Vibrating Level Switch

Flameproof enclosures
PTB 11 ATEX 1044 X
Transistor (NPN/PNP)
Contactless electronic switch, Relay (DPDT)
Two-wire, NAMUR
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Supplementary documentation:
• Operating Instructions OPTISWITCH 3100C, 3300C
• EU-type approval certificate PTB 11 ATEX 1044 X, Issue 01 (Document ID: 53849)

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<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>
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<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>
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<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>
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</tbody>
</table>
1 Area of applicability
These safety instructions apply to the vibrating level switches OPTISWITCH 3*00C.L***C/R/T/Z/NA** with integrated electronics module WE60C/R/T/Z/N according to EU type approval certificate PTB 11 ATEX 1044 X, Issue 01 (certificate number on the type label) and for all instruments with the number of the safety instruction (53848) on the type label.

2 General information
The OPTISWITCH 3*00C.L***C/R/T/Z/NA** are used for level measurement in hazardous areas. The measured products can also be combustible liquids, gases, mist or vapour.
The OPTISWITCH 3*00C.L***C/R/T/Z/NA** are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring instruments of category 1/2G or category 2G.
If the OPTISWITCH 3*00C.L***C/R/T/Z/NA** 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 1/2G instruments
The electronics housing is installed in hazardous areas requiring instruments 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 instruments
The OPTISWITCH 3*00C.L***C/R/T/Z/NA** are installed in hazardous areas requiring an instrument of category 2G.
Tested according to the following applied standards:
EN 60079-0: 2012 + A11: 2013
EN 60079-1: 2014
EN 60079-26: 2015

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

Important specification in the type code
OPTISWITCH 3100C/3300C abcdefghij

<table>
<thead>
<tr>
<th>Position</th>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td>ab</td>
<td>Approval</td>
<td>LX ATEX II 1/2G, 2G Ex db IIC T1 ... T6 Ga/Gb, Gb</td>
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<tr>
<td></td>
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<td>LK ATEX II 1/2G, 2G Ex db IIC T6 + ATEX II 1D, 1/2D, 2D Ex</td>
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<tr>
<td>Position</td>
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<td>c</td>
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<td>i</td>
<td>Cable entry / Cable gland / Plug connection</td>
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<tr>
<td>j</td>
<td>Additional equipment</td>
<td>X</td>
</tr>
</tbody>
</table>

3 Technical data

**Electrical data**

**OPTISWITCH 3*00.C.L***CA* with integrated electronics module WE60C (electronics C)**

Voltage supply: (terminals 1, 2)  
U = 20 … 253 V AC, 50/60 Hz or U = 20 … 253 V DC, max. 1 W  
\[ U_m = 253 \text{ V AC} \]

Output  
Contactless electronic switch

Domestic current requirement  
< 5 mA (via load circuit)

Load current  
- Min. 10 mA  
- Max. 400 mA

**OPTISWITCH 3*00.C.L***RA* with integrated electronics module WE60R (electronics R)**

Voltage supply: (terminals 1, 2)  
20 … 253 V AC, 50/60 Hz  
U = 20 … 72 V DC  
\[ U_m = 253 \text{ V AC} \]

Max. power consumption  
1 … 8 VA, 1.6 W
Relay circuit

- Contact set 1: (terminals 3, 4, 5)  
  Maximum values  
  $253 \text{ V AC}, 3 \text{ A}, 500 \text{ VA}$
- Contact set 2: (terminals 6, 7, 8)  
  $253 \text{ V DC}, 1 \text{ A}, 41 \text{ W}$

**OPTISWITCH 3*00C.L***TA* with integrated electronics module WE60T (electronics T)**

Voltage supply: (terminals 1, 4)  
$10 \ldots 55 \text{ V DC}$  
$U_m = 253 \text{ V AC}$
Max. power consumption  
$0.5 \text{ W}$
Max. load current, floating transistor output: (terminals 2, 3)  
$400 \text{ mA}, 55 \text{ V DC}$

**OPTISWITCH 3*00C.L***ZA* with integrated electronics module WE60Z (electronics Z)**

Power supply and signal circuit: (terminals 1[+], 2[-])  
$U_i = 12 \ldots 36 \text{ V DC}$  
$U_m = 253 \text{ V}$

**OPTISWITCH 3*00C.L***NA* with integrated electronics module WE60N (electronics N)**

Power supply and signal circuit: (terminals 1[+], 2[-])  
$U_i = 4 \ldots 12.5 \text{ V DC}$  
$U_m = 253 \text{ V}$

### 4 Application conditions

The max. permissible ambient temperatures depending on the temperature classes are specified in the following tables.

<table>
<thead>
<tr>
<th>Category 1/2G instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature class</strong></td>
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<tr>
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<tr>
<td>T4</td>
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<tr>
<td>T3</td>
</tr>
<tr>
<td>T2, T1</td>
</tr>
</tbody>
</table>

When the sensor of OPTISWITCH 3100C and 3300C is operated in hazardous atmospheres of zone 0, there is no danger of ignition if it is operated under non-atmospheric pressures from vacuum to 16 bar and temperatures according to the temperature classes T6 ... T1.

<table>
<thead>
<tr>
<th>Category 2G instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature class</strong></td>
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<tr>
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<tr>
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<tr>
<td>T6</td>
</tr>
<tr>
<td>T5</td>
</tr>
</tbody>
</table>
### Temperature class

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature on the electronics</th>
<th>Permissible ambient temperature on the sensor without temperature adapter</th>
<th>Permissible ambient temperature on the sensor with temperature adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>T4</td>
<td>-40 ... +80 °C</td>
<td>-50 ... +135 °C</td>
<td>-50 ... +135 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 ... +80 °C</td>
<td>-50 ... +150 °C</td>
<td>-50 ... +200 °C</td>
</tr>
<tr>
<td>T2, T1</td>
<td>-40 ... +80 °C</td>
<td>-50 ... +150 °C</td>
<td>-50 ... +250 °C</td>
</tr>
</tbody>
</table>

The permissible operating temperatures and pressures are mentioned in the respective manufacturer instructions.

### Permissible process pressure on the sensor

#### Category 1/2G instruments
If OPTISWITCH 3100C and 3300C are used as category 1/2G instruments, pressures on the sensor from vacuum to 16 bar are permissible according to the temperature classes T6 ... T1.

There is no danger of ignition if the sensor used in hazardous atmospheres of Zone 0 is operated under non-atmospheric pressures and temperatures.

#### Category 1/2G instruments
If OPTISWITCH 3100C and 3300C are used as category 1/2G instruments pressures from -1 bis 16 bar according to temperature classes T6 ... T1 are permitted also in the version with lock fitting (ARV-VB63.2*, ARV-VB63.2B* and ARV-WE63.2*).

#### Category 2G instruments
If VEGAWAVE 61 and 63 are used as category 2G instrument, pressures on the sensor from vacuum to 16 bar are permissible.

The permissible operating temperatures and pressures are mentioned in the respective manufacturer instructions.

### 5 Protection against static electricity

The OPTISWITCH 3*00C.L***C/R/T/Z/NA** in versions 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 3*00C.L***C/R/T/Z/NA** 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 Impact and friction sparks

When used as category 1/2G instruments, the OPTISWITCH 3*00C.L***C/R/T/Z/NA** aluminium versions 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.

7 Potential equalisation
The OPTISWITCH 300C.L***C/R/T/Z/NA** have to be connected to the local potential equalisation, e.g. via the external or internal earth terminal on the housing.

8 Installation
The OPTISWITCH 300C.L***C/R/T/Z/NA** have to be mounted such that they are effectively protected against oscillating and vibrating due to the influence of other vessel installations and the flow conditions. This applies especially to distance tube lengths over 3 m.

9 Material resistance
The OPTISWITCH 300C.L***C/R/T/Z/NA** 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 $8.8 \times 10^{11}$ load changes with a max. amplitude of 222 $\mu$m. The lifetime is minimum 20 years.

10 Locking mechanism of housing cover
With single-chamber housing versions, the lid must be screwed in to the stop and secured with the locking device before setup and use of OPTISWITCH 300C.L***C/R/T/Z/NA** in hazardous atmospheres. It must be secured by unscrewing the cover locking screw to the stop.

Single chamber housing

11 Ignition protection type flameproof enclosure Ex "d"
The terminals for connecting the operating voltage or signal circuits are integrated in the terminal compartment with ignition protection type flameproof enclosure "d". The thread gap between housing and cover is a flameproof gap.
The gap must not be damaged.
No repairs may be carried out on the flame-proof gap.

The "Ex-d" connection compartment is provided with a M20 x 1.5 or \( \frac{1}{2} \)-14 NPT thread for connecting to a certified "Conduit" system or for mounting an "Ex-d" cable entry certified according to EN 60079-1. Cable entries of simple construction may not be used. Please take note of section 13.1 and 13.2 of EN 60079-1. When connecting to a "Conduit" system, the associated sealing facility must be located directly on the "Ex-d" connection compartment.

A certified "Ex-d" cable gland can optionally be supplied with the delivery. It is suitable for insertion of armoured or unarmoured cables depending on the ordered version. The instructions in the document accompanying the respective cable entry must be observed. The "Ex-d" cable entry must be screwed tightly into the housing. The supplied cable entry is suitable for the housing temperature range mentioned in the OPTISWITCH 3100C.L***C/R/T/Z/NA** specification. If a different cable entry is used, the separately certified cable entry or the temperature classes on the electronics determines the maximum permissible ambient temperature on the housing.

Before opening the lid of the "Ex-d" terminal compartment or in case it is already open (e.g. during connection or service work), make sure that either the supply cable is completely voltage free or no explosive atmosphere is present.

When wiring the connection line to the "Ex-d" terminal compartment, it must be sufficiently secured against damage and in conformity with EN 60079-14.

The cover of the "Ex-d" connection compartment must be screwed in completely before commissioning and secured by screwing out the lid locking screw all the way to the stop.

Unused openings must be covered according to EN 60079-1 section 11.9. For this purpose, the supplied sealing plug marked 1/2-14 NPT 2.3069 can be used.

If the temperature at the inlet components exceeds 70 °C, temperature-resistant connection cables must be used.

The connection cables of OPTISWITCH 3100C.L***C/R/T/Z/NA** must be connected in a housing meeting the requirements of the accepted ignition protection type according to EN 60079-0, section 1, if the connection is located in the hazardous area.

### 12 Type and size of the threads for the "Ex-d" cable entries

The "Ex-d" connection compartment of OPTISWITCH 3100C.L***C/R/T/Z/NAM* has cable entries M20 x 1.5.

The "Ex-d" connection compartment of OPTISWITCH 3100C.L***C/R/T/Z/NAN* has cable entries \( \frac{1}{2} \)-14 NPT.
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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