Vibrating Level Switch

Intrinsic safety
IECEx PTB 17.0001 X
NAMUR
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Please note:
These safety instructions are part of the operating instructions:
- 30429 - OPTISWITCH 5100 - NAMUR
- 30434 - OPTISWITCH 5200 - NAMUR
- 50987 - Certificate of Conformity IECEx PTB 17.0001 X, Issue 00

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1 Area of applicability
These safety instructions apply to the vibrating level switches OPTISWITCH 5**0C VF1*.C******N/W* according to Certificate of Conformity IECEx PTB 17.0001 X, Issue 00 (certificate number on the type label) and to all instruments with the number of the safety instruction (50986) on the type label.

2 General information
The OPTISWITCH 5**0C VF1*.C******N/W* are used for monitoring and control of levels. The measured products can also be combustible liquids, gases, mist or vapour.

The OPTISWITCH 5**0C VF1*.C******N/W* are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring instruments of EPL Ga, EPL Ga/Gb or EPL Gb.

If the OPTISWITCH 5**0C VF1*.C******N/W* are installed and operated in hazardous areas, the general Ex installation regulations IEC 60079-14 as well as these safety instructions must be observed.

The operating instructions as well as the installation regulations or standards that apply for explosion protection of electrical systems must generally be observed.

The installation of explosion-endangered systems must always be carried out by qualified personnel.

EPL Ga instrument
The OPTISWITCH 5**0C VF1*.C******N/W* are installed in hazardous areas requiring a EPL Ga instrument.

EPL Ga/Gb instrument
The electronics housing is installed in hazardous areas requiring instruments of type EPL Gb. The process connection element is installed in the separating wall, which separates areas requiring instruments of type EPL Gb or EPL Ga. The antenna system with the mechanical fixing element is installed in hazardous areas requiring instruments of type EPL Ga.

EPL Gb instrument
The OPTISWITCH 5**0C VF1*.C******N/W* are installed in hazardous areas requiring a EPL Gb instrument.

Ignition protection label
Ex ia IIC T6 Ga, Ga/Gb, Gb

Important specification in the type code
OPTISWITCH 5**0 C VF1(*)abcdefghij

<table>
<thead>
<tr>
<th>Position</th>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ab - Approval</td>
<td>CI</td>
<td>IEC Ex ia IIC T6 Ga, Ga/Gb, Gb</td>
</tr>
<tr>
<td>cde - Process fitting / Material</td>
<td>**</td>
<td>Process fittings acc. to industry standard</td>
</tr>
<tr>
<td>f - Adapter / Process temperature</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
### Technical data

#### Electrical data

The OPTISWITCH 5**0C VF1*.C******N/W* have intrinsically safe circuits. These intrinsically safe circuits are connected to terminals which are located in an "Ex i" connection compartment.

#### Supply and signal circuit

<table>
<thead>
<tr>
<th>Terminals 1[+], 2[-]</th>
<th>In ignition protection type intrinsic safety Ex ia IIC/IIB Only for connection to a certified, intrinsically safe circuit. Maximum values:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• $U_i = 20$ V</td>
</tr>
<tr>
<td></td>
<td>• $I_i = 103$ mA</td>
</tr>
<tr>
<td></td>
<td>• $P_i = 516$ mW</td>
</tr>
<tr>
<td></td>
<td>• $L_i = $ negligibly small</td>
</tr>
</tbody>
</table>

In the version with fix mounted connection cable $L_i' = 55$ $\mu$H/m.

• $C_i = 2.2$ nF

In the version with fix mounted connection cable $C_{i \text{wire/wire}} = 58$ pF/m and $C_{i \text{wire/screen}} = 270$ pF/m must be also taken into account.

The intrinsically safe circuits are electrically separated from parts which can be grounded.

For applications requiring instruments of EPL Ga or EPL Ga/Gb, the intrinsically safe power supply and signal circuit can correspond to protection class ia or ib. For connection to a circuit of category ib, the ignition protection type identification is Ex ib IIC T6 Gb.
For applications requiring instruments of EPL Ga, the intrinsically safe power supply and signal circuit must be in conformity with category ia.

For applications requiring EPL Ga instruments the OPTISWITCH 5**0CVF1*.C******N/W* is preferably connected to appropriate instruments with electrically isolated, intrinsically safe circuits.

## 4 Application conditions

### Permissible ambient temperatures

**On the sensor, EPL Ga**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-20 ... +51 °C</td>
</tr>
<tr>
<td>T5, T4, T3, T2, T1</td>
<td>-20 ... +60 °C</td>
</tr>
</tbody>
</table>

**On the sensor, EPL Ga/Gb**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-20 ... +85 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-20 ... +100 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-20 ... +135 °C</td>
</tr>
<tr>
<td>T3 without temperature adapter</td>
<td>-20 ... +150 °C</td>
</tr>
<tr>
<td>T3 with temperature adapter</td>
<td>-20 ... +200 °C</td>
</tr>
<tr>
<td>T2, T1 with temperature adapter</td>
<td>-20 ... +250 °C</td>
</tr>
</tbody>
</table>

If the sensors of OPTISWITCH 5**0C VF1*.C******N/W* are operated at temperatures higher than those specified in the above table, please make sure by means of appropriate measures that there is no danger of ignition from hot surfaces. The temperature on the electronics/housing must not exceed the values specified in the above table.

Please make sure that the sensor (also in case of failure) does not generate heat itself. Responsibility for safe operation of the equipment, with respect to pressures/temperatures of the materials used, rests with the operator.

**On the sensor, EPL Gb**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 ... +85 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 ... +100 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 ... +135 °C</td>
</tr>
<tr>
<td>T3 without temperature adapter</td>
<td>-40 ... +150 °C</td>
</tr>
<tr>
<td>T3 with temperature adapter</td>
<td>-50 ... +200 °C</td>
</tr>
<tr>
<td>T2, T1 with temperature adapter</td>
<td>-50 ... +250 °C</td>
</tr>
</tbody>
</table>

If the sensors of OPTISWITCH 5**0C VF1*.C******N/W* are operated at temperatures higher than those specified in the above table, please make sure by means of appropriate measures that there is no danger of ignition from hot surfaces. The temperature on the electronics/housing must not exceed the values specified in the above table.

**On the electronics, EPL Ga**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-20 ... +51 °C</td>
</tr>
</tbody>
</table>
On the electronics, EPL Ga/Gb or EPL Gb

Temperature class

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Sensor Temperature on the electronics</th>
<th>Ambient temperature on the electronics</th>
<th>Process pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5, T4, T3, T2, T1</td>
<td>-20 ... +60 °C</td>
<td>-40 ... +90 °C</td>
<td>0 ... 6 bar</td>
</tr>
<tr>
<td>T6</td>
<td>-40 ... +67 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-40 ... +82 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4, T3, T2, T1</td>
<td>-40 ... +90 °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Permissible operating pressure in the area of the measuring probe

EPL Ga or EPL Ga/Gb

Under explosive atmosphere requiring instruments of EPL Ga: 0.8 ... 1.1 bar

EPL Gb

Operating pressure

Vacuum ... 64 bar (when applicable, take nominal pressure of the process connection element into account)

Information:

The application conditions mentioned before also apply to OPTISWITCH 52*0 C VF1*.C******N* with lock fitting ARV52.2** (P_max. 16 bar, T_max. 150 °C) and lock fitting ARV52.3** (P_max. 64 bar, T_max. 250 °C).

Permissible differing application conditions

The OPTISWITCH 5**0C VF1*.C******N/W* (also with lock fitting ARV52.2/3**) can also be operated as EPL Ga/Gb instrument according to the conditions mentioned below.

Note:

If the abovementioned application conditions in the area of the sensor are different when using OPTISWITCH 5**0C VF1*.C******N/W* as EPL Ga/Gb instrument, please make sure that the sensor does not heat up (even in case of malfunctions). It is the responsibility of the plant operator to make sure the pressure/temperature of the processed materials presents no danger.

The permissible pressures and temperatures for operation are mentioned in the operating instructions manuals.

5 Protection against static electricity

The OPTISWITCH 5**0C VF1*.C******N/W* (also with lock fitting in versions ARV52.2/3), with electrostatically chargeable plastic parts, such as e.g. plastic housing, metal housing with inspection window, with plastic coated sensors or distance tube, have a caution label pointing out the safety measures that must be taken with regard to electrostatic charges during operation.

Caution: Plastic parts! Danger of electrostatic charging!
• Avoid friction
• No dry cleaning

• Construction/Installation: The OPTISWITCH 5**0C VF1*.C******N/W* must be constructed/installed in such a way that
  – electrostatic charges are ruled out during operation, maintenance and cleaning.
  – process-related electrostatic charges, e.g. by measuring media flowing past, are ruled out

6 Installation/construction
The OPTISWITCH 52*0 C VF1*.C******N/W* must be mounted in a way that adequately ensures that the sensor tube will not oscillate, vibrate or bend due to the movements of other installations or the medium in the vessel.

7 Impact and friction sparks
The OPTISWITCH 5**0C VF1*.C******N/W* must be mounted in such a way that sparks from impact and friction between aluminium and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

8 Use of an overvoltage arrester
If necessary, a suitable overvoltage arrester can be connected in front of the OPTISWITCH 5**0C VF1*.C******N/W*.
When used as EPL Ga or EPL Ga/Gb instrument, as far as necessary analogue, a suitable overvoltage arrester must be connected in front as protection against voltage surges according to IEC 60079-14.

9 Material resistance
The OPTISWITCH 5**0C VF1*.C******N/W* must only be used in media against which the materials of the wetted parts are sufficiently resistant.
The min. fatigue strength of the vibrating element is $8.6 \times 10^{11}$ load changes with a max. amplitude of 7.5 $\mu$m. The lifetime is minimum 20 years.

10 Grounding
The OPTISWITCH 5**0C VF1*.C******N/W* must be grounded electrostatically (transfer resistance ≤ 1 M$\Omega$), e.g. via the internal or external ground terminal on the housing. The metallic parts of the OPTISWITCH 5**0C VF1*.C******N/W* are electrically connected with the internal or external ground terminal on the housing.
KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature assemblies
- Pressure transmitters
- Analysis products
- Products and systems for the oil and gas industry

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