OPTISWITCH 51*0, 52*0  Safety instructions

Vibrating Level Switch

Intrinsic safety
NAMUR
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Please note:
These safety instructions are part of the operating instructions:

- 30429 - OPTISWITCH 5100 - NAMUR
- 30434 - OPTISWITCH 5200 - NAMUR
- 50677 - EU type approval certificate PTB 02 ATEX 2117 X, Ausgabe 01

Editing status: 2017-01-23
<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE</td>
<td>Sicherheitshinweise für den Einsatz in explosionsgefährdeten Bereichen</td>
</tr>
<tr>
<td>EN</td>
<td>Safety instructions for the use in hazardous areas</td>
</tr>
<tr>
<td>FR</td>
<td>Consignes de sécurité pour une application en atmosphères explosibles</td>
</tr>
<tr>
<td>IT</td>
<td>Normative di sicurezza per l’impiego in luoghi con pericolo di esplosione</td>
</tr>
<tr>
<td>ES</td>
<td>Instrucciones de seguridad para el empleo en áreas con riesgo de explosión</td>
</tr>
<tr>
<td>PT</td>
<td>Normas de segurança para utilização em zonas sujeitas a explosão</td>
</tr>
<tr>
<td>NL</td>
<td>Veiligheidsaanwijzingen voor gebruik op plaatsen waar ontploffingsgevaar kan heersen</td>
</tr>
<tr>
<td>SV</td>
<td>Säkerhetsanvisningar för användning i explosionsfarliga områden</td>
</tr>
<tr>
<td>DA</td>
<td>Sikkerhedsforskrifter til anvendelse i explosionsfarlig atmosfære</td>
</tr>
<tr>
<td>FI</td>
<td>Turvallisuusohjeet räjähdyssvaarallisissa tiloissa käyttöä varten</td>
</tr>
<tr>
<td>EL</td>
<td>Υποδείξεις ασφαλείας για τη χρησιμοποίηση σε περιοχές που υπάρχει κίνδυνος έκρηξης</td>
</tr>
<tr>
<td>EN</td>
<td>The present safety instructions are available in German, English, French and Spanish. Further EU languages will be provided by the manufacturer upon request.</td>
</tr>
<tr>
<td>FR</td>
<td>Les présentes consignes de sécurité sont disponibles dans les langues allemand, anglais, français et espagnol. Le fabricant met d'autres langues de l'Union Européenne à disposition en fonction des demandes.</td>
</tr>
<tr>
<td>ES</td>
<td>Las presentes instrucciones de seguridad están disponibles en los idiomas alemán, inglés, francés y español. El fabricante pone a disposición según demanda otros idiomas nacionales de la UE.</td>
</tr>
</tbody>
</table>
1 Area of applicability

These safety instructions apply to the vibrating level switches OPTISWITCH 5**0 C VF1*.CX******N/W* according to EU type approval certificate PTB 02 ATEX 2117 X, issue 01 (certificate number on the type label) and for all instruments with the number of the safety instruction (50676) on the type label.

Subject of the evaluation of OPTISWITCH in the version with ignition protection type intrinsic safety "Ex i" are the types OPTISWITCH 5**0 C VF1*.CX******N/W*.

The versions OPTISWITCH 5**0 C VF1*.CX******N/W* with the features "CA" and "CM" on the type label are certified version with Ignition protection type intrinsic safety or ignition protection type intrinsic safety also with a ship certificate/overfill protection.

Feature "CX" in the type code: Certificate intrinsic safety Ex ia
Feature "CA" in the type code: Certificate intrinsic safety but also overfill protection
Feature "CM" in the type code: Certificate intrinsic safety but also ship certificate

The ship certificate and the certification as overfill protection are not subject of the assessment and evaluation acc. to the EU Type approval certificate PTB 02 ATEX 2117 X, issue 01.

2 General information

The OPTISWITCH 5**0 C VF1*.CX******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**0 C VF1*.CX******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 category 1G, category 1/2G or category 2G.

If the OPTISWITCH 5**0 C VF1*.CX******N/W* are installed and operated in hazardous areas, the general Ex installation regulations EN 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.

Category 1G instrument (EPL Ga instrument)
The OPTISWITCH 5**0 C VF1*.CX******N/W* are installed in hazardous areas requiring an instrument of category 1G.

Category 1/2G instrument (EPL Ga/Gb instrument)
The electronics housing is installed in hazardous areas requiring an instrument of category 2G. The process connection element is installed in the separating wall, which separates areas requiring instruments of category 2G or 1G. The antenna system with the mechanical fixing element is installed in hazardous areas requiring instruments of category 1G.

Category 2G instrument (EPL Gb instrument)
The OPTISWITCH 5**0 C VF1*.CX******N/W* are installed in hazardous areas requiring an instrument of category 2G.

Ignition protection label
II 1G, II 1/2G, II 2G Ex ia IIC T6 Ga, Ga/Gb, Gb

Important specification in the type code
OPTISWITCH 5**0 C VF1(*)abcdefghij
### 3 Technical data

**Electrical data**
The OPTISWITCH 5**0 C VF1*.CX*****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

Terminals 1[+], 2[-]

In ignition protection type intrinsic safety Ex ia IIC/IIB

Only for connection to a certified, intrinsically safe circuit.

Maximum values:

- \( U_i = 20 \text{ V} \)
- \( I_i = 103 \text{ mA} \)
- \( P_i = 516 \text{ mW} \)
- \( L_i = \) negligibly small

In the version with fix mounted connection cable \( L_i' = 55 \text{ } \mu\text{H/m} \).

- \( C_i = 2.2 \text{ nF} \)

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

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

For applications requiring instruments of category 2G or 1/2G, 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 category 1G, the intrinsically safe power supply and signal circuit must be in conformity with category ia.

For applications requiring instruments of category 1G the OPTISWITCH 5**0 C VF1*.CX*****N/W* is preferably connected to appropriate instruments with electrically isolated, intrinsically safe circuits.

### 4 Application conditions

Permissible ambient temperatures

**On the sensor, category 1G**

<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, category 1/2G**

<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**0 C VF1*.CX*****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, category 2G

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Temperature range</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**0 C VF1*.CX******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, category 1G

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Temperature range</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 electronics, category 1/2G or 2G

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 ... +67 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 ... +82 °C</td>
</tr>
<tr>
<td>T4, T3, T2, T1</td>
<td>-40 ... +90 °C</td>
</tr>
</tbody>
</table>

### Permissible operating pressure in the area of the measuring probe

**Category 1G or 1/2G**

Under explosive atmosphere requiring instruments of category 1G: 0.8 ... 1.1 bar

**Kategorie 2G**

<table>
<thead>
<tr>
<th>Operating pressure</th>
<th>Pressure range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum</td>
<td>... 64 bar</td>
</tr>
</tbody>
</table>

*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**0 C VF1*.CX******N/W* (also with lock fitting ARV52.2/3**) can also be operated as category 1/2G instrument according to the conditions mentioned below.
### Temperature class

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

#### Note:
If the abovementioned application conditions in the area of the sensor are different when using OPTISWITCH 5**0 C VF1*.CX*****N/W* as category 1/2G 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.

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### 5 Protection against static electricity

The OPTISWITCH 5**0 C VF1*.CX*****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.

**WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD - SEE INSTRUCTIONS**

Caution: Plastic parts! Danger of electrostatic charging!

- Avoid friction
- No dry cleaning

- **Construction/Installation:** The OPTISWITCH 5**0 C VF1*.CX*****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**0 C VF1*.CX*****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**0 C VF1*.CX*****N/W*.

When used as category 1G or 1/2G instrument, as far as necessary analogue, a suitable overvoltage arrester must be connected in front as protection against voltage surges according to EN 60079-14 chapter 12.3.
9  **Material resistance**

The OPTISWITCH 5**0 C VF1*.CX******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**0 C VF1*.CX******N/W* must be grounded electrostatically (transfer resistance $\leq 1$ M$\Omega$), e.g. via the internal or external ground terminal on the housing. The metallic parts of the OPTISWITCH 5**0 C VF1*.CX******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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