Vibrating Level Switch

Flameproof enclosures
IECEEx DEK 16.0070 X
Contactless electronic switch
Relay (DPDT)
Transistor (NPN/PNP)
Two-wire
NAMUR
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**Please note:**

These safety instructions are part of the operating instructions:

- **OPTISWITCH 5100 C, 5150 C**
  - 30428 - Contactless electrical switch
  - 30426 - Relay (DPDT)
  - 30427 - Transistor (NPN/PNP)
  - 30430 - Two-wire
  - 30429 - NAMUR

- **OPTISWITCH 5200 C, 5250 C**
  - 30433 - Contactless electrical switch
  - 30431 - Relay (DPDT)
  - 30432 - Transistor (NPN/PNP)
  - 30435 - Two-wire
  - 30434 - NAMUR

- 50847 - Certificate of Conformity IECEx DEK 16.0070 X

Editing status: 2017-01-30
1 Area of applicability
These safety instructions apply to the vibrating level switches OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* according to Certificate of Conformity IECEx DEK 16.0070 X, Issue 1 (certificate number on the type label) and to all instruments with the number of the safety instruction (50846) on the type label.

2 General information
The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* are used for level measurement in hazardous areas.

The measured products can also be combustible liquids, gases, mist or vapour.

The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* are suitable for use in hazardous atmospheres of all combustible materials of explosion group IIA, IIB and IIC for applications requiring instruments of type EPL-Ga/Gb.

If the OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* 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/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.

Tested according to the following applied standards:
IEC 60079-0: 2011 (Ed. 6)
IEC 60079-1: 2014 (Ed. 7)
IEC 60079-26: 2014 (Ed. 3)

Ignition protection label
Ex db IIC T6 ... T2 Ga/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>DI</td>
<td>IEC Ex db IIC T6 Ga/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>
<tr>
<td>g - Housing / Protection / Cable gland</td>
<td>M</td>
<td>Aluminium single chamber / IP66/IP67 / M20x1,5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Special colour Aluminium single chamber / IP66/IP67 / M20x1,5</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>Aluminium single chamber / IP66/IP67 / ½NPT</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Special colour Aluminium single chamber / IP66/IP67 / ½NPT</td>
</tr>
</tbody>
</table>

OPTISWITCH 51*0 C, 52*0 C
3 Technical data

Electrical data

**OPTISWITCH 5**0 C VF1*.D******Z** (electronics Z)

Connection voltage: (terminals 1[+], 2[-]) 12 ... 36 V DC
Signal current 1.8 ... 16 mA

**OPTISWITCH 5**0 C VF1*.D******C** (electronics C)

Connection voltage: (terminals 1[+], 2[-]) 20 ... 253 V AC/DC
Max. consumer current 400 mA continuing (maximum ambient temperature is 60 °C with I > 300 mA)

**OPTISWITCH 5**0 C VF1*.D******R** (electronics R)

Connection voltage: (terminals 1[+], 2[-]) 20 ... 72 V DC, 20 ... 253 V AC
Relay outputs: (terminals 3, 4, 5, terminals 6, 7, 8), switching capacity
AC max. 253 V, 3 A, 750 VA
DC max. 253 V, 1 A, 54 W

**OPTISWITCH 5**0 C VF1*.D******T/V** (electronics T)

Connection voltage: (terminals 1[+], 4[-]) 10 ... 55 V DC
Signal output: transistor output (terminals DC max. 55 V, 400 mA 2[+], 3[-])

**OPTISWITCH 5**0 C VF1*.D******N/W** (electronics N)

Connection voltage: Signal current (terminals 1[+], 2[-]) NAMUR switch amplifier according to IEC 60947-5-6

The metallic parts of the level switches are electrically connected with the internal and the external earth terminals.
4 Application conditions

Permissible ambient temperatures

If the application requires EPL-Ga/Gb instruments:

Caution:
The process temperature shall not bring the enclosure of the electronics compartment above the permitted (see table below) ambient temperature range.

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Process temperature</th>
<th>Ambient temperature on the housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 ... +78 °C</td>
<td>-40 ... +70 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 ... +93 °C</td>
<td>-40 ... +70 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 ... +128 °C</td>
<td>-40 ... +70 °C</td>
</tr>
<tr>
<td>T3, T2, T1</td>
<td>-40 ... +150 °C (without temperature adapter)</td>
<td>-40 ... +40 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 ... +193 °C (with temperature adapter)</td>
<td>-40 ... +70 °C</td>
</tr>
<tr>
<td>T2, T1</td>
<td>-40 ... +250 °C (with temperature adapter)</td>
<td>-40 ... +70 °C</td>
</tr>
</tbody>
</table>

Fig. 1: Ambient temperature - Process temperature

1 Process temperature in °C (°F)
2 Ambient temperature in °C (°F)
3 Temperature range with temperature adapter

Permissible operating pressure on the sensor

If the application requires zone 0/1 (Ga/Gb) instruments: 0.8 ... 1.1 bar
If the application requires zone 1 (Gb) instruments: Vacuum ... 64 bar
The permissible operating temperatures and pressures (depending on the instrument version) are stated in the operating instructions manual.

5 Protection against static electricity

The OPTISWITCH 51*0 C VF1*.D********, 52*0 C VF1*.D******** in versions with electrostatically chargeable parts, such as e.g. plastic coated or enamelled parts, 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
**Warning!**

- **Danger of electrostatic charging!**
  - Housing: paint
  - Sensor: Plastic parts (e.g. ECTFE, PFA), coating with enamel
- Avoid friction
- No dry cleaning

- **Construction/Installation:** The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* 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**

The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* 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  **Connection conditions**

The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* must be connected via suitable cable gland or conduit systems that are in conformity with the requirements of IEC 60079-1 paragr. 13.1 and 13.2 and provided with a separate type approval certificate.

Cable entries (Pg threaded fittings) as well as plugs of simple construction must not be used. When connecting the OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* via a conduit specially approved for this purpose, the appropriate sealing facility must be placed directly on the housing.

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

The connection cable of OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* must be installed in such a way that it is sufficiently protected against damage. It must be installed according to IEC 60079-14.

The "Ex-d" connection housing is provided with a ½-14 NPT thread or a M20 x 1.5 thread for connection to a "Conduit" system or for installation of an "Ex-d" cable gland with IEC certificate according to IEC 60079-1.

A certified "Ex-d" cable gland is included with the delivery. The document accompanying the respective cable gland must be heeded. The "Ex-d" cable gland must be screwed tightly into the housing. The supplied cable gland is suitable for the housing temperature range mentioned in the OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* specification. If a different cable gland is used, the separately certified cable gland or the temperature classes of the electronics determines the maximum permissible ambient temperature on the housing.

8  **Potential equalisation**

The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* have to be connected to the potential equalisation, for example via the external earth terminal on the housing.

Make sure that you connect a ground cable. For external grounding, use M5 Crimp connections (> 4 mm²) with spring, lock washer and clamp bracket to avoid loosening and turning.

The ground cable (AWG12) should be dismantled at the end over a length of 10 mm and fastened to the M5 Crimp connection (with a suitable Crimp tool).
9 Mechanical fixing

VEGASWING 63.D must be mounted in such a way that it is effectively secured against oscillation.

10 Material resistance

The OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* 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.

11 Ignition protection type flameproof enclosure Ex "d"

The terminals for connecting to the operating voltage, i.e. signal circuits, are integrated in a compartment according to protection type flameproof enclosure "d".

The gaps between housing and cover as well as between threaded fitting and container are ignition-proof gaps.

The flameproof joints are not intended to be repaired.

The joint surfaces are not coated with paint or are not powder coated.

The "Ex-d" connection compartment is provided with a M20 x 1.5 or ½-14 NPT thread for connection to a certified "Conduit" system or for mounting a "Ex-d" cable entry certified according to IEC 60079-1. Cable entries of simple construction may not be used. Please take note of section 13.1 and 13.2 of IEC 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 51*0 C VF1*.D*********, 52*0 C VF1*.D********* specification. If a different cable entry is used (suitable Ex d certified cable glands and blind plugs should be used), the separately certified cable entry (e.g. cable gland or cover elements) or the temperature classes on the electronics determines the maximum permissible ambient temperature range -40 ... +70 °C on the housing.

With ambient temperatures > 60 °C, cables with a temperature resistance of at least 92 °C should be used.

The factory-installed screw plug or blind plug (depending on the type ordered) is part of the "Ex-d" housing. If a screw plug type other than the factory-installed screw plug or the one with article number 2.30690 is used, it must be suitable for the function and certified according to IEC 60079-1.

Before opening the lid of a "Ex-d" 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" connection compartment, it must be sufficiently secured against damage and in conformity with IEC 60079-14.

The connection cables, the cable entries and the closing screws or the pipeline sealing facilities must be suitable for the lowest ambient temperature.

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 sealed according to IEC 60079-1 paragraph 11.9.

The cover of the "Ex-d" connection compartment is provided with the warning label "Do not open when an explosive gas atmosphere is present".
12 Removing and replacing the red threaded/dust cover

The red thread or/dust covers screwed in when the instrument is shipped (depending on the version) must be removed before setup. The openings must be closed before setup by a way approved for the flame proofing. Approved and suitable cable glands or blind plugs must be installed according to the supplied documents.

Before setting up OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* you have to check if all other openings are closed in a way approved for the ignition protection.

1 Red thread or dust cover must be removed before setup. The opening must be closed before setup by a way approved for the flame proofing.
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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