Protection – ATEX
Explosion Protection Catalogue | Version 05

K.A. Schmersal GmbH
Industrielle Sicherheitsschaltsysteme
Möddinghofe 30
D-42279 Wuppertal
Postfach 24 02 63
D-42232 Wuppertal
Telefon +49 (0)2 02 64 74 - 0
Telefax +49 (0)2 02 64 74 - 1 00
E-Mail info@schmersal.com
Internet www.schmersal.com

Elan Schaltelemente GmbH & Co. KG
Im Ostpark 2
D-35435 Wettenberg
Postfach 11 09
D-35429 Wettenberg
Telefon +49 (0)641 9848-0
Telefax +49 (0)641 9848-420
E-Mail info-elan@schmersal.com
Internet www.elan.de

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
The direct way

If you need further information or you want personal advice, you can call us as well:

+49 (0) 20 74 74-0

The addresses of our representations in Germany and abroad can be found on the front pages of this catalogue.

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The basics of explosion protection

The implementation of the ATEX Directives (ATEX: ATmosphères EXplosibles) in Europe has changed the way of thinking with regard to the explosion protection. The manufacturers must follow the directive 94/4/EC to fulfill the harmonised standards in Europe. The directive is obligatory in all Member States and transposed into national law. This was carried out until 2003. On the other side the users have to fulfill the directive 1999/92/EC regarding the basic safety and health requirements for operation. Both Directives are based upon the standards listed in the Official Journal (OJ) of the European Commission. Not only the gas explosive protection is now standardised, but also the protection for dust atmospheres. In a few countries, e.g. in Germany, explosion protection regulations existed already at national level, however not harmonised.

Due to the internationalisation and the standardisation on EN basis, the standards defining the requirements on equipment to be used in explosive atmospheres will gradually be replaced by the European Standards series EN 60079. Hybrid mixtures from gas and dust are included in the standardisation work as well. The mechanical explosion protection required by the ATEX Directives however still is in its “infancy”.

The comprehensive product portfolio from Schmersal and Elan Schaltelemente complies with the requirements of the standards and directives. Our existing products and our innovations are consistently developed and refined on the basis of the current standards as well as the amendments, which are in the transitional stage. In this way, both the standard requirements and safety technology are integrated in the potentially explosive areas.

Sources of ignition

<table>
<thead>
<tr>
<th>Source of ignition</th>
<th>Examples of the cause</th>
</tr>
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<tr>
<td>Sparks</td>
<td>Mechanically generated sparks (e.g. by friction, stroke or cutting removal operations), electric sparks</td>
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<td>Electric arcs/flashovers</td>
<td>Short-circuit, switching operations</td>
</tr>
<tr>
<td>Hot surfaces</td>
<td>Current in electrical installations, heaters and radiators, machining, heating during operation</td>
</tr>
<tr>
<td>Flames and hot gases</td>
<td>By combustion reactions, spark projection during welding</td>
</tr>
<tr>
<td>Electrical installations</td>
<td>Even extra-low voltages (U &lt; 50 V) still can generate sufficient energy to ignite an explosive atmosphere. Opening/closing of contacts, loose or defective contacts</td>
</tr>
<tr>
<td>Static electricity</td>
<td>Separately arranged conductive parts, many plastics</td>
</tr>
<tr>
<td>Equalizing currents</td>
<td>Reverse current from generators, earth connection in case of faults, induction</td>
</tr>
<tr>
<td>Electromagnetic waves in the 3 x 10^11 ... 3 x 10^15 Hz range</td>
<td>Laser beam for range finding, especially in case of beam focusing</td>
</tr>
<tr>
<td>High frequency 10^11 ... 3 x 10^12 Hz</td>
<td>Radio signals, industrial high-frequency generators for heating, drying, cutting, etc.</td>
</tr>
<tr>
<td>Lightning</td>
<td>Atmospheric disturbances</td>
</tr>
<tr>
<td>Ionizing radiation</td>
<td>X-ray device, radioactive substances, energy absorption leads to heating</td>
</tr>
<tr>
<td>Ultrasonic</td>
<td>Energy absorption in solid/liquid substances leads to heating</td>
</tr>
<tr>
<td>Adiabatic compression and shock waves</td>
<td>Strokewise opening of valves</td>
</tr>
<tr>
<td>Exothermal reactions</td>
<td>Chemical reaction</td>
</tr>
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</table>
The basic physics and technical principles

Combustion or burning is a complex sequence of exothermic chemical reactions. A fire starts when a flammable and/or combustible material with an adequate supply of oxygen is exothermically disintegrated. Depending on the speed of combustion, we speak of deflagration, explosion or detonation. A complete combustion causes significant damages, which vary with the combustion speed.

Order of magnitude of the speed of combustion
- Deflagration: cm/s
- Explosion: m/s
- Detonation: km/s

Explosion
An explosion can only occur when three factors come together: flammable material in ignitable quantities, oxygen and an ignition source. If one component is missing, no exothermic reaction will occur.

Oxygen
When a flammable substance is mixed with oxygen, a potentially explosive mixture is created.

For gases, the concentration ratio determines whether an explosion is possible. The mixture can only be ignited if the concentration of the substance in air is within the lower and upper explosive limits. Mixtures with concentrations smaller or greater than these limits will not explode. A few chemically unstable substances (e.g., acetylene, ethylene oxide) have self-decomposing properties and therefore can also produce exothermal reactions without oxygen. In these cases, the upper explosion limit (UEL) is 100 vol. %. For pressurised gases, the explosion ranges change. Dusts are also classified by a lower explosion limit (approx. at 20...60 g/m³) and an upper explosion limit (approx. at 2...6 kg/m³).

Potentially explosive substance
Any flammable substance in the form of gas, mist, vapour or dust is considered as potentially explosive substance. For mists and dusts, a potentially explosive atmosphere occurs when the drop or the particle size is smaller than 1 mm. Frequently-used mists, aerosols and dusts have a particle size between 0.001 mm and 0.1 mm. Dusts with larger particle sizes are not combustible.

Deposits of dust can be compared to porous elements and have hollow portions of up to 90%. The increase of temperature of dust deposits can cause the spontaneous ignition of the dust-like flammable substance. If a deposit of dust with small particle size is swirled up, the dust, along with the oxygen in the air, forms a combustible dust/air mix. The bigger the size reduction, the higher the explosion danger, since the surface of the hollow space increases. Dust explosions are often the consequence of smouldering dust layers which become stirred up and already carry the ignition initiation. The potential danger of explosive dust atmospheres and the selection of the appropriate safety measures are evaluated by means of the safety characteristics of the substances concerned. To this end, dusts are classified in accordance with two of their substance-specific properties:

- Conductivity
  Dusts are considered to be conductive when they have a specific electric resistance of up to 10³ ohmmeters.
- Combustibility
  Combustible dusts are characterised by the fact that they can burn or smoulder when mixed with air and that they form explosive mixtures along with oxygen under atmospheric pressure and at temperatures ranging from –20°C to +60°C.

The safety characteristics of swirled up dusts are for instance the minimum ignition energy and the ignition temperature, whereas for deposits of dust the smouldering temperature is a characteristic feature.
The basics of explosion protection

Classification of zones and selection of equipment
Setting-up installations in potentially explosive areas involves a great deal of precautions to be taken. For instance, the equipment, the resources, the cables and conductors as well as the construction have to meet special requirements. In case of doubt, the consultation of experts during the planning is recommended.

Risk assessment
It is the responsibility and duty of the user to perform a risk analysis prior to installing new facilities. He must verify where there is a risk of explosion and then divide areas into zones accordingly. Every plant must be examined for its particularities. If nonetheless an explosion would be caused, the possible hazard scenario must be taken into consideration in the forefront. Can chain reaction occur, are damages to the building to be expected and which are the impacts of the explosion of subsequent plant components and parts? Potential interactions with adjacent plants can occur, which cannot be produced on the individual plant.

The risk analysis requires a great deal of experience as well as a correct assessment. In case of doubt, consulting experts on this matter is highly recommended, considering that the risk analysis builds the basis of all further measures to be taken before the installation can be put into operation.

Analysis of the explosion protection risk
The user of a machine or installation has to perform an accurate analysis according to the standards EN 60079-10, EN 60079-14 and EN 1127-1. On the basis of this analysis, he has to classify the areas in which explosive atmospheres may be present into zones. These observations must be documented.

Documentation of the explosion protection
The documentation is essential to ensure a safe operation of the installation in the potentially explosive area. It is drawn up prior to the set-up and must always be kept up-to-date. In case of changes to the installation, all the described influences data must be taken into account.

Example of an explosion protection document
Object responsible
Called by name in the documentation
Description of the structural/constructional and geographic conditions
Layout plan, building map, plant ventilation system
Description of the procedure, description of the plant with regard to explosion protection
Substance characteristics, list of all data including explosion-relevant parameters
Risk analysis, refer to checklist below
Protection concept, zone classification, explosion protection types used
Organisational measures
Instructions, prescriptions in written, work authorisations
Classification of the potentially explosive areas into zones

To determine the necessary protective measures to be taken and to select appropriate equipment, the potentially explosive areas have to be classified into zones. This classification of the potentially explosive areas into zones is based upon the frequency and the duration of the presence of the dangerous explosive atmosphere.

These framework conditions (frequency, duration) determine the classification and identification of gas explosion risk areas as zone 0, 1 or 2 as well as the required measures to be taken in order to avoid active sources of ignition. Dust explosion risk areas are accordingly classified as zone 20, 21 or 22.

The EN 60079-10 standard can provide help in the classification of gas explosion risk areas into zones. The zone definition is included in all common documentation, i.e. in the ATEX Directive 1999/92/EC as well.

Zone 0 is an area, in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapor or mist is present continuously or for long periods or frequently.

- Example: areas surrounding zone 0 or 1, specific storage plants
- Example: areas surrounding zone 0 or 1, specific storage plants

Zone 20 is an area, in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously or for long periods or frequently.

- Example: these conditions are usually found only inside containers, pipes, apparatus (e.g. mills and grinders, dryers, mixers, feed pipes, silos etc).

Zone 21 is an area, in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur occasionally in normal operation.

- Example: also areas in the vicinity of inlets or work stations where dust is poured into containers, as well as areas where there are dust deposits and where a combustible dust/air mixture could form in the course of normal operation.

Zone 22 is an area, in which an explosive atmosphere in the form of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

- Example: this could also include areas in the vicinity of devices containing dust, protection systems or components from which dust leaks and forms deposits (e.g. milling/grinding facilities, from which dust leaks and forms layers)

Dust Ex: selection according to the smouldering temperature and the ignition temperature

When selecting electrical apparatus for use in dust explosion risk areas, the smouldering temperature of the deposited dust and the ignition temperature of the potentially explosive dust/air mixture must be known, regardless of the zone. The smouldering temperature is the lowest temperature of a hot surface on which a dust deposit of a defined thickness is ignited.

The ignition temperature of a dust cloud is the lowest temperature of a heated wall of an oven that ignites the dust/air mixture upon brief contact.

Combustible dusts are not divided into temperature classes like gases. The maximum surface temperature must be mentioned on the electrical equipment.

The table below summarizes the explosion parameters (ignition temperature, smouldering temperature and minimum ignition energy) of a few dusts.

Please note that for flammable substances a collective name, e.g. mill dust, designates different kinds of that product, each of them with diverging safety characteristics and parameters.

Wheat flour for instance has other parameters than rye flour.

The specific parameters of the dust, which is permanent in each dust explosive area, must be determined. When the parameters of collective names are used, miscalculations can occur.

<table>
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<tr>
<th>Substance</th>
<th>Ignition temperature $T_i$ [°C]</th>
<th>Smouldering temperature $T_s$ [°C]</th>
<th>Minimum energy $\varnothing E_{\text{min}}$ [mJ]</th>
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<tbody>
<tr>
<td>Flour</td>
<td>$\geq 380$</td>
<td>$\geq 300$</td>
<td>$\geq 100$</td>
</tr>
<tr>
<td>Wood</td>
<td>$\geq 410$</td>
<td>$\geq 200$</td>
<td>$\geq 5$</td>
</tr>
<tr>
<td>Brown coal</td>
<td>$\geq 380$</td>
<td>$\geq 225$</td>
<td>–</td>
</tr>
<tr>
<td>Coal</td>
<td>$\geq 500$</td>
<td>$\geq 240$</td>
<td>$\geq 1000$</td>
</tr>
<tr>
<td>PVC</td>
<td>$\geq 530$</td>
<td>$\geq 340$</td>
<td>$\geq 5$</td>
</tr>
<tr>
<td>Aluminium</td>
<td>$\geq 560$</td>
<td>$\geq 270$</td>
<td>$\geq 5$</td>
</tr>
<tr>
<td>Sulphur</td>
<td>$\geq 240$</td>
<td>$\geq 250$</td>
<td>10</td>
</tr>
</tbody>
</table>
The basics of explosion protection

Types of protection

General overview

Essential requirements

The EN 60079-0 describes the essential requirements, which apply to all types of explosion protection.

Mechanical protection

Mechanical tests are carried out in accordance with EN 60079-0. The enclosures or the exterior part of the enclosure, pushbuttons must withstand high impact energy.

Type of protection “n” EN 60079-15

The type of protection “n” originally was used as stand-alone standard for use in ATEX category 3G respectively was defined as zone 2 standard in IECEx. This standard has been designed for normal operation. The fault analysis, which is performed for the other types of protection, is not executed, considering that the explosive atmosphere and the ignition spark are very unlikely to occur simultaneously in zone 2; in other words: electrical apparatus cannot ignite an explosive atmosphere surrounding them in normal operation and under defined abnormal operating conditions. Meanwhile, the EN 60079-15 has been rewritten, so that the essential requirements are now described in the EN 60079-0. This reflects for instance in the following way: The type of protection Ex nL has been replaced with the Ex ic type of protection relative to intrinsic safety. The sub-group is transferred from the EN 60079-15 into the EN 60079-11. This leads to changes, which could require a more accurate analysis.

Temperature classes for gases (EN 60079-0):

| Classification of the maximum surface temperature into classes for electrical apparatus belonging to Equipment Group II |
|---|---|---|---|---|---|
| T1 | T2 | T2 | T4 | T5 | T6 |
| 450°C | 300°C | 200°C | 135°C | 100°C | 85°C |

Ignition protection type and the main characteristics

Ignition protection type Basic principle, main application

Oil immersion „o“ The source of ignition is permanently immersed in oil. Application: switchgear and transformers

Pressurized enclosures „p“ The formation of a potentially explosive atmosphere inside an enclosure is prevented by maintaining a positive internal pressure of protective gas in relation to the surrounding atmosphere. Application: machinery, commutation motors, control cabinets, monitors, keyboards, analysers

Powder filling „q“ A fine granular packing material surrounds the ignition source, thus making it impossible for an electric arc created in the enclosure under certain operating conditions to ignite a potentially explosive atmosphere surrounding the enclosure. Application: capacitors, condensers, electronic ballast, sensors

Flameproof enclosures „d“ Parts which can ignite a potentially explosive atmosphere are surrounded by an enclosure which withstands the pressure of an explosive mixture exploding inside the enclosure and prevents the transmission of the explosion to the atmosphere surrounding the enclosure. Application: switchgear, spark-generating parts, power engineering, heavy-current engineering

Increased safety „e“ Additional measures are applied to increase the level of safety, thus preventing the possibility of excessive temperatures and the occurrence of sparks or electric arcs within the enclosure or on exposed parts of electrical apparatus, where such ignition sources would not occur in normal service. Application: terminal and connection boxes (engines)

Encapsulation „m“ Parts that are capable of igniting an explosive atmosphere by either sparking or heating are enclosed in a compound in such way as to avoid ignition of an explosive atmosphere. Application: sensors, variable speed drives

Intrinsic safety „i“ An electric circuit is intrinsically safe if no sparks or thermal effects produced under specified test conditions are not capable of causing ignition of a given explosive atmosphere. Application: measurement and control technology

Intrinsically safe systems „i-SYST“ The entirety of interlinked and interconnected electrical apparatus, documented by a system description. Circuits used completely or partly inside hazardous areas are intrinsic safe.
Intrinsic safety
Principle
The type of protection "intrinsic safety" Ex i is based on the principle of limitation of current, voltage and storable energy within an electric circuit. Intrinsic safety does not reduce the potentially explosive substance and/or the oxidizing agent.

The ignition of an explosive mixture is avoided, when neither electric sparks nor the effect of heat can occur. The electrical energy is limited in order to keep electrical sparks below the ignition limit.

The energy limitation avoids the excessive heating of the electrical apparatus and its surfaces. This also applies to the sensors integrated in the intrinsically safe electrical circuits. Electrical energy can be stored in capacities (condensers) or inductivities (coils) within the intrinsically safe electrical circuit.

Zener diodes, which are used for limiting voltage, become conductive as of a specific voltage. The increased voltage is conducted through the zener diode, i.e. the electrical circuit in the EX zone has limited voltage. A series-wired resistance limits the current in the potentially explosive area.

\[ I_{\text{max}} = I_o = \frac{U_o}{R} \]

With the limitation of voltage and current, the maximum power is

\[ P_o = U_o^2 / 4R \]

The authorised maximum values are taken from the ignition limit curves, defined in the EN 60079-11 standard. For the gas groups I, IIA, IIB and IIC, there are four ignition limit curves. The classification is done according to the ignition energy.

The ignition limit curves have been calculated by means of a spark tester, as described in the EN 60079-11 standard.

Subdivision of the type of protection „n“ Ex n in Europe

<table>
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<th>Symbol</th>
<th>Meaning</th>
<th>Comparable with</th>
<th>Method</th>
<th>Subdivision</th>
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<tr>
<td>A</td>
<td>Non-sparking</td>
<td>Ex e</td>
<td>Occurrence of electric arcs, sparks or hot surfaces is minimised</td>
<td>None</td>
</tr>
<tr>
<td>C</td>
<td>Sparking apparatus</td>
<td>Partially Ex d, Ex m</td>
<td>Enclosed switching device, non-explosive components hermetically closed, sealed or encapsulated devices</td>
<td>IIA, IIB, IIC</td>
</tr>
<tr>
<td>R</td>
<td>Vapour-tight enclosure</td>
<td>–</td>
<td>Penetration of explosive gases is reduced</td>
<td>None</td>
</tr>
<tr>
<td>L*</td>
<td>Energy limitation</td>
<td>Ex i</td>
<td>Energy limitation, so that neither sparks nor thermal effects can produce an ignition</td>
<td>IIA, IIB, IIC</td>
</tr>
<tr>
<td>P</td>
<td>Simplified pressurized enclosure</td>
<td>Ex p</td>
<td>Penetration of explosive gases is avoided by overpressure. The monitoring unit will not switch-off</td>
<td>None</td>
</tr>
</tbody>
</table>

*different in North-America and Europe
The basics of explosion protection

Electrical apparatus and associated apparatus

An intrinsically safe electric circuit contains at least one electrical apparatus and one associated apparatus.

The electric circuits of the electrical apparatus meet the requirements of the intrinsic safety. The electrical apparatus must only be connected to non-intrinsically safe circuits through associated apparatus. An associated apparatus possesses both intrinsically safe and non-intrinsically safe circuits. To separate the electric circuits, a zener diode or galvanic isolators are used. The EN 60079-11 describes this separation calls as a “safety barrier”.

Intrinsically safe electrical apparatus and intrinsically safe components from associated equipment are classified in different levels of protection “ia”, “ib” and “ic” according to EN 60079-11. This classification is included as of the 5th edition of the IEC Ex version.

The “ia” category basically offers the highest level of protection, “ib” a higher level of protection and “ic” a high level of protection.

The category “ia” or “ib” determines whether the protective circuit offers a single fault safety or a double fault safety. For protection level “ic”, no fault analysis is performed.

Here the safety for normal operation is sufficient. Therefore, the standard EN 60079-14, chapter 12.3 recommends galvanic isolation for intrinsically safe circuits in zone 0, category “ia”. For intrinsic safety, a fault analysis is performed to exclude explosion risks. However, no statement whatsoever is made with regard to the operational safety. This means that a functional total breakdown is, for the explosion protection standpoint, allowed.

The electrical apparatus may be used in zone 0 in accordance with the category. The associated apparatus are installed in the safe area, only the intrinsically safe electric circuits are installed in the potentially explosive area in accordance with the category.

Basically it is possible to apply further protection measures. So that the associated apparatus can be installed in zone 2 or even in zone 1.

Design of intrinsically safe electric circuits

Design of intrinsically safe electric circuits (typical values)

<table>
<thead>
<tr>
<th>Resistance (back/forth)</th>
<th>0.5 mm²</th>
<th>72 Ohm/km</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.75 mm²</td>
<td>48 Ohm/km</td>
</tr>
<tr>
<td></td>
<td>1.5 mm²</td>
<td>24 Ohm/km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>180-200 nF/km</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Inductivity</th>
<th>0.8-1 mH/km</th>
</tr>
</thead>
</table>

Simple electrical apparatus – intrinsic safety

<table>
<thead>
<tr>
<th>Type</th>
<th>Condition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive components</td>
<td>None</td>
<td>Switches, terminal/junction boxes (modular enclosures), resistance, simple semi-conductor components</td>
</tr>
<tr>
<td>Energy storage</td>
<td>Values must be observed during calculation</td>
<td>Capacitors, coils</td>
</tr>
<tr>
<td>Energy source</td>
<td>≤ 1.5 V</td>
<td>Thermocouple</td>
</tr>
<tr>
<td></td>
<td>≤ 100 mA</td>
<td>Photocell</td>
</tr>
<tr>
<td></td>
<td>≤ 25 mW</td>
<td></td>
</tr>
</tbody>
</table>
In the control cabinet, the intrinsically safe electric circuits must be clearly marked. The standard prescribes no uniform procedure and only points out that for the marking preferably a light blue colour should be used. However, the neutral conductors of energy cables are usually also marked with a blue colour. In order to avoid confusion, another marking should be used for the intrinsically safe electric circuits in this case. What is important, is a conveniently arranged layout and a spatial separation in the control cabinet.

Conductive shields must only be earthed at places located outside the potentially explosive atmosphere.

Cables for zones 0, 1 and 2
The cables must be laid in such manner that they are protected against mechanical damages, corrosion, chemical and thermal influences. This is an obligatory requirement for the type of protection “intrinsic safety”. The accumulation of potentially explosive atmospheres must be prevented in shafts, pits, ducts, conduits and trenches. The propagation of flammable gases, vapours, liquids or combustible dusts through shafts, pits, ducts, conduits and trenches must be prevented as well.

If possible, cables and conductors must be laid without interruption in the potentially explosive area. If this is impossible, the connection of cables must be realised in an junction box with the appropriate explosion protection type for that zone. If deviation of this stipulation is required for installation reasons, the requirements of the EN 60079-14 standard must be observed.

Conductive shields must only be earthed at places located outside the potentially explosive atmosphere.

Appropriate cables must be selected for intrinsically safe electric circuits. Furthermore, the following conditions apply to intrinsically safe electric circuits, also when they are installed outside of the potentially explosive area:

- Protection against the ingress of external energy.
- Protection against external electric or magnetic fields.

Possible cause: overhead highvoltage line or 1-phase highvoltage lines.

- The conductors of intrinsically safe and non-intrinsically safe electric circuits must not be laid in the same conduit.
- In case of armoured, metal sheathed or shielded cables, intrinsically safe and non-intrinsically safe electric circuits can be laid in the same conduit.

In the control cabinet, the intrinsically safe electric circuits must be clearly marked. The standard prescribes no uniform procedure and only points out that for the marking preferably a light blue colour should be used. However, the neutral conductors of energy cables are usually also marked with a blue colour. In order to avoid confusion, another marking should be used for the intrinsically safe electric circuits in this case. What is important, is a conveniently arranged layout and a spatial separation in the control cabinet.

Conductive shields must only be earthed at places located outside the potentially explosive atmosphere.

Selection criteria for cables for the type of protection “intrinsic safety”

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Condition</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated cables</td>
<td>Test voltage ≥ 500 VAC</td>
<td>Cable ground, cable shield and shield ground</td>
</tr>
<tr>
<td>Diameter of the individual conductors</td>
<td>≥ 0,1 mm</td>
<td>Also for flexible conductors</td>
</tr>
<tr>
<td>Flexible conductors</td>
<td>To be protected against splicing</td>
<td>e.g. by using conductor ferrules</td>
</tr>
<tr>
<td>Multi-wire cables</td>
<td>Acceptable</td>
<td>The requirements for the error analysis to EN 60079-14 must be observed</td>
</tr>
<tr>
<td>Parameters</td>
<td>(Cc and Lc) or (Cc and Lc/Rc)</td>
<td>In case of doubt: worst case</td>
</tr>
</tbody>
</table>
The basics of explosion protection

Mechanical explosion protection

The general requirements can be summarised as follows:

• The equipment must meet all stipulated application requirements (e.g. rough operation, humidity effects, ambient temperature and pressure fluctuations, influence of chemical agents, corrosion, vibrations) (refer to the operating instructions);

• Determination and evaluation of the ignition hazards – Apparatus interior (heating due to failure capable of causing ignition inside the device) – Dust deposits (friction between moving parts) – Evaluation of the surface temperature according to the category

• Documentation of the ignition hazard analysis

• Determine the maximum surface temperature for internal and external surfaces (for category 1 maximum 80 % of T1 ... T6)

• Prevention of mechanically generated sparks by friction, stroke and grinding processes (aluminium, magnesium, titan and zirconium portion in alloys and coatings to be limited in accordance with the category); All conductive parts must be grounded and protected against sparks produced by static electricity; disruptive discharge voltage of non-conductive layers on metallic surfaces smaller than 4 kV; surface resistance smaller than $10^9$ Ohm

• Further detailed requirements depending on the equipment category and possible sources of ignition.

The maximum authorised mass portions for the material used for external parts in case an ignition hazard is present due to friction, stroke or friction sparks according to the ignition hazard evaluation, amount to:

• Category M1/M2: not more than 15% aluminium, magnesium, titan and zirconium in total as well as not more than 6% magnesium, titan and zirconium in total

• Category 1: not more than 10 % aluminium, magnesium, titan and zirconium in total as well as not more than 7.5 % magnesium, titan and zirconium in total

• Category 2: not more than 7.5 % magnesium, titan and zirconium in total

• Category 3: no special requirements.

EN 13463-1, clause 5.2 “Evaluation of the ignition hazard” requires an assessment of the ignition hazards as well as a corresponding report in tabular form (example: refer to page 13). The ignition hazard assessment is used for the classification into equipment categories:

“If an equipment has been designed and built in accordance with good engineering practices and the assessment of the ignition hazards ensures that under normal operation, the equipment has no potential source of ignition, the equipment can be classified into the equipment category 3.

If the ignition hazard assessment ensures that the equipment has no potential source of ignition in case of expected or rare malfunctions, it can be classified into the equipment category 2 or 1”.

Section 5.2.7 of the EN 13463-1 includes an assessment report for Group II equipment.

Constructional safety „c“

• Type of protection, in which constructional measures are applied to ensure protection against potential ignition by hot surfaces, sparks and adiabatic compressions generated by moving parts,

• Using proven technical principles,

• The probability of a dangerous failure is very low

• Observations with regard to the lifetime of ball and rolling bearings, distances between moving and fixed parts, rotation speeds higher than 1 m/s, electrostatic problem for belt transmissions.

Marking

• Basic requirement: the field of application of all EX-relevant equipment, protective systems and components must be identified.

• Marking example: LII 1G c T4

Conditions for safe operation

• The special conditions for a safe application are described in the operating instructions manual of the individual Ex safety switchgear.
Assessment of the ignition hazard for equipment of Group II (EN 13463-1), gas

<table>
<thead>
<tr>
<th>Potential ignition source</th>
<th>Measures applied to prevent the source becoming effective</th>
<th>Ignition protection used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation (1b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected malfunction (1b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rare malfunction (1c)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Columns (1b) and (1c) are only required, when the definition of the equipment category of Group II requires that they must be protected in case of specific malfunctions, e.g. for equipment category 2 or 1.

The manufacturer of the equipment performs and documents the risk analysis of the ignition hazard. The user must also perform a risk analysis for the equipment, which was integrated in the machine at the time when it had to meet the requirements of the ATEX 1999/92/EC.

### Product designation

<table>
<thead>
<tr>
<th>No.</th>
<th>Potential ignition source</th>
<th>期间正常运行</th>
<th>期间预期故障</th>
<th>期间罕见故障</th>
<th>原因评估</th>
<th>描述</th>
<th>预防措施的描述（标准，技术规则，实验结果）</th>
<th>证明（包括相关Ex特性列表）</th>
<th>结果设备类别</th>
<th>必要的限制</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resulting equipment category including all existing ignition hazards
The basics of explosion protection
The safety relay modules of the PROTECT series SRB 101Exi (one safety release) and SRB 200Exi (two safety releases) are suitable for use in potentially explosive atmospheres or Ex zones. There are variants with monitored reset function (trailing edge) as well as with automatic or manual reset function. All these versions have a stop 0 safety release and optionally can be supplied with cross-wire short detection.
**SRB-EXi safety relay module**

### Technical data

| Equipment category, explosion protection type: | Gas: IIC T5 (SRB in zone 2) |
| Inputs (S11-S12, S21-S22, X1-X2/X3): | [Ex ib] IIC/Ex ibD |
| Temperature class: | T5 |
| Voltage Uo: | 33,6 V |
| Current I0: | 57,0 mA |
| Capacity Po: | 478,8 mW (linear characteristic) |
| Maximum safety voltage Umax: | 253 VAC |
| Isolation: | safe separation to EN 60079-11: Amplitude of the voltage 375 V |
| Rated operating voltage: | 24 VDC -15%/+20%, residual ripple max. 10% |
| Recommended fuse for the operating voltage: | internal fuse F1: T 50 mA/250 V internal fuse F2: T 100 mA/250 V |
| Protection class: | enclosure: IP 40 |
| Power consumption: | max. 3,0 W |
| Switching capacity of the enabling paths: | 230 V; 3 A ohmic (inductive with suitable protective circuit) AC-15: 230 VAC/3 A DC-13: 24 VDC/3 A |
| Recommended fuse for the enabling paths: | 3,15 A slow blow |
| Min. switching capacity: | min. 10 V/10 mA |
| Contact resistance: | max. 100 mΩ in new state |
| Contact material/contacts: | AgSnO, self-cleaning, positive drive |
| Switching capacity of the auxiliary contacts (21-22): | 24 VDC, 2 A |
| Recommended fuse for the auxiliary contacts: | 2 A slow blow |
| Current and voltage at S11-S12, S21-S22: | 15 mA |
| Pull-in delay: | approx. 300 ms (Version -1A) |
| Drop-out delay: | approx. 20 ms (Version -1R) |
| Air clearances and creepage distances: | EN 60664-1:2003 (DIN VDE 0110-1), 4 kV/2 EN 60079-11:2007 (DIN VDE 0170/0171 Part 7) |
| Max. total line resistance: | 30 Ohm |
| Ambient operating: | -25 °C ... +60°C |
| EMV: | EN 61000-6-2:2005 |
| Vibrations: | EN 60068-2-6:1996 |
| Frequency: | 10 ... 55 Hz |
| Amplitude: | 0,35 mm |
| Climatic resistance: | EN 60668-2-3:1986 |
| Storage temperature: | -40°C ... +85°C |
| Mechanical life: | 10^7 operations |
| Weight: | 230 g |
| Dimensions: | 22.5 x 100 x 121 mm |

### Approvals

- Gas zone (1), 2 / Dust zone (21), (22)
- CE

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Insert</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R</td>
<td>trailing edge</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Automatic reset function</td>
</tr>
</tbody>
</table>

### Note

- Cable connections:
  - single strand: rigid or flexible (with or without conductor ferrules) 0.25 ... 2.5 mm² multi-strand with identical section: rigid or flexible (with conductor ferrules without plastic) 0.25 ... 2.5 mm²; flexible (without or with TWIN conductor ferrules) 0.5 ... 1.5 mm²
SRB-EXi safety relay module

Note

• 2-channel control, shown for a guard door monitor with two position switches where one has a positive break contact; with external reset button ⊗.

• Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts. S = feedback circuits ⊙ = Feedback circuit

• The control recognizes cable break, cross-wire shorts (switch in position “QS”) and earth leakages in the monitoring circuit.

• The safety function is defined as the opening of release 13-14 when the inputs S11- S12 or S21-S22 are opened.

• The safety-relevant current path with output contact 13-14 meets the following requirements under observation of a $B_{tep}$ value assessment (also refer to “Requirements of DIN EN ISO 13 849-1”):
  – Category 4 – PL “e” to DIN EN ISO 13 849-1:2007
  – SIL 3 to DIN EN 61 508-2:2002
  – SILCL 3 to DIN EN 62 061:2005 (meets the requirements of control category 4 to DIN EN 954-1:1997).

• To determine the Performance Level (PL) of the entire safety function (e.g. sensor, logic, actuator) to DIN EN ISO 13 849-1:2007, an analysis of all relevant components is required.
SRB-EXi safety relay module

Technical data

- Equipment category, explosion protection type: Gas: L II 3 G Ex nAIC T5 (SRB in zone 2), Gas/dust: G II (2) GD [Ex ib] IIC[Ex ibD]
- Inputs (S11-S12, S21-S22, X1-X2/X3): [Ex ib] IIC[Ex ibD]
- Temperature class: T5
- Voltage Uo: 33,6 V
- Current Io: 57,0 mA
- Capacity Po: 478,8 mW (linear characteristic)
- Maximum safety voltage Um: 253 VAC
- Isolation: safe separation to EN 60079-11:2007, Amplitude of the voltage 375 V
- Recommended fuse for the enabling paths: 3,15 A slow blow
- Recommended fuse for the operating voltage: internal fuse F1: T 50 mA/250 V internal fuse F2: T 100 mA/250 V
- Power consumption: max. 3,0 W
- Switching capacity of the enabling paths: 230 V; 3 A ohmic (inductive with suitable protective circuit) AC-15: 230 VAC, 3 A DC-13: 24 VDC/3 A
- Min. switching capacity: min. 10 V/10 mA
- Contact resistance: max. 100 mΩ in new state
- Contact material/contacts: AgSnO, self-cleaning, positive drive
- Current and voltage at S11-S12, S21-S22: 24 VDC, 5 mA
- Current limitation at S11-S12, S21-S22: 15 mA
- Pull-in delay: approx. 300 ms (Version -1A) approx. 20 ms (Version -1R)
- Drop-out delay: in case of emergency stop: approx. 20 ms in case of voltage drop: approx. 20 ms
- Bridge in case of voltage drops: approx. 15 ms
- Air clearances and creepage distances: EN 60664-1:2003 (DIN VDE 0110-1), 4 kV/2 EN 60079-11:2007 (VDE 0170/0171 Part 7)
- Max. total line resistance: 30 Ohm
- Ambient operating: −25 °C ... +60 °C
- EMV: EN 61000-6-2:2005
- Vibration: EN 60668-2-6:1996
- Frequency: 10 ... 55 Hz
- Amplitude: 0.35 mm
- Storage temperature: −40 °C ... +85 °C
- Mechanical life: 10³ operations
- Weight: 230 g
- Dimensions: 22.5 x 100 x 121 mm

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Insert</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R</td>
<td>trailing edge</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Automatic reset function</td>
</tr>
</tbody>
</table>

Note

- Cable connections:
  - single strand: rigid or flexible (with or without conductor ferrules) 2 ... 2 mm²
  - multi-strand with identical section: rigid or flexible (with conductor ferrules without plastic) 2 ... 2 mm²
  - flexible (without or with TWIN conductor ferrules) 2 ... 2 mm²

Gas zone (1), 2 / Dust zone (21), (22)
SRB-EXi safety relay module

Note

• 2-channel control, shown for a guard door monitor with two position switches where one has a positive break contact; with external reset button ⊗.
• Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts. S = feedback circuits ⊗ = Feedback circuit
• The control recognizes cable break, cross-wire shorts (switch in position “QS”) and earth leakages in the monitoring circuit.
• The safety function is defined as the opening of release 13-14 when the inputs S11-S12 or S21-S22 are opened.
• The safety-relevant current path with output contact 13-14/23-24 meets the following requirements under observation of a $B_{\text{max}}$ value assessment (also refer to “Requirements of DIN EN ISO 13 849-1”):
  – Category 4 – PL “e” to DIN EN ISO 13 849-1:2007
  – SIL 3 to DIN EN 61 508-2:2002
  – SILCL 3 to DIN EN 62 061:2005
• (meets the requirements of control category 4 to DIN EN 954-1:1997).
• To determine the Performance Level (PL) of the entire safety function (e.g. sensor, logic, actuator) to DIN EN ISO 13 849-1:2007, an analysis of all relevant components is required.

Wiring example
Simple electric apparatus, type of protection “intrinsic safety”

For the classification of the protection type "intrinsic safety", an assessment of simple electrical apparatus to EN 60079-11 and EN 61241-11 must be executed.

As simple electrical apparatus within the meaning of intrinsic safety do not represent a potential source of ignition, the Directive 94/9/EC is not applicable. To demonstrate the intrinsic safety to EN 60079-14, a declaration of the manufacturer therefore can be used.

The devices classified as simple electrical apparatus can be used in the Zones 1 /2 and 21 / 22.

On the basis of a valid declaration of the manufacturer with an assessment as simple electrical apparatus, the following devices can be used:

<table>
<thead>
<tr>
<th>Series</th>
<th>Switch</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety switch</td>
<td>EX-AZ 16-....-3D</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>EX-AZ 335-....-3D</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>EX-AZ 355-....-3D</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>EX-AZ 415-....-3D</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>EX-AZ 3350-....-3D</td>
<td>32</td>
</tr>
<tr>
<td>Position switches</td>
<td>EX-Z/T 235-....-3D</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>EX-Z/T 335-....-3D</td>
<td>54</td>
</tr>
<tr>
<td>Safety sensors</td>
<td>EX-BNS 33-....-3G/D, however without LED</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 120-....-3G/D, however without LED</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 180-....-3G/D</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 303-....-3G/D, however without LED</td>
<td>98</td>
</tr>
<tr>
<td>Magnetic reed switches</td>
<td>EX-BN 20-....-3G/D</td>
<td>104</td>
</tr>
<tr>
<td>Reset buttons</td>
<td>Ex-RDT</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Ex-RDM</td>
<td>112</td>
</tr>
<tr>
<td>Emergency stop control devices</td>
<td>Ex-RDRZ45</td>
<td>116</td>
</tr>
</tbody>
</table>
In the class 2 safety switches, the switching element and the actuator are not physically connected, but brought together or separated upon switching. When the safety guard is opened, the actuator is separated from the base unit. During this process, the NC contacts in the safety switch are positively opened and the NO contacts closed.
Safety switch with separate actuator

**EX-AZ 16-....-3D**

- Ex certified
- Thermoplastic enclosure
- Multiple coding
- Long life
- Double insulated X
- 3 cable entries M16
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Slotted holes for adjustment, circular holes for location
- Including Ex-certified screwed cable gland and screw plug

**Technical data**

- Equipment category: **Ex III D**
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1
- Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Actuator: stainless steel 1.4301
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact type: change-over contact with double break, type Zb or 3 NC contacts, with galvanically separated contact bridges
- Switching system: slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Uimp: 6 kV
- Ue: 500 V
- Ie: 2.5 A
- Utilisation category: AC-15 DC-13
- Ie/Ue: 2.5 A / 230 VAC
- 2.5 A / 24 VDC
- Max. fuse rating: 4 A gG D-fuse
- Positive break travel: 8 mm
- Positive break force: 10 N for each
- Ambient temperature: –20 °C … +70°C
- Mechanical life: > 1 million operations
- Latching force: 30 N for ordering suffix r
- Cable cross-section of the cable glands: min. Ø 5 mm, max. Ø 10 mm

**Note**

Actuators must be ordered separately.

**Ordering details**

**EX-AZ16-①ZV②K-③-3D**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>03</td>
<td>3 NC contact</td>
</tr>
<tr>
<td>②</td>
<td>12</td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>Ejection force</td>
</tr>
<tr>
<td>③</td>
<td>2254</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>1762</td>
<td></td>
<td>Front mounting</td>
</tr>
<tr>
<td>1637</td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Contact variants**

<table>
<thead>
<tr>
<th>1 NO / 2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 12</td>
</tr>
<tr>
<td>② 31</td>
</tr>
<tr>
<td>③ 31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 NC contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 12</td>
</tr>
<tr>
<td>② 31</td>
</tr>
<tr>
<td>③ 31</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Safety switch with separate actuator

System components

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
<th>With rubber mounting B1-2245</th>
<th>Mounting set MS AZ 15/16</th>
</tr>
</thead>
</table>

Actuator B1-2024 with slot lip-seal

Actuator B1-2053 with ball latch

Actuator B1-2177 with centering guide

Flexible actuator B2

Flexible actuator B3

Flexible actuator B6

Front mounting -1762

Ordering details

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>AZ 15/16-B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>with slot lip-seal</td>
<td>AZ 15/16-B1-2024</td>
</tr>
<tr>
<td>with ball latch</td>
<td>AZ 15/16-B1-2053</td>
</tr>
<tr>
<td>with centering guide</td>
<td>AZ 15/16-B1-2177</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>AZ 15/16-B1-2245</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible actuator</td>
<td>AZ 15/16-B2</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZ 15/16-B3</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZ 15/16-B6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting set</th>
<th>MS AZ 15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot sealing plug</td>
<td>AZ 15/16-1476</td>
</tr>
<tr>
<td>Ball catch 2053-2</td>
<td>-2053-2</td>
</tr>
<tr>
<td>Front mounting with M5 nuts</td>
<td>-1762</td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

System components

Tamperproof screws

EX-certified screwed cable gland

EX-certified screw plug

Ordering details

Tamperproof screws
- M5 x 12: 1135338
- M5 x 16: 1135339
- M5 x 20: 1135340
  (Quantity 2 pcs)

EX-certified screwed cable gland: EX-KLE-M16x1.5
EX-certified screw plug: EX-VS-M16x1.5

Dust zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Safety switch with separate actuator

EX-AZ 335-...-3D

- Ex certified
- Metal enclosure
- 3 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Slotted holes for adjustment, circular holes for location
- 1 Cable entry M20
- Including Ex-certified screwed cable gland

Technical data

- Equipment category: Ex II 3D
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1
- Ex: EN 61241-0
- BG: EN 61241-1
- Enclosure: light-alloy diecast, paint finish
- Actuator: stainless steel 1.4301
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact type: change-over with double break Zb, or 3 NC contacts, galvanically separated contact bridges
- Switching system: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- Cable entry: M20
- Uₑ/Ui: 4 kV
- Iₑ/Ui: 10 A
- Utilisation category: AC-15, DC-13
- Iₑ/Ui: 4 A / 230 VAC
- Max. fuse rating: 6 A g5 D-fuse
- Positive break travel: 10.7 mm
- Positive break force: 5 N for each
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: 10 million operations
- Latching force: 30 N for ordering suffix r
- Cable cross-section of the cable glands: min. Ø 7 mm
- Max. Ø 12 mm
- Ex protection: Ex IIC A22 IP67 T90°C X

Contact variants

- 1 NO / 2 NC
- 3 NC contacts

Ordering details

EX-AZ 335-...-z-kl-r-3D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>12</td>
<td>3 NC contact</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>1 NO/2NC contacts</td>
</tr>
<tr>
<td></td>
<td>UE</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>1637</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With overlapping contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

- Actuators must be ordered separately.
- By turning the head in 90° steps, 8 actuating planes are possible. A Torx T10 screwdriver is required for this purpose.
Safety switch with separate actuator

EX-AZ 355-...-3D

--- Technical data ---

- Equipment category: II 3D
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1
- Enclosure: light-alloy diecast, paint finish
- Actuator: stainless steel 1.4301
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact type: change-over contact with double break, type Zb or 3 NC contacts, with galvanically separated contact bridges
- Switching system: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- Cable entry: 3 x M20
- U_{imp}²: 4 kW
- I_{imp}: 10 A
- Utilisation category: AC-15, DC-13
- I_{f}/U_{e}: 4 A / 230 VAC; 4 A / 24 VDC
- Max. fuse rating: 6 A g6 D-fuse
- Positive break travel: 10.7 mm
- Positive break force: 5 N for each
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: 10 million operations
- Latching force: 30 N for ordering suffix r
- Cable cross-section of the cable glands: min. Ø 7 mm
- Max. Ø 12 mm

--- Contact variants ---

1 NO / 2 NC

1 NO / 2 NC

3 NC contacts

3 NC contacts

--- Approvals ---

--- Ordering details ---

EX-AZ 355-...-ZK-...-3D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>03</td>
<td>3 NC contact</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>UE</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>3</td>
<td>1637</td>
<td>With overlapping contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

--- Note ---

Actuators must be ordered separately.

By turning the head in 90° steps, 8 actuating planes are possible. A Torx T10 screwdriver is required for this purpose.
### Safety switch with separate actuator

#### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator B1</td>
<td>AZ 335/355-B1</td>
<td><img src="image1" alt="Straight actuator B1 Diagram" /></td>
</tr>
<tr>
<td>Flexible actuator B6</td>
<td>AZ 335/355-B6</td>
<td><img src="image2" alt="Flexible actuator B6 Diagram" /></td>
</tr>
<tr>
<td>Slot sealing plug AZ 335/355-1990</td>
<td></td>
<td><img src="image3" alt="Slot sealing plug AZ 335/355-1990 Diagram" /></td>
</tr>
<tr>
<td>With rubber mountings B1-2245</td>
<td></td>
<td><img src="image4" alt="With rubber mountings B1-2245 Diagram" /></td>
</tr>
<tr>
<td>Flexible actuator B6-Flex</td>
<td></td>
<td><img src="image5" alt="Flexible actuator B6-Flex Diagram" /></td>
</tr>
<tr>
<td>Lockout tag SZ 16/335</td>
<td></td>
<td><img src="image6" alt="Lockout tag SZ 16/335 Diagram" /></td>
</tr>
<tr>
<td>Angled actuator B5</td>
<td>AZ 335/355-B5</td>
<td><img src="image7" alt="Angled actuator B5 Diagram" /></td>
</tr>
<tr>
<td>Flexible actuator B6-Flex</td>
<td>AZ 335/355-B6-Flex</td>
<td><img src="image8" alt="Flexible actuator B6-Flex Diagram" /></td>
</tr>
<tr>
<td>EX-certified screwed cable gland</td>
<td></td>
<td><img src="image9" alt="EX-certified screwed cable gland Diagram" /></td>
</tr>
<tr>
<td>Angled actuator B5-Flex</td>
<td>AZ 335/355-B5-Flex</td>
<td><img src="image10" alt="Angled actuator B5-Flex Diagram" /></td>
</tr>
<tr>
<td>EX-certified screw plug M20</td>
<td></td>
<td><img src="image11" alt="EX-certified screw plug M20 Diagram" /></td>
</tr>
</tbody>
</table>

#### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with rubber mounting</td>
<td>AZ 335/355-B1</td>
<td><img src="image12" alt="Straight actuator with rubber mounting Diagram" /></td>
</tr>
<tr>
<td>Angled actuator</td>
<td>AZ 335/355-B5</td>
<td><img src="image13" alt="Angled actuator Diagram" /></td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZ 335/355-B6</td>
<td><img src="image14" alt="Flexible actuator Diagram" /></td>
</tr>
<tr>
<td>Flexible actuator with rubber mounting</td>
<td>AZ 335/355-B1-2245</td>
<td><img src="image15" alt="Flexible actuator with rubber mounting Diagram" /></td>
</tr>
<tr>
<td>Slot sealing plug</td>
<td>AZ 335/355-1990</td>
<td><img src="image16" alt="Slot sealing plug Diagram" /></td>
</tr>
<tr>
<td>Lockout tag</td>
<td>SZ 16/335</td>
<td><img src="image17" alt="Lockout tag Diagram" /></td>
</tr>
<tr>
<td>EX-certified screwed cable gland</td>
<td>EX-KLE-M20x1.5</td>
<td><img src="image18" alt="EX-certified screwed cable gland Diagram" /></td>
</tr>
<tr>
<td>EX-certified screw plug</td>
<td>EX-VS-M20x1.5</td>
<td><img src="image19" alt="EX-certified screw plug Diagram" /></td>
</tr>
</tbody>
</table>

Dust zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Safety switch with separate actuator

EX-AZ 415-…-3D

A: setting screw ball latch  30 - 500 N

- Ex certified
- Metal enclosure
- 2 switches with different actuating functions in a single enclosure
- Long life
- High level of contact reliability with low voltages and currents
- Adjustable ball latch to 500 N
- Spring-loaded actuators
- 2 cable entries M20
- Including Ex-certified screwed cable gland and screw plug

Technical data

- Equipment category: ☑ II 3D
- Ex protection: ☑ Ex tD A22 IP67 T60°C X
- Standards: ☑ EN 60947-5-1
- ☑ EN 61241-0
- ☑ EN 61241-1
- ☑ GS-GS-ET-15
- Enclosure: light-alloy diecast, paint finish
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Actuator: zinc-plated brass / aluminium
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching system: ☑ IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 1.5 mm² / min. 0.75 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- Uimp: 4 kV
- Uİ: 250 V
- lim: 6 A
- Utilisation category: AC-15, DC-13
- I/Ui: 4 A / 230 VAC
- 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 3.8 mm
- Positive break force: max. 31 N
- Ambient temperature: -10 °C ... + 50 °C
- Mechanical life: > 1 million operations
- Latching force: 30 - 500 N (adjustable)
- Cable cross-section of the cable glands: min. Ø 7 mm / max. Ø 12 mm
- ☑ II 2D

Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S1 / S2</td>
<td>1 NO 1 NC / 1 NO 1 NC contact</td>
</tr>
<tr>
<td>02/11</td>
<td>2NC / 1NO 1NC contact</td>
<td></td>
</tr>
<tr>
<td>02/20</td>
<td>2 NC / 2 NO contact</td>
<td></td>
</tr>
<tr>
<td>02/02</td>
<td>2 NC / 2 NC contact</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Approvals

Conductors must be ordered separately.

Note

- Contact symbols shown for the closed condition of the guard device.
Safety switch with separate actuator

System components

Straight actuator B1

EX-certified screwed cable gland

EX-certified screw plug M20

Ordering details

Straight actuator | AZ/AZM 415-B1
EX-certified screwed cable gland | EX-KLE-M20x1.5
EX-certified screw plug | EX-VS-M20x1.5
Safety switch with separate actuator

**EX-AZ 3350-...-3D**

- Ex certified
- Metal enclosure
- Long life
- High level of contact reliability with low voltages and currents
- Shearing force 15,000 N
- Door handle latching
- Lockout tag against unintentional locking available
- Centring device available
- 1 Cable entry M20
- Including Ex-certified screwed cable gland
- Actuating head:

**Technical data**

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>⚡ II 3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex tD A22 IP67 T90°C X</td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 60947-5-1</td>
</tr>
<tr>
<td></td>
<td>EN 61241-0</td>
</tr>
<tr>
<td></td>
<td>EN 61241-1</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>light-alloy diecast, paint finish</td>
</tr>
<tr>
<td>Max. impact energy:</td>
<td>4 J</td>
</tr>
<tr>
<td>Actuating speed:</td>
<td>max. 1 m/s</td>
</tr>
<tr>
<td>Actuator:</td>
<td>brass, blue chrome-plated</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP 67 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>Silver</td>
</tr>
<tr>
<td>Contact type:</td>
<td>change-over with double break</td>
</tr>
<tr>
<td>Switching system:</td>
<td>⚡ IEC 60947-5-1, BG-GS-ET-15, slow action, NC contact with positive break</td>
</tr>
<tr>
<td>Connection:</td>
<td>screw terminals</td>
</tr>
<tr>
<td>Cable section:</td>
<td>max. 1.5 mm²</td>
</tr>
<tr>
<td>Cable entry:</td>
<td>1 x M20</td>
</tr>
<tr>
<td>$U_{imp}$:</td>
<td>4 kV</td>
</tr>
<tr>
<td>$U_e$:</td>
<td>250 V</td>
</tr>
<tr>
<td>$I_{imp}$:</td>
<td>10 A</td>
</tr>
<tr>
<td>Utilisation category:</td>
<td>AC-15, DC-13</td>
</tr>
<tr>
<td>$U_i/U_e$:</td>
<td>4 A / 230 V</td>
</tr>
<tr>
<td></td>
<td>4 A / 24 VDC</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>6 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break travel:</td>
<td>10.7 mm</td>
</tr>
<tr>
<td>Positive break force:</td>
<td>5 N for each</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>–10 °C … + 60 °C</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>1 million operations</td>
</tr>
<tr>
<td>Cable cross-section:</td>
<td>min. Ø 7 mm</td>
</tr>
<tr>
<td>of the cable glands:</td>
<td>max. Ø 12 mm</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 03-ZK</td>
<td>3 NC contact</td>
</tr>
<tr>
<td>② 12-ZUEK</td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td>③ 1637</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td>④ U90</td>
<td>Actuating head 90° rotation Door hinge on the left-hand side</td>
</tr>
<tr>
<td>⑤ U270</td>
<td>270° rotation Door hinge on the right-hand side</td>
</tr>
</tbody>
</table>

**Note**

Included in delivery
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (For variant -05 and -06 incl. mounting plate)

**Ordering example**

To order, first choose the desired safety switch and then the door handle system:
- for example EX-AZ 3350-12-ZUEK-U90 and EX-AZ 3350-STS30-02

The drawings are always shown with a view to the switch.

When the TF centering device is used, the maximum actuating speed for closing the safety guard is limited to 1 m/s.
Safety switch with separate actuator

**System variants**
- EX-AZ 3350-STS30-01
- EX-AZ 3350-STS30-02
- EX-AZ 3350-STS30-03
- EX-AZ 3350-STS30-04
- EX-AZ 3350-STS30-05
- EX-AZ 3350-STS30-06
- EX-AZ 3350-STS30-07
- EX-AZ 3350-STS30-08

**System components**
- EX-certified screwed cable gland
- Lockout tag SZ 415-1/-2
- Lockout tag SZ 415-1/-2 -2477
- Centring device TF.
- Mounting plate MP TG-01

**Ordering details**

**Mounting inside with emergency handle**
- Door hinge right: EX-AZ 3350-STS30-01
- Door hinge left: EX-AZ 3350-STS30-01

**Mounting without emergency handle**
- Door hinge right: EX-AZ 3350-STS30-03
- Door hinge left: EX-AZ 3350-STS30-04

**Mounting outside with emergency handle**
- Door hinge right: EX-AZ 3350-STS30-05
- Door hinge left: EX-AZ 3350-STS30-06

**Mounting without emergency handle**
- Door hinge right: EX-AZ 3350-STS30-06
- Door hinge left: EX-AZ 3350-STS30-08

**Ordering details**

- Lockout tag for STS30-01/-02/-04/-05/-07:
  - SZ 415-1
  - SZ 415-2
- Lockout tag with 5 bore holes for STS30-01/-03/-06/-08:
  - SZ 415-1
  - SZ 415-2
- Centering device:
  - TFA-010: Mounting outside
  - TFI-010: Mounting inside
- For product information and dimensions, please refer to the Main Catalogue “Safety Technology”.
- Mounting plate: MP TG-01

**Ordering details**

- EX-certified screwed cable gland: EX-KLE-M20x1.5

In all images, the guard door opens outwards.

Dust zone 22
Detailed technical information at:
www.schmersal.com
In the solenoid interlocks of the EX-AZM series, the switching element with interlocking device and the actuator are not physically connected, but brought together or separated upon switching. When the safety guard is opened in the unlocked condition, the actuator is separated from the base unit. During this process, the NC contacts are positively opened and the NO contacts closed. Interlocking is carried out by means of a blocking bolt / latching bolt. This latching bolt blocks the actuator so that it cannot be withdrawn from the interlock. The machine control is only enabled when the actuator has been inserted into the interlock and the latching bolt is in the blocking position. This is ensured by the contact monitoring of the latching bolt.
Solenoid interlocks

**EX-AZM 170-...-3G/D**

- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Cut clamp terminals
- Compact design
- Manual release
- Long life
- Double insulated
- High holding force 1000 N
- Latching force 5 N or 30 N
- Power to unlock / Power to lock
- Individual coding available on request
- 1 cable entry M20
- Including Ex-certified screwed cable gland

**Technical data**

- **Equipment category:** II 3GD
- **Ex protection:** Ex nC IIC T5 X
- **Standards:**
  - EN 60947-5-1
  - EN 61241-0
  - EN 61241-1
  - EN 60079-0
  - EN 60079-15
  - BG-GS-ET-19
- **Enclosure:** Glass-fibre reinforced thermoplastic, self-extinguishing
- **Max. impact energy:** 1 J
- **Actuating speed:** max. 1 m/s
- **Actuator and locking bolt:** Stainless steel 1.4301
- **Protection class:** IP 67 to EN 60529
- **Contact material:** Silver change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- **Switching system:** EN 60947-5-1, slow action, positive break NC contact
- **Connection:** Cut clamp terminals
- **Cable section:** 0.75 – 1.0 mm², flexible
- **Uimp:** 4 kV
- **Uc:** 250 V
- **Iimp:** 2 A
- **Utilisation category:** AC-15, DC-13
- **I, Uc:**
  - 2 A / 230 VAC
  - 2 A / 24 VDC
- **Max. fuse rating:** 2 A gG D-fuse
- **Positive break travel:** 11 mm
- **Positive break force:** 6 N for each NC contact fitted
- **Magnet:** 100% ED
- **Uc:** 24 VAC/DC
- **Power consumption:** max. 10 W
- **Ambient temperature:** –15 °C ... +45 °C
- **Mechanical life:** > 1 million operations
- **Fmax:** 1000 N
- **Latching force:** 30 N or ordering suffix r
- **Cable cross-section:** min. Ø 6.5 mm
- **of the cable glands:** max. Ø 12 mm

**Contact variants**

- **Power to unlock 1 NO / 1 NC**
  - 1 NC contact
  - 2 NC contacts
- **Power to lock 1 NO / 1 NC**
  - 1 NC contact
  - 2 NC contacts

**Note**

- The contact 21–32 is actuated when A1-A2 is energised or de-energised.
- At least one magnetic contact with positive break must be integrated in the safety circuit.
- Circuit diagrams show the de-energised condition with actuator inserted (0 in switch travel diagram).
- Interlocks with the power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

**Approvals**

- Ex
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>1NO/1NC contacts</td>
</tr>
<tr>
<td>02</td>
<td>2</td>
<td>2 NC contact</td>
</tr>
<tr>
<td>R</td>
<td>3</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>1637</td>
<td>5</td>
<td>Manual release</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Note**

- Manual release (left)
  - For manual release using M5 triangular key, available as accessory
  - Included in standard version

---

Gas zone 2 / Dust zone 22

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Solenoid interlocks

### System components

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
<th>Long straight actuator B11</th>
<th>EX-certified screwed cable gland</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Straight actuator B1" /></td>
<td><img src="image2.png" alt="Long straight actuator B11" /></td>
<td><img src="image3.png" alt="EX-certified screwed cable gland" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With rubber mounting B1-2245</th>
<th>Long angled actuator B15</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="With rubber mounting B1-2245" /></td>
<td><img src="image5.png" alt="Long angled actuator B15" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angled actuator B5</th>
<th>Flexible actuator B6</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image6.png" alt="Angled actuator B5" /></td>
<td><img src="image7.png" alt="Flexible actuator B6" /></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Straight actuator with rubber mountings</th>
<th>Long straight actuator</th>
<th>Long angled actuator</th>
<th>EX-certified screwed cable gland</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ 17/170-B1</td>
<td>AZ 17/170-B11</td>
<td>AZ 17/170-B15</td>
<td>EX-KLE-M20x1.5</td>
</tr>
<tr>
<td>AZ 17/170-B1-2245</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angled actuator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ 17/170-B5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible actuator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZM 170-B6</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Gas zone 2 / Dust zone 22

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Solenoid interlocks

**EX-AZM 161-...-3D**

- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release
- Long life
- Double insulated
- High holding force 2000 N
- Large wiring compartment
- Power to unlock / Power to lock
- Cage clamps or screw terminals
- 4 cable entries M16
- Including Ex-certified screwed cable gland

**Technical data**

- Equipment category: II 3D
- Ex protection: Ex tD A22 IP67 T80°C X
- Standards: EN 60947-5-1
- EN 61241-0
- EN 61241-1
- BG-GS-ET-19
- Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing
- Actuator and locking bolt: stainless steel 1.4301
- Protective cover: Steel painted
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Protection class: IP 67
- Contact material: Silver
- Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action, positive break NC contact
- Connection: screw terminals or cage clamps
- Cable section: max. 1.5 mm² (incl. conductor ferrules)
- Cable entry: 4x M16
- U_{limp}: 4 kV
- U_{ mains}: 250 V
- I_{limp}: 5 A
- Utilisation category: AC-15, DC-13
- I_{/U_e}: 4 A / 230 VAC
- 2.5 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 9.5 mm
- Positive break force: 10 N for each NC contact fitted
- U_{ mains}: 24 VAC/DC
- Magnet: 100% ED
- Power consumption: max. 10 W
- Ambient temperature: – 15 °C ... + 50 °C
- Mechanical life: > 1 million operations
- F_{max}: 2000 N
- Latching force: 30 N for ordering suffix r
- Cable cross-section of the cable glands: min. Ø 5 mm
- max. Ø 10 mm

**Contact variants**

2 NO contact / 4 NC contacts (12/12)

**Power to unlock**

**Power to lock**

**Ordering details**

**EX-AZM 161 ①-12/12-②K③-024-3D**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① SK</td>
<td>Screw terminals</td>
<td></td>
</tr>
<tr>
<td>② CC</td>
<td>Cage clamps</td>
<td></td>
</tr>
<tr>
<td>③ R</td>
<td>Latching force 5 N</td>
<td></td>
</tr>
<tr>
<td>③ A</td>
<td>Latching force 30 N</td>
<td></td>
</tr>
<tr>
<td>③ A</td>
<td>Power to unlock</td>
<td></td>
</tr>
<tr>
<td>③ A</td>
<td>Power to lock</td>
<td></td>
</tr>
</tbody>
</table>

**Note**


**Contact variants are shown in the de-energised condition with the actuator inserted (0 in switch travel diagram).**

Interlocks with the power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Actuators and protective cover must be ordered separately.

**Approvals**

- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release
- Long life
- Double insulated
- High holding force 2000 N
- Large wiring compartment
- Power to unlock / Power to lock
- Cage clamps or screw terminals
- 4 cable entries M16
- Including Ex-certified screwed cable gland

**Dust zone 22**

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Solenoid interlocks

System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimensions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator B1</td>
<td>Ø 5.5 x 16</td>
<td>R min. 150</td>
</tr>
<tr>
<td>Straight actuator B1E</td>
<td>Ø 5.5 x 16</td>
<td>R min. 150</td>
</tr>
<tr>
<td>Straight actuator B1F</td>
<td>Ø 5.5 x 16</td>
<td>R min. 150</td>
</tr>
<tr>
<td>Flexible actuator B6</td>
<td>Ø 5.5 x 16</td>
<td>R min. 150</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator</td>
<td>AZM 161-B1</td>
</tr>
<tr>
<td>Straight actuator</td>
<td>AZM 161-B1E</td>
</tr>
<tr>
<td>Straight actuator</td>
<td>AZM 161-B1F</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZM 161-B6</td>
</tr>
</tbody>
</table>

Dust zone 22

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Solenoid interlocks

System components

Mounting set MS AZM 161 P

Slot sealing plug AZM 161

EX-certified screwed cable gland

EX-certified screw plug

Ordering details

Mounting set
- MS AZM 161 P
- MS AZM 161 R/P
- Slot sealing plug AZM 161: 1145379
- Tamperproof screws with unidirectional slots (without drawing)
  - M5 x 12: 1135338
  - M5 x 16: 1135339
  - M5 x 20: 1135340
- (Quantity 2 pcs)
- EX-certified screwed cable gland: EX-KLE-M16x1.5
- EX-certified screw plug: EX-VS-M16x1.5

Protective cover
- AZM 161-ME

Dust zone 22

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Data sheets, mounting and wiring instructions, declaration of conformity and other information at:
www.schmersal.com
Solenoid interlocks

EX-AZM 415-...-3D

- Ex certified
- Interlock with protection against incorrect locking
- Metal enclosure
- Two switches in one enclosure
- Problem-free opening of stressed doors by means of bell-crank system
- Robust design
- Long life
- High holding force 3500 N
- Adjustable ball latch to 400 N
- Power to unlock / Power to lock
- 2 cable entries M20
- Including Ex-certified screwed cable gland and screw plug

Technical data

- Equipment category: ° II 3D
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1
- Enclosure: light-alloy die-cast, enameled finish
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Actuator: zinc-plated brass / aluminium
- Protection class: IP 67 to EN 60529
- Contact material: Silver change-over contact with double break, type Zb, with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action, positive break NC contact
- Connection: Screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- Uimp: 4 kV
- Ul: 250 V
- Im: 6 A
- Utilisation category: AC-15
- I/Uc: 4 A / 230 VAC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 5 mm
- Positive break force: min. 15 N (depending on the setting of the ball latch)
- Magnet: 100% ED
- Ue: 24 VAC/DC
- Power consumption: max. 10 W
- Power to unlock 11/11
- Temperature: – 10 °C ... + 50 ºC
- Mechanical life: > 1 million operations
- Fmax: 3500 N
- Latching force: 30 - 400 N (adjustable)
- Cable cross-section of the cable glands: min. Ø 7 mm
- max. Ø 12 mm
- Contact variants

Contact variants

Power to unlock 11/11

2NC/2NO

02/11 3NC/1NO

02/02 4NC

02/20 2NC/2NO

Contact symbols are shown for the closed condition of the guard device.

The contacts 11-12 and 23-24 are actuated when the solenoid A1-A2 is energised or de-energised.

At least one magnetic contact with positive break ◊ must be integrated in the safety circuit.

Approvals

Ordering details

EX-AZM 415-...-3ZPK® 24VAC/DC-3D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11/11</td>
<td>2NC/2NO</td>
</tr>
<tr>
<td>2</td>
<td>02/11</td>
<td>3NC/1NO</td>
</tr>
<tr>
<td>3</td>
<td>02/20</td>
<td>2NC/2NO</td>
</tr>
<tr>
<td>4</td>
<td>02/02</td>
<td>4NC</td>
</tr>
<tr>
<td>A</td>
<td>Power to unlock</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

Actuators must be ordered separately.

Note

Contact symbols are shown for the closed condition of the guard device.

The contacts 11-12 and 23-24 are actuated when the solenoid A1-A2 is energised or de-energised.

At least one magnetic contact with positive break ◊ must be integrated in the safety circuit.

Dust zone 22

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Contact variants

**Power to lock 11/11 2NC/2NO**

02/11 3NC/1NO

02/2 4NC

02/20 2NC/2NO

**System components**

Straight actuator B1

EX-certified screwed cable gland

EX-certified screw plug M20

**Note**

Interlocks with the power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

**Ordering details**

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator</td>
<td>AZ/AZM 415-B1</td>
</tr>
<tr>
<td>EX-certified screwed cable gland</td>
<td>EX-KLE-M20x1.5</td>
</tr>
<tr>
<td>EX-certified screw plug</td>
<td>EX-VS-M20x1.5</td>
</tr>
</tbody>
</table>
Detailed technical information at:
www.schmersal.com
The position switches with safety function are suitable for sliding and hinged guards, which need to be closed in order to ensure the required operational safety.

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX-Z/T 235-...-3D</td>
<td>44</td>
</tr>
<tr>
<td>EX-Z/T 335-...-3G/D</td>
<td>54</td>
</tr>
<tr>
<td>EX-Z/T 355-...-3G/D</td>
<td>55</td>
</tr>
<tr>
<td>EX-MAF 330-...-3D</td>
<td>60</td>
</tr>
<tr>
<td>EX-T 335-...</td>
<td>62</td>
</tr>
<tr>
<td>EX-T/M 441-...</td>
<td>68</td>
</tr>
<tr>
<td>EX-T/M 250-...</td>
<td>69</td>
</tr>
<tr>
<td>EX-TS 064-...</td>
<td>70</td>
</tr>
<tr>
<td>EX-MS 064-...</td>
<td>71</td>
</tr>
<tr>
<td>EX-T, 064-...</td>
<td>73</td>
</tr>
<tr>
<td>EX-M, 064 R</td>
<td>74</td>
</tr>
<tr>
<td>EX-M, 064 L</td>
<td>75</td>
</tr>
</tbody>
</table>
Position switches with safety function

**EX-Z/T 235-…-3D**

![Diagram of position switch]

### Technical data
- **Equipment category:** II 3D
- **Ex protection:** Ex tD A22 IP67 T90°C X
- **Standards:** EN 60947-5-1
  - EN 61241-0
  - EN 61241-1
  - BG-GS-ET -15
- **Design:** fixings to EN 50047
- **Enclosure:** zinc die-cast, enamel finish
- **Max. impact energy:** 1 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP 67 to EN 60529
- **Contact material:** Silver
- **Contact type:** change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- **Switching system:** IEC 60947-5-1 slow or snap action, NC contacts with positive break
- **Connection:** screw terminals
- **Cable section:** max. 2.5 mm², min. 0.75 mm² (including conductor ferrules)
- **Cable entry:** M20
- **U_{NP}:** 6 kW
- **U_{P}:** 500 V
- **I_{max}:** 6 A
- **Utilisation category:** AC-15, DC-13
- **I_{P}/U_{P}:**
  - 4 A / 230 VAC
  - 1 A / 24 VDC
- **Max. fuse rating:** 6 A gG D-fuse
- **Ambient temperature:** – 20 °C ... + 60 °C
- **Mechanical life:** 20 million operations
- **Switching frequency:** max. 5000/h
- **Bounce duration:** Snap action: < 3 ms; Slow action: in accordance with the actuating speed
- **Switchover time:** Snap action: > 5.5 ms; Slow action: in accordance with the actuating speed
- **Cable cross-section of the cable glands:**
  - min. Ø 7 mm
  - max. Ø 12 mm
  - II 2D

### System components
- **EX-certified screwed cable gland**

### Approvals
- Ex certified
- Mounting details to EN 50047
- Metal enclosure
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- Wiring compartment
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- 1 cable entry M20
- Incl. Ex-certified cable gland

### Ordering details

**EX-Z/T 235-…-3D**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z</td>
<td>Snap action</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Slow action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with staggered contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with overlapping contacts</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Enclosure with transverse slotted holes</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Roller lever 7H for safety duties</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

*Switches with 2 NO contacts are only suitable for positioning tasks!*

**EX-certified screwed cable gland**

**EX-KLE-M20x1.5**

---

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Position switches with safety function

**Plunger S**

- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
  - Snap action: Min. 10 mm/min, max. 1 m/s
  - Slow action: Min. 60 mm/min, max. 1 m/s

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZS 235-11Z-3D</td>
<td>EX-TS 235-11Z-3D</td>
<td>EX-TS 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZS 235-02Z-3D</td>
<td>EX-TS 235-02Z-3D</td>
<td>EX-TS 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TS 235-20Z-3D</td>
<td>EX-TS 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Roller plunger R**

- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 20 mm/min, max. 1 m/s
  - Slow action: Min. 120 mm/min, max. 1 m/s

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZR 235-11Z-3D</td>
<td>EX-TR 235-11Z-3D</td>
<td>EX-TR 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZR 235-02Z-3D</td>
<td>EX-TR 235-02Z-3D</td>
<td>EX-TR 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TR 235-20Z-3D</td>
<td>EX-TR 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Position switches with safety function

**Plunger 4S**

- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis

Snap action: Min. 10 mm/min, max. 1 m/s
Slow action: Min. 60 mm/min, max. 1 m/s

---

**Roller plunger 4R**

- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis

Snap action: Min. 20 mm/min, max. 1 m/s
Slow action: Min. 120 mm/min, max. 1 m/s

---

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z4S 235-11Z-3D</td>
<td>EX-T4S 235-11Z-3D</td>
<td>EX-T4S 235-11ZUE-3D</td>
<td></td>
</tr>
</tbody>
</table>

| 2 NC contacts | EX-Z4S 235-02Z-3D | EX-T4S 235-02Z-3D | EX-T4S 235-02ZH-3D |

| 2 NO contacts | EX-T4S 235-20Z-3D | EX-T4S 235-20ZH-3D |

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### Offset roller lever 1R

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z1R 235-11Z-3D</td>
<td>EX-T1R 235-11Z-3D</td>
<td>EX-T1R 235-11ZUE-3D</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-Z1R 235-02z-3D</td>
<td>EX-T1R 235-02Z-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T1R 235-20Z-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis

Snap action: Min. 27 mm/min, max. 1 m/s
Slow action: Min. 160 mm/min, max. 1 m/s

### Offset roller lever K

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZK 235-11Z-3D</td>
<td>EX-TK 235-11Z-3D</td>
<td>EX-TK 235-11ZUE-3D</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZK 235-02Z-3D</td>
<td>EX-TK 235-02Z-3D</td>
<td>EX-TK 235-02ZH-3D</td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TK 235-20Z-3D</td>
<td></td>
<td>EX-TK 235-20ZH-3D</td>
</tr>
</tbody>
</table>

- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis

Snap action: Min. 24 mm/min, max. 1 m/s
Slow action: Min. 240 mm/min, max. 1 m/s
Position switches with safety function

### Angle roller lever 3K

- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 27 mm/min, max. 1 m/s
  - Slow action: Min. 160 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

#### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z3K 235-11Z-3D</td>
<td>EX-T3K 235-11Z-3D</td>
<td>EX-T3K 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-Z3K 235-02Z-3D</td>
<td>EX-T3K 235-02Z-3D</td>
<td>EX-T3K 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T3K 235-20Z-3D</td>
<td>EX-T3K 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Angle roller lever 4K

- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 44 mm/min, max. 1 m/s
  - Slow action: Min. 264 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

#### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z4K 235-11Z-3D</td>
<td>EX-T4K 235-11Z-3D</td>
<td>EX-T4K 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-Z4K 235-02Z-3D</td>
<td>EX-T4K 235-02Z-3D</td>
<td>EX-T4K 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4K 235-20Z-3D</td>
<td>EX-T4K 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Position switches with safety function

**Angle roller lever K4**

- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 56 mm/min, max. 1 m/s
  - Slow action: Min. 336 mm/min, max. 1 m/s

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZK4 235-11Z-3D</td>
<td>EX-TK4 235-11Z-3D</td>
<td>EX-TK4 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZK4 235-02Z-3D</td>
<td>EX-TK4 235-02Z-3D</td>
<td>EX-TK4 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TK4 235-20Z-3D</td>
<td>EX-TK4 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Roller lever 1H**

- Plastic lever
- Actuator type A to EN 50047
- Angle of roller lever adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 92 mm/min, max. 1 m/s
  - Slow action: Min. 492 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -Z

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV1H 235-11Z-3D</td>
<td>EX-TV1H 235-11Z-3D</td>
<td>EX-TV1H 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV1H 235-02Z-3D</td>
<td>EX-TV1H 235-02Z-3D</td>
<td>EX-TV1H 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV1H 235-20Z-3D</td>
<td>EX-TV1H 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Position switches with safety function

Roller lever 7H

- only for positioning tasks
- Angle of roller lever adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -Z

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV7H 235-11Z-3D</td>
<td>EX-TV7H 235-11Z-3D</td>
<td>EX-TV7H 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV7H 235-02Z-3D</td>
<td>EX-TV7H 235-02Z-3D</td>
<td>EX-TV7H 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV7H 235-20Z-3D</td>
<td>EX-TV7H 235-20Z-3D</td>
<td>EX-TV7H 235-20ZH-3D</td>
<td></td>
</tr>
</tbody>
</table>

7H-2138

- Angle of roller lever adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -Z

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV7H 235-11Z-2138-3D</td>
<td>EX-TV7H 235-11Z-2138-3D</td>
<td>EX-TV7H 235-11ZUE-2138-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV7H 235-02Z-2138-3D</td>
<td>EX-TV7H 235-02Z-2138-3D</td>
<td>EX-TV7H 235-02ZH-2138-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV7H 235-20Z-2138-3D</td>
<td>EX-TV7H 235-20Z-2138-3D</td>
<td>EX-TV7H 235-20ZH-2138-3D</td>
<td></td>
</tr>
</tbody>
</table>

Dust zone 22

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Position switches with safety function

**Rod lever 10H**

- **only for positioning tasks**
- Angle of roller lever adjustable in 10° steps
- Plastic rod
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 687 mm/min, max. 1 m/s
  - Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -Z
- Aluminium rod, ordering suffix -1183

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV10H 235-11Z-3D</td>
<td>EX-TV10H 235-11Z-3D</td>
<td>EX-TV10H 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV10H 235-02Z-3D</td>
<td>EX-TV10H 235-02Z-3D</td>
<td>EX-TV10H 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV10H 235-20Z-3D</td>
<td>EX-TV10H 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Roller lever 12H**

- Metal lever with plastic roller
- Actuator type A to EN 50047
- Angle of roller lever adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  - Snap action: Min. 687 mm/min, max. 1 m/s
  - Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -Z
- Available with metal roller, ordering suffix -RMS

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV12H 235-11Z-3D</td>
<td>EX-TV12H 235-11Z-3D</td>
<td>EX-TV12H 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV12H 235-02Z-3D</td>
<td>EX-TV12H 235-02Z-3D</td>
<td>EX-TV12H 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV12H 235-20Z-3D</td>
<td>EX-TV12H 235-20ZH-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Position switches with safety function

Roller lever 14H

• Metal lever with plastic roller
• Angle of roller lever adjustable in 10° steps
• Actuating torque: Min. 15 Ncm
• Positive break torque: 18.5 Ncm
• Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min, max. 1 m/s
• Actuator head gasket, ordering suffix -Z
• Available with metal roller, ordering suffix –RMS

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-ZV14H 235-11Z-3D</td>
<td>EX-TV14H 235-11Z-3D</td>
<td>EX-TV14H 235-11ZUE-3D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-ZV14H 235-02Z-3D</td>
<td>EX-TV14H 235-02Z-3D</td>
<td>EX-TV14H 235-02ZH-3D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-TV14H 235-20Z-3D</td>
<td>EX-TV14H 235-20Z-3D</td>
<td>EX-TV14H 235-20ZH-3D</td>
<td></td>
</tr>
</tbody>
</table>

Dust zone 22

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More Details

Detailed technical information at:
www.schmersal.net

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Position switches with safety function

**EX-Z/T 335-…-3G/D**

| Equipment category: | Ex NC IIC T5 X | Ex TD A22 IP67 T90°C X |
| Standards: | EN 60947-5-1 | EN 61241-0 | EN 61241-1 | EN 60079-0 | EN 60079-15 | BG-GS-ET-15 | DIN EN 50041 |
| Design: | Light-alloy diecast, paint finish |
| Max. impact energy: | 4 J |
| Actuating speed: | max. 1 m/s |
| Protection class: | IP 67 to EN 60529 |
| Contact material: | Silver |
| Contact type: | Change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges |
| Switching system: | EN 60947-5-1, slow action or snap action, positive break NC contact |
| Connection: | Screw terminals |
| Cable section: | max. 2.5 mm² (including conductor ferrules) |
| Cable entry: | M20 |
| Ui: | 6 kV -03Z, -12Z: 4 kV |
| U1: | 500 V -03Z, -12Z: 250 V |
| Imax: | 10 A |
| Utilisation category: | AC-15, DC-13 |
| Ie/Ue: | 4 A / 230 VAC 4 A / 24 VDC |
| Max. fuse rating: | 6 A gG D-fuse |
| Ambient temperature: | –20 °C … +60 °C |
| Mechanical life: | 30 million operations |
| Switching frequency: | max. 5000/h |
| Bounce duration: | Snap action: in accordance with actuating speed; Slow action: <2 ms |
| Switchover time: |

**Approvals**

- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- 1 cable entry M20
- incl. Ex-certified cable gland

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z</td>
<td>Snap action A</td>
</tr>
<tr>
<td>2</td>
<td>T</td>
<td>Slow action A</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>3</td>
<td>02</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>2 NO contacts*</td>
</tr>
<tr>
<td>3</td>
<td>01/01</td>
<td>1 NO contact to the left / 1 NC contact to the right</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>1 NO contact / 2 NC contacts</td>
</tr>
<tr>
<td>3</td>
<td>03</td>
<td>3 NC contacts</td>
</tr>
<tr>
<td>4</td>
<td>H</td>
<td>Slow action with staggered contacts</td>
</tr>
<tr>
<td></td>
<td>UE</td>
<td>with overlapping contacts</td>
</tr>
</tbody>
</table>

**System components**

- Snap action: <2 ms; Slow action: in accordance with actuating speed
- Cable cross-section of the cable glands: min. Ø 7 mm max. Ø 12 mm

**Technical data**

**System components**

- EX-certified screwed cable gland

**Ordering details**

- Enclosure with transverse slotted holes
- Roller lever 7H for safety duties
- Gold-plated contacts

* Switches with 2 NO contacts are only suitable for positioning tasks!
Position switches with safety function

Technical data

- Equipment category: IIC T5 X
- Ex protection: EN 60947-5-1
- Standards: EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15
- Design: light-alloy diecast, paint finish
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact type: Change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action or snap action, positive break NC contact
- Connection: screw terminals (including conductor ferrules)
- Cable entry: 3 x M 20
- Cable cross-section: min. Ø 7 mm, max. Ø 12 mm
- Uimp: 6 kV
- -03z, -12z: 4kV
- U1: 500 V
- -03z, -12z: 250 V
- Iimp: 10 A
- Utilisation category: AC-15, DC-13
- Ie/Ue: 4 A / 230 VAC, 4 A / 24VDC
- Max. fuse rating: 6 A gG D-fuse
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: max. 5000/h
- Switching frequency: max. 5000/h
- Bounce duration: Snap action: in accordance with actuating speed; Slow action: < 2 ms
- Snap action time: Snap action: < 2 ms; Slow action: in accordance with actuating speed
- Number of contacts: 1 … 2 NC contacts
- Number of NO contacts: 1 … 2
- Number of NC contacts: 1 … 3

System components

- EX-certified screwed cable gland
- EX-certified screw plug M20

Ordering details

EX-Z/T 355-...-3G/D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z</td>
<td>Snap action A</td>
</tr>
<tr>
<td>2</td>
<td>T</td>
<td>Slow action A</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td></td>
<td>01/01</td>
<td>1 NC contact to the left/ 1 NC contact to the right</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>1 NO contact / 2 NC contacts</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>3 NC contacts</td>
</tr>
<tr>
<td>4</td>
<td>H</td>
<td>Slow action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with staggered contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with overlapping contacts</td>
</tr>
</tbody>
</table>

EX-certified screwed cable gland

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1297</td>
<td>Enclosure with transversely slotted mounting holes</td>
</tr>
<tr>
<td>2</td>
<td>2138</td>
<td>Roller lever 7H for safety duties</td>
</tr>
<tr>
<td>3</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

* Switches with 2 NO contacts are only suitable for positioning tasks!
Position switches with safety function

**Plunger S**

- Actuator type B to EN 50041
- Required actuating force
  - Snap action: 12 N
  - Slow action: 17 N
- Actuating speed with actuating angle 0° to switch axis: max. 0.5 m/s

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 NO contact / 1 NC contact</strong></td>
<td>EX-ZS 3..-11Z-3G/D</td>
<td>EX-TS 3..-11Z-3G/D</td>
<td>EX-TS 3..-11ZUE-3G/D</td>
<td></td>
</tr>
<tr>
<td><strong>2 NC contacts</strong></td>
<td>EX-ZS 3..-02Z-3G/D</td>
<td>EX-TS 3..-02Z-3G/D</td>
<td>EX-TS 3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td><strong>2 NO contacts</strong></td>
<td>EX-TS 3..-20Z-3G/D</td>
<td>EX-TS 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 NO contact / 2 NC contact</strong></td>
<td>EX-TS 3..-12Z-3G/D</td>
<td>EX-TS 3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3 NC contacts</strong></td>
<td>EX-TS 3..-03Z-3G/D</td>
<td>EX-TS 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Roller plunger R**

- Actuator type C to EN 50041
- Required actuating force
  - Snap action: 12 N
  - Slow action: 17 N
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

**Contact variants**

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 NO contact / 1 NC contact</strong></td>
<td>EX-ZR 3..-11Z-3G/D</td>
<td>EX-TR 3..-11Z-3G/D</td>
<td>EX-TR 3..-11ZUE-3G/D</td>
<td></td>
</tr>
<tr>
<td><strong>2 NC contacts</strong></td>
<td>EX-ZR 3..-02Z-3G/D</td>
<td>EX-TR 3..-02Z-3G/D</td>
<td>EX-TR 3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td><strong>2 NO contacts</strong></td>
<td>EX-TR 3..-20Z-3G/D</td>
<td>EX-TR 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 NO contact / 2 NC contact</strong></td>
<td>EX-TR 3..-12Z-3G/D</td>
<td>EX-TR 3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3 NC contacts</strong></td>
<td>EX-TR 3..-03Z-3G/D</td>
<td>EX-TR 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gas zone 2 / Dust zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Position switches with safety function

Roller lever H

- Actuator type A to EN 50041
- Required actuating torque
  - Snap action: 26 Ncm
  - Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Also available with plastic roller, ordering suffix: 1H
- Available with metal roller, ordering suffix: -RMS

On version EX-TVH ...-01/01z positive break only to one side.

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z4VH3..-11z-3G/D</td>
<td>EX-T4VH3..-11z-3G/D</td>
<td>EX-T4VH3..-11z-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-Z4VH3..-02z-3G/D</td>
<td>EX-T4VH3..-02z-3G/D</td>
<td>EX-T4VH3..-02zh-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4VH3..-20z-3G/D</td>
<td>EX-T4VH3..-20zh-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC contact to the left</td>
<td>EX-T4VH3..-12z-3G/D</td>
<td>EX-T4VH3..-12z3-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC contact to the right</td>
<td>EX-T4VH3..-12z3-3G/D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC contacts</td>
<td>EX-T4VH3..-03z-3G/D</td>
<td>EX-T4VH3..-03z-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rod lever 10H

- Only for positioning tasks
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque
  - Snap action: 26 Ncm
  - Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix: -1183

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z4V10H3..-11Z-3G/D</td>
<td>EX-T4V10H3..-11Z-3G/D</td>
<td>EX-T4V10H3..-11ZU-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-Z4V10H3..-02Z-3G/D</td>
<td>EX-T4V10H3..-02Z-3G/D</td>
<td>EX-T4V10H3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4V10H3..-20Z-3G/D</td>
<td>EX-T4V10H3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC contact to the left</td>
<td>EX-T4V10H3..-12Z-3G/D</td>
<td>EX-T4V10H3..-12Z3-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC contact to the right</td>
<td>EX-T4V10H3..-12Z3-3G/D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC contacts</td>
<td>EX-T4V10H3..-03Z-3G/D</td>
<td>EX-T4V10H3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Gas zone 2 / Dust zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Position switches with safety function

Roller lever 7H

- only for positioning tasks
- Required actuating torque
  Snap action: 26 Ncm
  Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

Contact variants

Switch travel/Contacts | Snap action | Slow action | Slow action with overlapping contacts | Slow action with staggered contacts
---|---|---|---|---
1 NO contact 1 NC contact | EX-Z4V7H3..-11Z-3G/D | EX-T4V7H3..-11Z-3G/D | EX-T4V7H3..-11ZUE-3G/D | EX-T4V7H3..-11ZUE-3G/D
2 NC contacts | EX-Z4V7H3..-02Z-3G/D | EX-T4V7H3..-02Z-3G/D | EX-T4V7H3..-02Z-3G/D | EX-T4V7H3..-02Z-3G/D
2 NO contacts | EX-T4V7H3..-20Z-3G/D | EX-T4V7H3..-20Z-3G/D | EX-T4V7H3..-20Z-3G/D | EX-T4V7H3..-20Z-3G/D
1 NC contact to the left 1 NC contact to the right | EX-TV7H3..01/01Z-3G/D | EX-TV7H3..01/01Z-3G/D | EX-TV7H3..01/01Z-3G/D | EX-TV7H3..01/01Z-3G/D
1 NO contact 2 NC contacts | EX-T4V7H3..-12Z-3G/D | EX-T4V7H3..-12Z-3G/D | EX-T4V7H3..-12ZUE-3G/D | EX-T4V7H3..-12ZUE-3G/D
3 NC contacts | EX-T4V7H3..-03Z-3G/D | EX-T4V7H3..-03Z-3G/D | EX-T4V7H3..-03Z-3G/D | EX-T4V7H3..-03Z-3G/D

7H-2138

- for safety duties A
- Required actuating torque
  Snap action: 26 Ncm
  Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TVH ...-01/01z positive break only to one side.

Contact variants

Switch travel/Contacts | Snap action | Slow action | Slow action with overlapping contacts | Slow action with staggered contacts
---|---|---|---|---
1 NO contact 1 NC contacts | EX-Z4V7H3..-11Z-2138-3G/D | EX-T4V7H3..-11Z-2138-3G/D | EX-T4V7H3..-11ZUE-2138-3G/D | EX-T4V7H3..-11ZUE-2138-3G/D
2 NC contacts | EX-Z4V7H3..-02Z-2138-3G/D | EX-T4V7H3..-02Z-2138-3G/D | EX-T4V7H3..-02Z-2138-3G/D | EX-T4V7H3..-02Z-2138-3G/D
2 NO contacts | EX-T4V7H3..-20Z-2138-3G/D | EX-T4V7H3..-20Z-2138-3G/D | EX-T4V7H3..-20Z-2138-3G/D | EX-T4V7H3..-20Z-2138-3G/D
1 NC contact to the left 1 NC contact to the right | EX-TV7H3..01/01Z-2138-3G/D | EX-TV7H3..01/01Z-2138-3G/D | EX-TV7H3..01/01Z-2138-3G/D | EX-TV7H3..01/01Z-2138-3G/D
1 NO contact 2 NC contacts | EX-T4V7H3..-12Z-2138-3G/D | EX-T4V7H3..-12Z-2138-3G/D | EX-T4V7H3..-12ZUE-2138-3G/D | EX-T4V7H3..-12ZUE-2138-3G/D
3 NC contacts | EX-T4V7H3..-03Z-2138-3G/D | EX-T4V7H3..-03Z-2138-3G/D | EX-T4V7H3..-03Z-2138-3G/D | EX-T4V7H3..-03Z-2138-3G/D

Gas zone 2 / Dust zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Position switches with safety function

Offset roller lever 1K

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z1K 3..-11Z-3G/D</td>
<td>EX-T1K 3..-11Z-3G/D</td>
<td>EX-T1K 3..-11ZUE-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-Z1K 3..-02Z-3G/D</td>
<td>EX-T1K 3..-02Z-3G/D</td>
<td>EX-T1K 3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 2 NC contact</td>
<td>EX-T1K 3..-12Z-3G/D</td>
<td>EX-T1K 3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC contacts</td>
<td>EX-T1K 3..-03Z-3G/D</td>
<td>EX-T1K 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Required actuating force
  Snap action: 12 N
  Slow action: 17 N
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Angle roller lever 3K

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-Z3K 3..-11Z-3G/D</td>
<td>EX-T3K 3..-11Z-3G/D</td>
<td>EX-T3K 3..-11ZUE-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-Z3K 3..-02Z-3G/D</td>
<td>EX-T3K 3..-02Z-3G/D</td>
<td>EX-T3K 3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 2 NC contact</td>
<td>EX-T3K 3..-12Z-3G/D</td>
<td>EX-T3K 3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC contacts</td>
<td>EX-T3K 3..-03Z-3G/D</td>
<td>EX-T3K 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Required actuating force
  Snap action: 12 N
  Slow action: 17 N
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below
Position switches

EX-MAF 330-...-3D

Technical data

- Equipment category: II 3D
- Ex protection: Ex tD A22 IP65 T100°C X
- Standards: EN 60947-5-1
- Enclosure: light-alloy diecast, paint finish
- Actuator: stainless steel 1.4301
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Protection class: IP 65 to EN 60529
- Contact material: Silver
- Contact type: Change-over contact with double break type Zb, 3 NC contacts with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action, positive break NC contact
- Connection: screw terminals
- Cable section: max. 2.5 mm², min. 0.75 mm² (including conductor ferrules)
- Cable entry: M20
- Uimp: 4 kV
- Ur: 250 V
- Iimp: 10 A
- Utilisation category: AC-15, DC-13
- Ie/Ue: 4 A / 230 VAC
- 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 10.7 mm
- Positive break force: each NC contact 5 N
- Ambient temperature: –15 °C ... +80 °C
- Mechanical life: 10 million operations
- Latching force: 30 N for ordering suffix r
- Cable cross-section of the cable glands: min. Ø 7 mm, max. Ø 12 mm

System components

EX-certified screwed cable gland

EX-MAF 330-11Y-➀-➁

Ordering details

- No. | Option | Description
- 1 | without LED
- 2 | AuNi Gold-rickel alloy contacts

Ordering details

EX-certified screwed cable gland

EX-KLE-M20x1.5

Dust zone 22

• Ex certified
• Metal enclosure
• Snap action with self-cleaning contacts, change-over contact with double break, silver contacts
• type Zb, with galvanically separated contact bridges
• Suitable for low actuating speeds
• 3 contacts
• Long life
• High level of contact reliability with low voltages and currents
• Mounting details to EN 50041
• Actuator heads can be repositioned in steps 4 x 90°
• Can be mounted on a flat surface
• Slotted holes for adjustment, circular holes for location
• 1 cable entry M20
• Including Ex-certified screwed cable gland
• Actuating speed min. 10 mm/min related to the plunger

Approvals

Ex

CE

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Position switches

Spring rod lever AF

- Required actuating force 9.0 N
- can be deflected in any direction
- Elasticity of the spring allows for deflection above the max. switching angle of 15°

Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Snap action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>MAF 330-11y</td>
</tr>
</tbody>
</table>

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Position switches

**EX-T 335-...**

- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Slow action with 2 positive-break NC contacts to EN 60947-5-1 available
- Slow action available with overlapping contacts
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- 1 cable entry M20
- Including Ex-certified screwed cable gland

**Technical data**

- Equipment category: II 2GD
- Ex protection: Ex de IIC T6
- Standards: EN 60947-5-1
- EN 61241-0
- EN 61241-1
- EN 60079-0
- EN 60079-1
- BG-GS-ET-15
- DIN EN 50041
- Design: zinc die-cast, paint finish
- Enclosure: 
- Max. impact energy: 7 J
- Actuating speed: max. 1 m/s
- Protection class: IP 65, IP 67
- to EN 60529
- Contact material: Silver
- Contact type: Change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action, positive break NC contact
- Connection: screw terminals
- Cable section: 1 mm² - 2.5 mm² (including conductor ferrules)
- Cable entry: M20
- U_imp: 4 kV
- U_t: 250 V
- I_th: 5 A
- Utilisation category: AC-1
- Max. fuse rating: 6 A gG D-fuse
- Ambient temperature: cable section 2.5 mm² -20 °C ... + 55 °C
cable section 1 mm² -20 °C ... + 50 °C
- Mechanical life: > 1 million operations
- Switching frequency: max. 1800/h
- Bounce duration:
  - Slow action: < 3 ms
  - Switchover time: in accordance with actuating speed
- Cable cross-section of the cable glands: min. Ø 7 mm
  max. Ø 12 mm

**System components**

**EX-certified screwed cable gland**

**Approvals**

![ExEx](image)

**Ordering details**

**EX-T® 335-2Y3-8**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>②</td>
<td>02</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>③</td>
<td>UE</td>
<td>with overlapping contacts</td>
</tr>
<tr>
<td>④</td>
<td>2138</td>
<td>Roller lever 7H for safety duties</td>
</tr>
</tbody>
</table>

* Switches with 2 NO contacts are only suitable for positioning tasks!

---

**Ordering details**

EX-certified screwed cable gland EX-KLE-M20x1.5
Position switches

**Plunger S**

- Actuator type B to EN 50041
- Required actuating force
  - Slow action: 17 N
- Actuating speed with actuating angle 0° to switch axis: max. 0.5 m/s

**Roller plunger R**

- Actuator type C to EN 50041
- Required actuating force
  - Slow action: 17 N
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

### Contact variants

**Switch travel/Contacts**

<table>
<thead>
<tr>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
</table>

#### 1 NO contact / 1 NC contact

- **EX-TS 335-11Y**

<table>
<thead>
<tr>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-22</td>
<td>21-22</td>
<td>13-14</td>
<td>13-14</td>
</tr>
</tbody>
</table>

- **EX-TS 335-11YUE**

<table>
<thead>
<tr>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-22</td>
<td>21-22</td>
<td>13-14</td>
<td>13-14</td>
</tr>
</tbody>
</table>

#### 2 NC contacts

- **EX-TS 335-02Y**

<table>
<thead>
<tr>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-22</td>
<td>21-22</td>
<td>13-14</td>
<td>13-14</td>
</tr>
</tbody>
</table>

#### 2 NO contacts

- **EX-TS 335-20Y**

<table>
<thead>
<tr>
<th>0</th>
<th>0</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14</td>
<td>13-14</td>
<td>23-24</td>
<td>23-24</td>
</tr>
</tbody>
</table>

Gas zone 1 / Dust zone 21

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### Position switches

#### Roller lever H

- Actuator type A to EN 50041
- Required actuating torque
  - Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

#### Rod lever 10H

- Only for positioning tasks
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque
  - Slow action: 31 Ncm
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roller lever H</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T4VH 335-11Y</td>
<td>EX-T4VH 335-11YUE</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T4VH 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4VH 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rod lever 10H</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T4V10H 335-11Y</td>
<td>EX-T4V10H 335-11YUE</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T4V10H 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4V10H 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>

Gas zone 1 / Dust zone 21
## Position switches

### Roller lever 7H

- **Only for positioning tasks**
- **Required actuating torque**
  - Slow action: 31 Ncm
  - Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T4V7H 335-11Y</td>
<td>EX-T4V7H 335-11YUE</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T4V7H 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4V7H 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>

### 7H-2138

- **For safety duties**
- **Required actuating torque**
  - Slow action: 31 Ncm
  - Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T4V7H 335-11Y-2138</td>
<td>EX-T4V7H 335-11YUE-2138</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T4V7H 335-02Y-2138</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T4V7H 335-20Y-2138</td>
<td></td>
</tr>
</tbody>
</table>
Position switches

### Offset roller lever 1K

![Image of Offset roller lever 1K]

- **Required actuating force**
  Slow action: 17 N
- **Actuating speed with actuating angle 30° to switch axis:** max. 0.5 m/s

### Angle roller lever 3K

![Image of Angle roller lever 3K]

- **Required actuating force**
  Slow action: 17 N
- **Actuating speed with actuating angle 30° to switch axis:** max. 0.5 m/s
- **Actuation parallel to axis of switch from below**

### Contact variants

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Offset roller lever 1K</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T1K 335-11Y</td>
<td>EX-T1K 335-11YUE</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T1K 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T1K 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch travel/Contacts</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Angle roller lever 3K</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO contact / 1 NC contact</td>
<td>EX-T3K 335-11Y</td>
<td>EX-T3K 335-11YUE</td>
</tr>
<tr>
<td>2 NC contacts</td>
<td>EX-T3K 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts</td>
<td>EX-T3K 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>
Position switches

**EX-T/M 441-...**

- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries M20
- Protection class IP 65, IP 66 and IP 67
- Suitable for heavy duty

**Technical data**

- **Equipment category:** Ex II 2D
- **Ex protection:** Ex tD A21 IP65 T90°C X
- **Standards:** EN 60947-5-1; EN 61241-0, EN 61241-1
- **Enclosure:** Grey cast iron, galvanized and painted
- **Actuating speed:**
- **Protection class:** IP 65, IP 66 and IP 67 to EN 60529
- **Contact material:** Silver, gold-flashed
- **Switching system:** Snap- and slow action with double break
- **Contact type:** Slow action: positive break NC contact of double break of 2 separated contact bridges
- **Connection:** Screw terminals M 4
- **Cable section:** Max. 2.5 mm² (incl. conductor ferrules)
- **U_{imp}:** Snap action: 4 kV; slow action: 6 kV
- **U_i:** Snap action: 250 V; slow action: 400 V
- **I_{max}:** 16 A
- **I_e/U_e:** Snap action: 4 A / 230 V; Slow action: 4 A / 400 V
- **Utilisation category:** AC-15
- **Max. fuse rating:** 16 A gG D-fuse
- **Contact break:** Max. 2 x 2.5 mm
- **Switcher time:** Snap action: 35 ms
- **Bounce duration:** Snap action: 5 ms
- **Ambient temperature:** –20 °C ... +60 °C
- **Mechanical life:** 10 million operations
- **Switching frequency:** Max. 3000/h
- **Cable cross-section:** Min. Ø 7 mm
- **of the cable glands:** Max. Ø 12 mm
- **Switch zone 21/22**

**Approvals**

- Ex certified

**Ordering details**

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>Snap action</td>
</tr>
<tr>
<td>1</td>
<td>T</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td>UE</td>
<td>Slow action with overlapping contacts</td>
</tr>
</tbody>
</table>

**Ordering details**

- **EX-KLE-M20x1.5**
- **EX-KLE-M25x1.5**
- **EX-VS-M20x1.5**
- **EX-VS-M25x1.5**

see page 76
Actuator selection (actuators must be ordered separately)
Position switches

EX-T/M 250-...

- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries M25
- Protection class IP 65, IP 66 and IP 67
- Suitable for heavy duty

Technical data

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>Ex tD A21 IP67 T90°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td></td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 60947-5-1; EN 61241-0, EN 61241-1</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Grey cast iron, galvanized and painted</td>
</tr>
<tr>
<td>Actuating speed:</td>
<td>IP 65, IP 66 and IP 67 to EN 60529</td>
</tr>
<tr>
<td>Protection class:</td>
<td>Silver, gold-flashed</td>
</tr>
<tr>
<td>Contact material:</td>
<td>Snap action, change-over contact, slow action positive break NC</td>
</tr>
<tr>
<td>Contact type:</td>
<td>Contact A double break with 2 separate contact bridges</td>
</tr>
<tr>
<td>Switching system:</td>
<td>Snap- and slow action</td>
</tr>
<tr>
<td>Connection:</td>
<td>Screw terminals M 4</td>
</tr>
<tr>
<td>Cable section:</td>
<td>Max. 2.5 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>U_imp:</td>
<td>6 kV</td>
</tr>
<tr>
<td>U_i:</td>
<td>500 V</td>
</tr>
<tr>
<td>I_max:</td>
<td>16 A</td>
</tr>
<tr>
<td>I/U:</td>
<td>4 A / 400 VAC</td>
</tr>
<tr>
<td>Utilisation category:</td>
<td>AC-15</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>16 A gG D-fuse</td>
</tr>
<tr>
<td>Contact break:</td>
<td>Snap action:</td>
</tr>
<tr>
<td></td>
<td>Max. 2 x 2.5 mm</td>
</tr>
<tr>
<td></td>
<td>Slow action:</td>
</tr>
<tr>
<td></td>
<td>Max. 2 x 2 mm</td>
</tr>
<tr>
<td>Switchover time:</td>
<td>35 ms</td>
</tr>
<tr>
<td>Bounce duration:</td>
<td>5 ms</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>–20 °C ... +60 °C</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>10 million operations</td>
</tr>
<tr>
<td>Switching frequency:</td>
<td>Max. 3000/h</td>
</tr>
<tr>
<td>Cable cross-section of the cable glands:</td>
<td>Min. Ø 14 mm</td>
</tr>
<tr>
<td></td>
<td>Max. Ø 18 mm</td>
</tr>
</tbody>
</table>

Contact variants

1 NO / 1 NC contacts

Snap action

Slow action

2 NO / 2 NC contacts

Snap action

Slow action

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>Snap action</td>
</tr>
<tr>
<td>T</td>
<td>Slow action</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1 NO/1 NC contacts</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
<td></td>
</tr>
</tbody>
</table>

EX-➀250-➁Z-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>EX-KLE-M20x1.5</td>
</tr>
<tr>
<td>T</td>
<td>Slow action</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1 NO/1 NC contacts</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
<td></td>
</tr>
</tbody>
</table>

see page 76
Actuator selection (actuators must be ordered separately)

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>EX-KLE-M20x1.5</td>
</tr>
<tr>
<td>T</td>
<td>Slow action</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1 NO/1 NC contacts</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
<td></td>
</tr>
</tbody>
</table>

see page 84
EX-certified screwed cable gland
EX-certified screwed cable gland
EX-certified screw plug
EX-certified screw plug

see page 76
Actuator selection (actuators must be ordered separately)
Position switches

**EX-TS 064-...**

- Ex certified
- Metal enclosure
- 3 or 4 contact, slow action A
- Roller levers J and X can be subsequently fitted at plunger S
- Actuator head can be repositioned in steps 4 x 90°
- 2 cable entries M25
- Protection class IP 65, IP 66 and IP 67

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

**Technical data**

- Equipment category: II 2D
- Ex protection: Ex tD A21 IP65 T90°C X
- Standards: EN 60947-5-1, EN 61241-0, EN 61241-1
- Enclosure: Grey cast iron, galvanized and painted
- Actuating speed: max. 1 m/s, min. 0.01 m/s at the plunger
- Protection class: IP 65, IP 66 and IP 67 to EN 60529
- Contact material: silver, gold-flashed
- Switching system: slow action with double break
- Contact type: NC contact positive break
- Connection: screw terminals M 5
- Cable section: max. 4 mm² (incl. conductor ferrules)
- Contact variant: 1 NO contact / 1 NC contact
- Actuating angle: max. 20°
- Weight: approx. 3.2 kg
- Cable cross-section of the cable glands: max. Ø 18 mm

**Ordering details**

- **EX-TS 064-2Y-3-1276-2**
- **N°** | **Option** | **Description**
- ➀ | For the appropriate actuator: see page 72
- ① | 03 | 3 NC contacts
- 12 | 1 NO/2 NC
- 21 | 2 NO/1 NC
- 30 | 3 NO contacts
- 04 | 4 NC contacts
- 13 | 1 NO/3 NC
- 22 | 2 NO/2 NC
- 31 | 3 NO/1 NC
- 40 | 4 NO contacts
- ③ | UE | Slow action with overlapping contacts
- | H | with staggered contacts

**Contact variants**

- **Plunger S**
  - 1 NO contact / 1 NC contact
- **Offset roller lever J**
  - 1 NO contact / 1 NC contact
- **Offset roller lever X**
  - 1 NO contact / 1 NC contact

**Approvals**

- IECEx
- CE

**Ordering details**

- **EX-KLE-M25x1.5**
- **EX-VS-M25x1.5**

**Force-travel diagram**
Position switches

EX-MS 064-...

- Ex certified
- Metal enclosure
- 3 or 4 contact, snap action with double break
- Roller levers J and X can be subsequently fitted at plunger S
- Actuator head can be repositioned in steps 4 x 90°
- 2 cable entries M25
- Protection class IP 65, IP 66 and IP 67

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

Technical data

Equipment category: ➀ II 2D
Ex protection: Ex tD A21 IP65 T90°C X
Standards: EN 60947-5-1, EN 61241-0, EN 61241-1
Enclosure: Grey cast iron, galvanized and painted
Protection class: IP 65, IP 66 and IP 67 to EN 60529
Contact material: silver, gold-flashed
Switching system: snap action with double break
Contact type: change-over contact, galvanically separated contact bridges
Connection: screw terminals M 5
Cable section: max. 4 mm² (incl. conductor ferrules)

U_imp: 6 kV
U_i: 500 V
I_imp: 25 A
I_e/U_e: 25 A / 400 VAC
Utilisation category: AC-15
Allowed horsepower: at 400 V

3-phase 5.5 kW
3-phase 5.5 kW
3-phase 5.5 kW
3-phase 5.5 kW
(squirrel-cage rotor n = 1500 rpm)
max. 2 x 4 mm
max. 2 x 4 mm
max. 2 x 4 mm
max. 2 x 4 mm

Ambient temperature: – 20 °C … + 60 °C
Mechanical life: 30000 operations
Switching frequency: max. 1000/h
Actuating speed: max. 1 m/s, min. 0.01 m/s at the plunger
Actuating angle: max. 20°
Weight: approx. 3.6 kg
Cable cross-section of the cable glands:

Contact variants

Plunger S
1 NC contact
1 NO contact
Offset roller lever J
1 NC contact
1 NO contact
Offset roller lever X
1 NC contact
1 NO contact

Ordering details

EX-M 064-3Y-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>For the appropriate actuator: see page 72</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>03</td>
<td>3 NC contacts</td>
</tr>
<tr>
<td>12</td>
<td>1 NO/2 NC</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>2 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3 NO contacts</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>4 NC contacts</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1 NO/3 NC</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>3 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>4 NO contacts</td>
<td></td>
</tr>
</tbody>
</table>

Force-travel diagram

EX-certified screwed cable gland
EX-KLE-M25x1.5
EX-certified screw plug
EX-VS-M25x1.5

Approvals

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
### Position switches

#### System components

<table>
<thead>
<tr>
<th>EX-certified screwed cable gland</th>
<th>Plunger S</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="EX-certified_screwed_cable_gland.png" alt="Image" /></td>
<td><img src="Plunger_S.png" alt="Image" /></td>
</tr>
</tbody>
</table>

- Actuating speed 1 m/s with an actuating angle of max. 20°
- Roller levers J and X can be subsequently fitted at plunger S

Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

Recommendation: use roller lever

#### Offset roller lever J

<table>
<thead>
<tr>
<th><img src="Offset_roller_lever_J.png" alt="Image" /></th>
</tr>
</thead>
</table>

- Actuating speed max. 0.5 m/s with an actuating angle of $a = 45°$ and $b = 30°$
- Plastic roller (metal roller on request)
- Actuator head can be repositioned in steps $4 \times 90°$
- Available with rubber roller, ordering suffix -1

Actuation from the right side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

#### Ordering details

<table>
<thead>
<tr>
<th>EX-certified screwed cable gland</th>
<th>EX-KLE-M25x1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX-certified screw plug</td>
<td>EX-VS-M25x1.5</td>
</tr>
</tbody>
</table>

#### Offset roller lever X

<table>
<thead>
<tr>
<th><img src="Offset_roller_lever_X.png" alt="Image" /></th>
</tr>
</thead>
</table>

- Actuating speed max. 0.5 m/s with an actuating angle of $a = 45°$ and $b = 30°$
- Plastic roller (metal roller on request)
- Actuator head can be repositioned in steps $4 \times 90°$

Actuation from the right side of the plunger should be avoided, since this reduces the mechanical life of the position switch.

**Legend**

$a$: Actuating angle from right of switch axis

$b$: Actuating angle from left of switch axis

---

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Position switches

EX-T. 064-...

Technical data

- Equipment category: Ex II 2D
- Ex protection: Ex tD A21 IP65 T90°C X
- Standards: EN 60947-5-1, EN 61241-0, EN 61241-1
- Enclosure: Grey cast iron, galvanized and painted
- Protection class: IP 65, IP 66 and IP 67 to EN 60529
- Contact material: silver, gold-flashed
- Switching system: slow action with double break
- Contact type: NC contact positive break
- Connection: screw terminals M 5
- Cable section: max. 4 mm² (incl. conductor ferrules)
- $U_{imp}$: 6 kV
- $U_i$: 500 V
- $I_{th}$: 25 A
- $I_e/U_e$: 25 A / 400 VAC
- Utilisation category: AC-15
- Max. fuse rating: 16 A gG D-fuse
- Allowed horsepower: at 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
- Contact break: max. 2 x 4 mm
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: 1 million operations
- Switching frequency: max. 1000/h
- Actuating speed: max. 3 m/s, min. 0.05 m/s
- Actuating angle: max. 30°
- Weight: approx. 3.5 kg
- Cable cross-section of the cable glands: min. Ø 14 mm, max. Ø 18 mm

Contact variants

- Roller lever
  - 1 NO contact
  - 1 NC contacts
- only NO contacts
- only NC contacts

Ordering details

EX-T. 064-1 Y-2-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>3 NC contacts</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1 NO/2 NC</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>2 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>3 NO contacts</td>
<td></td>
</tr>
<tr>
<td>01/02</td>
<td>1 NC to the left/2 NC to the right</td>
<td></td>
</tr>
<tr>
<td>02/01</td>
<td>2 NC to the left/1 NC to the right</td>
<td></td>
</tr>
<tr>
<td>10/20</td>
<td>1 NC to the left/2 NC to the right</td>
<td></td>
</tr>
<tr>
<td>20/10</td>
<td>2 NC to the left/1 NC to the right</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>H</td>
<td>with staggered contacts</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>Latching 2 x 45°</td>
</tr>
<tr>
<td>3</td>
<td>1877</td>
<td>Toothed shaft</td>
</tr>
</tbody>
</table>

Force-travel diagram

Ordering details

- see page 72
- EX-certified screwed cable gland
  - EX-KLE-M25x1.5
- EX-certified screw plug
  - EX-VS-M25x1.5

see page 76

Actuator selection (actuators must be ordered separately)
Position switches

EX-M. 064 R

- Ex certified
- Metal enclosure
- 3 or 4 contact, snap action with double break
- Actuating direction always 50° right-hand side rotation
- 2 cable entries M25
- Protection class IP 65, IP 66 and IP 67
- Splined shaft and lever available with 10° toothing

Technical data

- Equipment category: L II 2D
- Ex protection: Ex tD A21 IP65 T90°C X
- Standards: EN 60947-5-1, EN 61241-0, EN 61241-1
- Enclosure: Grey cast iron, galvanized and painted
- Protection class: IP 65, IP 66 and IP 67 to EN 60529
- Contact material: silver, gold-flashed
- Switching system: snap action with double break
- Connection: screw terminals M 5
- Cable section: max. 4 mm² (incl. conductor ferrules)
- Uimp: 6 kV
- U: 500 V
- Im: 25 A
- U/I: 25 A / 400 VAC
- Utilisation category: AC-15
- Max. fuse rating: 25 A gG D-fuse
- Allowed horsepower: bei 400 V 3-phase 5.5 kW
- (squirrel-cage rotor n = 1500 rpm)
- Contact break: max. 2 x 4 mm
- Ambient temperature: –20 °C ... + 60 °C
- Mechanical life: 30000 operations
- Switching frequency: max. 1000/h
- Actuating speed: max. 3 m/s, min. 0.05 m/s
- Actuating angle: max. 30°
- Weight: approx. 3.7 kg
- Cable cross-section of the cable glands: min. Ø 14 mm, max. Ø 18 mm

Contact variants

- Roller lever
  - 1 NC contacts
  - 1 NO contact

Ordering details

EX-M. 064-➀-Y-R-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1</td>
<td>1 NO/2 NC</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>2 NO/1 NC</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>3 NO contacts</td>
</tr>
<tr>
<td>31</td>
<td>3</td>
<td>3 NO/1 NC</td>
</tr>
<tr>
<td>40</td>
<td>4</td>
<td>4 NO contacts</td>
</tr>
<tr>
<td>1877</td>
<td>1</td>
<td>Toothed shaft</td>
</tr>
</tbody>
</table>

Ordering details

- see page 72
- EX-certified screwed cable gland EX-KLE-M25x1.5
- EX-certified screw plug EX-VS-M25x1.5

Ordering details

- see page 76
- Actuator selection (actuators must be ordered separately)
Position switches

**EX-M. 064 L**

- Ex certified
- Metal enclosure
- 3 or 4 contact, snap action with double break
- Actuating direction always 55° left-hand side rotation
- 2 cable entries M25
- Protection class IP 65, IP 66 and IP 67
- Splined shaft and lever available with 10° toothing

### Technical data

- **Equipment category:** II 2D
- **Ex protection:** Ex tD A21 IP65 T90°C X
- **Standards:** EN 60947-5-1, EN 61241-0, EN 61241-1
- **Enclosure:** Grey cast iron, galvanized and painted
- **Protection class:** IP 65, IP 66 and IP 67 to EN 60529
- **Contact material:** silver, gold-flashed
- **Switching system:** snap action with double break
- **Contact type:** change-over contact, galvanically separated contact bridges
- **Connection:** screw terminals M 5
- **Cable section:** max. 4 mm² (incl. conductor ferrules)
- **Uimp:** 6 kV
- **Ue:** 500 V
- **Ihas:** 25 A
- **Ie/Ue:** 25 A / 400 VAC
- **Utilisation category:** AC-15
- **Max. fuse rating:** 25 A gG D-fuse
- **Protection class:** IP 65, IP 66 and IP 67 to EN 60529
- **Contact material:** silver, gold-flashed
- **Switching system:** snap action with double break
- **Contact type:** change-over contact, galvanically separated contact bridges
- **Connection:** screw terminals M 5
- **Cable section:** max. 4 mm² (incl. conductor ferrules)
- **Uimp:** 6 kV
- **Ue:** 500 V
- **Ihas:** 25 A
- **Ie/Ue:** 25 A / 400 VAC
- **Utilisation category:** AC-15
- **Max. fuse rating:** 25 A gG D-fuse
- **Protection class:** IP 65, IP 66 and IP 67 to EN 60529

### Contact variants

- **Roller lever**
  - 1 NC contacts
  - 1 NO contact

### Ordering details

#### EX-M. 064-Y-L-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>03</td>
<td>3 NC contacts</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>1 NO/2 NC</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>2 NO/1 NC</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>4 NC contacts</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>1 NO/3 NC</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>2 NO/2 NC contacts</td>
</tr>
<tr>
<td>②</td>
<td>1877</td>
<td>Toothed shaft</td>
</tr>
</tbody>
</table>

#### Force-travel diagram

- See page 72

#### Ordering details

- EX-certified screwed cable gland
  - EX-KLE-M25x1.5
- EX-certified screw plug
  - EX-VS-M25x1.5

- Actuator selection (actuators must be ordered separately)
Position switches

**Roller lever L**
- Actuating speed max. 3 m/s with an actuating angle of $a$ and $b = 30^\circ$
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

**Roller lever V**
- Actuating speed max. 3 m/s with an actuating angle of $a$ and $b = 30^\circ$
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

**Fork lever C**
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

**Roller lever A**
- Actuating speed max. 3 m/s with an actuating angle of $a$ and $b = 30^\circ$
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

**Pull lever Z**
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

**Offset roller lever 4D**
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

**Roller lever 2A**
- Actuating speed max. 3 m/s with an actuating angle of $a$ and $b = 30^\circ$
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

**Pull lever 2Z**
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

**Legend**
- $a$: Actuating angle from right of switch axis
- $b$: Actuating angle from left of switch axis
Safety switch for hinged guards

The position switches with safety function are suitable for hinged guards, which need to be closed in order to ensure the required operational safety.
**Safety switch for hinged guards**

**EX-TV.S 335-3D**

- Metal enclosure
- Good resistance to oil and petroleum spirit
- The actuator can be turned by 4 x 90° using Torx T 20 screwdriver with pin
- Actuator shaft can be turned 360°
- 1 Cable entry M20
- Shaft bore Ø 8 and 10 mm

**Technical data**

- Equipment category: L II 3D
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1; EN 61241-0; EN 61241-1
- Enclosure: light-alloy diecast, paint finish stainless steel 1.4301
- Actuator: stainless steel 1.4301
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Protection class: IP 67 to EN 60529
- Contact material: Silver
- Contact types: Change-over contact with double break type Zb, 3 NC contacts with galvanically separated contact bridges
- Switching system: EN 60947-5-1, slow action, positive break NC contact
- Connection: screw terminals
- Cable section: max. 2.5 mm²
- (incl. conductor ferrules)
- Cable entry: M20
- U_{imp}:
  - 6 kV
- U_{I}:
  - 500 V
- I_{M}:
  - 10 A
- Utilisation category: AC-15; DC-13
- I_{U} / U_{C}:
  - 4 A / 230 VAC
  - 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 10.7 mm
- Positive break force: each NC contact 5 N
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: > 1 million operations
- Switching frequency: max. 1000/h
- Shaft bore: Ø 8 mm / 10 mm
- Positive break angle: 7°
- Positive break torque: 0.6 Nm
- B_{10d} value to EN ISO 13849-1: 20 million
- Cable cross-section of the cable glands: min. Ø 7 mm
- max. Ø 12 mm

**Contact variants**

- 1 NO contact
- 1 NC contacts
- 2 NC contacts
- 1 NO contact
- 2 NC contacts
- 3 NC contacts

**Ordering details**

<table>
<thead>
<tr>
<th>Ex-TV.S 335-3Z-③</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 8</td>
<td></td>
<td>Shaft bore Ø 8 mm</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Shaft bore Ø 10 mm</td>
</tr>
<tr>
<td>② 02</td>
<td></td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>3 NC contacts</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>1NO/1NC contact</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td>③</td>
<td></td>
<td>Cable entry M20</td>
</tr>
</tbody>
</table>

**Contact variants**

- Classification: EN ISO 13849-1
- B_{10d} Opener (NC): 20,000,000
- Service life: 20 years

**Approvals**

- CE

**Note**

Closed guard device = 0° in contact switch travel diagrams.

The switch is in resting position.

- Adjustment tool: locking screw to fix, shaft pre-drilled to pin
- Universal joint available to compensate for axial displacement only for Ø 10 mm

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Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Safety switch for hinged guards

System components

<table>
<thead>
<tr>
<th>Fixed hinge F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustable hinge L</td>
</tr>
<tr>
<td>Universal joint K1</td>
</tr>
<tr>
<td>Universal joint K2</td>
</tr>
</tbody>
</table>

EX-certified screwed cable gland

Ordering details

| Fixed hinge F | 1138414 |
| Adjustable hinge L | 1138413 |
| Universal joint K1 | 1138412 |
| Universal joint K2 | 1147448 |

EX-certified screwed cable gland EX-KLE-M20x1.5

(in combination with hinge F or L) only for TV8S 521

for ES 13 SB, ES 95 SB-10mm, TV 10S 335 and TV10S 355

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Ordering details

Detailed technical information at:
www.schmersal.com

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Belt alignment switches and slack-wire switches are suitable for use on material handling equipment. The belt alignment switch is actuated, when the conveyor belt becomes misaligned. Depending on the plant setup, this signal can be used to switch off the machinery or plant either to provide an automatic correction of the belt alignment.
**Belt alignment switch / Slack-wire switch**

**EX-T/M 441-...**

- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries M20
- Belt alignment lever available with different roller lengths
- Protection class IP 65, IP 66 and IP 67
- Suitable for heavy duty

### Technical data

| Equipment category: | Ex II 2D |
| Ex protection: | Ex tD A21 IP65 T90°C X |
| Standards: | EN 60947-5-1; EN 61241-0, EN 61241-1 |
| Enclosure: | Grey cast iron, galvanized and painted |
| Actuating speed: | IP 65, IP 66 and IP 67 to EN 60529 |
| Contact material: | silver, gold-flashed |
| Switching system: | Snap- and slow action with double break |
| Contact types: | Slow action: positive break NC contact; double break of 2 separated contact bridges |
| Connection: | Screw terminals M 4 |
| Cable section: | max. 2.5 mm² (incl. conductor ferrules) |
| Uimp: | snap action: 4 kV; slow action: 6 kV |
| Ul: | slow action: 250 V; snap action: 400 V |
| Ith: | 16 A |
| le/ue: | Slow action: 4 A / 230 V; 4 A / 400 V |
| Utilisation category: | AC-15 |
| Max. fuse rating: | 16 A gG D-fuse |
| Contact break: | Snap action: max. 2 x 2.5 mm; Slow action: max. 2 x 6.0 mm |
| Switchover time: | Snap action: 35 ms |
| Bounce duration: | Snap action: 5 ms |
| Ambient temperature: | – 20 °C ... + 60 °C |
| Mechanical life: | 10 million operations |
| Switching frequency: | max. 3000/h |
| Cable cross-section of the cable glands: | min. Ø 7 mm; max. Ø 12 mm |

### Contact variants

- 1 NO contact
- 1 NC contacts

### Snap action

<table>
<thead>
<tr>
<th>0°</th>
<th>36°</th>
<th>36°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>13°</td>
<td>13°</td>
</tr>
<tr>
<td>60°</td>
<td>60°</td>
<td>60°</td>
</tr>
</tbody>
</table>

### Slow action

<table>
<thead>
<tr>
<th>0°</th>
<th>36°</th>
<th>36°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>18°</td>
<td>18°</td>
</tr>
<tr>
<td>60°</td>
<td>60°</td>
<td>60°</td>
</tr>
</tbody>
</table>

### Ordering details

**EX-T/M 441-11Y-□□-1276-2**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.</td>
<td>Snap action</td>
</tr>
<tr>
<td></td>
<td>T.</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td>UE</td>
<td>Slow action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with overlapping contacts</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Actuator selection, see page 86</td>
</tr>
</tbody>
</table>

**Approvals**

- IECEx
- CE

**Contact variants**

- 1 NO contact
- 1 NC contacts

**Snap action**

<table>
<thead>
<tr>
<th>0°</th>
<th>36°</th>
<th>36°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>13°</td>
<td>13°</td>
</tr>
<tr>
<td>60°</td>
<td>60°</td>
<td>60°</td>
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</tbody>
</table>

**Slow action**

<table>
<thead>
<tr>
<th>0°</th>
<th>36°</th>
<th>36°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>18°</td>
<td>18°</td>
</tr>
<tr>
<td>60°</td>
<td>60°</td>
<td>60°</td>
</tr>
</tbody>
</table>

**Dust zone 21, 22**

**Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com**
Belt alignment switch / Slack-wire switch

EX-T/M 250-...

- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries M25
- Belt alignment lever available with different roller lengths
- Protection class IP 65, IP 66 and IP 67
- Suitable for heavy duty

Technical data

- Equipment category: IIA 2D
- Ex protection: Ex tD A21 IP67 T90°C X
- Standards: EN 60947-5-1; EN 61241-0, EN 61241-1
- Enclosure: Grey cast iron, galvanized and painted
- Actuating speed: IP 65, IP 66 and IP 67 to EN 60529
- Protection class: silver, gold-flashed
- Contact material: change-over contact, slow action positive break NC contact with double break with 2 separate contact bridges
- Switching system: Snap- and slow action
- Connection: screw terminals M 4
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Uimp: 6 kV
- Ui: 500 V
- Iimp: 16 A
- Ie/Ue: 4 A / 400 VAC
- Utilisation category: AC-15
- Max. fuse rating: 16 A gG D-fuse
- Contact break: Snap action: max. 2 x 2.5 mm
- Slow action: max. 2 x 2 mm
- Switchover time: 35 ms
- Bounce duration: 5 ms
- Ambient temperature: – 20 °C ... + 60 °C
- Mechanical life: 10 million operations
- Switching frequency: max. 3000/h
- Cable cross-section of the cable glands: min. Ø 14 mm, max. Ø 18 mm

Contact variants

- 1 NO contact
- 1 NC contacts
- Snap action
- Slow action
- 2 NO contact
- 2 NC contacts

Ordering details

EX-T/M 250-Z-1276-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M.</td>
<td>Snap action</td>
</tr>
<tr>
<td></td>
<td>T.</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>1 NO/1 NC contact</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>2 NO/2 NC contacts</td>
</tr>
<tr>
<td>3</td>
<td>Actuator selection, see page 86</td>
<td></td>
</tr>
</tbody>
</table>

Approvals

IECEX
CE

Dust zone 21, 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Belt alignment switch / Slack-wire switch

System components

Belt alignment lever 243
EX-certified screwed cable gland M20

Belt alignment lever 966
EX-certified screwed cable gland M25

Belt alignment lever 1224
EX-certified screw plug M20

Slack-wire lever type 14
EX-certified screw plug M25

Ordering details

Belt alignment lever
243  Ordering suffix -243  EX-certified screwed cable gland EX-KLE-M20x1.5
966  Ordering suffix -966  EX-certified screwed cable gland EX-KLE-M25x1.5
1224 Ordering suffix -1224  EX-certified screw plug EX-VS-M20x1.5

Slack-wire lever (only in combination with EX-T/M 441) type 14
EX-certified screw plug EX-VS-M25x1.5

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Pull-wire emergency stop switches are mounted on machines and sections of plants which cannot be protected by guards. In contrast to mushroom head emergency stop push buttons, on pull-wire switches the emergency stop command can be initiated from any point on the wire.
Pull-wire emergency-stop switches

Ex-ZQ 900-3D

- to EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- 4 contacts
- Position indication
- Robust design
- Large wiring compartment
- 3 cable entries M20
- One tension force for wire lengths from 5 to 50 m
- Wire up to 50 m long
- Reset pushbutton
- Twisting of towing eye not possible
- External watertight collar
- Wire pull and breakage detection
- Stainless
- Including Ex-certified screwed cable gland
- Including Ex-certified screw plug

Technical data

Equipment category: II 3D
Ex protection: Ex tD A22 IP67 T100°C
Standards: IEC/EN 60947-5-1; IEC/EN 60947-5-5; EN 61241-0 EN 61241-1; EN ISO 13850
Enclosure: zinc die-cast, enamel finish
Cover: Steel
Max. impact energy: 7 J
Protection class: IP 67 to IEC/EN 60529
Contact material: Silver
Contact types: 1 NC / 1 NO or 2 NC / 2 NO or 3 NC / 1 NO or 2 NC or 4 NC
Switching system: IEC 60947-5-1 snap action, NC contacts with positive break
Connection: Screw terminals
Cable entry: 3x M20
Uimp: 6 kW
Ue: 500 V
Ie: 4 A
Utilisation category: AC-15, DC-13
Ie/Ue: 1 A / 24 VDC
Max. fuse rating: 6 A gG D-fuse to IEC/EN 60269-1
Ambient temperature: – 20 °C ... + 55 °C
Mechanical life: > 1 million operations
Max. wire length: 50 m
(please observe the ambient temperature range and the wire supports)
Features: wire pull and breakage detection
Cable cross-section of the cable glands: min. Ø 7 mm
max. Ø 12 mm

Contact variants

1 NO/1 NC contact
2 NC contacts
1 NO/3 NC contacts
2 NO/2 NC contacts
4 NC contacts

Ordering details

EX-ZQ 900-3D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>1 NO/1 NC contact</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1 NO/3 NC contacts</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>2 NO/2 NC contacts</td>
</tr>
<tr>
<td>02</td>
<td>2</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>04</td>
<td>4</td>
<td>4 NC contacts</td>
</tr>
</tbody>
</table>

Ordering details

EX-certified screwed cable gland
EX-certified screw plug

Note

Recommended cable lengths for pull-wire Emergency-Stop switches in relation to the range of ambient temperature.
At 5 m distance intermediate wire supports are required, see accessories

Approvals

Classification:
Standards: EN ISO 13849-1
B10d Opener (NC): 100.000
Service life: 20 years

MTTFd = \( \frac{B_{10d}}{0.1 \times n_{hp}} \) \( \frac{d_{in} \times h_{hp} \times 3600 \times s}{t_{cycle}} \)

Ordering details

EX-KLE-M20x1.5
EX-VS-M20x1.5

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Pull-wire emergency-stop switches

Mode of operation

<table>
<thead>
<tr>
<th>Wire pull and breakage detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not actuated</td>
</tr>
<tr>
<td>Wire pull detection</td>
</tr>
<tr>
<td>Wire breakage detection</td>
</tr>
</tbody>
</table>

Mounting instructions

1 = Wire rope  
2 = eyebolt  
3 = nut  
4 = Wire clamp  
5 = tensioner  
6 = wire thimble  
7 = shackle  
8 = wire tensioner  

A = position indication  
B = emergency-stop button

One-side operation

Note:
As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.
Pull-wire emergency-stop switches

EX-T3Z 068-...

Technical data

Equipment category:  II 2D
Ex protection:  Ex tD A21 IP65 T90°C X
Standards:  EN 60947-5-1;  EN 60947-5-5;
Ex ISO 13850;
EN 61241-0, EN 61241-1
Enclosure:  Grey cast iron, painted
Cover:  Grey cast iron, painted
Protection class:  IP 65 and IP 66 to EN 60529
Contact material:  Silver, gold-flashed
Contact types:  Change-over contact with double break, max. 3 NO and 3 NC contacts
Switching system:  IEC 60947-5-1 snap action, NC contacts with positive break
Connection:  Screw terminals
Cable section:  max. 1.5 mm², min. 0.75 mm² solid and stranded wire with conductor ferrules
Cable entry:  2 x M 20
Ui:  250 VAC
Ith:  10 A
Utilisation category:  AC-15, DC-13
Ie/Ue:  2.5 A / 230 VAC
6 A / 24 VDC
Max. fuse rating:  6 A gG D-fuse
Positive break torque:  1.8 Nm
Angle for positive break travel:  32°
Positive break force:  50 N
Actuating force:  max. 50 N, (30 N in wire direction)
Ambient temperature:  – 20 °C ... + 60 °C
Mechanical life:  50000 operations
Max. wire length:  2 x 50 m
Features:  wire pull and breakage detection
Cable cross-section of the cable glands:
min. Ø 7 mm
max. Ø 12 mm

Contact variants

1 NO contact
1 NC contacts
2 NO contact
2 NC contacts
3 NO contact
3 NC contacts

Note

At 3 m distance intermediate wire supports are required, see accessories

Ordering details

EX-T3Z 068-... YR-1637

No.  Option  Description
1  11  1NO/1NC contact
22  2NO/2NC contacts
33  3NO/3NC contacts

Technical data

Classification:
Standards:  EN ISO 13849-1
B10d Opener (NC):  100,000
Service life:  20 years

Contact details

1 NO contact
1 NC contacts
2 NO contact
2 NC contacts
3 NO contact
3 NC contacts

Note

At 3 m distance intermediate wire supports are required, see accessories

Ordering details

EX-KLE-M20x1.5
EX-VS-M20x1.5
## Pull-wire emergency-stop switches

### System components

<table>
<thead>
<tr>
<th>Eyebolt</th>
<th>Pulley</th>
<th>Tension spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Eybolt" /></td>
<td><img src="image2" alt="Pulley" /></td>
<td><img src="image3" alt="Tension spring" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire clamp</th>
<th>Tensioner</th>
<th>S 900 wire tensioner</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Wire clamp" /></td>
<td><img src="image5" alt="Tensioner" /></td>
<td><img src="image6" alt="S 900 wire tensioner" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duplex wire clamp</th>
<th>Wire rope</th>
<th>Shackle</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="Duplex wire clamp" /></td>
<td><img src="image8" alt="Wire rope" /></td>
<td><img src="image9" alt="Shackle" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire thimble</th>
<th>Wire unit complete</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image10" alt="Wire thimble" /></td>
<td><img src="image11" alt="Wire unit complete" /></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Eyebolt</th>
<th>Pulley (stainless steel)</th>
<th>Tension spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM 10 x 40</td>
<td>1192433</td>
<td>1186696</td>
</tr>
<tr>
<td>BM 8 x 70 (stainless steel)</td>
<td>1087930</td>
<td>S 900 wire tensioner</td>
</tr>
<tr>
<td>Wire clamp 3 mm (stainless steel)</td>
<td>Wire rope per m</td>
<td>on request</td>
</tr>
<tr>
<td>Duplex wire clamp 3 mm (stainless steel)</td>
<td>Wire unit complete</td>
<td>on request</td>
</tr>
<tr>
<td>Wire thimble 4 mm (stainless steel)</td>
<td>1203475</td>
<td>Shackle (stainless steel)</td>
</tr>
<tr>
<td>Egg-shaped wire clamp (without images)</td>
<td>1077072</td>
<td>1186490</td>
</tr>
</tbody>
</table>

---

Dust zone 21, 22

---

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Ordering details

Detailed technical information at:
www.schmersal.com
The use of magnetic safety sensors is of particular advantage, in cases where extremely dirty conditions can occur. This is provided by the simplicity of cleaning of the devices. Another advantage is the possibility of concealed mounting behind non-magnetic materials. Working surfaces and storage areas can be designed without dust-collecting edges or other functional cut-outs and structures.

In applications, where a precise approach is not possible and larger tolerances are required, the magnetic safety sensors of the BNS series can also be used.

Content
EX-BNS 250-....-3G/D 92
EX-BNS 33-....-3G/D 94
EX-BNS 120-....-3G/D 96
EX-BNS 180-....-3G/D 98
EX-BNS 303-....-3G/D 100
EX-CSS 180-....-3G/D 102
Safety sensors

**EX-BNS 250-...-3G/D**

- Ex certified
- Thermoplastic enclosure
- with coding
- Smallest design
- long life, no mechanical wear
- Protection class IP 67
- Actuation only possible with EX-BPS 250
- Intensive to transverse misalignment
- Concealed mounting possible
- Intensive to soiling

**Technical data**

- Equipment category: II 3GD
- Explosion protection: Ex nC IIC T6 X
- Ex tD A22 IP67 T80°C X
- EN 60947-5-3, EN 61241-0,
- EN 61241-1, EN 60790-0,
- EN 60795-15, BG-GS-ET-14
- Design: rectangular
- Enclosure: glass-fibre reinforced thermoplastic
- Max. impact energy: 1 J
- Protection class: IP 67 to EN 60529
- Connection: Boflex cable
- Cable section: 4 x 0.25 mm²
- Operating principle: magnetic
- Actuating magnet: EX-BPS 250, coded
- S_m: 4 mm
- S_m: 14 mm
- Switching condition indication: LED only with ordering suffix G
- Max. switching voltage without LED: 24 VDC
- with LED: 24 VDC
- Max. switching current without LED: 100 mA
- with LED: 10 mA
- Max. switching capacity without LED: 1 W
- with LED: 240 mW
- Ambient temperature: – 25 °C ... + 70 °C
- Storage and transport temperature: – 25 °C ... + 70 °C
- Max. switching frequency: 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 g ... 55Hz, Amplitude 1 mm
- Classification:
- Standards: EN ISO 13849-1
- B_{10d} NC/NO contact: 25,000,000 at 20% contact load
- Service life: 20 years
- MTTF_x = \frac{B_{10d}}{0.1 x n_{op}} x \frac{n_{op}}{t_{cycle}} x 3600 s/h

**Contact variants**

1 NO / 1 NC contacts
- BK 13
- WH 21

1 NO / 2 NC contacts
- BK 22
- WH 32

1 NO / 2 NC
(Ordering suffix -2187 without LED)
- BK 13
- WH 31

1 NO / 1 NC contacts
- BK 22
- WH 21

Note

Contact symbols shown for the closed condition of the guard device.

The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is open.

Enabling zone

The actuators for the magnetic safety sensors must be ordered separately.
Safety sensors

System components

Actuating magnet EX-BPS 250

Spacer BNS 250

Ordering details

Actuating magnet EX-BPS 250
Spacer BNS 250
Safety sensors

EX-BNS 33-...-3G/D

• Ex certified
• Thermoplastic enclosure
• with coding
• long life, no mechanical wear
• Intensive to transverse misalignment
• Concealed mounting possible
• Intensive to soiling

Equipment category: © III 3GD
Explosion protection:
EX-BNS 33:
Ex nIIC T6 X
Ex tD A22 IP67 T80°C X
EN 60947-5-3, EN 61241-0,
EN 61241-1, EN 60079-0.
EN 60079-15, BG-GS-ET-14
Standards:
Design: rectangular
Enclosure: glass-fibre reinforced thermoplastic
Max. impact energy: 1 J
Protection class: IP 67 to EN 60529
Connection: Boflex cable
Cable section: 4 x 0.25 mm²
Ordering suffix ...12-2187: 6 x 0.25 mm²
Operating principle: magnetic
Actuating magnet: EX-BPS 33, coded
Sao: 5 mm
Sar: 15 mm
Switching condition indication: LED only with ordering suffix G
Max. switching voltage without LED: 100 VAC/DC
with LED: 24 VDC
Max. switching current without LED: max. 400 mA
with LED: 10 mA
Ordering suffix -2187: 250 mA
Max. switching capacity without LED: 10 W
Max. switching voltage ordering suffix ...-2187: 3 W
with LED: 240 mW
Ambient temperature: – 25 °C ... + 70 °C
Storage and transport temperature: – 25 °C ... + 70 °C
Repeat accuracy R: ≤ 0.1 x Sao
Max. switching frequency: ca. 5 Hz
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 55 Hz,
Amplitude 1 mm
Classification:
Standards: EN ISO 13849-1
B10d NC/NO contact: 25.000.000
at 20% contact load
Service life: 20 years
MTTF = \frac{B_{10d}}{0.1 \times n_{op}} \times \frac{n_{op}}{d_{op} \times h_{op} \times 3600 \times sh} \times \frac{1}{t_{cycle}}

Approvals

Contact variants

1 NO / 1 NC contacts
BK 13 14 BU
Wh 21 22 BN
1 NO / 2 NC contacts
BK 22 14 BU
Wh 31 22 BN
1 NO / 2 NC (Ordering suffix -2187)
GY 13 14 PK
GN 21 22 VN
Wh 31 32 BN
2 NC (Ordering suffix -2187)
BK 11 12 BU
Wh 21 22 BN

Ordering details

EX-BNS 33-...-3G/D

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO / 1 NC contacts</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC contacts</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>2 NC contacts</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>without LED</td>
<td></td>
</tr>
<tr>
<td>2187</td>
<td>with LED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individual contact outlet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(not possible for 1 NO/1 NO)</td>
<td></td>
</tr>
</tbody>
</table>

Note

Contact symbols shown for the closed condition of the guard device.

The contact configuration for versions with or without LED is identical.

Enabling zone

The actuators for the magnetic safety sensors must be ordered separately.
Safety sensors

System components

Actuating magnet EX-BPS 33

Spacer BN 31/BNS 33

Ordering details

Actuating magnet  EX-BPS 33
Spacer           BN 31/BNS 33
Safety sensors

EX-BNS 120-...-3G/D

Technical data

- Equipment category: II 3GD
- Ex protection: Ex n IIC T6 X
- Ex tD A22 IP67 T80°C X
- Standards: EN 60947-5-3, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15, BG-GS-ET-14
- Design: cylindrical
- Enclosure: glass-fibre reinforced thermoplastic
- Protection class: IP 67
- Max. impact energy: 1 J
- Connection: Boflex cable
- Cable section: 4 x 0.25 mm²
- Operating principle: magnetic
- Actuating magnet: BP 6, BP 8, BP 10, BP 15 SS, not coded
- \( S_{op} \): 10 mm (BP 6 / BP 8)
- \( S_{op} \): 20 mm (BP 10 / BP 15 SS)
- \( S_{ar} \): 22 mm (BP 6 / BP 8)
- \( S_{ar} \): 32 mm (BP 10 / BP 15 SS)
- Switching condition indication: –
- Switching voltage max. without LED: 100 VAC/DC
- Switching current max. without LED: 250 mA
- Switching capacity max. without LED: 02z: 3 W
- Ambient temperature: -25 °C ... +70 °C
- Storage and transport temperature: -25 °C ... +70 °C
- Max. switching frequency: 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55 Hz, Amplitude 1 mm
- Classification:
  - Standards: EN ISO 13849-1
  - \( B_{100} \), NO/NO contact: 25,000,000 at 20% contact load
  - Service life: 20 years

Contact variants

- 1 NO / 1 NC contacts
  - BK 13
  - WH 21
  - 12 BU
- 1 NO / 2 NC contacts
  - BK 22
  - WH 32
  - 14 BU
- 2 NC contacts
  - BK 11
  - WH 21
  - 12 BU
  - 14 BU

Ordering details

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>1 NO / 1 NC contacts</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>1 NO / 2 NC contacts</td>
</tr>
<tr>
<td>02</td>
<td>2</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Bk 13, WH 21</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Bk 22, WH 32</td>
</tr>
</tbody>
</table>

Note

- Contact symbols shown for the closed condition of the guard device.

The safety sensor is to be installed in such a way that operation with a magnet is not possible (covered installation in accordance with EN 1088).

Enabling zone

The actuators for the magnetic safety sensors must be ordered separately.
Safety sensors

System components

BP 6

BP 8

BP 10

BP 15 SS

Ordering details

Actuating magnets:
- unenclosed BP 6
- unenclosed BP 8
- unenclosed BP 10
- stainless steel BP 15 SS
Safety sensors

EX-BNS 180-...-3G/D

Technical data

- Equipment category: II 3GD
- Ex protection: Ex nc IIC T6 X
- Ex td A22 IP67 T80°C X
- Standards: EN 60947-5-3, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15, BG-GS-ET-14
- Design: cylindrical
- Enclosure: glass-fibre reinforced thermoplastic
- Tightening torque A/F 24 max. 500 Ncm
- Max. impact energy: 1 J
- Protection class: IP 67 to EN 60529
- Connection: Boflex cable
- Cable section: 6 x 0.25 mm²
- Operating principle: magnetic
- Actuating magnet: BP 6, BP 8, BP 10, BP 15 SS, not coded
- Depth: 8 mm (BP 6 / BP 8)
- 18 mm (BP 10 / BP 15 SS)
- 20 mm (BP 6 / BP 8)
- 28 mm (BP 10 / BP 15 SS)
- Switching voltage max. without LED: 120 V AC/DC
- Switching current: max. 250 mA
- Switching capacity: max. 5 W
- Ambient temperature: – 25 °C ... + 70 °C
- Storage and transport temperature: – 25 °C ... + 70 °C
- Max. switching frequency: 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55 Hz,
  Amplitude 1 mm
- Classification: EN ISO 13849-1
- B₁₀₀ NC/NO contact: 25.000.000
  at 20% contact load
- Service life: 20 years

MTTFₜₐₜ = \frac{B_{th}}{0.1 \times n_{op}} \ \text{mm} \times \frac{n_{op}}{d_{op} \times n_{op} \times 3600 \text{ s/h}} \ \text{t}_{cycle}

Contact variants

- 1 NO / 2 NC contacts
  GY 13 – – – – 14PK
  GW 21 – – – – 22YE
  WM 31 – – – – 32BN

Approvals

Ordering details

EX-BNS 180-12z-2187-2-3G/D

Note

- The actuators for the magnetic safety sensors must be ordered separately.

Gas zone 2 / Dust zone 22

Enabling zone

The safety sensor is to be installed in such a way that operation with a magnet is not possible (covered installation in accordance with EN 1088).
### Safety sensors

#### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP 6</td>
<td><img src="image1" alt="BP 6 Diagram" /></td>
</tr>
<tr>
<td>BP 8</td>
<td><img src="image2" alt="BP 8 Diagram" /></td>
</tr>
<tr>
<td>BP 10</td>
<td><img src="image3" alt="BP 10 Diagram" /></td>
</tr>
<tr>
<td>BP 15 SS</td>
<td><img src="image4" alt="BP 15 SS Diagram" /></td>
</tr>
</tbody>
</table>

#### Ordering details

Actuating magnets:

- unenclosed: BP 6
- unenclosed: BP 8
- unenclosed: BP 10
- stainless steel: BP 15 SS
Safety sensors

EX-BNS 303-...-3G/D

- Ex certified
- Thermoplastic enclosure
- with coding
- Intensive to transverse misalignment
- Intensive to soiling
- Suitable for food processing industry
- LED version available

Technical data

Equipment category: Ex II 3GD
Ex protection: Ex nC IIC T6 X
Ex d A22 IP67 T80°C X
Standards: EN 60947-5-3, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15, BG-GS-ET-14
Design: cylindrical
Enclosure: glass-fibre reinforced thermoplastic, tightening force A/F 36 mm max. 300 Ncm
Max. impact energy: 1 J
Protection class: IP 67 to EN 60529
Connection: Boflex cable
Cable section: 6 x 0.25 mm²
Operating principle: magnetic
Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded
S_a: 5 mm
S_u: 15 mm
Switching condition indication: LED only with ordering suffix G
Max. switching voltage without LED: max. 100 VAC/DC
with LED: max. 24 VDC
Max. switching current without LED: max. 400 mA
with LED: 10 mA
Max. switching capacity without LED: 10 W
with LED: 240 mW
Ambient temperature: – 25 °C ... + 70 °C
Storage and transport temperature: – 25 °C ... + 70 °C
Max. switching frequency: 5 Hz
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 55Hz, Amplitude 1 mm

Classification:
Standards: EN ISO 13849-1
B10d NC/NO contact: 25.000.000 at 20% contact load
Service life: 20 years

Note

Contact symbols shown for the closed condition of the guard device.
The contact configuration for versions with or without LED is identical.
The LED is illuminated when the guard door is open.

Enabling zone

The actuators for the magnetic safety sensors must be ordered separately.

Contact variants

1 NO contacts
2 NC contacts

1 NO contacts with LED

Gas zone 2 / Dust zone 22

Approvals

Gas zone 2 / Dust zone 22

Ordering details

EX-BNS 303-12z-2187-3G/D

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
<td>without LED with LED</td>
</tr>
</tbody>
</table>

Note

The actuators for the magnetic safety sensors must be ordered separately.
Safety sensors

System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPS 300</td>
<td><img src="image1" alt="BPS 300 Diagram" /></td>
</tr>
<tr>
<td>BPS 303</td>
<td><img src="image2" alt="BPS 303 Diagram" /></td>
</tr>
<tr>
<td>BPS 303 SS</td>
<td><img src="image3" alt="BPS 303 SS Diagram" /></td>
</tr>
</tbody>
</table>

Ordering details

Actuating magnet:
- with plastic enclosure: BPS 300
- with plastic enclosure for food-processing industry: BPS 303
- Stainless steel for food-processing industry: BPS 303 SS
Safety sensors

**EX-CSS 180-...-3G/D**

**Technical data**

- **Equipment category:** II 3GD
- **Ex protection:** Ex na IIC T6 X
- **Standards:** EN 60947-5-3, EN 954-1, IEC 61508, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15
- **Design:** cylindrical
- **Enclosure:** glass-fibre reinforced thermoplastic
- **Max. impact energy:** 1 J
- **Protection class:** IP 65 and IP 67
- **Termination:** Cable
- **Cable section:** 7 x 0.25 mm²
- **Cable length:** max. 200 m
- **Operating principle:** inductive
- **Actuator:** CST-180-1, CST-180-2
- **Category:** 4 to EN 954-1
- **Classification:** up to PDF-M to IEC 60947-5-3
- **SIL classification:** suitable for SIL 3 applications to IEC 61508, PFH < 6.1 x 10⁻⁹
- **Rated switching distance Sₖ:** 8 mm
- **Sₙ:** 7 mm
- **Sₐ:** 10 mm
- **Hysteresis:** ≤ 0.7 mm
- **Repeat accuracy R:** ≤ 0.2 mm
- **Response time:** < 30 ms
- **Duration of risk:** ≤ 30 ms
- **Uₑ:** 24 VDC – 15 % / + 10 %
- **Iₑ:** 1.0 A
- **Iₒ:** 0.05 A
- **Leakage current Iₒ:** ≤ 0.5 mA
- **Protection class:** II
- **Overvoltage category:** III
- **Degree of pollution:** 3
- **Uₑ:** 0.8 kV
- **Uₑ:** 32 VAC/DC
- **Safety outputs:** short-circuit proof, p-type
- **Output current:** max. 0.5 A each output
- **Uₑ:** max. 0.5 V
- **Iₑ / Uₑ:** 0.5 A / 24 VDC
- **Signalling output:** short-circuit proof, p-type
- **Iₑ / Uₑ:** 0.05 A / 24 VDC
- **Utilisation category:** AC-12, DC-13
- **Ambient temperature:** – 20 °C ... + 40 °C
- **Storage and transport temperature:** – 25 °C ... + 85 °C
- **Switching frequency f:** ca. 3 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 ... 55Hz, Amplitude 1 mm
- **Gas zone 2 / Dust zone 22**

**Approvals**

- Ex certified
- Thermoplastic enclosure
- Category 4 to EN 954-1
- Classification PDF-M to IEC 60947-5-3
- Fit for SIL 3 applications to IEC 61508, PFH value < 6.1 x 10⁻⁹
- Electronic contact-free, coded system
- Large switching distance
- Misaligned actuation possible
- High repeat accuracy of the switching points
- Self-monitored series-wiring of max. 16 sensors
- Max. length of the sensor chain 200 m
- Comfortable diagnostics through sensor LED and electronic signalling output
- Early warning when operating near the limit of the sensor’s hysteresis range
- 2 short-circuit proof PNP safety outputs (24 VDC per 500 mA)

**System components**

- CST-180-1 actuator
- CST-180-2 actuator
- H 18 clamp

**Ordering details**

**EX-CSS 8-180-2P+D-M-L-3G/D**

**Note**

- Actuator
- Actuator
- Clump

Actuators must be ordered separately.

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Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Safety sensors

Connection

Sensor with multifunctional connection:
EX-CSS 8-180-2P+D-M-L-3G/D

Connecting cable:
2 m length;
cable section 7 poles: 7 x 0.25 mm²

Wiring

<table>
<thead>
<tr>
<th>Lead colours</th>
<th>Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN (brown)</td>
<td>A1 Ue</td>
</tr>
<tr>
<td>BU (blue)</td>
<td>A2 GND</td>
</tr>
<tr>
<td>VT (violet)</td>
<td>X1 Safety input 1</td>
</tr>
<tr>
<td>WH (white)</td>
<td>X2 Safety input 2</td>
</tr>
<tr>
<td>BK (black)</td>
<td>Y1 Safety output 1</td>
</tr>
<tr>
<td>RD (red)</td>
<td>Y2 Safety output 2</td>
</tr>
<tr>
<td>GY (grey)</td>
<td>Signalling output</td>
</tr>
</tbody>
</table>

Requirements for the safety monitoring module

2-channel p-type safety input. The safety monitoring module must tolerate internal functional tests of the sensors in milliseconds (max. 2 ms).

A range of suitable safety monitoring modules for these applications can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Note

- Series-wiring of sensors:
  16 self-monitoring CSS 180 safety sensors can be wired in series without loss of control category 4 to EN 954-1. The redundant output of the first sensor is wired into the input of the next sensor.
- The voltage drop over a long sensor chain should be taken into account when planning cable routing. It depends on several factors which are operating voltage, cable length, ambient temperature, number of sensors series connected, and input load of the safety control monitor.
Ordering details

Detailed technical information at:
www.schmersal.com

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Magnetic reed switches are often used to replace mechanically actuated limit switches with plungers, roller and turning levers.
Magnetic reed switches

EX-BN 20-...-3G/D

- Ex certified
- Aluminium enclosure
- Long life
- Non-contact principle
- 1 Reed contact
- Particularly resistant to vibration
- Available for actuation from front or side
- Actuating distance up to 50 mm depending on actuating magnet and version
- Screw connection
- Protection class IP 67
- 2 cable entries M 16
- Including Ex-certified screwed cable gland

Technical data

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>Ex II 3GD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex nC IIC T5 X</td>
</tr>
<tr>
<td>Ex tD A22 IP67 T90ºC X</td>
<td></td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-15</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Al/Si12 die-casting, painted</td>
</tr>
<tr>
<td>Max. impact energy:</td>
<td>4 J</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP 67 to EN 60529</td>
</tr>
<tr>
<td>Connection:</td>
<td>screw terminals</td>
</tr>
<tr>
<td>cable entry:</td>
<td>2x M16</td>
</tr>
<tr>
<td>Operating principle:</td>
<td>magnetic</td>
</tr>
<tr>
<td>Switching voltage:</td>
<td>max. 250 VAC/DC</td>
</tr>
<tr>
<td>Switching current:</td>
<td>max. 3 A</td>
</tr>
<tr>
<td>Switching capacity:</td>
<td>max. 120 VA/W</td>
</tr>
<tr>
<td>Dielectric strength:</td>
<td>&gt; 600 VAC (50 Hz)</td>
</tr>
<tr>
<td>Switching speed:</td>
<td>max. 18 m/s</td>
</tr>
<tr>
<td>Switching frequency:</td>
<td>max. 300 S/s</td>
</tr>
<tr>
<td>Switching time “Close”:</td>
<td>0.3 ms ... 1.5 ms</td>
</tr>
<tr>
<td>Switching time “Open”:</td>
<td>max. 0.5 ms</td>
</tr>
<tr>
<td>Bounce duration:</td>
<td>0.3 ms ... 0.6 ms</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>– 15 ºC ... + 70 ºC</td>
</tr>
<tr>
<td>Storage temperature:</td>
<td>– 25 ºC ... + 70 ºC</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>10⁸ operations</td>
</tr>
<tr>
<td>Electrical life:</td>
<td>1 million - 1 billion operations, depending on load</td>
</tr>
<tr>
<td>Resistance to vibration:</td>
<td>50 g on sine wave oscillation</td>
</tr>
<tr>
<td>Switching point accuracy:</td>
<td>± 0.25 mm, T = constant</td>
</tr>
<tr>
<td>Resistance to shock:</td>
<td>30 g / 11 ms</td>
</tr>
<tr>
<td>Resistance to vibration:</td>
<td>10 ... 55 Hz</td>
</tr>
<tr>
<td>Cable cross-section of the cable glands:</td>
<td>min. Ø 6 mm</td>
</tr>
<tr>
<td></td>
<td>max. Ø 10 mm</td>
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</table>

Contact variants

1 NO contact EX-BN 20-10 2 NC contact EX-BN 20-01z with N-S actuating magnet BP 2

1 bistable contact EX-BN 20-rz with N actuating magnet BP 20N

1 bistable contact EX-BN 20-rz with S actuating magnet BP 20S

Note

In version -10 and -01: When the switches and actuators come together, the colours must coincide: Red (S) to red (S) and green (N) to green (N).

The actuators for the magnetic safety sensors must be ordered separately.

On the next pages, a range of suitable actuating magnets is presented.
### Magnetic reed switches

#### Switch distances

<table>
<thead>
<tr>
<th>Actuating magnet</th>
<th>EX-BN 20-10z</th>
<th>EX-BN 20-20z</th>
<th>EX-BN 20-01z</th>
<th>EX-BN 20-02z</th>
<th>EX-BN 20-11z</th>
<th>EX-BN 20-rz</th>
<th>EX-BN 20-2rz</th>
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#### System components

- **EX-certified screwed cable gland**
- **EX-certified screw plug**

#### Ordering details

- EX-certified screwed cable gland: EX-KLE-M16x1.5
- EX-certified screw plug: EX-VS-M16x1.5
## Magnetic Reed Switches

### System Components

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<tr>
<th>BP 10</th>
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### Ordering Details

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<th>Thermoplastic enclosure, N-S</th>
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<th>Metal enclosure Al, S</th>
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<td>BP 20 S</td>
<td>BP 20</td>
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Gas Zone 2 / Dust Zone 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
### Magnetic reed switches

#### System components

<table>
<thead>
<tr>
<th>BP 12 N / BP 12 S</th>
<th>BP 12 N / 2x BP 12 S</th>
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</thead>
<tbody>
<tr>
<td>BP 21</td>
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<td>BP 21 N / BP 21 S</td>
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#### Ordering details

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<th>BP 12 N</th>
<th>2x BP 21 N</th>
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</thead>
<tbody>
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<td>2x BP 21 S</td>
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<td>metal enclosure Al, S</td>
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Ordering details

Detailed technical information at:
www.schmersal.com
The entire EX-R programme has a modular structure. Each control device consists of contact elements, a contact holder, the mounting flange and the operating or display element. The modular structure facilitates assembly and fitting and allows a great diversity of variants: various versions of pushbuttons and illuminated buttons, indicator lights, emergency-stop buttons, selector switches and key-operated selector switches are available.
Control devices and indicator lights

General description

Concept
With the development of the new programme of 22 mm Ex control devices and indicator lights, Elan provides the user with a state-of-the-art switchgear concept that is compliant to EN 61241 and EN 60 079, featuring additional device functionality, reliability and spatial use beyond the usual standard. The EX-RF/RLDE contact and light element system makes a special contribution here. Well-tried and proven features and material from earlier Elan designs (metal front parts, caps in high-quality shock-proof thermoplastic) have been retained and improved.

The equipment is suitable for the Ex category II 2GD. The explosion protection or the type of protection of the devices is:
- Ex ib IIC T4 X
- Ex tD A21 IP65 T110°C X

Control devices and indicator light heads
A large diversity of fully insulated pushbuttons/impact buttons/illuminated buttons/pivoting pushbuttons etc. is offered. The front part of the actuating head is in chrome-plated brass. The programme is characterised by large actuating surfaces of at least 28 mm. The material of the button is brass-coated. The caps or lens covers of the illuminated pushbuttons and indicator lights are in shock-proof thermoplastic. In addition to the high mechanical strength, this material selection permits a more than average degree of resistance to heat and chemical effects.

Protection class
The front seal of these devices corresponds to protection class IP 65 to EN DIN 60 529. The design features of the device sealing guarantee the maximum of protection over a long period of time, even in extreme conditions.

Mechanical protection
Mechanical tests are carried out in accordance with EN 60079-0. The enclosures or the exterior part of the enclosure, pushbuttons must withstand a high impact energy.

Programme structure
A control and indicator device consists of an actuator, a mounting flange and a contact or light element. The type designation of this type series starts with EX-R…, e.g. EX-RDT for a pushbutton. The mounting flange (divided into two, type EX-RLM) is included in the delivery of the device heads, both for the operating and the display elements.

Per control device, a maximum of 2 contact elements is provided.

One-hole fixing
The devices are designed for mounting holes of 22.3 mm + 0.4 mm according to DIN EN 60 947-5-1 Pt. 6.3.1. An additional cut-out to prevent rotation is not required.

Spacing
It is possible to install several devices with minimum dimensions in the following way:

Minimum distance between the mounting holes to DIN EN 60 947-5-1:
- horizontal: 40 mm
- vertical: 50 mm

Exceptions:
Selector switches/pushbuttons with long knob, emergency stop buttons EX-RDRZ45...:
- horizontal: 50 mm
- vertical: 60 mm
Control devices and indicator lights

Assembly schematic

Pushbutton

mounting flange

Contact carrier with contact lugs and 2 plunger elements

Light element with integrated multi-LED

Contact elements
Control devices and indicator lights – Pushbuttons

EX-RDT...

- Pushbutton

EX-RDM...

- Pushbutton with membrane

Technical data

<table>
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<tr>
<th>Equipment category:</th>
<th>Ex II 2GD</th>
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<tr>
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<tr>
<td>Standards:</td>
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<td>Max. impact energy (EN 60079-0):</td>
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<td>identification plates, symbols</td>
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<tr>
<td>Climates resistance to DIN EN 60068:</td>
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<tr>
<td>Ambient temperature:</td>
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<td>Switching frequency:</td>
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<td>Full insulation:</td>
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<tr>
<td>Materials:</td>
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Ordering details

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Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127).
Control devices and indicator lights – Illuminated pushbuttons

EX-RDL...

• Illuminated pushbutton

EX-RDLM...

• Illuminated pushbutton with membrane

Technical data

Equipment category: Ex II 2GD
Ex protection: Ex ib IIC T4 X
Ex tD A21 IP65 T110°C X
Standards: EN 60947-5-1, EN 60947-1,
EN 61241-0, EN 61241-1,
EN 60079-0, EN 60079-11
Max. impact energy: 4 J
Design: round
Installation-ø: 22.3 mm
Grid dimensions: 40 x 50 mm
Front plate thickness: 1 ... 6 mm
Mounting position: random
Designation: identification plates, symbols
Climatic resistance to DIN EN 60068:
Part 2-30
Ambient temperature: −20 °C ... + 55 °C
Switching frequency: 1,000 s/h
Protection class to EN 60529: IP 65
Full insulation: yes
Materials:
Membranes: PC (good resistance to chemical agents)
Front ring/buttons: chrome-plated brass,
powder-coated brass
Fixing:
Max. tightening torque: 2 Nm
Resistance to shocks to EN 60068-2-27: < 50 g
Resistance to vibrations to EN 60068-2-6: 5 g
Actuating stroke: 4 mm
Actuating force: ca. 1.5 N
Mechanical life: 1 x 10⁶ operations
RoHS conformity: yes

Approvals

Ordering details

Ex-RDL ① ②

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Ex-RDLM ① ②

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Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
Control devices and indicator lights – Indicator lights

EX-RMLH...

Technical data

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<tbody>
<tr>
<td>Ex protection:</td>
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<tr>
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<td>Ex tD A21 IP65 T110°C X</td>
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<tr>
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<td>EN 60947-5-1, EN 60947-1, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-11</td>
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<tr>
<td>Max. impact energy:</td>
<td>4 J</td>
</tr>
<tr>
<td>Design:</td>
<td>round</td>
</tr>
<tr>
<td>Installation-Ø:</td>
<td>22.3 mm</td>
</tr>
<tr>
<td>Grid dimensions:</td>
<td>40 × 50 mm</td>
</tr>
<tr>
<td>Front plate thickness:</td>
<td>1 ... 6 mm</td>
</tr>
<tr>
<td>Mounting position:</td>
<td>random</td>
</tr>
<tr>
<td>Designation:</td>
<td>identification plates, symbols</td>
</tr>
<tr>
<td>Climatic resistance to DIN EN 60068:</td>
<td>Part 2-30</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>-20 °C ... + 55 °C</td>
</tr>
<tr>
<td>Protection class to EN 60529:</td>
<td>IP 65</td>
</tr>
<tr>
<td>Full insulation:</td>
<td>yes</td>
</tr>
<tr>
<td>Materials:</td>
<td>Lens covers: PC (good resistance to chemical agents)</td>
</tr>
<tr>
<td></td>
<td>Front ring/buttons: chrome-plated brass, powder-coated brass</td>
</tr>
<tr>
<td></td>
<td>Fixing: with mounting flange</td>
</tr>
<tr>
<td>Max. tightening torque:</td>
<td>2 Nm</td>
</tr>
<tr>
<td>Resistance to shocks to EN 60068-2-27:</td>
<td>&lt; 50 g</td>
</tr>
<tr>
<td>Resistance to vibrations to EN 60068-2-6:</td>
<td>5 g</td>
</tr>
<tr>
<td>Rohs conformity:</td>
<td>yes</td>
</tr>
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</table>

Approvals

Ordering details

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</tr>
<tr>
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<tr>
<td>❼</td>
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<tr>
<td>❼</td>
</tr>
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</table>

Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
Control devices and indicator lights – Mushroom buttons

EX-RDP40...

**Technical data**

- **Equipment category:** II 2GD
- **Ex protection:**
  - Ex ib IIC T4 X
  - Ex tD A21 IP65 T110°C X
- **Standards:**
  - EN 60947-5-1, EN 60947-1,
  - EN 61241-0, EN 61241-1,
  - EN 60079-0, EN 60079-11
- **Max. impact energy:** 4 J
- **Design:**
  - round
  - Installation ø: 22.3 mm
- **Grid dimensions:** 50 x 60 mm
- **Front plate thickness:** 1 ... 6 mm
- **Mounting position:** random
- **Designation:** identification plates, symbols
- **Climatic resistance to DIN EN 60068:** Part 2-30
- **Ambient temperature:** –20 °C ... + 55 °C
- **Switching frequency:** 1,000 s/h
- **Protection class to EN 60529:** IP 65
- **Full insulation:** yes
- **Materials:**
  - Front ring/buttons: chrome-plated brass, powder-coated brass
- **Fixing:** with mounting flange
- **Max. tightening torque:** 2 Nm
- **Resistance to shocks to EN 60068-2-27:** < 50 g
- **Resistance to vibrations to EN 60068-2-6:** 5 g
- **Actuating stroke:** 4 mm
- **Actuating force:** approx. 2 N
- **Mechanical life:** 1 x 10⁶ operations
- **Rohs conformity:** yes

**Approvals**

- €

**Ordering details**

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tr>
<td></td>
<td>rd</td>
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</tr>
<tr>
<td></td>
<td>gn</td>
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</tr>
<tr>
<td></td>
<td>wh</td>
<td>white</td>
</tr>
<tr>
<td></td>
<td>bu</td>
<td>blue</td>
</tr>
<tr>
<td>②</td>
<td></td>
<td>Identification plate, symbols: refer to page 128</td>
</tr>
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**Note**

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127).
Control devices and indicator lights – Mushroom buttons

**EX-RDRZ45...**

**Technical data**

- **Equipment category:** II 2GD
- **Ex protection:** Ex ib IIC T4 X
  Ex tD A21 IP65 T110°C X
- **Standards:** EN 60947-5-1, EN 60947-1, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-11
- **Max. impact energy:** 4 J
- **Design:** round
- **Installation-d:** 22.3 mm
- **Grid dimensions:** 50 × 60 mm
- **Front plate thickness:** 1 ... 6 mm
- **Mounting position:** random
- **Climatic resistance to DIN EN 6068:** Part 2-30
- **Ambient temperature:** −20 °C ... + 55 °C
- **Switching frequency:** 600 s/h
- **Protection class to EN 60529:** IP 65
- **Full insulation:** yes
- **Materials:**
  - Front ring/buttons: chrome-plated brass, powder-coated brass
  - Fixing: with mounting flange
- **Max. tightening torque:** 2 Nm
- **Resistance to shocks to EN 60068-2-27:** < 50 g
- **Resistance to vibrations to EN 60068-2-6:** 5 g
- **Actuating stroke:** 5 mm
- **Actuating force:** approx. 2 N
- **Mechanical life:** 1 × 10⁶ operations
- **RoHS conformity:** yes

- Mushroom button with latching function

**Approvals**

<table>
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<tr>
<th>Ex-RDRZ45</th>
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</thead>
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**Ordering details**

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<td>1</td>
<td>ye</td>
<td>yellow</td>
</tr>
<tr>
<td>1</td>
<td>gn</td>
<td>green</td>
</tr>
<tr>
<td>2</td>
<td>Identification plate, symbols: refer to page 128</td>
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**Note**

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
Control devices and indicator lights – Emergency stop buttons

**EX-RDRZ45rt**

- Emergency stop button to ISO 13850, 2006

**Technical data**

- **Equipment category:** G II 2GD
- **Ex protection:**
  - Ex ib IIC T4 X
  - Ex tD A21 IP65 T110°C X
- **Standards:**
  - EN 60947-5-1; EN 60947-5-5
  - EN 60947-1; EN 61241-1
  - EN 60079-0; EN 60079-11
- **Max. impact energy:** 4 J
- **Design:** round
- **Installation-Ø:** 22.3 mm
- **Grid dimensions:** 50 × 60 mm
- **Front plate thickness:** 1 … 6 mm
- **Mounting position:** random
- **Climatic resistance to DIN EN 60068:** Part 2-30
- **Ambient temperature:** –20 °C … + 55 °C
- **Switching frequency:** 600 s/h
- **Protection class to EN 60529:** IP 65
- **Full insulation:** yes
- **Materials:**
  - Front ring/buttons: chrome-plated brass, powder-coated brass
  - Fixing: with mounting flange
- **Max. tightening torque:** 2 Nm
- **Resistance to shocks to EN 60068-2-27:** < 50 g
- **Resistance to vibrations to EN 60068-2-6:** 5 g
- **Actuating stroke:** 5 mm
- **Actuating force:** approx. 2 N
- **Mechanical life:** 1 × 10⁵ operations
- **Rohs conformity:** yes

---

**Approvals**

![Ex]![CE]

**Ordering details**

**Ex-RDRZ45 rt**

**Note**

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
Control devices and indicator lights

**EX-RW...21/32**
- Maintained selector switch, spring return selector switch with short knob
- 2 or 3 positions

**EX-RW...21.1/32.1**
- Maintained selector switch, spring return selector switch with long knob
- 2 or 3 positions

**Technical data**
- **Equipment category:** II 2GD
- **Ex protection:** Ex ib IIC T4 X
- **Ex tD A21 IP65 T110°C X**
- **Standards:** EN 60947-5-1, EN 60947-1, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-11
- **Max. impact energy:** 4 J
- **Design:** round
- **Installation-ø:** 22.3 mm
- **Grid dimensions:** 50 x 60 mm
- **Front plate thickness:** 1 ... 6 mm
- **Mounting position:** random
- **Designation:** identification plates, symbols
- **Climatic resistance to DIN EN 60068:** Part 2-30
- **Ambient temperature:** 0 °C ... + 55 °C
- **Switching frequency:** 1,000 s/h
- **Protection class to EN 60529:** IP 65
- **Full insulation:** yes
- **Materials:**
  - knob: PC (good resistance to chemical agents)
  - Front ring/buttons: chrome-plated brass, powder-coated brass
- **Fixing:** with mounting flange
- **Max. tightening torque:** 2 Nm
- **Resistance to shocks to EN 60068-2-27:** < 50 g
- **Resistance to vibrations to EN 60068-2-6:** 5 g
- **Actuating stroke:** 6 mm
- **Actuating force:** approx. 0.2 N
- **Mechanical life:** 3 x 10⁵ operations
- **Rohs conformity:** yes

**Approvals**

**Ordering details**

Ex-RW

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<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>T</td>
<td>Selector switch</td>
</tr>
<tr>
<td>1</td>
<td>S</td>
<td>Selector switch</td>
</tr>
<tr>
<td>1</td>
<td>ST</td>
<td>Spring-return rotary selector switch</td>
</tr>
<tr>
<td>1</td>
<td>TS</td>
<td>Maintained spring-return rotary selector switch</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>2 positions</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>3 positions</td>
</tr>
</tbody>
</table>

Ex-RW...21.1

<table>
<thead>
<tr>
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<th>Option</th>
<th>Description</th>
</tr>
</thead>
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<td>Selector switch</td>
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<tr>
<td>1</td>
<td>S</td>
<td>Selector switch</td>
</tr>
<tr>
<td>1</td>
<td>ST</td>
<td>Spring-return rotary selector switch</td>
</tr>
<tr>
<td>1</td>
<td>TS</td>
<td>Maintained spring-return rotary selector switch</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>2 positions</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>3 positions</td>
</tr>
</tbody>
</table>

**Note**

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
## Control devices and indicator lights

<table>
<thead>
<tr>
<th>Brief description</th>
<th>Switching angle</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring-return rotary selector switch with 2 positions</td>
<td>1 × 55°</td>
<td>Ex-RWT 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex-RWT 21.1</td>
</tr>
<tr>
<td>Selector switch with 2 latched positions</td>
<td>1 × 70°</td>
<td>Ex-RWS 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex-RWS 21.1</td>
</tr>
<tr>
<td>Maintained spring-return rotary selector switch with 3 positions</td>
<td>2 × 35°</td>
<td>Ex-RWT 32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex-RWT 32.1</td>
</tr>
<tr>
<td>Selector switch with 3 positions; right: latching, left: switching</td>
<td>right 35</td>
<td>Ex-RWST 32</td>
</tr>
<tr>
<td></td>
<td>left 55°</td>
<td>Ex-RWST 32.1</td>
</tr>
<tr>
<td>Maintained spring-return rotary selector switch with 3 positions</td>
<td>2 × 55°</td>
<td>Ex-RWS 32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex-RWS 32.1</td>
</tr>
<tr>
<td>Maintained spring-return rotary selector switch with 3 positions, right: switching, left: latching</td>
<td>right 55</td>
<td>Ex-RWTS 32</td>
</tr>
<tr>
<td></td>
<td>left 35°</td>
<td>Ex-RWTS 32.1</td>
</tr>
</tbody>
</table>
Control devices and indicator lights

EX-RS...

Technical data

- **Equipment category:** II 2GD
- **Ex protection:** Ex ib IIC T4 X
- **Ex tD A21 IP65 T110°C X**
- **Standards:** EN 60947-5-1, EN 60947-1, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-11
- **Max. impact energy:** 4 J
- **Design:** round
- **Installation-Ø:** 22.3 mm
- **Grid dimensions:** 40 × 50 mm
- **Front plate thickness:** 1 ... 6 mm
- **Mounting position:** random
- **Designation:** identification plates, symbols
- **Climatic resistance**
  - to DIN EN 60068:
  - Ambient temperature: 0 °C ... + 55 °C
  - Switching frequency: 1,000 s/h
  - Protection class to EN 60529: IP 65
  - Full insulation: yes
- **Materials:**
  - Front ring/buttons: chrome-plated brass, powder-coated brass
  - Fixing: with mounting flange
  - Max. tightening torque: 2 Nm
- **Resistance to shocks to EN 60068-2-27:** < 50 g
- **Resistance to vibrations to EN 60068-2-6:** 5 g
- **Actuating stroke:** 6 mm
- **Actuating force:** approx. 0.2 N
- **Mechanical life:** 1 × 10⁶ operations
- **RoHS conformity:** yes

Approvals

Ordering details

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>Key-operated selector switch</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Key-operated spring-return selector switch</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>position of the key</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>number of plungers</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>position for key retraction</td>
</tr>
</tbody>
</table>

Note

- The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page 127)
## Control devices and indicator lights

**Key-operated selector switches/selector switch pushbuttons, lock EKM 30**

<table>
<thead>
<tr>
<th>Brief description</th>
<th>Key-withdrawal position</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key-operated selector switch with 2 latched positions</td>
<td>only left</td>
<td>Ex-RSS21S1</td>
</tr>
<tr>
<td></td>
<td>only right</td>
<td>Ex-RSS21S2</td>
</tr>
<tr>
<td></td>
<td>in both positions</td>
<td>Ex-RSS21S12</td>
</tr>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-operated selector switch with 3 latched positions</td>
<td>left</td>
<td>Ex-RSS32S1</td>
</tr>
<tr>
<td></td>
<td>middle</td>
<td>Ex-RSS32S2</td>
</tr>
<tr>
<td></td>
<td>right</td>
<td>Ex-RSS32S3</td>
</tr>
<tr>
<td></td>
<td>in all 3 positions</td>
<td>Ex-RSS32S12</td>
</tr>
<tr>
<td><img src="image2" alt="Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-operated spring-return selector switch with 1 touch position, automatic return to the zero position, latch position 55°</td>
<td>only left</td>
<td>Ex-RST21S1</td>
</tr>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-operated spring-return selector switch with 2 touch positions left and right, automatic return to the zero position</td>
<td>only middle</td>
<td>Ex-RST32S2</td>
</tr>
<tr>
<td><img src="image4" alt="Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-operated selector switch pushbutton with 3 positions, touch position 35°, latch position 55° – left switching, right latching</td>
<td>S1 = only left</td>
<td>Ex-RSST32S1</td>
</tr>
<tr>
<td></td>
<td>S2 = only middle</td>
<td>Ex-RSST32S2</td>
</tr>
<tr>
<td><img src="image5" alt="Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-operated selector switch pushbutton with 3 positions, touch position 35°, latch position 55° – left switching, right latching</td>
<td>S2 = only middle</td>
<td>Ex-RSTS32S2</td>
</tr>
<tr>
<td></td>
<td>S3 = only right</td>
<td>Ex-RSTS32S3</td>
</tr>
<tr>
<td><img src="image6" alt="Diagram" /></td>
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<td></td>
</tr>
</tbody>
</table>

**Spare key EKM 30 for CES lock**  
(for EX-RSS../RST.., standard for the above listed versions)

**Spare key EKM 30 for CES lock**

| Spare key EKM 30 for CES lock | SDS2 |

Special locks and master key function available: On request  
Contact elements: See page 124  
2 keys belong to the delivery range of the above listed devices
### Control devices and indicator lights – Contacts

#### EX-RF 10...  
- **Contacts**  
  - Screw connection  
  - Cable sections:  
    - single-strand: 2 x (0.5 ... 2.5 mm²)  
    - multi-strand with conductor ferrules: 2 x (0.5 ... 1.5 mm²)  
- **Protection class**  
  - Connections: IP 20 (finger-safe)  
  - Wiring compartments: IP 40

#### EX-RF 03...  
- **Contacts**  
  - Screw connection  
  - Cable sections:  
    - single-strand: 2 x (0.5 ... 2.5 mm²)  
    - multi-strand with conductor ferrules: 2 x (0.5 ... 1.5 mm²)  
- **Protection class**  
  - Connections: IP 20 (finger-safe)  
  - Wiring compartments: IP 40

#### Technical data
- **Equipment category:** II 2GD  
- **Explosion protection:** Ex ib IIC T4 X  
- **Explosion protection:** Ex tD A21 IP65 T110°C X  
- **Standards:** EN 60947-5-1, EN 61241-0, EN 61241-1, EN 60079-11  
- **U_1:** 250 V  
- **I_1:** 3.3 A for Ex ib  
  - 5.0 A at Ex ic  
- **C:** – 0  
- **L:** – 0  
- **U:** 250 V  
- **I:** 5 A  
- **P:** max. 1500 W  
- **Contact reliability:** 5 VDC/1 mA  
- **Proof of positive opening:** 2.5 kV impulse voltage  
- **Positive opening path:** approx. 2 mm after achieving opening point  
- **Air clearance and creepage distance to DIN EN 60 664-1:** 4 kV/3 1.200 s/h  
- **Switching frequency:** approx. 1 mm  
- **Switching points:** approx. 2.5 mm  
- **Temperature range:** –20° C ... + 55° C  
- **Climate resistance to DIN EN 60068:** Part 2-20  
- **Mounting position:** random  
- **Mechanical life to EN 60 947-5-1:** 10 x 10⁶ operations  
- **Actuating force at stroke end:** approx. 4.5 N  
- **Terminal designations:** to EN 60947-1  
- **Tightening torque for the connecting screw:** max. 1 Nm

#### Approvals
- Ex
- CE

#### Ordering details

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tr>
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<td>10</td>
<td>Contact labelling 1, 2</td>
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<td>10.1</td>
<td>Contact labelling 11, 12</td>
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</table>

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>03</td>
<td>Contact labelling 3, 4</td>
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<tr>
<td></td>
<td>03.1</td>
<td>Contact labelling 13, 14</td>
</tr>
</tbody>
</table>
Control devices and indicator lights – Light terminal blocks

**EX-RLDE ws 24**

- Light terminal block
- Screw connection
- Cable sections
  - single-strand: 2 x (0.5 ... 2.5 mm²)
  - multi-strand with conductor ferrules: 2 x (0.5 ... 1.5mm²)
- Protection class
  - Connections: IP 20 (finger-safe)
  - Wiring compartments: IP 40

**Technical data**

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>Ex II 2GD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosion protection:</td>
<td>Ex ib IIC T4 X</td>
</tr>
<tr>
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<td>Ex tD A21 IP65 T110°C X</td>
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<tr>
<td>Standards:</td>
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<td>U:</td>
<td>30 V</td>
</tr>
<tr>
<td>I:</td>
<td>not relevant (max. 30 mA)</td>
</tr>
<tr>
<td>P:</td>
<td>not relevant (max. 30 mA)</td>
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</tr>
<tr>
<td>L:</td>
<td>0</td>
</tr>
<tr>
<td>U:</td>
<td>24 V +/-10%</td>
</tr>
<tr>
<td>I:</td>
<td>30 mA</td>
</tr>
<tr>
<td>P:</td>
<td>0.9 W</td>
</tr>
<tr>
<td>Temperature range:</td>
<td>-20°C ... +55°C</td>
</tr>
<tr>
<td>Climate resistance to DIN EN 60068:</td>
<td>Part 2-20</td>
</tr>
<tr>
<td>Mounting position:</td>
<td>random</td>
</tr>
<tr>
<td>Terminal designations:</td>
<td>to EN 60947-1</td>
</tr>
<tr>
<td>Tightening torque for the connecting screw:</td>
<td>max. 1 Nm</td>
</tr>
</tbody>
</table>

**Approvals**

- Ex
- CE

**Ordering details**

Ex-RLDE ws 24
Control devices and indicator lights – Enclosure

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>![Image](78x664 to 175x737)</td>
<td>![Image](252x665 to 349x738)</td>
<td>![Image](422x664 to 520x737)</td>
</tr>
<tr>
<td>• Empty enclosure in V4A</td>
<td>• Empty enclosure in V4A</td>
<td>• Empty enclosure in V4A</td>
</tr>
<tr>
<td>• Version with 1 fitting hole for installation ø 22.3 m</td>
<td>• Version with 3 fitting holes for installation ø 22.3 mm</td>
<td>• Versions with 5 fitting holes for installation ø 22.3 mm</td>
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<tr>
<td>• incl. 1 cable gland M20</td>
<td>• incl. 1 cable gland M25</td>
<td>• incl. 2 cable glands M25</td>
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<tr>
<td>• incl. 1 locking screw</td>
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Approvals

Ordering details

EX-EBG 331.O

EX-EBG 633.O

EX-EBG 665.O
Control devices and indicator lights – Accessories

**System components**

- Mounting tool RMW
- Identification label EX-RZSO
- Mounting flange EX-RLM

**Ordering details**

- Mounting tool for mounting flange: RMW, EX-RB
- Identification label: EX-RZSO
- Mounting flange: EX-RLM

Gas zone 1, 2 / Dust zone 21, 22

© SCHMERSAL

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Control devices and indicator lights – Symbols

### Drives

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td><img src="image" alt="Electric motor" /></td>
<td>Electric motor</td>
</tr>
<tr>
<td><img src="image" alt="Pump general" /></td>
<td>Pump general</td>
</tr>
<tr>
<td><img src="image" alt="Gear pump" /></td>
<td>Gear pump</td>
</tr>
<tr>
<td><img src="image" alt="Coolant" /></td>
<td>Coolant</td>
</tr>
<tr>
<td><img src="image" alt="Oil lubrication" /></td>
<td>Oil lubrication</td>
</tr>
<tr>
<td><img src="image" alt="Rotary indexing table" /></td>
<td>Rotary indexing table</td>
</tr>
<tr>
<td><img src="image" alt="Shuttle table forward" /></td>
<td>Shuttle table forward</td>
</tr>
<tr>
<td><img src="image" alt="Shuttle table back" /></td>
<td>Shuttle table back</td>
</tr>
<tr>
<td><img src="image" alt="Brake fan" /></td>
<td>Brake fan</td>
</tr>
<tr>
<td><img src="image" alt="Caution – live" /></td>
<td>Caution – live</td>
</tr>
<tr>
<td><img src="image" alt="Clamp table rectangular" /></td>
<td>Clamp table rectangular</td>
</tr>
<tr>
<td><img src="image" alt="Electrical machine" /></td>
<td>Electrical machine</td>
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### Signals

<table>
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<tr>
<td><img src="image" alt="On" /></td>
<td>On</td>
</tr>
<tr>
<td><img src="image" alt="Jog" /></td>
<td>Jog</td>
</tr>
<tr>
<td><img src="image" alt="Automatic" /></td>
<td>Automatic</td>
</tr>
<tr>
<td><img src="image" alt="Off" /></td>
<td>Off</td>
</tr>
<tr>
<td><img src="image" alt="Everything off" /></td>
<td>Everything off</td>
</tr>
<tr>
<td><img src="image" alt="On – off" /></td>
<td>On – off</td>
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<tr>
<td><img src="image" alt="Increase of a variable" /></td>
<td>Increase of a variable</td>
</tr>
<tr>
<td><img src="image" alt="Decrease of a variable" /></td>
<td>Decrease of a variable</td>
</tr>
<tr>
<td><img src="image" alt="Pause (time elapse)" /></td>
<td>Pause (time elapse)</td>
</tr>
<tr>
<td><img src="image" alt="Manual operation" /></td>
<td>Manual operation</td>
</tr>
<tr>
<td><img src="image" alt="Visual" /></td>
<td>Visual</td>
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### Words

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<td><img src="image" alt="START" /></td>
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</tr>
<tr>
<td><img src="image" alt="STOP" /></td>
<td>STOP</td>
</tr>
<tr>
<td><img src="image" alt="EIN" /></td>
<td>EIN</td>
</tr>
<tr>
<td><img src="image" alt="AUS" /></td>
<td>AUS</td>
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<tr>
<td><img src="image" alt="LINKS" /></td>
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<tr>
<td><img src="image" alt="RECHTS" /></td>
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<tr>
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<td>AUF</td>
</tr>
<tr>
<td><img src="image" alt="AB" /></td>
<td>AB</td>
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<td><img src="image" alt="ZU" /></td>
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<td><img src="image" alt="HALT" /></td>
<td>HALT</td>
</tr>
<tr>
<td><img src="image" alt="VOLL" /></td>
<td>VOLL</td>
</tr>
<tr>
<td><img src="image" alt="LEER" /></td>
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### Letters

<table>
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<th>Description</th>
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<td><img src="image" alt="A" /></td>
<td>A</td>
</tr>
<tr>
<td><img src="image" alt="B" /></td>
<td>B</td>
</tr>
<tr>
<td><img src="image" alt="C" /></td>
<td>C</td>
</tr>
<tr>
<td><img src="image" alt="D" /></td>
<td>D</td>
</tr>
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</table>

Other numerals available, e.g. for number 9 ordering code 709
### Control devices and indicator lights – Symbols

#### Linear motion

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="101" /></td>
<td>101 Working motion feed</td>
</tr>
<tr>
<td><img src="image2" alt="102" /></td>
<td>102 Rapid motion or idling</td>
</tr>
<tr>
<td><img src="image3" alt="103" /></td>
<td>103 Rapid motion</td>
</tr>
<tr>
<td><img src="image4" alt="104" /></td>
<td>104 Feed</td>
</tr>
<tr>
<td><img src="image5" alt="105" /></td>
<td>105 Interrupted motion jogging</td>
</tr>
<tr>
<td><img src="image6" alt="106" /></td>
<td>106 Reciprocating motion</td>
</tr>
<tr>
<td><img src="image7" alt="107" /></td>
<td>107 Limited motion</td>
</tr>
<tr>
<td><img src="image8" alt="108" /></td>
<td>108 Indexing</td>
</tr>
<tr>
<td><img src="image9" alt="109" /></td>
<td>109 Motion in 2 directions</td>
</tr>
</tbody>
</table>

#### Rotary motion

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><img src="image10" alt="201" /></td>
<td>201 Continuous clockwise rotation</td>
</tr>
<tr>
<td><img src="image11" alt="202" /></td>
<td>202 Anti-clockwise rotation</td>
</tr>
<tr>
<td><img src="image12" alt="203" /></td>
<td>203 Clockwise rotation STOP</td>
</tr>
<tr>
<td><img src="image13" alt="204" /></td>
<td>204 Anti-clockwise rotation STOP</td>
</tr>
<tr>
<td><img src="image14" alt="205" /></td>
<td>205 1 revolution clockwise</td>
</tr>
<tr>
<td><img src="image15" alt="206" /></td>
<td>206 Anti-clockwise</td>
</tr>
<tr>
<td><img src="image16" alt="207" /></td>
<td>207 Rotary indexing</td>
</tr>
<tr>
<td><img src="image17" alt="208" /></td>
<td>208 Interrupted rotary motion</td>
</tr>
<tr>
<td><img src="image18" alt="209" /></td>
<td>209 Clockwise motion restricted</td>
</tr>
<tr>
<td><img src="image19" alt="210" /></td>
<td>210 Anti-clockwise motion restricted</td>
</tr>
<tr>
<td><img src="image20" alt="211" /></td>
<td>211 Clockwise motion from a restriction</td>
</tr>
<tr>
<td><img src="image21" alt="211" /></td>
<td>211 Anti-clockwise motion from a restriction</td>
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#### Additional options

<table>
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<th>Description</th>
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<tbody>
<tr>
<td><img src="image22" alt="301" /></td>
<td>301 Clamping, chucking</td>
</tr>
<tr>
<td><img src="image23" alt="302" /></td>
<td>302 Release</td>
</tr>
<tr>
<td><img src="image24" alt="303" /></td>
<td>303 Braking</td>
</tr>
<tr>
<td><img src="image25" alt="304" /></td>
<td>304 Release brake</td>
</tr>
<tr>
<td><img src="image26" alt="305" /></td>
<td>305 Unlock</td>
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<tr>
<td><img src="image27" alt="306" /></td>
<td>306 Lock</td>
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#### Arabic numerals

<table>
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<tbody>
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<td>700</td>
</tr>
<tr>
<td><img src="image29" alt="701" /></td>
<td>701</td>
</tr>
<tr>
<td><img src="image30" alt="702" /></td>
<td>702</td>
</tr>
<tr>
<td><img src="image31" alt="801" /></td>
<td>801</td>
</tr>
<tr>
<td><img src="image32" alt="802" /></td>
<td>802</td>
</tr>
<tr>
<td><img src="image33" alt="803" /></td>
<td>803</td>
</tr>
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</table>
More details

Detailed technical information at:
www.schmersal.net
The fundamental functional characteristic of a trapped key system is that, depending on the operating condition of the machine control, the key is trapped and cannot be withdrawn.

- In automatic mode (with the safety guard locked) in a control element, usually a key-operated selector switch or
- If the safety guard is open (in an electrically de-energised condition), in the guard locking device, i.e. a lock

Content
EX-SHGV-..-2G/D 136
EX-SHGV-..-3G/D 134
EX-SVM 1/-6/-..-2G/D 135
EX-SVM 1/-10/-..-2G/D 135
EX-SVM-..-2G/D 136
EX-SVM-..-2G/D 136
EX-Trapped key system

Mode of operation

The fundamental functional characteristic of a trapped key system is that, depending on the operating condition of the machine control, the key is trapped and cannot be withdrawn.

- in automatic mode (with the safety guard locked) in a control element, usually a key-operated selector switch or
- if the safety guard is open (in an electrically de-energised condition), in the guard locking device, i.e. a lock

In other words, a principle feature of the system is that the removable key is trapped either in the guard locking device or in the switch lock.

The locking device of the guard is designed in such a way that the trapped key can only be enabled if the guard is closed and locked (failsafe). Only in this way can the key be transferred from here to the key-operated selector switch.

When the machine control system is switched on the key is trapped and cannot be removed for as long as the switch is set to ON.

If the transfer time between the opening of the key-operated selector switch and the locking of the guard is not sufficient for a hazardous machine motion to come to a standstill, a key-operated selector switch interlocking device may also be required.

Framework conditions

When using the EX-SHGV safety door interlocking system it must be ensured that

- the time between switching off at the control panel and access to the guard is greater than the stopping time of any hazardous motion, or that the key-operated selector switch interlocking device of the type SVE is used;
- only one key is used in the trapped key system and any spare keys available are stored carefully;
- the separate actuators of the EX-SHGV guard locking devices are fitted to the guard in such a way, e.g. with the non-reusable screws supplied with the equipment, that they cannot be released by simple means;
- the entry throat for the separate actuator is fitted in the guard locking device in a concealed position where at all possible. This recommendation applies generally to interlocking devices with separate actuator.

Please note:

- Owing to the trapped key system the systems are less suited to charging doors or moving guards with more frequent access.
- Even if key and lock barrel have 200 individual cuts / tumbler arrangements, a key can be copied in the same way as a separate actuator. Any damage caused as a result of such wilful manipulation of a guard no longer falls within the protection of statutory accident insurance (otherwise there would also be no BG test certificate for the SHGV system) for example.
- Every EX-SHGV system comes with a spare key should the original one be lost under the strict condition that it is kept carefully and not used in the operational key transfer procedure.
EX-Trapped key system

EX-SHGV/ESS key-operated selector switch

The EX-SHGV/ESS key-operated selector switch as control element to interrupt or switch off automatic mode.

Guard locking device Type EX-SHGV

The design of the Guard locking device EX-SHGV is based on that of a position switch with separate actuator, but the function of the position monitoring and locking is based exclusively on a mechanical principle of operation using the integrated lock barrel and the positively connected mechanism as well as the interaction between actuator and the articulating mechanism in the device head.

Version with a second lock barrel

The version with a second lock barrel using which the operation of lock barrel 1 can be blocked if an operator needs to access a room and wishes to protect himself from unintentional start-up of the machine control system by a third party.

EX-SVM key distribution station

The EX-SVM key distribution station is used when multiple guards must be operated with one key selector switch.
EX-Trapped key system

**EX-SHGV-....-3G/D**

- Key-operated selector switch
- Ex certified
- Mounting hole 22.3 mm
- Metal front ring
- Good resistance to oil and petroleum spirit

---

**Technical data**

- Equipment category: II 3GD
- Ex protection: Ex nL IIC T5 X  
  Ex tD A22 IP65 T110°C X
- Standards: EN 60947-1  
  EN 60947-5-1  
  EN 61241-1  
  EN 60079-0  
  EN 60079-15
- Mounting hole Ø: 22.3 mm
- Front plate thickness: 1.5 ... max. 6 mm
- Spacing: 50 x 50 mm
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Protection class: Key-operated selector switch: IP 65
- Contact element: IP 44
- Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges, NC contact with positive break
- Contact material: fine silver
- Connection: Screw terminals
- \( U_i: \) 36 VDC
- \( I_i: \) 100 mA
- \( P_i: \) 0.9 W
- \( C_i: \) ~ 0
- \( L_i: \) ~ 0
- Utilisation category: AC-15, DC-13
- \( I_{\text{f}}/U_{\text{f}}: \) 6 A / 250 VAC  
  4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Ambient temperature: 0 °C ... + 70 °C
- Mechanical life: 10 million operations

---

**Approvals**

![CE](ce.png)

---

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>e.g. 201</td>
<td>individual key numbers</td>
</tr>
</tbody>
</table>

---

**Contact variants**

- **1 NO / 1 NC** EF 103.1  
  \[23\] \[24\]  
  \[21\] \[22\]  
- **EF 103.2**  
  \[41\] \[42\]  
  \[43\] \[44\]

---

**Contact variants**

- **Contact variants**
  - Contact element EF103.1: 1 NC / 1 NO
  - Contact element EF103.2: 1 NC / 1 NO
- Contact variant 1 NC / 1 NO included in delivery.
- If more contacts are needed, on request.

---

**Note**

- **Contact variants**
  - Contact element EF103.1: 1 NC / 1 NO
  - Contact element EF103.2: 1 NC / 1 NO
- Contact variant 1 NC / 1 NO included in delivery.
- If more contacts are needed, on request.
EX-Trapped key system

**EX-SVM 1/..-6/..-2G/D**

- Key distribution station
- with 6 keys
- Ex certified
- Metal enclosure
- Good resistance to oil and petroleum spirit
- Metal front plate
- 6 Cylinder lock for solenoid keys EX-SHGV.

**EX-SVM 1/..-10/..-2G/D**

- Key distribution station
- with 10 keys
- Ex certified
- Metal enclosure
- Good resistance to oil and petroleum spirit
- Metal front plate
- 10 Cylinder lock for solenoid keys EX-SHGV.

### Technical data

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Ex protection:</td>
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<tr>
<td>Standards:</td>
<td>EN 13463-1, EN 61241-0</td>
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<tr>
<td>Design:</td>
<td>Enclosure for top mounting or front plate mounting</td>
</tr>
<tr>
<td>Material:</td>
<td>Enclosure for top mounting AISi12 front plate 1.4301</td>
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<tr>
<td>Actuating speed:</td>
<td>max. 1 m/s</td>
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<tr>
<td>Mechanical life:</td>
<td>10 million operations</td>
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</tbody>
</table>

### Approvals

- ✴
- ✮
- CE

### Ordering details

#### EX-SVM1/1-6/2-3-2G/D

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
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<td>e.g. 34</td>
<td>individual key number for main cylinder lock</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>individual key number for solenoid key EX-SHGV.</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Enclosure for surface mounting</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Front plate mounting</td>
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</tbody>
</table>

#### EX-SVM1/1-10/2-3-2G/D

<table>
<thead>
<tr>
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<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>e.g. 34</td>
<td>individual key number for main cylinder lock</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>individual key number for solenoid key EX-SHGV.</td>
</tr>
<tr>
<td>3</td>
<td>A</td>
<td>Enclosure for surface mounting</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Front plate mounting</td>
</tr>
</tbody>
</table>

Gas zone 1, 2 / Dust zone 21, 22

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
EX-Trapped key system

**EX-SHGV-….2G/D**

- Interlock
- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Good resistance to oil and petroleum spirit

**Technical data**

- **Equipment category:** Ex II 2GD
- **Ex protection:** c 85°C X
- **Standards:** EN 13463-1, EN 61241-0
- **Design:** fixings to EN 50041
- **Enclosure:** Al Si12 die-casting, painted
- **Actuating speed:** max. 1 m/s
- **Mechanical life:** 10 million operations

---

**Approvals**

- Ex

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
<td>B</td>
<td>Cylinder lock on the back</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>Lock barrel to left</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Lock barrel to the right</td>
</tr>
<tr>
<td>②</td>
<td>e.g. 201</td>
<td>Individual key numbers</td>
</tr>
<tr>
<td>③</td>
<td>e.g. BO</td>
<td>For the appropriate actuator see page 137</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Lock barrel to left</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Lock barrel to the right</td>
</tr>
<tr>
<td>②</td>
<td>e.g. 201</td>
<td>Individual key number for LHS or RHS cylinder lock</td>
</tr>
<tr>
<td>③</td>
<td>e.g. 34</td>
<td>Individual key number for second cylinder lock</td>
</tr>
<tr>
<td>④</td>
<td>e.g. BO</td>
<td>For the appropriate actuator see page 137</td>
</tr>
</tbody>
</table>
EX-Trapped key system

System components

Straight actuator EX-BO

Angled actuator EX-BOW

Straight radius actuator EX-BOR

Angled radius actuator EX-BOWR

Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
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<td>EX-BO</td>
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<tr>
<td>Angled actuator</td>
<td>EX-BOW</td>
</tr>
<tr>
<td>Straight radius actuator</td>
<td>EX-BOR</td>
</tr>
<tr>
<td>Angled radius actuator</td>
<td>EX-BOWR</td>
</tr>
</tbody>
</table>
Online documentation in six languages

Service for designers

The online catalogue also includes the technical drawings of our products – a special service to designers. In this way, they can be downloaded and directly imported into CAD systems.

The Schmersal homepage furthermore contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings. To be bookmarked!

The direct way

If you need further information or you want personal advice, you can call us as well:

+49 (0) 2 02 64 74 00

The addresses of our representations in Germany and abroad can be found on the front pages of this catalogue.

At your disposal – anywhere, anytime!