Trimod Besta Level Switch type Z...5
for use in potentially explosive atmospheres acc. to IECEx scheme

Contents

1. Safety instructions
2. Conformity of standards
3. Technical data
4. Installation and initial start-up
5. Maintenance
6. Replacing the switch module
7. Fire protection
8. Disposal
9. Certificate

Legend

Information: Application hints and important information. To be followed for optimal function.

Attention: Requirements and prohibitions to prevent damages, especially to material and the environment.

Danger: Dangerous situation that can lead to injury and death if instructions are not followed.

1. Safety instructions

The operating manual must be read before installation; if you are uncertain on any point, please contact Besta AG.

The electrical connection may only be carried out by qualified personnel who have been authorised by the operator.

All attached cables and cable bushings must comply with the requirements of IEC 60079-0 Appendix A – explosion-proof cables and cable entries.

The supply voltage may only be applied after the cover has been closed.

Please ensure that you always observe the special regulations concerning work on explosion-proof devices and during work in potentially explosive atmospheres at the operator’s site.

Every Trimod Besta level switch must be selected by qualified, trained personnel in accordance with the specifications stipulated by the customer. These specifications must be kept by the operator in a safe place, together with the operating manual, the customer-specific designation and the type number (see type plate).

In the event of any deviation of the physical quantities (pressure, temperature, density, etc.) from the original specification, the suitability of the level switch must be checked again by qualified, trained personnel or by the manufacturer, with regard to the new specifications.

Process vessels / float chambers must be brought to atmospheric pressure before work is carried out and must be appropriately vented.

If the device is mounted in a partition wall, which separates zones from one another, and if category 1 or 2 equipment is necessary, an equipotential bond must be made (contact resistance ≤ MΩ) between the metal housing of the level switch and the wall of the container. The float and flange module must be included in the regular plant pressure tests.

The devices may, under no circumstances, be used as a support aid or as a security fixture for equipment structures or for persons.

2. Conformity of standards

Type Z...5 level switches conform with the requirements of

- IEC 60079-0 Electrical apparatus for explosive gas atmospheres - General requirements
- IEC 60079-1 Electrical apparatus for explosive gas atmospheres - Flameproof enclosures “d”
- IEC 60079-7 Electrical apparatus for explosive gas atmospheres - Increased safety “e”
- IEC 60079-26 Electrical apparatus for explosive gas atmospheres - Construction, test and marking of Group II Zone 0 electrical apparatus

Subject to technical modifications
3. Technical data

Explosion protection acc. IECEx: Zone 0/1 Ex ed IIC T6 resp. T5
IECEx Certificate of Conformity: IECEx PTB 07.0003

Supply voltage: max. 5A / 250 VAC 50/60 Hz - 0.25 A / 250 VDC
EMC according to EN 60947-5-2

Electrical connection
The electrical connection should be carried out in accordance with the regulations for explosion-proof devices.

Switching capacity

<table>
<thead>
<tr>
<th>with AC</th>
<th>Resistive load</th>
<th>Inductive load</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 V</td>
<td>5 A</td>
<td>5 A</td>
</tr>
<tr>
<td>30 V</td>
<td>5 A</td>
<td>5 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>with DC</th>
<th>Resistive load</th>
<th>Inductive load</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 V</td>
<td>0.25 A</td>
<td>0.03 A</td>
</tr>
<tr>
<td>125 V</td>
<td>0.5 A</td>
<td>0.06 A</td>
</tr>
<tr>
<td>75 V</td>
<td>1 A</td>
<td>1 A</td>
</tr>
<tr>
<td>30 V</td>
<td>5 A</td>
<td>5 A</td>
</tr>
</tbody>
</table>

Special conditions for safe use

Types without heat exchanger

Temperature at the micro switch $T_i$
Ambient temperature acc. to IEC 60079-0 $T_A$
Operating Temperature $T_0$

- ZK...5, ZKK...5, ZR...5, ZRR...5
- ZS...5, ZSS...5, ZRS...5

-20°C to 80°C
-20°C to 40°C
-30°C to 145°C

Types with heat exchanger for very high or low operating temperatures

Temperature at the micro switch $T_i$
Ambient temperature acc. to IEC 60079-0 $T_A$
Operating Temperature $T_0$

- ZHK...5, ZHKK...5, ZR...5, ZRR...5
- ZS...5, ZSS...5, ZRS...5

-20°C to 80°C
-20°C to 40°C
0°C to 380°C

- ZTDK...5, ZTDKK...5, ZR...5, ZRR...5
- ZS...5, ZSS...5, ZRS...5

-20°C to 80°C
-20°C to 40°C
-196°C to 270°C

In addition to the ambient temperature $T_A$ and the operating (medium) temperature $T_0$, the following data have an influence on the max. temperature data of the whole device.

Rated voltage: max. 250 V
Rated current $I_L$: max. 5 A, $\cos \varphi = 0.9$

Temperature class | Rated current $I_L$ | Temperature at the micro switch $T_i$ (max)
---|---|---
T6 | 5 A | 65°C
T6 | 4 A | 70°C
T5 | 5 A | 80°C
T5 | 3 A | 90°C

Subject to technical modifications
The rated cross-section of the conductor to be considered here must be at least 0.5 mm². Connection cables may not be bare for a distance of more than 3 mm from the terminal screw. Wire end ferrules must always be used.

4. **Installation and initial start-up**

During installation, the correct operating position must be observed.

For side mounting, observe the „Top” arrow on the type plate.

The float must be able to move freely over the whole range of movement and must not be restricted by the tanks walls or by fittings in the tank.

Installation positions that are subject to turbulence impair the function and should always be avoided.

**Process connection flange – Industrial range**

For switches in the industrial range with flanges according to DIN, ANSI, etc., the seals (¹) and connecting studs (¹) that are used must correspond to the industry standard for material, pressure class and type of seal and must be tightened to the corresponding tightening torques.

(¹) not a component of the supply

In case of uncertainty on any point, refer to the corresponding standard or consult the manufacturer.

**Process connection flange – Standard range**

For switches of the standard range PN 25 (360 psi), corresponding seals are supplied with the unit.

Minimum tightening torques and tightening sequence

<table>
<thead>
<tr>
<th>Flange</th>
<th>D</th>
<th>Seal</th>
<th>Stud Carbon steel</th>
<th>Stud Stainless steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 / 011</td>
<td>92 mm</td>
<td>Garlock Blue Gard 3000</td>
<td>18 Nm (²)</td>
<td>22 Nm (³)</td>
</tr>
</tbody>
</table>

(¹) Data refer to lubricated studs
(²) High / low temperature application (graphit gasket)

**Connecting**

1. Loosen the cover screws, remove the protective plug from the cable entry and fit the cable gland.
2. Insert the cable and connect the wires according to the connection diagram (see inside the housing cover and instructions). All terminal connections are self-opening.

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
<th>Conn. diagram</th>
<th>Type</th>
<th>Function</th>
<th>Conn. diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZK…</td>
<td>SPDT - change over</td>
<td>11 14 12</td>
<td>ZKK…</td>
<td>Dual SPDT - change over</td>
<td>11 14 22 21</td>
</tr>
<tr>
<td>ZR…</td>
<td>SPST - NC contact</td>
<td>11 12</td>
<td>ZRR…</td>
<td>Dual SPST - NC contact</td>
<td>11 12 22 21</td>
</tr>
<tr>
<td>ZS…</td>
<td>SPST - NO contact</td>
<td>11 14</td>
<td>ZSS…</td>
<td>Dual SPST - NO contact</td>
<td>11 14 24 21</td>
</tr>
<tr>
<td>ZRS…</td>
<td>Dual SPST - 1 x NC, 1 x NO</td>
<td>11 12 21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Connect the earth (inside the housing) and equipotential bonding (external, near to cable entry)

4. First close the cover and then apply the supply voltage!

5. Maintenance

Level switches must be periodically tested and cleaned, at least once annually.

Procedure:

1. Before opening the cover, disconnect the supply voltage; electrical shocks can be life threatening.
2. Process vessels/float chambers must be brought to atmospheric pressure before work is carried out and must be appropriately vented. If necessary, lower the fill level. If the switch is mounted in a chamber, close the corresponding shut-off valves, and depending on the requirement, empty or vent the chamber.
3. Loosen the flange connection and remove the level switch.
4. Check the float and mechanism for damage and contamination.
5. Remove deposits and metal particles by means of suitable and approved methods. Care must be taken to ensure that no mechanical damage occurs as a result of the cleaning.
6. In the case of floats with protective bellows, the bellows must be removed before cleaning and should be cleaned separately, both internally and externally.
7. Check the float and mechanism for complete deflection, as well as for smooth and unrestricted operation.
8. In the event that it becomes necessary to replace individual components, please note that only original spare parts, split pins, float, switch module, etc., may be installed.
9. After completion of the cleaning/inspection work, the switch module must be checked for correct function by means of an acoustic continuity tester or similar device with simultaneous deflection of the float, followed by recording in the inspection log book.
10. In order to guarantee the absence of leaks between process vessel/float chamber, the flange seal must be replaced after each dismantling.
11. After carrying out the inspection work, the device is re-fitted at the intended location.

6. Replacing the switch module

Defective switch elements must be replaced by new, works-tested units. In order that the complete type number can be stamped on the type plate, the complete number of the existing switch must be specified at the time of ordering. In the event that a complete number is given, only the module number will be stamped on the plate. This is insufficient for later traceability of the switch type and must therefore be supplemented in all cases by the customer.

Example

- Complete type number of the switch: ZK5 01 041
- Incomplete data of replacement switch module: ZK5
- Complete the type number with: 01 041 → ZK5 01 041

In the case of uncertainty on any point, please contact the local Trimod Besta agent or the manufacturer.
Replacing the switch module

The switch does not need to be removed from the tank on order to replace the switch module.

1. Please observe chapter 1 „Safety Instructions“.
2. Before opening the cover, disconnect the supply voltage; electrical shocks can be life-threatening.
3. Loosen 2 cover screws with screwdriver.
4. Check that terminals are not live.
5. Disconnect wires, including grounding and equipotential connection.
6. Loosen 2 Allan screws (Allan key 5 mm – 3/16”) on the side of the terminal block.
7. Unscrew switch module (together with intermediate temperature piece, for H… and T… types) from the flange module.
8. Make sure that the O-ring seals or flat gaskets fit properly.
9. Fit replacement module (together with intermediate temperature piece, for H… and T… types) and tighten 2 screws.
10. Re-connect wires including grounding- and equipotential bonding connection (see connection diagram inside cover and attached switch operating instruction).
11. Energize power supply only after the hinged cover has been closed.

Further information see operating instruction - Switch module replacement - LTIX2E

7. Fire protection

Trimod Besta level switches must be protected against external fires.

8. Disposal

Trimod Besta level switches are free of asbestos or otherwise hazardous materials. Disposal to be carried out according to environmental and local regulations.

9. Certificate

Certificate of conformity acc. to IECEx scheme see page 6.