**OPTISWITCH 51*0 C, 52*0 C**

Safety instructions

Vibrating Level Switch

Flameproof enclosures
KEMA 02 ATEX 2110 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
- 50845 - EU type approval certificate KEMA 02 ATEX 2110 X

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<table>
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<th>Sprache</th>
<th>Übersetzung</th>
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<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>
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<td>ES</td>
<td>Instrucciones de seguridad para el empleo en áreas con riesgo de explosión</td>
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<td>PT</td>
<td>Normas de segurança para utilização em zonas sujeitas a explosão</td>
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<td>NL</td>
<td>Veiligheidsaanwijzingen voor gebruik op plaatsen waar ontplofingsgevaar kan heersen</td>
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<td>SV</td>
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<td>EL</td>
<td>Υποδείξεις ασφαλείας για τη χρησιμοποίηση σε περιοχές που υπάρχει κίνδυνος έκρηξης</td>
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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>
</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 51*0 C VF1*.D*********, 52*0 C VF1*.D********* according to EU type approval certificate KEMA 01 ATEX 2110 X, issue 4 (certificate number on the type label) and for all instruments with the number of the safety instruction (50844) on the type label.

Subject of the evaluation of OPTISWITCH 51*0 C_.D** in the version with ignition protection type flameproof enclosure "Ex db" are the types OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D*********.

The versions OPTISWITCH 51*0 C VF1*.D*********, 52*0 C VF1*.D********* with the features "DA" and "DM" on the type label are certified version with ignition protection type flameproof enclosure also with a ship certificate/overfill protection.

Feature "DX" in the type code: Certificate ignition protection type flameproof enclosure Ex db
Feature "DA" in the type code: Certificate ignition protection type flameproof enclosure but also overfill protection
Feature "DM" in the type code: Certificate ignition protection type flameproof enclosure 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 KEMA 01 ATEX 2110 X, issue 4.

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 category 1/2G.

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 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.

Tested according to the following applied standards:
EN 60079-0: 2012 + A11: 2013
EN 60079-1: 2014
EN 60079-26: 2015

Ignition protection label
I/2G Ex db IIIC T6 ... T2 Ga/Gb
**Important specification in the type code**

**OPTISWITCH 5**0C VF1*.abcdefghij

<table>
<thead>
<tr>
<th>Position</th>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ab - Approval</td>
<td>DX</td>
<td>ATEX II 1/2G Ex db IIC T6 Ga/Gb</td>
</tr>
<tr>
<td></td>
<td>DM</td>
<td>ATEX II 1/2G Ex db IIC T6 Ga/Gb + ship approval</td>
</tr>
<tr>
<td></td>
<td>DA</td>
<td>ATEX II 1/2G Ex db IIC T6 Ga/Gb + overfill protection (WRA)</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>
<tr>
<td>h - Electronics</td>
<td>C</td>
<td>Contactless electronic switch 20 … 250 V AC/DC</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Relay (DPDT) 20 … 72 V DC/20 … 250 V AC (3A)</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Transistor (NPN/PNP) 10 … 55 V DC</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>Transistor (NPN/PNP) 10 … 55 V DC (250 ms)</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>Two-wire (8/16 mA) 12 … 36 V DC</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>NAMUR signal</td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>NAMUR signal (250 ms)</td>
</tr>
<tr>
<td>i - Switching point</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>j - Measurement loop identification label</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### 3 Technical data

**Electrical data**

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

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

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

- Connection voltage: (terminals 1[+], 2[-]) 20 … 72 V DC, 20 … 253 V AC
  (Maximum ambient temperature of 50 °C with U > 60 V)
- 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 temperature

For use as category 1/2G instrument

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 … +50 °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 instruments of category 1/2G: 0.8 … 1.1 bar
If the application requires instruments of category 2G: Vacuum … 64 bar

The process fittings correspond to the international standards and industry standards.
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!**

- 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 pres-
ence 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 EN 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 EN 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 EN 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 ATEX certificate
according to EN 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 deter-
mines 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 × 10\(^{11}\) load changes with a max. amplitude of 7.5 µm. 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 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 by 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 EN 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" terminal compartment, it must be sufficiently secured
against damage and in conformity with EN 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 EN 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".

**Single chamber housing with "Ex-d" connection compartment**

1. Thread protection
2. Locking screw of the lid
3. Screw plug
4. Marking of the thread
5. "Ex-d" connection compartment with electronics module
6. External ground terminal

**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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