams”, pages 22 to 25).

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

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

It is recommended that connecting cables with a conductor cross-section of 0.5 mm² and an external diameter of 6 to 9 mm are used. The radial thickness of the isolation 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 or wires 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.

Equipment for use in 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 (energy-limited equipment) according to EN 60079-15:2003 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 (see pages 45 ff.).
Fig. 11 - Connection diagrams for maximum number possible of fitted components
Connection diagrams for plug-type connectors according to EN 175301-803

2 inductive contacts (2-wire)

1 electric contact (change-over contact)

2 electric contacts (change-over contacts)

1 inductive contact (2-wire)

1 pilot valve

3 inductive contacts (2-wire)

2 pilot valves

1 inductive contact (3-wire)

2 pilot valves

1 electric contact (change-over contact)

Fig. 12 - Connection diagrams for maximum number possible of fitted components

● = Coding (only if two plug-type connectors are used)
Fig. 13 · Connection diagrams for maximum number possible of fitted components

- = Coding (only if two plug-type connectors are used)
Fig. 14 · Connection diagrams for maximum number possible of fitted components

- Coding (only if two round connectors are used)

3 inductive contacts (2-wire) 2 inductive contacts (3-wire)

1 pilot valve
2 inductive contacts (2-wire)

2 pilot valves
1 inductive contact (3-wire)

2 pilot valves
3 inductive contacts (3-wire)

2 pilot valves
3 electric contacts (change-over contacts)
AS-Interface module (version 2011)

- Type 3776-0XXXXXXXX52
  Type 3776-0XXXXXXXX53

The AS-Interface module is installed on a printed circuit board in the enclosure, ready for connection (see Fig. 15).

Note:
In the delivered state, the AS-Interface module is programmed to the slave address A 2.

Slave profile
A/B slave

Data bit

<table>
<thead>
<tr>
<th>Bit assignment</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>–</td>
<td>OUT 1</td>
</tr>
<tr>
<td>01</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>02</td>
<td>IN 1</td>
<td>–</td>
</tr>
<tr>
<td>03</td>
<td>IN 2</td>
<td>–</td>
</tr>
</tbody>
</table>

Status indication
Three LEDs are arranged on the printed circuit board to indicate the status of the AS-Interface module and the two inputs IN 1 and IN 2 (see table below).

<table>
<thead>
<tr>
<th>Status indication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED</strong></td>
</tr>
<tr>
<td>1 green</td>
</tr>
<tr>
<td>red</td>
</tr>
<tr>
<td>flashing green/red</td>
</tr>
<tr>
<td>2 yellow</td>
</tr>
<tr>
<td>3 yellow</td>
</tr>
</tbody>
</table>

Cable break and short-circuit monitoring
The cable break and short-circuit monitoring functions are set using a programming device connected to the AS-i master.

The LED 1 flashes green/red to indicate a cable break or short-circuit.
When the cable break and short-circuit monitoring functions are switched on, the initiator is attenuated in case of a cable break and un-attenuated in case of a short-circuit (LED 2 or LED 3 illuminates yellow).

EB 8368 EN
**Bus connection**
The bus connection is established using an AS-i flat cable with cable adapter or a connecting cable with round connector M 12 × 1 screwed into the tapped hole A of the flange plate (see Fig. 16).

![Connection diagrams](image)

**Bus connection with a round connector M 12 × 1**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

**Screw terminals on the printed circuit**

Fig. 16
Pilot valve/manual override

For safety circuits, only pilot valves without manual override shall be used.

Devices with pilot valve

The pilot valve, which consists of an e/p binary converter (1) and a pressure reducer (2), is optionally provided with a manual override (3) (see Fig. 17).

When a nominal signal is not available, the pilot valve can be operated by a pushbutton or a pushbutton switch using a screwdriver (4.5 mm blade).
Contacts

The devices are equipped either with maximum three inductive pick-ups, one inductive double proximity switch or three electric microswitches (see pages 30 to 32).

For most applications, the contacts are adjusted to provide a signal when the actuator has reached one of its end positions. The switching point can also be adjusted to any position within the rotary range or travel range to signalize an intermediate position.

Switching point shift due to changes in temperature

The contacts and their actuating appliances are sensitive to changes in temperature.

In order to ensure safe switching, the switching hysteresis between the switching position of the actuator and the switching point of the contact must be larger than the shift of the switching point due to changes in temperature.

For this reason, when adjusting the contacts, the shift of the switching point must be compensated for with x turnings of the adjusting screw (see table “Adjustment data”).

<table>
<thead>
<tr>
<th>Adjustment data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching point shift $\Delta T = 50 , ^\circ C$</td>
</tr>
<tr>
<td>Angle of rotation</td>
</tr>
<tr>
<td>$\leq 2^\circ$</td>
</tr>
<tr>
<td>Turnings of the adjusting screw</td>
</tr>
<tr>
<td>$x = \frac{1}{16}$</td>
</tr>
</tbody>
</table>
Inductive pick-ups

For devices with inductive pick-ups ③, the shaft ① has a maximum of three adjustable metal tags ② (see Fig. 18).
When the metal tag is within the magnetic field of the pick-up, the pick-up is attenuated and the output has high impedance.

Switching functions:
Type SC3,5-N0: Contact open (LED off)
Type SJ3,5-SN: Contact open
Type SB3,5-E2: Contact closed (LED on)

When the metal tag leaves the magnetic field, the pick-up is unattenuated and the output has low impedance.

Switching functions:
Type SC3,5-N0: Contact closed (LED on)
Type SJ3,5-SN: Contact closed
Type SB3,5-E2: Contact open (LED off)

Note: The metal tags of pick-ups that have been mounted by the manufacturer are adjusted so that the pick-ups are unattenuated in the switching positions of the control valves.

Adjusting the switching points

1. Unscrew enclosure cover from the device.
2. Pull off indicating cap from the cam holder (only for rotary actuators).
3. Move control valve to the desired switching position.
4. Turn adjusting screw ④ with a screwdriver, until the metal tag ② moves out of the magnetic field of the pick-up ③ and the output signal changes from “0” to “1” or from “1” to “0”.
5. To compensate for the switching point shift due to temperature changes, turn adjusting screw ④ by x turnings (see adjustment data table on page 28) in the opposite direction.
6. Move control valve out of the switching position and check whether the output signal changes from “1” to “0” or from “0” to “1”.
7. Move control valve to the switching position again and check the switching point.
8. Attach and turn indicating cap onto the cam holder until it engages (only for rotary actuators).
9. Attach enclosure cover to the device.

Adjusting the switching points for inductive pick-ups

1. Shaft
2. Metal tag
3. Inductive pick-up
4. Adjusting screw

Fig. 18 - Device without enclosure cover and indicating cap
Inductive double proximity switch

For devices with inductive double proximity switch ③, the shaft ① is equipped with an adjustable metal tag ② with an angle of rotation of 70° or 90° (see Fig. 19).

Note: These devices can only be used on rotary actuators.

When the metal tag is within the magnetic field of the proximity switch, the proximity switch is attenuated and the output has high impedance. Switching function: Contact open (LED off)

When the metal tag leaves the magnetic field, the proximity switch is unattenuated and the output has low impedance. Switching function: Contact closed (LED on)

Note: The metal tag is designed so that in the switching positions of the rotary actuator the proximity switches are unattenuated. When the device is mounted to the rotary actuator turned by 90°, the connecting cables of the proximity switches must be changed to signalize the switching positions “closed” and “open” correctly.

Adjusting the switching points
1. Unscrew enclosure cover from the device.
2. Pull off indicating cap from the cam holder.
3. Move rotary actuator to the switching position “closed”.
4. Turn adjusting screw ④ with a screwdriver, until the metal tag ② moves out of the magnetic field of the proximity switch “closed” and the output signal changes from “0” to “1”.
5. To compensate for the switching point shift due to temperature changes, turn adjusting screw ④ by x turnings (see adjustment data table on page 28) in the opposite direction.
6. Move rotary actuator in the switching position “open” and check whether the output signal of proximity switch “open” changes from “0” to “1”.
7. Move rotary actuator to the switching position “close” again and check the switching point.
8. Attach and turn indicating cap onto the cam holder until it engages.
9. Attach enclosure cover to the device.

Adjusting the switching points for inductive double proximity switch

Fig. 19 - Device without enclosure cover and indicating cap

① Shaft
② Metal tag
③ Inductive double proximity switch
④ Adjusting screw
Electric microswitches

For devices with electric microswitches, the shaft 1 is equipped with up to three adjustable cam disks 2. Each cam disk 2 actuates an electric microswitch 3 by the roller attached to the switch lever 4 (see Fig. 20). The electric microswitches have a change-over contact which can be used as normally open contact or normally closed contact.

Adjusting the switching points

1. Unscrew enclosure cover from the device.
2. Pull off indicating cap from the cam holder (only for rotary actuators).
3. Move control valve to the desired switching position.
4. Turn adjusting screw 5 with a screwdriver until the cam disk 2 actuates the electric microswitch 3 and the output signal changes.
5. To compensate for the switching point shift due to temperature changes, turn adjusting screw 5 by x turnings (see adjustment data on page 28) in the opposite direction.
6. Move control valve out of the switching position and check whether the output signal changes.
7. Move control valve to the switching position again and check the switching point.
8. Attach and turn indicating cap onto the cam holder until it engages (only for rotary actuators).
9. Attach enclosure cover to the device.

Adjusting the switching points for electric microswitches

Fig. 20 - Device without enclosure cover and indicating cap

1. Shaft
2. Cam disc
3. Electric microswitch
4. Switch lever
5. Adjusting screw
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 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. Document the passing of the routine test 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 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”.

Maintenance, calibration and work on equipment

Interconnection with intrinsically safe circuits to check or calibrate the equipment inside 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 (see pages 34 ff.).
(1) EC TYPE EXAMINATION CERTIFICATION


(3) EC Type Examination Certificate Number

PTB 98 ATEX 2072

(4) Equipment: Model 3776-1 Limit Switch

(5) Manufacturer: Samson AG

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents referred to therein.

(8) 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 No. PTB Ex 98-28049.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with

EN 50014: 1997

EN 50020: 1994

(10) 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.

(11) This EC TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of the equipment.

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

II 2 G Ex ia IIC T6
Zertifizierungsstelle Explosionsschutz
By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

EC Type Examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB07.doc
Schedule

EC TYPE EXAMINATION CERTIFICATE No. PTB 98 ATEX 2072

Description of Equipment

The Model 3776-1... Limit Switches are intended for attachment to rotary actuators according to VDE/DIN 3845 and for integral attachment to Model 3277 Linear Actuators with concealed lever system. Depending on the version, they are equipped with various types of limit contacts and solenoid valves of low electrical power.

The Model 3776-1... Limit Switches are passive two-terminal networks that may be connected to all certified intrinsically safe circuits, provided the permissible maximum values of \( U_i \), \( I_i \) and \( P_i \) are not exceeded.

Electrical connection is made across plugs and sockets or cable entries.

The relation between temperature classification and the permissible maximum ambient temperature range is specified in the table below:

In the Model 3776-17 Limit Switches, the relation between temperature classification and the permissible maximum ambient temperature range is as follows:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Ambient Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-20 °C... +55 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-20 °C... +55 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-20 °C... +80 °C</td>
</tr>
</tbody>
</table>

Electrical data

Contact circuits: Type of protection: Intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit

Model 3776-11, Model 3776-12, Model 3776-14 with inductive two-wire sensor:

<table>
<thead>
<tr>
<th>Maximum values:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( U_i ) = 16 V</td>
</tr>
<tr>
<td>( I_i ) = 52 mA</td>
</tr>
<tr>
<td>( P_i ) = 169 mW</td>
</tr>
</tbody>
</table>

Effective internal capacitance: \( C_i = 80 \) nF
Effective internal inductance: \( L_i = 500 \) \( \mu \)H

Model 3776-17, with double inductive proximity switch:
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

(terminals 41/42, 45/46 and 51/52) \[ U_i = 15 \text{ V} \]
\[ I_i = 52 \text{ mA} \]
\[ P_i = 169 \text{ mW} \]

Effective internal capacitance: \[ C_i = 100 \text{ nF} \]
Effective internal inductance: \[ L_i = 100 \text{ } \mu\text{H} \]

Model 3776-15., Model 3776-16. with electric microswitch:
(terminals 41/42/43, 44/45/46 and 51/52/53) \[ U_i = 45 \text{ V} \]
\[ P_i = 2 \text{ W} \]

The effective internal capacitances and inductances are negligible.

Model 3776-1...1, Model 3776-1...2, Model 3776-1...3 with solenoid valve

Input circuit: Type of protection: Intrinsic safety EEx ia IIC
(terminals 81/82 only for connection to a certified intrinsically
and 83/84) safe circuit.

Maximum values:

<table>
<thead>
<tr>
<th>( U_i )</th>
<th>25 V</th>
<th>27 V</th>
<th>28 V</th>
<th>30 V</th>
<th>32 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_i )</td>
<td>150 mA</td>
<td>125 mA</td>
<td>115 mA</td>
<td>100 mA</td>
<td>90 mA</td>
</tr>
</tbody>
</table>

The effective internal capacitances and inductances are negligible.

(16) **Report PTB Ex 98-28049**

(17) **Sespcl conditions for safe use**

Not applicable

(18) **Essential Health and Safety Requirements**

In compliance with the Standards mentioned above.

Zertifizierungsstelle Explosionsschutz
By order

(Signature) (seal)

Dr. Ing. U. Johannsmeyer
TRANSLATION

ADDENDUM No.: 1

in compliance with Directive 94/9/EC Annex III Clause 6
to the EC Type Examination Certificate PTB 98 ATEX 2072

Equipment: Model 3776-1 Limit Switch

Marking: II 2G Ex ia IIC T6

Manufacturer: SAMSON AG Mess- und Regeltechnik

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

Description of the additions and modifications

In future the Model 3776-1 Limit Switch may be manufactured in compliance with the certification documents listed in the associated test report. The modification was made in view of Directive 94/9/EX Article 14.

The modifications related to the design and construction.

The electrical data are changed as follows:

The correlation between the equipment type, temperature classification, permissible ambient temperature ranges and maximum short-circuit currents is shown in the table below:

Types 3776-11; 3776-12, and 3776-14.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Maximum short-circuit current</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>45°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45°C . . . 60°C</td>
<td>52 mA</td>
</tr>
<tr>
<td>T4</td>
<td>80°C</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>65°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45°C . . . 80°C</td>
<td>25 mA</td>
</tr>
<tr>
<td>T4</td>
<td>100°C</td>
<td></td>
</tr>
</tbody>
</table>

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Addendum No.: 1 to the EC Type Examination Certificate PTB 98 ATEX 2072

Types 3776-17.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Maximum short-circuit current</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>55°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45°C … 70°C</td>
<td>52 mA</td>
</tr>
<tr>
<td>T4</td>
<td>85°C</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>70°C</td>
<td>25 mA</td>
</tr>
<tr>
<td>T5</td>
<td>-45°C … 80°C</td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>100°C</td>
<td></td>
</tr>
</tbody>
</table>

Electrical data

Contact circuit: Type of protection: Intrinsically safety EEx ia II C
only for connection to a certified intrinsically safe circuit

Types 3776-11.; 3776-12. and 3776-14. with inductive two-wire sensor:
(terminals 41/42, 45/46 and 51/52

Maximum values:

\[ U_i = 16 \text{ V} \]
\[ I_i = 52 \text{ mA} \]
\[ P_i = 169 \text{ mW} \]
\[ C_i = 50 \text{ nF} \]
\[ L_i = 250 \mu \text{H} \]

Types 3776-17. with inductive dual proximity switch:
(terminals 41/42 and 51/52

Maximum values:

\[ U_i = 15 \text{ V} \]
\[ I_i = 52 \text{ mA} \]
\[ P_i = 169 \text{ mW} \]
\[ C_i = 100 \text{ nF} \]
\[ L_i = 100 \mu \text{H} \]

Type 3776-1 . . . 1.; 3776-1 . . . 2. and 3776-1 . . . 3. with solenoid valve:

Input circuit: Type of protection: Intrinsically safety EEx ia II C
(terminals 81/82 and 83/84

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

The correlation between the version, temperature classification, permissible ambient temperature ranges and maximum power dissipation is shown in the table below:

<table>
<thead>
<tr>
<th>Version Un</th>
<th>6V</th>
<th>12V</th>
<th>24V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature class</td>
<td>T6</td>
<td>60°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>-45°C ... 70°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>80°C</td>
<td></td>
</tr>
<tr>
<td>Characteristic linear or rectangular</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
</tbody>
</table>

# The permissible power dissipation in the 6V version is 250 mW
## The maximum values for connection to a certified intrinsically safe circuit is shown in the table below:

<table>
<thead>
<tr>
<th>Ui</th>
<th>25V</th>
<th>27V</th>
<th>28V</th>
<th>30V</th>
<th>32V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li</td>
<td>150mA</td>
<td>125mA</td>
<td>115mA</td>
<td>100mA</td>
<td>85mA</td>
</tr>
<tr>
<td>Pi</td>
<td>no limitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All the other data apply without change also to this Addendum No. 1.

Test report: **PTB EX 01-21202**

Zertifizierungsstelle Explosionsschutz
Braunschweig, 09 August 2001

By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

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TRANSLATION
ADDENDUM N O.: 2

in compliance with Directive 94/9/EC Annex III Clause 6
to the EC Type Examination Certificate PTB 98 ATEX 2072

Equipment: Model 3776-1 Limit Switch

Marking: Ex II 2G EEx ia IIC T6

Manufacturer: SAMSON AG

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

Description of the additions and modifications

The Model 3776-1 Limit Switch is permitted to be manufactured and operated in future also in compliance with the documents specified in the test report.

The modification relate to the internal and external design.

The correlation between the equipment versions, temperature classification, permissible ambient temperature ranges and electrical data is shown in the table below

 Versions 3776-11, 3776-12, and 3776 14.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Ui</th>
<th>II</th>
<th>Pi</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>+45 °C</td>
<td>16 V</td>
<td>52 mA</td>
<td>169 mW</td>
</tr>
<tr>
<td>T5</td>
<td>-45 °C ... +60 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>+80 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>+65 °C</td>
<td>16 V</td>
<td>25 mA</td>
<td>64 mW</td>
</tr>
<tr>
<td>T5</td>
<td>-45 °C ... +80 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>+100 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

Version 3776-17

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Ui</th>
<th>Li</th>
<th>Pi</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>+55 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45 °C ... +70 °C</td>
<td>15 V</td>
<td>52 mA</td>
<td>169 mW</td>
</tr>
<tr>
<td>T4</td>
<td>+85 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>+70 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45 °C ... +80 °C</td>
<td>15 V</td>
<td>25 mA</td>
<td>64 mW</td>
</tr>
<tr>
<td>T4</td>
<td>+100 °C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The electrical data are modified as follows:

**Electrical data**
Contract circuit Type of protection: Intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit

**Versions 3773-11., 3776-12. and 3776-14.**

a) With inductive two-wire sensor:
(Terminals 41/42, 45/46 and 51/52)

<table>
<thead>
<tr>
<th></th>
<th>Ui</th>
<th>Li</th>
<th>Pi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 V</td>
<td>52 mA</td>
<td>169 mW</td>
</tr>
</tbody>
</table>

The correlation between sensor type and permissible maximum reactance is shown in the table below.

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>SC3.5...-N0...</th>
<th>SJ3.5-SN..</th>
<th>SJ3.5...-N..</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ci</td>
<td>150 nF</td>
<td>30 nF</td>
<td>50 nF</td>
</tr>
<tr>
<td>Li</td>
<td>150 µH</td>
<td>100 µH</td>
<td>250 µH</td>
</tr>
</tbody>
</table>

b) With inductive proximity sensor:
(Terminal 41/42, 45/46 and 51/52)

<table>
<thead>
<tr>
<th></th>
<th>Ui</th>
<th>Li</th>
<th>Pi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16 V</td>
<td>52 mA</td>
<td>169 mW</td>
</tr>
</tbody>
</table>

The correlation between sensor type and permissible maximum reactance is shown in the table below:

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>NJ2-V3-N..</th>
<th>NCN3-F24-N4..</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ci</td>
<td>40 nF</td>
<td>100 nF</td>
</tr>
<tr>
<td>Li</td>
<td>150 µH</td>
<td>100 µH</td>
</tr>
</tbody>
</table>

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Physikalisch Technische Bundesanstalt - Bundesallee 100 - D - 38116 Braunschweig

Ptb07Add-2.doc
All the other data apply without modification also to this Addendum No. 2.

Test report: PTB Ex 04-23528

Zertifizierungsstelle Explosionsschutz
By order

(Baahl)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

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Physikalisch-Technische Bundesanstalt - Bundesallee 100 - D - 38116 Braunschweig

Pb07Add-2.doc
ADDENDUM Nr. 3

In compliance with Directive 94/9/EC Annex III Clause 6
to the EC Type Examination Certificate PTB 03 ATEX 2072

Equipment: Model 3776-1. Limit Switch

Marking: Ex II 2 G Ex ia I I T 6

Manufacturer: SAMSON AG, Mess- und Regeltechnik

Address: Weismüllerstrasse 3, 60314 Frankfurt am Main, Germany

1. Description of the additions and modifications
This addendum covers the determination of the temperature classification of the Model 3776-1 and 3776-16. Limit Switches and the supplementation of the electrical data for organizational reasons. No further modifications were made.

Models 3776-15, 3776-16. with electrical microswitch

The interrelationship between temperature classifications and permissible ambient temperature ranges is shown in the table below:

<table>
<thead>
<tr>
<th>Temperatur class</th>
<th>Permissible ambient temperature ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>..... 60 °C</td>
</tr>
<tr>
<td>T5</td>
<td>- 45°C ..... 70 °C</td>
</tr>
<tr>
<td>T4</td>
<td>..... 80 °C</td>
</tr>
</tbody>
</table>

EC Type Examination Certificates without signature and seal are invalid. This EC Type Examination Certificate may be reproduced only without any changes. Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.
Electrical data

Signal circuit ...........................................  Maximum values:
(terminal 41/42/43,
44/45/46 and 51/52/53)

\[ U_i = 45 \, \text{V} \]
\[ P_i = 2 \, \text{W} \]
\[ G_i = \text{negligible} \]
\[ L_i = \text{negligible} \]

All the other data specified in the EC Type Examination Certificate apply without change also to this Amendment No. 3.

Test report: PTB Ex 06-26195

Zertifizierungsstelle Explosionsschutz Braunschweig, 25 August 2006

By order
(Signature) (Seal)
Dr. Ing. U. Johannsmeyer
Director and Professor
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

TRANSLATION

Statement of Conformity


(3) EC Type Examination Certificate Number

PTB 02 ATEX 2007 X

(4) Equipment: Model 3776-8 Limit Switch

(5) Manufacturer: SAMSON AG Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

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

(8) 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 Requirements 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 02-21203.

(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 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.

Statements of conformity without signature and seal are invalid.
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Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig
(12) The marking of the equipment shall include the following:

\[ \text{Ex} \quad \text{II 3 G} \quad \text{EEx nA II T6} \]

Zertifizierungsstelle Explosionsschutz
By order

(Signature) (Seal)

Dr. Ing. U. Johannismeyer
Regierungsdirektor

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Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

Pitz07Ex n.doc
Schedule

Statement of Conformity PTB 02 ATEX 2007 X

Description of Equipment

The Model 3776-8... Limit Switches are suitable for attachment to rotary actuators complying with VDE/DIN 3845 and for integral attachment to Model 3277 Linear Actuators with covered lever system. Dependent on the version, they are equipped with limit contacts of different design and with low-power solenoid valves.

The electrical connection is made by plug connectors or cable entries.

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

<table>
<thead>
<tr>
<th>Version</th>
<th>UN</th>
<th>6V</th>
<th>12V</th>
<th>24V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T6</td>
<td></td>
<td></td>
<td>60°C</td>
</tr>
<tr>
<td>Temperature class</td>
<td>T5</td>
<td></td>
<td>-45°C</td>
<td>. . .70°C</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td></td>
<td></td>
<td>80°C</td>
</tr>
</tbody>
</table>

Electrical data

Versions:

a.) With dual inductive proximity switch:  
Contact circuit  
(terminals 41/42, 51/52)  
Type of protection EEx nA II

b.) With inductive limit switch:  
Contact circuit  
(terminals 41/42, 45/46 and 51/52)  
Type of protection EEx nA II

c.) With electrical limit switch:  
Contact circuit  
(terminals 41/42/43, 44/45/46 and 51/52/53)  
Type of protection EEx nA II

d.) With solenoid valve module:  
Contact circuit  
(terminals 81/82, 83/84)  
Type of protection EEx nA II

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Schedule of the Statement of Conformity PTB 02 ATEX 2007 X

(16) Test report PTB Ex 02-21203

(17) Special conditions for safe use

The Model 3776-8 . . . Limit Switch shall be installed in an enclosure providing at least Degree of Protection IP 54 in compliance with the IEC Publication 60529:1989

The wiring shall be connected in such a manner that the connection facilities are not subjected to tensile and/or torsional stress.

(18) Basic health and safety requirements

Arc satisfied by compliance with the standard specified.

Zertifizierungsstelle Explosionsschutz Braunschweig, 07 März 2002

By order

(Signature) (seal)

Dr. Ing. U. Johannsmeyer
CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

3776-3abcde. Limit Switch
I S / I / 1 / ABCD / T5 Ta = 60°C - Addendum to EB 8368 EN, pages 1 - 5; Entity
I / O / AEx ia IIC / T5 Ta = 60°C - Addendum to EB 8368 EN, pages 1 - 5; Entity
NI / I / 2 / ABCD / T5 Ta = 60°C - Addendum to EB 8368 EN, pages 1-5; NIFW
Class I, Zone 2 / IIC / T5 Ta = 60°C - Addendum to EB 8368 EN, pages 1-5; NIFW

Inductive Pick-ups SC3.5,...-N0
Entity Parameters:
Vmax (Ui) = 16V, Imax (Ii) = 25mA, Pmax (Pi) = 64mW, Ci = 150nF, Li = 150μH
Vmax (Ui) = 16V, Imax (Ii) = 52mA, Pmax (Pi) = 169mW, Ci = 150nF, Li = 150μH

Nonincendive Field Wiring Parameters:
Vmax (Ui) = 16V, Imax (Ii) = 25mA, Pmax (Pi) = 64mW, Ci = 150nF, Li = 150μH
Vmax (Ui) = 16V, Imax (Ii) = 52mA, Pmax (Pi) = 169mW, Ci = 150nF, Li = 150μH

Inductive pick-ups SJ3.5-SN...
Entity Parameters:
Vmax (Ui) = 16V, Imax (Ii) = 25mA, Pmax (Pi) = 64mW, Ci = 30nF, Li = 100μH
Vmax (Ui) = 16V, Imax (Ii) = 52mA, Pmax (Pi) = 169mW, Ci = 30nF, Li = 100μH

Nonincendive Field Wiring Parameters:
Vmax (Ui) = 16V, Imax (Ii) = 25mA, Pmax (Pi) = 64mW, Ci = 30nF, Li = 100μH
Vmax (Ui) = 16V, Imax (Ii) = 52mA, Pmax (Pi) = 169mW, Ci = 30nF, Li = 100μH

Electric Microswitches
Entity Parameters/Nonincendive Field Wiring Parameters:
Vmax (Ui) = 45V, Imax (Ii) = 115mA, Pmax (Pi) = 2W, Ci = 0, Li = 0

Eip Binary converter
Entity Parameters/Nonincendive Field Wiring Parameters:
Vmax (Ui) = 28V, Imax (Ii) = 115mA, Pmax (Pi) = 250mW, Ci = 0, Li = 0

FM Approvals HLC 1/06
3026958
Page 1 of 3

EB 8368 EN  – 50 –
a = Contacts: 1 (Inductive pick-up type SC3.5...NO), 2 (Inductive pick-up type SJ3.5-SN), 3 (Electrical microswitch with silver contact) or 6 (Electrical microswitch with golden contact).
b = Quantity of contacts: 1, 2 or 3.
c = No ex-relevant characteristics.
d = Solenoid valve – nominal voltage: 1 (6VDC), 2 (12VDC) or 3 (24VDC).
e = Electrical connections: M20 x 1.5 (Polyamide) or M20 x 1.5 (Metal).

Special Condition of Use:
The equipment shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of ultimate application, including a tool removable cover.

Equipment Ratings:

Intrinsically Safe electrical apparatus with Entity requirements for use in Class I, Division 1, Groups A, B, C and D; Class I, Zone 0, IIIC when installed per Addendum to EB 8368 EN, pages 1 - 5; Nonincendive electrical apparatus with nonincendive field wiring for use in Class I, Division 2, Groups A, B, C and D; Class I, Zone 2, IIC indoor hazardous (classified) Locations.

FM Approved for:

Samson AG
D-60314 Frankfurt, Germany
This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600 1998
Class 3610 1999
Class 3611 2004
Class 3610 2005

Original Project ID: 3026956
Approval Granted: October 6, 2006

Subsequent Revision Reports / Date Approval Amended
Report Number Date Report Number Date

FM Approvals LLC

Roger L. Allard
Assistant Vice President

FM Approvals HLC 1/06 3026958
Page 3 of 3

October 6, 2006
Addendum

**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 for Intrinsically Safe Entity Parameters and Nonincendive Field Wiring Parameters**

<table>
<thead>
<tr>
<th>Circuit No.</th>
<th>Inductive pick-ups type SC3.5...-NO...</th>
<th>Inductive pick-ups type SJ3.5-SN...</th>
<th>Electric microswitches</th>
<th>E/P binary converter type 1079-27</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 / 2 / 3</td>
<td>1 / 2 / 3</td>
<td>4 / 5 / 6</td>
<td>7 / 8</td>
</tr>
<tr>
<td>Ui or Vmax</td>
<td>16 V</td>
<td>16 V</td>
<td>45 V</td>
<td>28 V</td>
</tr>
<tr>
<td>Ii or Imax</td>
<td>25 / 52 mA</td>
<td>25 / 52 mA</td>
<td>115 mA</td>
<td>115 mA</td>
</tr>
<tr>
<td>Pi or Pmax</td>
<td>64 / 169 mW</td>
<td>64 / 169 mW</td>
<td>2 W</td>
<td>** 250 mW</td>
</tr>
<tr>
<td>Ci</td>
<td>150 nF</td>
<td>30 nF</td>
<td>0 nF</td>
<td>0 nF</td>
</tr>
<tr>
<td>Li</td>
<td>150 μH</td>
<td>100 μH</td>
<td>0 μH</td>
<td>0 μH</td>
</tr>
</tbody>
</table>

** for e/p binary converter 6V version: Pi or Pmax ≤ 250 mW;
for e/p binary converter 12V and 24 V version: Pi or Pmax not limited

**Table 2: FM-approved barrier parameters of circuits 4 - 8**

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Supply barrier</th>
<th>Evaluation barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V_{OC}</td>
<td>R_{min}</td>
</tr>
<tr>
<td>*Circuits 7/8</td>
<td>≤ 28V</td>
<td>≥ 240Ω</td>
</tr>
<tr>
<td>**Circuits 7/8</td>
<td>≤ 28V</td>
<td>≥ 745Ω</td>
</tr>
<tr>
<td>Circuits 4/5/6</td>
<td>≤ 28V</td>
<td>≥ 98Ω</td>
</tr>
</tbody>
</table>

** for e/p binary converter 6V version: Pi or Pmax ≤ 250 mW;
* for e/p binary converter 12V and 24 V version: Pi or Pmax not limited

Revision Control Number 1

Addendum to EB 8368 EN
Table 3: The correlation between temperature classification and permissible ambient temperature ranges

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-45°C ... 60°C</td>
</tr>
<tr>
<td>T5</td>
<td>-45°C ... 70°C</td>
</tr>
<tr>
<td>T4</td>
<td>-45°C ... 80°C</td>
</tr>
</tbody>
</table>

Table 4: The correlation between temperature classification, permissible ambient temperature ranges and short-circuit current

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Short-circuit current</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-45°C ... 65°C</td>
<td>25mA</td>
</tr>
<tr>
<td>T5</td>
<td>-45°C ... 80°C</td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>-45°C ... 80°C</td>
<td>52mA</td>
</tr>
<tr>
<td>T6</td>
<td>-45°C ... 45°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-45°C ... 60°C</td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>-45°C ... 80°C</td>
<td></td>
</tr>
</tbody>
</table>

FM Approved for hazardous locations

Class I / Division 1/ Groups A, B, C, D
Class I / Zone 0 / AEx ia IIC T6

Notes:

1. The apparatus may be installed in intrinsically safe circuits only when used in conjunction with the FM approved apparatus. For maximum input values Ui or Vmax, li or Imax, Pi or Pmax, Ci and Li of the various apparatus see Table 1 on page 1.
2. For the interconnection of intrinsically safe and associated apparatus not specifically examined in combination as a system, the Entity Parameters must meet following requirements:
   
   \[
   V_{OC} \text{ or } U_0 \leq U_i \text{ or } V_{max} \\
   I_{SC} \text{ or } I_0 \leq I_i \text{ or } I_{max} \\
   P_0 \leq P_i \text{ or } P_{max} \\
   C_0 \text{ or } C_i \geq C_i + C_{Cable} \\
   L_0 \text{ or } L_0 \geq L_i + L_{Cable}
   \]

3. 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 on page 1.
4. Installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01.
5. Use only wires suitable for 5°C above surrounding temperature.

Revision Control Number 1

Addendum to EB 8368 EN
FM Approved for hazardous locations

Class I / Division 2 / Groups A, B, C, D
Class I / Zone 2 / IIIC

Notes:
1. For the maximum values of the individual circuits see Table 1 and 2
2. Installation must be in accordance with the National electrical code ANSI/NFPA 70.
3. Cable entry only rigid metal conduit according to drawing No. 1050-0351.
Nonincendive field wiring:

1. The apparatus may be installed in nonincendive field wiring circuits only in conjunction with FM-approved associated nonincendive field wiring apparatus. For the maximum input values of the nonincendive field wiring apparatus see Table 1 on page 1.

2. For the interconnection of nonincendive field wiring apparatus and associated nonincendive field wiring apparatus not specifically examined in combination as a system, the nonincendive field wiring parameters must meet the following requirements:
   
   \[
   \begin{align*}
   V_{DC} \text{ or } U_0 & \leq U_i \text{ or } U_{\text{max}} \\
   I_{EC} \text{ or } I_0 & \leq I_i \text{ or } I_{\text{max}} \\
   P_0 & \leq P_i \text{ or } P_{\text{max}} \\
   C_0 \text{ or } C_0 & \geq C_i + C_{\text{cable}} \\
   L_0 \text{ or } I_0 & \geq L_i + L_{\text{cable}}
   \end{align*}
   \]

3. Installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA 12.12.01.

Revision Control Number 1

Addendum to EB 8368 EN