The direct way
If you need further information or you want personal advice, you can call us as well:
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The addresses of our representations in Germany and abroad can be found on the front pages of this catalogue.

We are at your disposal – anyplace, anywhere, anytime!

Attention!
The data specified in this catalogue are carefully checked typical standard values.
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You will also find detailed information regarding our product variety on our website: www.schmersal.net.

Online documentation in 13 languages
The online catalogue for our customers is permanently updated. The Main catalogue can be consulted on the Internet in as much as 13 languages. The technical data of our entire product range are always up-to-date. The declarations of conformity, the test certificates and the mounting instructions can be consulted or even downloaded as well.

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 fed in 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!

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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 fulfil 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 fulfil 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.

### Source of ignition

<table>
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<th>Source of ignition</th>
<th>Examples of the cause</th>
</tr>
</thead>
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<tr>
<td>Sparks</td>
<td>Mechanically generated sparks (e.g. by friction, stroke or cutting removal operations), electric sparks</td>
</tr>
<tr>
<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>
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<td>Static electricity</td>
<td>Separately arranged conductive parts, many plastics</td>
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<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 10¹¹ ... 3 x 10¹⁵ Hz range</td>
<td>Laser beam for range finding, especially in case of beam focusing</td>
</tr>
<tr>
<td>High frequency 10¹ ... 3 x 10¹² 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>
</tbody>
</table>
The basic physic and technical principles

**Complete combustion**
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 various with the combustion speed.

<table>
<thead>
<tr>
<th>Order of magnitude of the speed of combustion</th>
<th>Deflagration cm/s</th>
<th>Explosion m/s</th>
<th>Detonation km/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 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 portion 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 $10^3$ 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 with 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, vapour or mist is present continuously or for long periods or frequently.

- Example: these conditions are usually found in 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).

### Classification of potentially explosive substances

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

<table>
<thead>
<tr>
<th>Substance</th>
<th>Ignition temperature $T_i$ [°C]</th>
<th>Smouldering temperature $T_s$ [°C]</th>
<th>$ø$ Minimum energy $ø$ Emin [mJ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flour</td>
<td>$≥ 380$</td>
<td>$≥ 300$</td>
<td>$≥ 30$</td>
</tr>
<tr>
<td>Wood</td>
<td>$≥ 410$</td>
<td>$≥ 200$</td>
<td>$≥ 100$</td>
</tr>
<tr>
<td>Brown coal</td>
<td>$≥ 380$</td>
<td>$≥ 225$</td>
<td>–</td>
</tr>
<tr>
<td>Coal</td>
<td>$≥ 500$</td>
<td>$≥ 240$</td>
<td>$≥ 1000$</td>
</tr>
<tr>
<td>PVC</td>
<td>$≥ 530$</td>
<td>$≥ 340$</td>
<td>$≥ 5$</td>
</tr>
<tr>
<td>Aluminium</td>
<td>$≥ 560$</td>
<td>$≥ 270$</td>
<td>$≥ 5$</td>
</tr>
<tr>
<td>Sulphur</td>
<td>$≥ 240$</td>
<td>$≥ 250$</td>
<td>10</td>
</tr>
</tbody>
</table>

**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 heated surface on which a dust deposit of a defined thickness is ignited.

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.
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 highimpact 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

<table>
<thead>
<tr>
<th>Class</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>450°C</td>
<td>300°C</td>
<td>200°C</td>
<td>135°C</td>
<td>100°C</td>
<td>85°C</td>
</tr>
</tbody>
</table>

Ignition protection type and the main characteristics

<table>
<thead>
<tr>
<th>Ignition protection type</th>
<th>Basic principle, main application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil immersion „o“</td>
<td>The source of ignition is permanently immersed in oil. Application: switchgear and transformers</td>
</tr>
<tr>
<td>Pressurized enclosures „p“</td>
<td>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</td>
</tr>
<tr>
<td>Powder filling „q“</td>
<td>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</td>
</tr>
<tr>
<td>Flameproof enclosures „d“</td>
<td>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</td>
</tr>
<tr>
<td>Increased safety „e“</td>
<td>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)</td>
</tr>
<tr>
<td>Encapsulation „m“</td>
<td>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</td>
</tr>
<tr>
<td>Intrinsic safety „i“</td>
<td>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</td>
</tr>
<tr>
<td>Intrinsically safe systems „i-SYST“</td>
<td>The entirety of interlinked and interconnected electrical apparatus, documented by a system description. Circuits used completely or partly inside hazardous areas are intrinsic safe.</td>
</tr>
</tbody>
</table>
**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.

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

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, II, 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>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Comparable with</th>
<th>Method</th>
<th>Subdivision</th>
</tr>
</thead>
<tbody>
<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 (typical values)

<table>
<thead>
<tr>
<th>Resistance (back/forth)</th>
<th>Simple electrical apparatus – intrinsic safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mm²</td>
<td>Passive components: None</td>
</tr>
<tr>
<td></td>
<td>Simple semiconductor components</td>
</tr>
<tr>
<td></td>
<td>Energy storage: Values must be observed during calculation</td>
</tr>
<tr>
<td></td>
<td>Energy source: ≤ 1.5 V ≤ 100 mA ≤ 25 mW</td>
</tr>
</tbody>
</table>

Design of intrinsically safe electric circuits

- Design of intrinsically safe electric circuits
  - Ex i
  - [Ex i]
  - Ex i
  - Ex i
  - Ex i
  - Ex i

Here are the typical values:

- Resistance (back/forth): 0.5 mm² 72 Ohm/km
- 0.75 mm² 48 Ohm/km
- 1.5 mm² 24 Ohm/km
- Capacity: 180-200 nF/km
- Inductivity: 0.8-1 mH/km
- Simple electrical apparatus – intrinsic safety
  - Type: Passive components
  - Condition: None
  - Example: Switches, terminal/junction boxes (modular enclosures), resistance, simple semiconductor components
  - Energy storage
  - Condition: Values must be observed during calculation
  - Example: Capacitors, coils
  - Energy source
  - Condition: ≤ 1.5 V ≤ 100 mA ≤ 25 mW
  - Example: Thermocouple, Photocell
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

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>
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, 
- 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: © II 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>No.</th>
<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></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td>Normal operation (1b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Expected malfunction (1b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<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>Reason for assessment</th>
<th>Description</th>
<th>Proof (including relevant Ex features listed in column 1)</th>
<th>Resulting equipment category in respect of this ignition hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<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.

<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRB 101Exi-...</td>
<td>16</td>
</tr>
<tr>
<td>SRB 200Exi-...</td>
<td>18</td>
</tr>
</tbody>
</table>
SRB-EXi safety relay module

PROTECT SRB 101EXi-...

- 1 or 2 channel control
- 1 safety contact
- Suitable for signal processing of emergency stop control devices, interlocking equipment, etc.
- 1 additional signalling contact (auxiliary contacts must not be used in safety circuits)
- Trailing edge (version -1R)
- Automatic reset function (version -1A)
- Optionally cross-wire short recognition (through switch)
- Current and voltage limitation of the input circuits (intrinsically safe)
- Green LED indications for relays K1, K2, UB, Ui and UExi
- DIN rail mounting to DIN EN 60715:2001
- Thermoplastic enclosure to UL-94-V-0, graphite black RAL 9011
- Certification to DIN EN ISO 13849-1:2007
- Certification to ATEX 94/9/EG
- Electric circuits up to zone 1/21
- Installation in zone 2 possible

Technical data

- Equipment category, explosion protection type: Gas: © II 3 G Ex nAnC IIC T5 (SRB in zone 2); Gas/dust: © 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 Ue: 33.6 V
- Current le: 57.0 mA
- Capacity Pem: 478.8 mW (linear characteristic)
- Maximum safety voltage Ue: 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: IP40
- Power consumption: max. 3.0 W
- Switching capacity of the enabling paths: 230 V; 3 A ohmic (inductive with suitable protective circuit)
- Recommended fuse for the enabling paths: AC-15: 230 VAC/3 A DC-13: 24 VDC/3 A
- Min. switching capacity: 3.15 A slow blow
- Contact resistance: max. 10 mV/10 mA
- 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: 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
- Bridging 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
- Storage temperature: –40 °C ... +85 °C
- EMV: EN 61000-6-2:2005
- Vibrations: EN 60068-2-6:1996
- Frequency: 10 … 55 Hz
- Amplitude: 0.35 mm
- Climatic resistance: EN 60068-2-3:1986
- Mechanical life: 10^7 operations
- Weight: 230 g
- Dimensions: 22.5 x 100 x 121 mm

Approvals

Ordering details

SRB 101EXi-1

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

Classification

Safety parameters:

- Standards: EN ISO 13849-1, IEC 61508, EN 60947-5-1
- PL: STOP 0: up to e
- Category: STOP 0: up to 4
- PFH value: STOP 0: ≤ 2.00 x 10^-9/h
- SIL: STOP 0: up to 3
- Mission time: 20 years

The PFH value of 2.00 x 10^-9/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.

<table>
<thead>
<tr>
<th>Contact load</th>
<th>n-op/y</th>
<th>t-cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 %</td>
<td>525,600</td>
<td>1.0 min</td>
</tr>
<tr>
<td>40 %</td>
<td>210,240</td>
<td>2.5 min</td>
</tr>
<tr>
<td>60 %</td>
<td>75,087</td>
<td>7.0 min</td>
</tr>
<tr>
<td>80 %</td>
<td>30,918</td>
<td>17.0 min</td>
</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts.

Diverging applications upon request.
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 ②.
- Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts.
- ② = 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.

**Wiring diagram**

- ① Sensor: Installation in zone 1/21
- ② SRB Exi: Installation in zone 2
- ③ Control

**Legend**

- 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

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

PROTECT SRB 200EXi...

• 1 or 2 channel control
• 2 safety contacts
• Suitable for signal processing of emergency stop control devices, interlocking equipment, etc.
• Trailing edge (version -1R)
• Automatic reset function (version -1A)
• Optionally cross-wire short recognition (through switch)
• Current and voltage limitation of the input circuits (intrinsically safe)
• Green LED indications for relays K1, K2, UB, Ui and UEXi
• DIN rail mounting to DIN EN 60715:2001
• Thermoplastic enclosure to UL-94-V-0, graphite black RAL 9011
• Certification to DIN EN ISO 13849-1:2007
• Certification to ATEX 94/9/EG
• Electric circuits up to zone 1/21
• Installation in zone 2 possible

Approval

Ordering details

SRB 200EXi-1©

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</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>

Technical data

Equipment category, explosion protection type: Gas: © II 3 G Ex nAnC IIC T5 (SRB in zone 2)
Gas/dust: © II (2) GD [Ex ib] IIC/[Ex ibD]

Inputs (S11-S12, S21-S22, X1-X2/X3):

Temperature class: T5
Voltage Uo: 33.6 V
Current Io: 57.0 mA
Capacity Pmax: 478.8 mW (linear characteristic)
Maximum safety voltage Umax: 253 VAC
Isolation: safe separation to EN 60079-11:
   Amplitude of the voltage 375 V
Recommended 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: IP40
   Wiring compartment: IP54
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:
   max. 10 V/10 mA
Contact resistance: 100 mΩ max.
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
   approx. 15 ms
Bridging in case of voltage drops:
   EN 60664-1:2003 (DIN VDE 0110-1), 4 kW/2;
   EN 60709-11:2007 (VDE 0770/0171 Part 7)
Max. total line resistance: 30 Ohm
Ambient operating:
   –25 °C ... +60 °C
Storage temperature:
   –40 °C ... +85 °C
EMV: EN 61000-6-2:2005
Vibrations: EN 60068-2-6:1996
Frequency: 10 … 55 Hz
Amplitude: 0.35 mm
Climatic resistance: EN 60068-2-3:1986
Mechanical life: 107 operations
Weight: 230 g
Dimensions: 22.5 x 100 x 121 mm

Classification

Safety parameters:
Standards:
   EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:
   STOP 0: up to e
Category:
   STOP 0: up to 4
PFH value:
   STOP 0: ≤ 2.00 x 10⁻⁸/h
SIL:
   STOP 0: up to 3
Mission time:
   20 years

The PFH value of 2.00 x 10⁻⁸/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.

<table>
<thead>
<tr>
<th>Contact load</th>
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<tbody>
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</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

Mission time:
20 years

Diverging applications upon request.

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 [5].
- Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts.
- 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.

**Legend**

1. Sensor: Installation in zone 1/21
2. SRB Exi: Installation in zone 2
3. Control

**Gas zone (1), 2 / Dust zone (21), 22**

- Sensor: Installation in zone 1/21
- SRB Exi: Installation in zone 2
- Control

**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
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>25</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>30</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>94</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 120-....-3G/D, however without LED</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 180-....-3G/D</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>EX-BNS 303-....-3G/D, however without LED</td>
<td>100</td>
</tr>
<tr>
<td>Magnetic reed switches</td>
<td>EX-BN 20-....-3G/D</td>
<td>106</td>
</tr>
<tr>
<td>Reset buttons</td>
<td>Ex-RDT</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Ex-RDM</td>
<td>114</td>
</tr>
<tr>
<td>Emergency stop control devices</td>
<td>Ex-RDRZ45</td>
<td>118</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:** II 3D
- **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:** IP67 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 (incl. conductor ferrules)
- **Cable entry:** 3 x M16
- **U_imp:** 6 kV
- **U_I:** 500 V
- **I_imp:** 2.5 A
- **Utilisation category:** AC-15 DC-13
- **I_e/U_e:** 2.5 A / 230 VAC
- **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

### Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>03</td>
<td>3 NC contact</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td>➁</td>
<td>Ejection force</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Latching force 30 N</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2254</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td>1762</td>
<td>Front mounting</td>
<td></td>
</tr>
<tr>
<td>1637</td>
<td>Gold-plated contacts</td>
<td></td>
</tr>
</tbody>
</table>

### Note

Actuators must be ordered separately.
Safety switch with separate actuator

System components

Straight actuator B1

Actuator B1-2024 with slot lip-seal

Actuator B1-2053 with ball latch

Actuator B1-2177 with centering guide

With rubber mounting B1-2245

Flexible actuator B2

Flexible actuator B3

Flexible actuator B6

Mounting set MS AZ 15/16

Slot sealing plug AZ 15/16-1476

Ball catch 2053-2

Front mounting -1762

Ordering details

Straight actuator
with slot lip-seal
with ball latch
with centering guide

AZ 15/16-B1
AZ 15/16-B1-2024
AZ 15/16-B1-2053
AZ 15/16-B1-2177

Flexible actuator
AZ 15/16-B2
AZ 15/16-B3
AZ 15/16-B6

Mounting set
MS AZ 15/16

Slot sealing plug
AZ 15/16-1476

Ball catch
-2053-2

Front mounting with M5 nuts
-1762

Dust zone 22
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 101135338
M5 x 16 101135339
M5 x 20 101135340
(Quantity 2 pcs)

EX-certified screwed cable gland EX-KLE-M16x1.5
EX-certified screw plug EX-VS-M16x1.5
**Technical data**

- **Equipment category:** I 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
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** stainless steel 1.4301
- **Max. impact energy:** 4 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP67 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 screw terminals
- **Connection:**
  - **Cable section:** max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
  - **Cable entry:** M20
  - **U_imp:** 4 kV
  - **U_l:** 250 V
  - **I_{imp}:** 10 A
  - **Utilisation category:** AC-15, DC-13
  - **I_v / U_v:**
    - 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:** 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:** min. Ø 7 mm
  - **of the cable glands:** max. Ø 12 mm
  - **Utilisation category:** AC-15, DC-13

**Contact variants**

<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>14</td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Note**

- Actuators must be ordered separately.

**Note**

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
  - EN 61241-0
  - EN 61241-1
  - BG-GS-ET-15
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** stainless steel 1.4301
- **Max. impact energy:** 1 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP67 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 screw terminals
- **Connection:**
  - **Cable section:** max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- **Cable entry:** 3 x M20
- **U_{imp}:** 4 kV
- **U_c:** 250 V
- **I_{imp}:** 10 A
- **Utilisation category:** AC-15, DC-13
- **I_{V}/U_{V}:**
  - 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:** 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
  - ②
  - ③
- 3 NC contacts
  - ④

### 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>②</td>
<td>12</td>
<td>1NO/2NC contacts</td>
</tr>
<tr>
<td></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></td>
<td>③</td>
<td>With overlapping contacts</td>
</tr>
<tr>
<td></td>
<td>1637</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>Straight actuator B1</th>
<th>Flexible actuator B6</th>
<th>Slot sealing plug AZ 335/355-1990</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Straight actuator B1 diagram" /></td>
<td><img src="image2" alt="Flexible actuator B6 diagram" /></td>
<td><img src="image3" alt="Slot sealing plug AZ 335/355-1990 diagram" /></td>
</tr>
</tbody>
</table>

With rubber mountings B1-2245

<table>
<thead>
<tr>
<th>With rubber mountings B1-2245</th>
<th>Flexible actuator B6-Flex</th>
<th>Lockout tag SZ 16/335</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="With rubber mountings B1-2245 diagram" /></td>
<td><img src="image5" alt="Flexible actuator B6-Flex diagram" /></td>
<td><img src="image6" alt="Lockout tag SZ 16/335 diagram" /></td>
</tr>
</tbody>
</table>

Angled actuator B5

<table>
<thead>
<tr>
<th>Angled actuator B5</th>
<th>Flexible actuator B6-Flex</th>
<th>EX-certified screwed cable gland</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="Angled actuator B5 diagram" /></td>
<td><img src="image5" alt="Flexible actuator B6-Flex diagram" /></td>
<td><img src="image8" alt="EX-certified screwed cable gland diagram" /></td>
</tr>
</tbody>
</table>

Angled actuator B5-Flex

<table>
<thead>
<tr>
<th>Angled actuator B5-Flex</th>
<th>EX-certified screw plug M20</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image9" alt="Angled actuator B5-Flex diagram" /></td>
<td><img src="image10" alt="EX-certified screw plug M20 diagram" /></td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>Straight actuator with rubber mounting</th>
<th>Flexible actuator</th>
<th>Slot sealing plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ 335/355-B1</td>
<td>AZ 335/355-B6</td>
<td>AZ 335/355-1990</td>
</tr>
<tr>
<td>AZ 335/355-B1-2245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ 335/355-B5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ 335/355-B5-Flex</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EX-certified screwed cable gland EX-KLE-M20x1.5
EX-certified screw plug EX-VS-M20x1.5

Dust zone 22
### Technical data

- **Equipment category:** Ex II 3D
- **Ex protection:** Ex tD A22, T60°C X
- **Standards:**
  - EN 60947-5-1
  - EN 61241-0
  - EN 61241-1
  - BG-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:** IP67 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
- **U_{imp}:** 2 x 4 kV
- **U_{ac}:** 250 V
- **I_{imp}:** 6 A
- **Utilisation category:** AC-15, DC-13
- **I_{1} / U_{e}:**
  - 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:** Min. 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:** Max. Ø 12 mm

### Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>11/02</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>02/11</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>02/02</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>02/20</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>02/02</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>02/02</td>
<td>2 NC contacts</td>
</tr>
</tbody>
</table>

### Contact symbols

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

### Approvals

### Ordering details

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

Note: Actuators must be ordered separately.

### Note

Dust zone 22
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:

![Actuating head diagram]

**Technical data**

- Equipment category: II 3D
- Ex protection: Ex tD A22 IP67 T90°C X
- Standards: EN 60947-5-1
- EN 61241-0
- Enclosure: light-alloy diecast, paint finish
- Max. impact energy: 4 J
- Actuating speed: max. 1 m/s
- Actuator: brass, blue chrome-plated
- Protection class: IP67 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, BG-GS-ET-15, slow action,
- NC contact with positive break
- Connection: screw terminals
- Cable section: max. 1.5 mm²
- (incl. conductor ferrules)
- Cable entry: 1 x M20
- U_{imp} : 4 kV
- U_i : 250 V
- I_{imp} : 10 A
- Utilisation category: AC-15, DC-15
- I_U : 4 A / 230 V
- 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 10.7 mm
- Positive break force: 5 N for each
- Ambient temperature: 1 million operations
- Mechanical life: min. Ø 7 mm
- Cable cross-section: max. Ø 12 mm
- of the cable glands: Ø 22 mm
- Connection: screw terminals
- Cable section: max. 1.5 mm²
- (incl. conductor ferrules)
- Cable entry: 1 x M20
- U_{imp} : 4 kV
- U_i : 250 V
- I_{imp} : 10 A
- Utilisation category: AC-15, DC-15
- I_U : 4 A / 230 V
- 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 10.7 mm
- Positive break force: 5 N for each
- Ambient temperature: 1 million operations
- Mechanical life: min. Ø 7 mm
- Cable cross-section: max. Ø 12 mm
- of the cable glands: Ø 22 mm

**Equipment details**

**EX-AZ 3350-STS30-...**

- 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:

![Actuating head diagram]

**Approvals**

![CE mark]

**Ordering details**

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

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

**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

**Note**

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

**Ordering details**

- 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.
### System variants

<table>
<thead>
<tr>
<th>Variant</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX-AZ 3350-STS30-01</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>EX-AZ 3350-STS30-04</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>EX-AZ 3350-STS30-05</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>EX-AZ 3350-STS30-06</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>EX-AZ 3350-STS30-07</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>EX-AZ 3350-STS30-08</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

In all images, the guard door opens outwards.

### System components

- **EX-certified screwed cable gland**
- **Lockout tag SZ 415-1/-2**
- **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-STS30-04

**Mounting outside with emergency handle**
- Door hinge right: EX-AZ 3350-STS30-05
- Door hinge left: EX-AZ 3350-STS30-08

**Lockout tag**
- for STS30-01/-03/-06/-08: SZ 415-1
- for STS30-02/-04/-05/-07: SZ 415-2

**Lockout tag with 5 bore holes**
- for STS30-01/-03/-06/-08: SZ 415-1-2177
- for STS30-02/-04/-05/-07: SZ 415-2-2177

**Centering device:**
- Mounting outside: TFA-010
- Mounting inside: TFI-010

For product information and dimensions, please refer to the Main Catalogue "Safety Technology".

**Mounting plate**: MP TG-01

**EX-certified screwed cable gland**: EX-KLE-M20x1.5
More Details

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
• 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

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>Ex IIC T5 X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex nC IIC T5 X</td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 60947-5-1, EN 61241-0, EN 61241-1, EN 60079-9, EN 60079-15, BG-GS-ET-19</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>glass-fibre reinforced thermoplastic, self-extinguishing</td>
</tr>
<tr>
<td>Max. impact energy:</td>
<td>1 J</td>
</tr>
<tr>
<td>Actuating speed:</td>
<td>max. 1 m/s</td>
</tr>
<tr>
<td>Actuator and locking bolt:</td>
<td>stainless steel 1.4301</td>
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<tr>
<td>Protection class:</td>
<td>IP67 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>Silver</td>
</tr>
<tr>
<td>Contact type:</td>
<td>change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges</td>
</tr>
<tr>
<td>Switching system:</td>
<td>EN 60947-5-1, slow action, positive break NC contact</td>
</tr>
<tr>
<td>Connection:</td>
<td>cut clamp terminals</td>
</tr>
<tr>
<td>Cable section:</td>
<td>0.75 – 1.0 mm², flexible</td>
</tr>
<tr>
<td>Uimp:</td>
<td>4 kV</td>
</tr>
<tr>
<td>U:</td>
<td>250 V</td>
</tr>
<tr>
<td>Iimp:</td>
<td>2 A</td>
</tr>
<tr>
<td>Utilisation category:</td>
<td>AC-15, DC-13</td>
</tr>
<tr>
<td>I, U:</td>
<td>2 A / 230 VAC, 2 A / 24 VDC</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>2 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break travel:</td>
<td>11 mm</td>
</tr>
<tr>
<td>Positive break force:</td>
<td>6 N for each NC contact fitted</td>
</tr>
<tr>
<td>Magnet:</td>
<td>100% ED</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>– 15 °C ... + 45 °C</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>&gt; 1 million operations</td>
</tr>
<tr>
<td>Fmax:</td>
<td>1000 N</td>
</tr>
<tr>
<td>Latching force:</td>
<td>30 N for ordering suffix R</td>
</tr>
<tr>
<td>Cable cross-section of the cable glands:</td>
<td>min. Ø 6.5 mm, max. Ø 12 mm</td>
</tr>
</tbody>
</table>

Power to unlock 1 NO / 1 NC

Power to lock 1 NO / 1 NC

Contact variants

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td></td>
<td>1NO/1NC contacts</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>2 NC contact</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>1637</td>
<td></td>
<td>Power to unlock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power to lock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual release</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

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.
- Actuators must be ordered separately.
Solenoid interlocks

**System components**

- **Straight actuator B1**
- **With rubber mounting B1-2245**
- **Angled actuator B5**
- **Flexible actuator B6**
- **Long straight actuator B11**
- **Long angled actuator B15**
- **EX-certified screwed cable gland**

**Ordering details**

- **Straight actuator**
  - with rubber mountings: AZ 17/170-B1
  - AZ 17/170-B1-2245
- **Angled actuator**
  - AZ 17/170-B5
- **Flexible actuator**
  - AZM 170-B6
- **Long straight actuator**
  - AZ 17/170-B11
- **Long angled actuator**
  - AZ 17/170-B15
- **EX-certified screwed cable gland**
  - EX-KLE-M20x1.5

Gas zone 2 / Dust zone 22
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
- **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:** IP67
- **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_{imp}²:** 4 kV
- **U_c:** 250 V
- **I_{me}²:** 5 A
- **Utilisation category:** AC-15, DC-13
- **I_U/I_U:** 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_d:** 24 VAC/DC
- **Magnet:** 100% ED
- **Power consumption:** max. 10 W
- **Ambient temperature:** –15 °C ... + 50 °C
- **Mechanical life:** > 1 million operations
- **F_{max}²:** 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**
- **© II 2D**

### Contact variants

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

### Power to lock

### Power to unlock

### Note

- **Manual release**
  - For manual release using M5 triangular key, available as accessory.
  - For Maintenance purposes only.

**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

**Ordering details**

**EX-AZM 161 12/12-CCK3-024-3D**

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

**Note**

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

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.
### System components

<table>
<thead>
<tr>
<th>Description</th>
<th>Order Code</th>
<th>Description</th>
<th>Order Code</th>
<th>Description</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator B1</td>
<td>AZM 161-B1</td>
<td>Straight actuator with slot lip-seal</td>
<td>AZM 161-B1-2024</td>
<td>Straight actuator with ball latch</td>
<td>AZM 161-B1-2053</td>
</tr>
<tr>
<td>Straight actuator B1E</td>
<td>AZM 161-B1E</td>
<td>Straight actuator with slot lip-seal</td>
<td>AZM 161-B1-2024</td>
<td>Shortened straight actuator B1S</td>
<td>AZM 161-B1S</td>
</tr>
<tr>
<td>Straight actuator B1F</td>
<td>AZM 161-B1F</td>
<td>Straight actuator with ball latch</td>
<td>AZM 161-B1-2053</td>
<td>Shortened angled actuator B6S</td>
<td>AZM 161-B6S</td>
</tr>
<tr>
<td>Flexible actuator B6</td>
<td>AZM 161-B6</td>
<td>Flexible actuator with centering guide</td>
<td>AZM 161-B6-2177</td>
<td>Flexible actuator with centering guide</td>
<td>AZM 161-B6-2177</td>
</tr>
</tbody>
</table>

### Ordering details

**Dust zone 22**
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**

<table>
<thead>
<tr>
<th>Mounting set</th>
<th>MS AZM 161 P</th>
<th>MS AZM 161 R/P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot sealing plug AZM 161</td>
<td>101145379</td>
<td></td>
</tr>
<tr>
<td>Tamperproof screws with unidirectional slots (without drawing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M5 x 12</td>
<td>101135338</td>
<td></td>
</tr>
<tr>
<td>M5 x 16</td>
<td>101135339</td>
<td></td>
</tr>
<tr>
<td>M5 x 20</td>
<td>101135340</td>
<td></td>
</tr>
<tr>
<td>(Quantity 2 pcs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EX-certified screwed cable gland</td>
<td>EX-KLE-M16x1.5</td>
<td></td>
</tr>
<tr>
<td>EX-certified screw plug</td>
<td>EX-VS-M16x1.5</td>
<td></td>
</tr>
<tr>
<td>Protective cover</td>
<td>AZM 161-ME</td>
<td></td>
</tr>
</tbody>
</table>
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
- 2 cable entries M20
- Including Ex-certified screwed cable gland and screw plug

### Technical data

**Equipment category:** Ex II 3D

**Ex protection:**
- T90°C X

**Standards:**
- EN 60947-5-1
- EN 61241-0
- EN 61241-1
- BG-GS-ET-19

**Enclosure:**
- Light-alloy die-cast, enamel finish

**Max. impact energy:** 4 J

**Actuating speed:** max. 1 m/s

**Actuator:** zinc-plated brass/aluminium

**Protection class:** IP67 to EN 60529

**Contact material:** Silver

**Contact type:** change-over contact with double break, type Zb, with galvanically separated contact bridges

**Switching system:**
- Slow action, positive break NC contact

**Connection:**
- Screw terminals

**Cable section:**
- MAX. 2.5 mm² (incl. conductor ferrules)

**Cable entry:**
- 2 x M20

**Cable entry:**
- 2 x M20

**Uimp:**
- 4 kV

**Uc:**
- 250 V

**Iimp:**
- 6 A

**Utilisation category:** AC-15

**Ie/Ue:**
- 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

**Uc:**
- 24 VAC/DC

**Power consumption:**
- max. 10 W

**Ambient temperature:**
- –10 °C ... + 50 °C

**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

**Equipment category:** Ex II 3D

**Ex protection:**
- T90°C X

**Standards:**
- EN 60947-5-1
- EN 61241-0
- EN 61241-1
- BG-GS-ET-19

**Enclosure:**
- Light-alloy die-cast, enamel finish

**Max. impact energy:** 4 J

**Actuating speed:** max. 1 m/s

**Actuator:** zinc-plated brass/aluminium

**Protection class:** IP67 to EN 60529

**Contact material:** Silver

**Contact type:** change-over contact with double break, type Zb, with galvanically separated contact bridges

**Switching system:**
- Slow action, positive break NC contact

**Connection:**
- Screw terminals

**Cable section:**
- MAX. 2.5 mm² (incl. conductor ferrules)

**Cable entry:**
- 2 x M20

**Cable entry:**
- 2 x M20

**Uimp:**
- 4 kV

**Uc:**
- 250 V

**Iimp:**
- 6 A

**Utilisation category:** AC-15

**Ie/Ue:**
- 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

**Uc:**
- 24 VAC/DC

**Power consumption:**
- max. 10 W

**Ambient temperature:**
- –10 °C ... + 50 °C

**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

**Approvals**

**Ordering details**

**EX-AZM 415-...-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>5</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>6</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.
Solenoid interlocks

### Contact variants

#### Power to lock

<table>
<thead>
<tr>
<th>11/11</th>
<th>2NC/2NO</th>
</tr>
</thead>
</table>

![Diagram of 11/11 2NC/2NO contact variant](image)

<table>
<thead>
<tr>
<th>02/11</th>
<th>3NC/1NO</th>
</tr>
</thead>
</table>

![Diagram of 02/11 3NC/1NO contact variant](image)

<table>
<thead>
<tr>
<th>02/02</th>
<th>4NC</th>
</tr>
</thead>
</table>

![Diagram of 02/02 4NC contact variant](image)

<table>
<thead>
<tr>
<th>02/20</th>
<th>2NC/2NO</th>
</tr>
</thead>
</table>

![Diagram of 02/20 2NC/2NO contact variant](image)

#### 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.

### System components

- **Straight actuator B1**

![Diagram of Straight actuator B1](image)

- **EX-certified screwed cable gland**

![Diagram of EX-certified screwed cable gland](image)

- **EX-certified screw plug M20**

![Diagram of EX-certified screw plug M20](image)

### 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
More Details

Detailed technical information at:
www.schmersal.com
Position switches with safety function

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**

- **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**

**Technical data**

- **Equipment category:** Ex II 3D
- **Ex protection:** Ex tD A22 IP67 790°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, enamelled finish
- **Max. impact energy:** 1 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP67 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:** 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
- **Uimp**: 6 kV
- **Ue**: 500 V
- **Ie**: 6 A
- **Utilisation category:** AC-15, DC-13
- **Ie/Ue**: 4 A / 230 VAC
  - 1 A / 24 VDC
- **Max. fuse rating:** 6 A g3 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

**System components**

- **EX-certified screwed 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</td>
</tr>
<tr>
<td>1</td>
<td>T</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td>02</td>
<td>2 NC contacts</td>
</tr>
<tr>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2 NO contacts</td>
<td></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>
<tr>
<td>5</td>
<td>1297</td>
<td>Enclosure with transverse slotted holes</td>
</tr>
<tr>
<td>6</td>
<td>2138</td>
<td>Roller lever 7H for safety duties</td>
</tr>
<tr>
<td>7</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

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

**Approvals**

CE Dust zone 22
### Position switches with safety function

#### Plunger S

![Plunger S diagram](image)

- 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>Contacts/Switch travel</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 / 1 NC EX-ZS 235-11Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
<tr>
<td>2 NC EX-ZS 235-02Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
<tr>
<td>2 NO EX-TS 235-20Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
</tbody>
</table>

#### Roller plunger R

![Roller plunger R diagram](image)

- 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>Contacts/Switch travel</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 / 1 NC EX-ZR 235-11Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
<tr>
<td>2 NC EX-ZR 235-02Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
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</tr>
<tr>
<td>2 NO EX-TR 235-20Z-3D</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
</tbody>
</table>

---

45
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>Contacts/ Switch travel</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 / 1 NC</td>
<td>EX-Z4S 235-11Z-3D</td>
<td>EX-T4S 235-11Z-3D</td>
<td>EX-T4S 235-11ZUE-3D</td>
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<tr>
<td>2 NC</td>
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<td>EX-T4S 235-02ZH-3D</td>
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<td>2 NO</td>
<td>EX-T4S 235-20Z-3D</td>
<td>EX-T4S 235-20ZH-3D</td>
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</tr>
</tbody>
</table>
Position switches with safety function

**Offset roller lever 1R**

- 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

**Contact variants**

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
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</thead>
<tbody>
<tr>
<td>EX-Z1R 235-11Z-3D</td>
<td>EX-T1R 235-11Z-3D</td>
<td>EX-T1R 235-11ZUE-3D</td>
<td></td>
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<tr>
<td>EX-Z1R 235-02Z-3D</td>
<td>EX-T1R 235-02Z-3D</td>
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<td>EX-T1R 235-20Z-3D</td>
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</tr>
</tbody>
</table>

**Offset roller lever K**

- 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

**Contact variants**

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX-ZK 235-11Z-3D</td>
<td>EX-TK 235-11Z-3D</td>
<td>EX-TK 235-11ZUE-3D</td>
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</tr>
<tr>
<td>EX-ZK 235-02Z-3D</td>
<td>EX-TK 235-02Z-3D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EX-TK 235-20Z-3D</td>
<td>EX-TK 235-20Z-3D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dust zone 22
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)

<table>
<thead>
<tr>
<th>Contact variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts/ Switch</td>
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<tr>
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</tr>
<tr>
<td>Snap action</td>
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<tr>
<td>Slow action</td>
</tr>
<tr>
<td>Slow action</td>
</tr>
<tr>
<td>Slow action</td>
</tr>
<tr>
<td>with overlapping</td>
</tr>
<tr>
<td>with staggered</td>
</tr>
<tr>
<td>contacts</td>
</tr>
<tr>
<td>contacts</td>
</tr>
</tbody>
</table>

1 NO / 1 NC
- EX-Z3K 235-11Z-3D
- EX-T3K 235-11Z-3D
- EX-T3K 235-11ZUE-3D

2 NC
- EX-Z3K 235-02Z-3D
- EX-T3K 235-02Z-3D
- EX-T3K 235-02ZH-3D

2 NO
- EX-T3K 235-20Z-3D
- EX-T3K 235-20Z-3D
- EX-T3K 235-20ZH-3D

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)

<table>
<thead>
<tr>
<th>Contact variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts/ Switch</td>
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<tr>
<td>Snap action</td>
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<td>Slow action</td>
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<td>Slow action</td>
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<tr>
<td>Slow action</td>
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<tr>
<td>Slow action</td>
</tr>
<tr>
<td>with overlapping</td>
</tr>
<tr>
<td>with staggered</td>
</tr>
<tr>
<td>contacts</td>
</tr>
<tr>
<td>contacts</td>
</tr>
</tbody>
</table>

1 NO / 1 NC
- EX-Z4K 235-11Z-3D
- EX-T4K 235-11Z-3D
- EX-T4K 235-11ZUE-3D

2 NC
- EX-Z4K 235-02Z-3D
- EX-T4K 235-02Z-3D
- EX-T4K 235-02ZH-3D

2 NO
- EX-T4K 235-20Z-3D
- EX-T4K 235-20Z-3D
- EX-T4K 235-20ZH-3D
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

![Diagram of Angle roller lever K4]

接触变体

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</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 / 1 NC</td>
<td>EX-ZK4 235-11Z-3D</td>
<td>EX-TK4 235-11Z-3D</td>
<td>EX-TK4 235-11ZUE-3D</td>
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<tr>
<td>2 NC</td>
<td>EX-ZK4 235-02Z-3D</td>
<td>EX-TK4 235-02Z-3D</td>
<td>EX-TK4 235-02ZH-3D</td>
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<tr>
<td>2 NO</td>
<td>EX-TK4 235-20Z-3D</td>
<td>EX-TK4 235-20ZH-3D</td>
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</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

![Diagram of Roller lever 1H]

接触变体

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

**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>Contacts/ Switch travel</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 / 1 NC</td>
<td>EX-ZV7H 235-112-ZD</td>
<td>EX-TV7H 235-112-ZD</td>
<td>EX-TV7H 235-112UE-ZD</td>
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<tr>
<td>2 NC</td>
<td>EX-ZV7H 235-022-ZD</td>
<td>EX-TV7H 235-022-ZD</td>
<td>EX-TV7H 235-022ZH-ZD</td>
<td></td>
</tr>
<tr>
<td>2 NO</td>
<td>EX-TV7H 235-202-ZD</td>
<td>EX-TV7H 235-202-ZD</td>
<td>EX-TV7H 235-202ZH-ZD</td>
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</table>

**Contact variants**

<table>
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<th>Contacts/ Switch travel</th>
<th>Snap action</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
<th>Slow action with staggered contacts</th>
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<tbody>
<tr>
<td>1 NO / 1 NC</td>
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<td>EX-TV7H 235-112-2138-ZD</td>
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<td>EX-TV7H 235-022-2138-ZD</td>
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</tr>
</tbody>
</table>

Dust zone 22
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

**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>Contacts/ Switch travel</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 / 1 NC</td>
<td>EX-ZV10H 235-11Z-3D</td>
<td>EX-TV10H 235-11Z-3D</td>
<td>EX-TV10H 235-11ZUE-3D</td>
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</tr>
<tr>
<td>2 NC</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</td>
<td>EX-TV10H 235-20Z-3D</td>
<td>EX-TV10H 235-20Z-3D</td>
<td>EX-TV10H 235-20ZH-3D</td>
<td></td>
</tr>
</tbody>
</table>

---

**Dust zone 22**
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>Contacts / Switch travel</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 / 1 NC</td>
<td>EX-ZV14H 235-11Z-3D</td>
<td>EX-TV14H 235-11Z-3D</td>
<td>EX-TV14H 235-11ZUE-3D</td>
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<tr>
<td>2 NC</td>
<td>EX-ZY14H 235-02Z-3D</td>
<td>EX-TV14H 235-02Z-3D</td>
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<tr>
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<td>EX-TV14H 235-20Z-3D</td>
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</tr>
</tbody>
</table>

Dust zone 22
More Details

Detailed technical information at: www.schmersal.net
Position switches with safety function

**EX-Z/T 335-...-3G/D**

### Technical data

- **Equipment category:** II 3GD
- **Ex protection:** Ex nIIC 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
- **Design:** DIN EN 50041
- **Enclosure:** light-alloy diecast, paint finish
- **Max. impact energy:** 4 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP67 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
- **U_{imp}:**
  - 6 kV
  - 4 kV (for -03Z, -12Z)
- **U_{c}:**
  - 500 V
  - 250 V (for -03Z, -12Z)
- **I_{imp}:**
  - 10 A
- **Utilisation category:** AC-15, DC-13
  - 4 A / 230 VAC
  - 4 A / 24 VDC
- **Max. fuse rating:** 6 A g6 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: < 2ms
- **Switchover time:** 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

### System components

EX-certified screwed cable gland

### Ex-certified screwed cable gland

**Approvals**

### Ordering details

**EX-Z/T 335-...-3G/D**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Z</td>
<td>Snap action</td>
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<td></td>
<td>T</td>
<td>Slow action</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>2 NO contacts*</td>
</tr>
<tr>
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<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>
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<tr>
<td>4</td>
<td>H</td>
<td>Slow action</td>
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<tr>
<td></td>
<td>UE</td>
<td>with staggered contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with overlapping contacts</td>
</tr>
</tbody>
</table>

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

**No.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>5</td>
<td>1297</td>
<td>Enclosure with transverse slotted holes</td>
</tr>
<tr>
<td>6</td>
<td>2138</td>
<td>Roller lever 7H for safety duties</td>
</tr>
<tr>
<td>7</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Ordering details**

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

---

**Gas zone 2 / Dust zone 22**
Position switches with safety function

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

Technical data

- Equipment category: II 3GD
- Ex protection: Ex nc IIIC 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
- Design: DIN EN 50041
- Enclosure: light-alloy diecast, paint finish
- Max. impact energy: 1 J
- Actuating speed: max. 1 m/s
- Protection class: IP67 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: 3 x M 20
- Cable entry: 3 x M20
- Uimp: 6 kV
- -03z, -12z: 4kV
- Uij: 500 V
- -03z, -12z: 250 V
- Iimp: 10 A
- Utilisation category: AC-15, DC-13
- L/Ue: 4 A / 230 VAC
- Ie/Ue: 4 A / 24VDC
- 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
- Bounce duration: Snap action: < 2 ms;
- Switchover time: Slow action: in accordance with actuating speed
- Cable cross-section of the cable glands: min. Ø 7 mm
- max. Ø 12 mm

Approvals

System components

EX-certified screwed cable gland

EX-certified screwed cable gland

EX-certified screw plug M20

EX-certified screw plug M20

Ordering details

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

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

No. | Option | Description
---|---|---
1 | Z | Snap action
2 | T | Slow action
3 | 1 | For the appropriate actuator: see page 58
4 | 02/01 | 1 NO contact / 1 NC contact
5 | 20 | 2 NC contacts
6 | 03 | 2 NO contacts* 1 NC contact to the left/ 1 NC contact to the right
7 | 12 | 1 NO contact / 2 NC contacts
8 | 01/01 | 3 NC contacts
9 | H | Slow action
10 | UE | with staggered contacts
11 | UE | with overlapping contacts

* 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

**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>Contacts/Contact variants</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>Plunger S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 1 NC</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>2 NC</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>2 NO</td>
<td>EX-TS 3..-20Z-3G/D</td>
<td>EX-TS 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</td>
<td>EX-TS 3..-12Z-3G/D</td>
<td>EX-TS 3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC</td>
<td>EX-TS 3..-03Z-3G/D</td>
<td>EX-TS 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roller plunger R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 1 NC</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>2 NC</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>2 NO</td>
<td>EX-TR 3..-20Z-3G/D</td>
<td>EX-TR 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</td>
<td>EX-TR 3..-12Z-3G/D</td>
<td>EX-TR 3..-12ZUE-3G/D</td>
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<td></td>
</tr>
<tr>
<td>3 NC</td>
<td>EX-TR 3..-03Z-3G/D</td>
<td>EX-TR 3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

| Contacts/ | Snap action | Slow action | Slow action with overlapping contacts | Slow action with staggered contacts |
| Switch travel | | | | |
| 1 NO / 1 NC | EX-Z4VH 3..-11Z-3G/D | EX-T4VH 3..-11Z-3G/D | EX-T4VH 3..-11ZU-3G/D |
| 2 NC | EX-Z4VH 3..-02Z-3G/D | EX-T4VH 3..-02Z-3G/D | EX-T4VH 3..-02ZH-3G/D |
| 2 NO | EX-T4VH 3..-20Z-3G/D | EX-T4VH 3..-20ZH-3G/D | |
| 1 NC left | EX-T4VH 3..-01Z-3G/D | EX-T4VH 3..-01ZH-3G/D | |
| 1 NC right | | | |
| 1 NO / 2 NC | EX-T4VH 3..-12Z-3G/D | EX-T4VH 3..-12ZU-3G/D | |
| 3 NC | EX-T4VH 3..-03Z-3G/D | EX-T4VH 3..-03ZH-3G/D | |

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

| Contacts/ | Snap action | Slow action | Slow action with overlapping contacts | Slow action with staggered contacts |
| Switch travel | | | | |
| 1 NO / 1 NC | EX-Z4VH 3..-11Z-3G/D | EX-T4VH 3..-11Z-3G/D | EX-T4VH 3..-11ZU-3G/D |
| 2 NC | EX-Z4VH 3..-02Z-3G/D | EX-T4VH 3..-02Z-3G/D | EX-T4VH 3..-02ZH-3G/D |
| 2 NO | EX-T4VH 3..-20Z-3G/D | EX-T4VH 3..-20ZH-3G/D | |
| 1 NC left | EX-T4VH 3..-01Z-3G/D | EX-T4VH 3..-01ZH-3G/D | |
| 1 NC right | | | |
| 1 NO / 2 NC | EX-T4VH 3..-12Z-3G/D | EX-T4VH 3..-12ZU-3G/D | |
| 3 NC | EX-T4VH 3..-03Z-3G/D | EX-T4VH 3..-03ZH-3G/D | |
Position switches with safety function

### Roller lever 7H

![Diagram of 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

### 7H-2138

![Diagram of 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

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</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 / 1 NC</td>
<td>EX-Z4V7H.3..-11Z-3G/D</td>
<td>EX-T4V7H.3..-11Z-3G/D</td>
<td>EX-T4V7H.3..-11ZUE-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NC</td>
<td>EX-Z4V7H.3..-02Z-3G/D</td>
<td>EX-T4V7H.3..-02Z-3G/D</td>
<td>EX-T4V7H.3..-02ZH-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO</td>
<td>EX-T4V7H.3..-20Z-3G/D</td>
<td>EX-T4V7H.3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC left</td>
<td>EX-TV7H.3..-01/01Z-3G/D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC right</td>
<td>EX-T4V7H.3..-03Z-3G/D</td>
<td>EX-T4V7H.3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</td>
<td>EX-T4V7H.3..-12Z-3G/D</td>
<td>EX-T4V7H.3..-12ZUE-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC</td>
<td>EX-T4V7H.3..-03Z-3G/D</td>
<td>EX-T4V7H.3..-03ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 1 NC</td>
<td>EX-Z4V7H.3..-11Z-2138-3G/D</td>
<td>EX-T4V7H.3..-11Z-2138-3G/D</td>
<td>EX-T4V7H.3..-11ZUE-2138-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NC</td>
<td>EX-Z4V7H.3..-02Z-2138-3G/D</td>
<td>EX-T4V7H.3..-02Z-2138-3G/D</td>
<td>EX-T4V7H.3..-02ZH-2138-3G/D</td>
<td></td>
</tr>
<tr>
<td>2 NO</td>
<td>EX-T4V7H.3..-20Z-2138-3G/D</td>
<td>EX-T4V7H.3..-20ZH-2138-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC left</td>
<td>EX-TV7H.3..-01/01Z-2138-3G/D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC right</td>
<td>EX-T4V7H.3..-03Z-2138-3G/D</td>
<td>EX-T4V7H.3..-03ZH-2138-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</td>
<td>EX-T4V7H.3..-12Z-2138-3G/D</td>
<td>EX-T4V7H.3..-12ZUE-2138-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 NC</td>
<td>EX-T4V7H.3..-03Z-2138-3G/D</td>
<td>EX-T4V7H.3..-03ZH-2138-3G/D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Position switches with safety function

### Offset roller lever 1K

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</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 / 1 NC</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 NC</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>2 NO</td>
<td>EX-T1K 3..-20Z-3G/D</td>
<td>EX-T1K 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</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</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>Contacts/ Switch travel</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 / 1 NC</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 NC</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>2 NO</td>
<td>EX-T3K 3..-20Z-3G/D</td>
<td>EX-T3K 3..-20ZH-3G/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NO / 2 NC</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</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
  - EN 61241-0
  - EN 61241-1
  - BG-GS-ET-15
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** stainless steel 1.4301
- **Max. impact energy:** 4 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP65 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:** 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
- **Ue:** 250 V
- **Ith:** 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**

**Approvals**

**Ordering details**

**EX-MAF 330-11Y-①-②**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td></td>
<td>without LED</td>
</tr>
<tr>
<td>②</td>
<td>AuNi</td>
<td>Gold-nickel alloy contacts</td>
</tr>
</tbody>
</table>

**Ordering details**

EX-certified screwed cable gland EX-KLE-M20x1.5
• 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>Contacts/ Switch travel</th>
<th>Snap action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC MAF 330-11y</td>
<td>1 NO / 1 NC MAF 330-11y</td>
</tr>
</tbody>
</table>

Dust zone 22
Position switches

EX-T 335-...

### Technical data
- **Equipment category:** II 2GD
- **Ex protection:** Ex de IIC T6
  - Ex tD A21 IP65 T80°C
- **Standards:**
  - EN 60947-5-1
  - EN 61241-0
  - EN 61241-1
  - EN 60079-0
  - EN 60079-1
  - BG-GS-ET-15
- **Design:** DIN EN 50041
- **Enclosure:** zinc die-cast, paint finish
- **Max. impact energy:** 7 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP65, IP67
- **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
- **$U_{\text{imp}}$:** 4 kV
- **$U_{\text{i}}$:** 250 V
- **$I_{\text{me}}$:** 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:** < 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**

### Position switches

- **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**

### Approvals

![IECEx]

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>For the appropriate actuator: see page 65</td>
<td></td>
</tr>
<tr>
<td>②</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>②</td>
<td>20</td>
<td>2 NO 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!
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

| Contacts/ | Slow action | Slow action with overlapping contacts |
| Switch travel | | |
| 1 NO / 1 NC | EX-TS 335-11Y | EX-TS 335-11YUE |
| 2 NC | EX-TS 335-02Y | |
| 2 NO | EX-TS 335-20Y | |

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

| Contacts/ | Slow action | Slow action with overlapping contacts |
| Switch travel | | |
| 1 NO / 1 NC | EX-TR 335-11Y | EX-TR 335-11YUE |
| 2 NC | EX-TR 335-02Y | |
| 2 NO | EX-TR 335-20Y | |
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

Contact variants

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

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>Contacts/ Switch travel</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
<td>EX-T4V10H 335-11Y</td>
<td>EX-T4V10H 335-11YUE</td>
</tr>
<tr>
<td>2 NC</td>
<td>EX-T4V10H 335-02Y</td>
<td></td>
</tr>
<tr>
<td>2 NO</td>
<td>EX-T4V10H 335-20Y</td>
<td></td>
</tr>
</tbody>
</table>
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>Contacts/ Switch travel</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
<td>EX-T4V7H 335-11Y</td>
<td>EX-T4V7H 335-11YUE</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>Contacts/ Switch travel</th>
<th>Slow action</th>
<th>Slow action with overlapping contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
<td>EX-T4V7H 335-11Y -2138</td>
<td>EX-T4V7H 335-11YUE-2138</td>
</tr>
</tbody>
</table>
**Position switches**

### Offset roller lever 1K

- **Contact variants**
  - **Contacts/ Switch travel**: 1 NO / 1 NC
  - **Switches**:
    - **EX-T1K 335-11Y**
    - **EX-T1K 335-11YUE**

### Angle roller lever 3K

- **Contact variants**
  - **Contacts/ Switch travel**: 1 NO / 1 NC
  - **Switches**:
    - **EX-T3K 335-11Y**
    - **EX-T3K 335-11YUE**
More Details

Detailed technical information at: www.schmersal.net
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 IP65, IP66 and IP67
- Suitable for heavy duty

Technical data

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>L II 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex tD A21 IP65 T90°C X</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>Protection class:</td>
<td>IP65, IP66 and IP67 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>Silver, gold-flashed</td>
</tr>
<tr>
<td>Switching system:</td>
<td>Snap- and slow action with double break</td>
</tr>
<tr>
<td>Contact type:</td>
<td>Slow action: positive break NC contact A double break of 2 separated contact bridges</td>
</tr>
<tr>
<td>Connection:</td>
<td>Screw terminals M4</td>
</tr>
<tr>
<td>Cable section:</td>
<td>Max. 2.5 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>U_{imp}:</td>
<td>Snap action: 4 kV; Slow action: 6 kV</td>
</tr>
<tr>
<td>U_{c}:</td>
<td>Slow action: 250 V; Snap action: 400 V</td>
</tr>
<tr>
<td>I_{imp}:</td>
<td>16 A</td>
</tr>
<tr>
<td>I_{c}/U_{c}:</td>
<td>Snap action: 4 A / 230 V; Slow action: 4 A / 400 V</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: max. 2 x 2.5 mm Slow action: max. 2 x 6.0 mm</td>
</tr>
<tr>
<td>Switchover time:</td>
<td>Snap action: 35 ms</td>
</tr>
<tr>
<td>Bounce duration:</td>
<td>Snap action: 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 7 mm Max. Ø 12 mm</td>
</tr>
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</table>

Ordering details

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

Contact variants

1 NO / 1 NC contacts

Snap action

<table>
<thead>
<tr>
<th>0°</th>
<th>36°</th>
<th>36°</th>
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Slow action

<table>
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<th>0°</th>
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<th>36°</th>
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Ordering Ex-

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<tbody>
<tr>
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<td>M. Snap action</td>
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</tr>
<tr>
<td>2</td>
<td>T. Slow action</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UE Slow action with overlapping contacts</td>
<td></td>
</tr>
</tbody>
</table>

see page 84

see page 76

Actuator selection (actuators must be ordered separately)

Approvals

CE

EX

Ordering details

see page 84

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

EX-certified screwed cable gland EX-KLE-M25x1.5

EX-certified screw plug EX- VS-M20x1.5

EX-certified screw plug EX- VS-M25x1.5

see page 76

Actuator selection (actuators must be ordered separately)

Dust zone 21/22

Ordering details

see page 84

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

EX-certified screwed cable gland EX-KLE-M25x1.5

EX-certified screw plug EX- VS-M20x1.5

EX-certified screw plug 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 IP65, IP66 and IP67
- Suitable for heavy duty

Technical data

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>II 2D</th>
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<tr>
<td>Ex protection:</td>
<td>Ex td A21 IP67 T90°C</td>
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<td>Standards:</td>
<td>EN 60947-5-1; EN 61241-0, EN 61241-1</td>
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<tr>
<td>Enclosure:</td>
<td>Grey cast iron, galvanized and painted</td>
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<tr>
<td>Protection class:</td>
<td>IP65, IP66 and IP67 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>silver, gold-flashed</td>
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<tr>
<td>Contact type:</td>
<td>snap action, change-over contact, slow action positive break NC contact double break with 2 separate contact bridges</td>
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<tr>
<td>Switching system:</td>
<td>Snap- and slow action</td>
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<tr>
<td>Connection:</td>
<td>screw terminals M 4</td>
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<tr>
<td>Cable section:</td>
<td>max. 2.5 mm²</td>
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<tr>
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<td>(incl. conductor ferrules)</td>
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<tr>
<td>U_{imp}:</td>
<td>6 kV</td>
</tr>
<tr>
<td>U_{e}:</td>
<td>500 V</td>
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<tr>
<td>I_{me}:</td>
<td>16 A</td>
</tr>
<tr>
<td>U_{e}/U_{e}:</td>
<td>4 A / 400 VAC</td>
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<tr>
<td>Utilisation category:</td>
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<tr>
<td>Max. fuse rating:</td>
<td>16 A gG D-fuse</td>
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<tr>
<td>Contact break:</td>
<td>Snap action: max. 2 x 2.5 mm</td>
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<tr>
<td></td>
<td>Slow action: 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>
<tr>
<td></td>
<td>© II 2D</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>
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<th>EX-0250-Z-1276-2</th>
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</table>

<table>
<thead>
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<th>No.</th>
<th>Option</th>
<th>Description</th>
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</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></td>
<td>1 NO/1 NC contacts</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-KLE-M20x1.5

EX-certified screwed cable gland
EX-KLE-M25x1.5

EX-certified screw plug
EX-VS-M20x1.5

EX-certified screw plug
EX-VS-M25x1.5

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
- 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 IP65, IP66 and IP67

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:** 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:** max. 1 m/s, min. 0.01 m/s at the plunger
- **Protection class:** IP65, IP66 and IP67 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 (incl. conductor ferrules)
- **U_{imp}**: 6 kV
- **U_{c}**: 500 V
- **I_{imp}**: 25 A
- **I_{c}/U_{c}**: 25 A / 400 VAC
- **Utilisation category:** AC-15
- **Max. fuse rating:** 16 A gG D-fuse
- **Allowed horsepower:** 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 angle:** max. 20°
- **Weight:** approx. 3.2 kg
- **Cable cross-section of the cable glands:** min. Ø 14 mm, max. Ø 18 mm
- **Protection class:** IP65, IP66 and IP67

### Contact variants

- **Plunger S**
  1 NO contact / 1 NC contact
  0 4 5 6 15

- **Offset roller lever J**
  1 NO contact / 1 NC contact
  0 9 12 29

- **Offset roller lever X**
  1 NO contact / 1 NC contact
  0 17 24 60

### Approvals

- IECEx
- CE

### Ordering details

**EX-T® 064-2Y-3-1276-2**

<table>
<thead>
<tr>
<th>N°</th>
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</tr>
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<tbody>
<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>
<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></td>
<td>H</td>
<td>with staggered contacts</td>
</tr>
</tbody>
</table>

**Force-travel diagram**

**Ordering details**

- EX-certified
- screw plug: EX-KLE-M25x1.5
- screw plug: EX-VS-M25x1.5

Dust zone 21/22
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 IP65, IP66 and IP67**

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 tA21 IP65 T90°C X
- **Standards:** EN 60947-5-1, EN 61241-0, EN 61241-1
- **Enclosure:** Grey cast iron, galvanized and painted
- **Protection class:** IP65, IP66 and IP67 to EN 60529
- **Contact material:** Silver, gold-flashed snap action with double break
- **Contact type:** Change-over contact, galvanically separated contact bridges
- **Connection:** Screw terminals M5
- **Cable section:** Max. 4 mm² (incl. conductor ferrules)
- **Uimp:** 6 kV
- **Uc:** 500 V
- **Ic:** 25 A
- **Ic/Uc:** 25 A / 400 VAC
- **Utilization category:** AC-15
- **Max. fuse rating:** 25 A gG D-fuse 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:** 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:** Min. Ø 14 mm max. Ø 18 mm

---

**Contact variants**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Options</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plunger S</td>
<td>1 NC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Offset roller lever J</td>
<td>1 NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Offset roller lever X</td>
<td>1 NC</td>
<td></td>
</tr>
</tbody>
</table>

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**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For the appropriate actuator: see page 72</td>
<td></td>
</tr>
<tr>
<td>2</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>30</td>
<td>3 NO contacts</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</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>3 NO/1 NC</td>
</tr>
<tr>
<td></td>
<td>40</td>
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</tr>
</tbody>
</table>

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**Approvals**

IECEx

---

**Force-travel diagram**

---

**Ordering details**

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
</tr>
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<tbody>
<tr>
<td>Screwed cable gland</td>
<td>EX-KLE-M25x1.5</td>
</tr>
<tr>
<td>Screw plug</td>
<td>EX-VS-M25x1.5</td>
</tr>
</tbody>
</table>
Position switches

System components

EX-certified screwed cable gland

EX-certified screw plug

Plunger S

- 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 X

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

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

Offset roller lever J

- 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 x 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.

Note

Legend

$a$: Actuating angle from right of switch axis
$\beta$: Actuating angle from left of switch axis

Ordering details

EX-certified screwed cable gland
EX-KLE-M25x1.5

EX-certified screw plug
EX-VS-M25x1.5
Position switches

EX-T. 064-....

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: IP65, IP66 and IP67 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 (incl. conductor ferrules)
- \( U_{\text{imp}} \): 6 kV
- \( U_2 \): 500 V
- \( I_{\text{imp}} \): 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
- 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

Ordering details

EX-T. 064-①-Y-②-1276-③

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<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>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>
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</tr>
<tr>
<td>10/20</td>
<td>1 NC to the left/2 NC to the right</td>
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</tr>
<tr>
<td>20/10</td>
<td>2 NC to the left/1 NC to the right</td>
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</tr>
<tr>
<td>②</td>
<td>H</td>
<td>with staggered contacts</td>
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<tr>
<td>R</td>
<td>Latching 2 x 45°</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>1877</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

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 IP65, IP66 and IP67
- Splined shaft and lever available with 10° toothing

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: IP65, IP66 and IP67 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)
- $U_{\text{imp}}$: 6 kV
- $U_{\text{r}}$: 500 V
- $I_{\text{e}}$: 25 A
- $I_{\text{e}}/U_{\text{e}}$: 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: $-20^\circ\text{C} ... +60^\circ\text{C}$
- 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 Ex II 2D

Contact variants

Roller lever

1 NC contacts

<table>
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<th>Option</th>
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<tbody>
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<td>1</td>
<td>1 NO/2 NC</td>
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<tr>
<td>21</td>
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<tr>
<td>30</td>
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<td>3 NO contacts</td>
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<td>22</td>
<td>4</td>
<td>2 NO/2 NC contacts</td>
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<tr>
<td>31</td>
<td>5</td>
<td>3 NO/1 NC</td>
</tr>
<tr>
<td>40</td>
<td>6</td>
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</tr>
<tr>
<td>1877</td>
<td>7</td>
<td>Toothed shaft</td>
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</table>

1 NO contact

<table>
<thead>
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<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
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<td>8</td>
<td>1 NO/1 NC</td>
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<td>2</td>
<td>9</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
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</tr>
<tr>
<td>4</td>
<td>11</td>
<td>4 NO contacts</td>
</tr>
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</table>

Dust zone 21, 22

Approvals

Ordering details

EX-M. 064-Y-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>22</td>
<td>4</td>
<td>2 NO/2 NC contacts</td>
</tr>
<tr>
<td>31</td>
<td>5</td>
<td>3 NO/1 NC</td>
</tr>
<tr>
<td>40</td>
<td>6</td>
<td>4 NO contacts</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

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 IP65, IP66 and IP67
- 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:** IP65, IP66 and IP67 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 mm (incl. conductor ferrules)
- **U_imp:** 6 kV
- **U_i:** 500 V
- **I_{imp}:** 25 A
- **I_{i}/U_{i}:** 25 A / 400 VAC
- **Utilisation category:** AC-15
- **Max. fuse rating:** 25 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:** 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**

1. **Roller lever**
   - 1 NC contacts
     - 55° 40° 25° 0°
   - 1 NO contact
     - 55° 40° 25° 0°

**Approvals**

- IECEx
- CE

**Ordering details**

**EX-M. 064-➀Y-L-1276-2❼**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>03</td>
<td>3 NC contacts</td>
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<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>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 contacts</td>
<td></td>
</tr>
<tr>
<td>➁</td>
<td>1877</td>
<td>Toothed shaft</td>
</tr>
</tbody>
</table>

**Force-travel diagram**

- See page 72

**Ordering details**

- See page 76
  - Actuator selection (actuators must be ordered separately)

**Dust zone 21, 22**
## Position switches

<table>
<thead>
<tr>
<th>Roller lever L</th>
<th>Roller lever V</th>
<th>Fork lever C</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>
| • Actuating speed max. 3 m/s with an actuating angle of a and b = 30°  
• 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 | • Actuating speed max. 3 m/s with an actuating angle of a and b = 30°  
• 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 | • Continuous adjustment of lever position 360°  
• Splined shaft and lever available with 10° toothing |

<table>
<thead>
<tr>
<th>Roller lever A</th>
<th>Pull lever Z</th>
<th>Offset roller lever 4D</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>
| • Actuating speed max. 3 m/s with an actuating angle of a and b = 30°  
• 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 | • Continuous adjustment of lever position 360°  
• Splined shaft and lever available with 10° toothing | • Continuous adjustment of lever position 360°  
• Splined shaft and lever available with 10° toothing |

<table>
<thead>
<tr>
<th>Roller lever 2A</th>
<th>Pull lever 2Z</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
</tbody>
</table>
| • Actuating speed max. 3 m/s with an actuating angle of a and b = 30°  
• 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 | • Continuous adjustment of lever position 360°  
• Splined shaft and lever available with 10° toothing |

### Legend
- u: Actuating angle from right of switch axis
- j: Actuating angle from left of switch axis
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; BG-GS-ET-15
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** stainless steel 1.4301
- **Max. impact energy:** 4 J
- **Actuating speed:** max. 1 m/s
- **Protection class:** IP67 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:** A EN 60947-5-1, slow action, positive break NC contact
- **Connection:** screw terminals
- **Cable section:** max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- **Cable entry:** M20
- **U_imp:** 6 kV
- **U_c:** 500 V
- **I_imp:** 10 A
- **Utilisation category:** AC-15; DC-13
- **I_U:** 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
- **B10d value to EN ISO 13849-1:** 20 million
- **Cable cross-section of the cable glands:** min. Ø 7 mm, max. Ø 12 mm
- **Classification:** EN ISO 13849-1
- **B10d Opener (NC):** 20,000,000
- **Service life:** 20 years
- **MTTFd =** $\frac{B_{10d}}{0.1 \times n_{op}} = \frac{d_{op} \times n_{op} \times 3600 \text{ s/h}}{I_{cycle}}$
- **Utilisation category:** AC-15; DC-13
- **I_e/U_e:** 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
- **B10d value to EN ISO 13849-1:** 20 million
- **Cable cross-section of the cable glands:** min. Ø 7 mm, max. Ø 12 mm
- **Classification:** EN ISO 13849-1
- **B10d Opener (NC):** 20,000,000
- **Service life:** 20 years
- **MTTFd =** $\frac{B_{10d}}{0.1 \times n_{op}} = \frac{d_{op} \times n_{op} \times 3600 \text{ s/h}}{I_{cycle}}$
- **Utilisation category:** AC-15; DC-13

### Contact variants

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

### Ordering details

**Ex-TV.S 335-2Z-③**

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

### 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
Safety switch for hinged guards

System components

Fixed hinge F

Adjustable hinge L

Universal joint K1

Universal joint K2

EX-certified screwed cable gland

System components

Ordering details

Fixed hinge F 101138414
Adjustable hinge L 101138413

Universal joint K1 101138412
(in combination with hinge F or L) only for TV8S 521

Universal joint K2 101147448
for ES 13 SB, ES 95 SB-10mm, TV 10S 335 and TV10S 355

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

Dust zone 21, 22
Ordering details

Detailed technical information at:
www.schmersal.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 set-up, 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 IP65, IP66 and IP67
- Suitable for heavy duty

### Equipment data

- **Equipment category:** I 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:** IP65, IP66 and IP67 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)
- **U_{imp}**: Snap action: 4 kV; slow action: 6 kV
- **U_c**: Slow action: 250 V; snap action: 400 V
- **I_{imp}**: 16 A
- **I_c/A_c**: 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:** Snap action: max. 2 × 2.5 mm; slow action: max. 2 × 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

<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>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 84</td>
</tr>
</tbody>
</table>

### Technical data

### Contact variants

<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>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 84</td>
</tr>
</tbody>
</table>

**Approvals**

IECEx

**Ordering details**

EX-③441-11Y-③-1276-2

<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>T.</td>
<td>Slow action</td>
<td></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 84</td>
</tr>
</tbody>
</table>
**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 IP65, IP66 and IP67
- Suitable for heavy duty

---

**Technical data**

- **Equipment category:** Ex II 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
- **Protection class:** IP65, IP66 and IP67 to EN 60529
- **Contact material:** Silver, gold-flashed snap action, change-over contact, slow action positive break NC contact double break with 2 separate contact bridges
- **Switching system:** Snap- and slow action
- **Contact material:** Silver, gold-flashed snap action, change-over contact, slow action positive break NC contact double break with 2 separate contact bridges
- **Connection:** Screw terminals M 4
- **Cable section:** Max. 2.5 mm²
- **Uimp:** 6 kV
- **Ue:** 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
- **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:** Min. Ø 14 mm
- **of the cable glands:** Max. Ø 18 mm
- **Protection class:** IP65, IP66 and IP67 to EN 60529

---

**Contact variants**

- **1 NO contact**
- **1 NC contacts**

**Snap action**

<table>
<thead>
<tr>
<th>°</th>
<th>0°</th>
<th>20°</th>
<th>40°</th>
<th>60°</th>
<th>90°</th>
</tr>
</thead>
</table>

**Slow action**

<table>
<thead>
<tr>
<th>°</th>
<th>0°</th>
<th>20°</th>
<th>40°</th>
<th>60°</th>
<th>90°</th>
</tr>
</thead>
</table>

---

**Ordering details**

EX-⃣⃣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>T.</td>
<td>Snap action</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>11</td>
<td>1 NO/1 NC contact</td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC contacts</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Actuator selection, see page 84</td>
<td></td>
</tr>
</tbody>
</table>

---

**Approvals**

- IECEx
- CE

---

**Dust zone 21, 22**
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
966  Ordering suffix -966
1224 Ordering suffix -1224
Slack-wire lever (only in combination with EX-T/M 441) type 14
EX-certified screwed cable gland  EX-KLE-M20x1.5
EX-certified screwed cable gland  EX-KLE-M25x1.5
EX-certified screw plug  EX-VS-M20x1.5
EX-certified screw plug  EX-VS-M25x1.5
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:** IP67 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:** (incl. conductor ferrules) 3x M20
- **Cable section:** max. 2.5 mm² (incl. conductor ferrules)
- **Connection:** Screw terminals
- **Uimp:** 6 kV
- **Ue:** 500 V
- **Iimp:** 4 A
- **Utilisation category:** AC-15, DC-13
- **Max. fuse rating:** 6 A gG D-fuse
- **Ambient temperature:** – 20 °C ... + 55 °C
- **Mechanical life:** > 1 million operations
- **Max. wire length:** 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/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>2</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>

### 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

### Classification

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

### Approvals

![CE]

### Ordering details

**EX-certified screwed cable gland**

<table>
<thead>
<tr>
<th>EX-KLE-M20x1.5</th>
<th>EX-VS-M20x1.5</th>
</tr>
</thead>
</table>
Pull-wire emergency-stop switches

Mode of operation

| Wire pull and breakage detection |

Not actuated

Wire pull detection

Wire breakage detection

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.

Thimble deformation
Pull-wire emergency-stop switches

### EX-T3Z 068-...

- **Ex certified**
- to EN ISO 13850 / EN 60947-5-5
- Metal enclosure
- Up to 6 contacts
- Robust design
- 2 cable entries M20
- Low actuating force
- Wire up to 2 x 50 m long
- Reset by pull ring

#### Technical data

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>⚡ II 2D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex tD A21 IP65 T90°C X</td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 60947-5-1; EN 60947-5-5; EN ISO 13850; EN 61241-0, EN 61241-1</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Grey cast iron, painted</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP65 and IP66 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>silver, gold-flashed</td>
</tr>
<tr>
<td>Contact types:</td>
<td>Change-over contact with double break, max. 3 NO and 3 NC contacts</td>
</tr>
<tr>
<td>Switching system:</td>
<td>IEC 60947-5-1 snap action, NC contacts with positive break</td>
</tr>
<tr>
<td>Connection:</td>
<td>Screw terminals</td>
</tr>
<tr>
<td>Cable section:</td>
<td>max. 1.5 mm², min. 0.75 mm² solid and stranded wire with conductor ferrules</td>
</tr>
<tr>
<td>Cable entry:</td>
<td>2 x M 20</td>
</tr>
<tr>
<td>$U_{imp}$:</td>
<td>4 kV</td>
</tr>
<tr>
<td>$U_{c}$:</td>
<td>250 VAC</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>$I_{imp}/U_{c}$:</td>
<td>2.5 A / 230 VAC</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>6 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break torque:</td>
<td>1.8 Nm</td>
</tr>
<tr>
<td>Angle for positive break travel:</td>
<td>32°</td>
</tr>
<tr>
<td>Positive break force:</td>
<td>50 N</td>
</tr>
<tr>
<td>Actuating force:</td>
<td>max. 50 N, (30 N in wire direction)</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>– 20 °C ... + 60 °C</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>50000 operations</td>
</tr>
<tr>
<td>Max. wire length:</td>
<td>2 x 50 m</td>
</tr>
<tr>
<td>Features:</td>
<td>wire pull and breakage detection</td>
</tr>
<tr>
<td>Cable cross-section of the cable glands:</td>
<td>min. Ø 7 mm, max. Ø 12 mm</td>
</tr>
</tbody>
</table>

#### Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO/1NC contact</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2NC contacts</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3 NO/3NC contacts</td>
<td></td>
</tr>
</tbody>
</table>

#### Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>11</td>
<td>1 NO/1NC contact</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2NC contacts</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3 NO/3NC contacts</td>
<td></td>
</tr>
</tbody>
</table>

#### Classification

| Standards: | EN ISO 13849-1 |
| B$_{100}$, Opener (NC): | 100,000 |
| Service life: | 20 years |

#### Note

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

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO/1NC contact</td>
<td>EX-KLE-M20x1.5</td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2NC contacts</td>
<td>EX-VS-M20x1.5</td>
</tr>
<tr>
<td>33</td>
<td>3 NO/3NC contacts</td>
<td>EX-VS-M20x1.5</td>
</tr>
</tbody>
</table>
Pull-wire emergency-stop switches

<table>
<thead>
<tr>
<th>System components</th>
<th>System components</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyebolt</td>
<td>Pulley</td>
<td>Tension spring</td>
</tr>
<tr>
<td>Wire clamp</td>
<td>Tensioner</td>
<td>S 900 wire tensioner</td>
</tr>
<tr>
<td>Duplex wire clamp</td>
<td>Wire rope</td>
<td>Shackle</td>
</tr>
<tr>
<td>Wire thimble</td>
<td>Wire unit complete</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>Eyebolt</th>
<th>101084928</th>
<th>BM 10 x 40</th>
<th>101192471</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM 8 x 70 (stainless steel)</td>
<td>101203477</td>
<td>Wire clamp 3 mm (stainless steel)</td>
<td>101190917</td>
</tr>
<tr>
<td>Wire thimble 4 mm (stainless steel)</td>
<td>101203475</td>
<td>Egg-shaped wire clamp (without Images)</td>
<td>101077072</td>
</tr>
<tr>
<td>Pulley (stainless steel)</td>
<td>101192433</td>
<td>Tensioner M6</td>
<td>101087930</td>
</tr>
<tr>
<td>Wire rope per m</td>
<td>on request</td>
<td>Wire unit complete</td>
<td>on request</td>
</tr>
<tr>
<td>Wire rope per m</td>
<td>on request</td>
<td>Wire unit complete</td>
<td>on request</td>
</tr>
</tbody>
</table>

Tension spring | 101186696 |
S 900 wire tensioner | 101186704 |
Shackle (stainless steel) | 101186490 |

Dust zone 21, 22
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 IP67
- 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
- **Standards:** EN 60947-5-3, EN 61241-0, EN 60079-15, BG-GS-ET-14
- **Design:** rectangular
- **Enclosure:** glass-fibre reinforced thermoplastic
- **Max. impact energy:** 1 J
- **Protection class:** IP67 to EN 60529
- **Connection:** Boflex cable
- **Cable section:** 4 x 0.25 mm²
  - **Ordering suffix -2187:** 6 x 0.25 mm²
- **Operating principle:** magnetic
- **Actuating magnet:** EX-BPS 250, coded
- **Sar:** 4 mm
- **Sao:** 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 ... 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

**Ordering details**

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td></td>
<td>1 NO / 1 NC contacts</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1 NO / 2 NC contacts without LED</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>with LED</td>
</tr>
<tr>
<td>2187</td>
<td></td>
<td>Individual contact outlet (only with 1 NO / 2 NC)</td>
</tr>
</tbody>
</table>

**Contact variants**

- **1 NO / 1 NC contacts**
  - BK 13 14 BU
  - WH 21 22 BN
- **1 NO / 2 NC**
  - BK 22 14 BU
  - WH 32 32 BN

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

**Note**

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuating magnet</td>
<td>EX-BPS 250</td>
</tr>
<tr>
<td>Spacer</td>
<td>BNS 250</td>
</tr>
</tbody>
</table>

Gas zone 2 / Dust zone 22
Safety sensors

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

Technical data

- Equipment category: II 3GD
- Explosion 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: rectangular
- Enclosure: glass-fibre reinforced thermoplastic
- Max. impact energy: 1 J
- Protection class: IP67 to EN 60529
- Connection: Boflex cable
- Cable section: 4 x 0.25 mm²
- Operating principle: magnetic
- Actuating magnet: EX-BPS 33, coded
- s_ac: 5 mm
- s_ar: 15 mm
- Switching condition indication: LED only with ordering suffix G
- Max. switching voltage: 100 VAC/DC
- with LED: 24 VDC
- Max. switching current: max. 400 mA
- without LED: 250 mA
- with LED: 10 mA
- Max. switching capacity: 10 W
- without LED: 3 W
- with LED: 240 mW
- Ambient temperature: –25 °C ... +70 °C
- Storage and transport temperature: –25 °C ... +70 °C
- Repeat accuracy R: \( \leq 0.1 \times s_{ac} \)
- Max. switching frequency: ca. 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55 Hz
- Amplitude 1 mm

Contact variants

1 NO / 1 NC contacts

- BK 13
- WH 21
- 14 BU
- WH 21

1 NO / 2 NC contacts

- BK 22
- WH 21
- 14 BU
- WH 21

1 NO / 2 NC (Ordering suffix -2187)

- GY 13
- GN 21
- WH 31

2 NC (Ordering suffix -2187)

- BK 11
- WH 21
- 12 BU
- WH 21

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</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>②</td>
<td>G</td>
<td>with LED</td>
</tr>
<tr>
<td>③</td>
<td>2187</td>
<td>Individual contact outlet (not possible for 1 NO/1 NO)</td>
</tr>
</tbody>
</table>

Gas zone 2 / Dust zone 22

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuating magnet</td>
<td>EX-BPS 33</td>
</tr>
<tr>
<td>Spacer</td>
<td>BN 31/BNS 33</td>
</tr>
</tbody>
</table>
Safety sensors

EX-BNS 120-...-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 17 max. 90 Ncm
- Max. impact energy: 1 J
- Connection: IP67 to EN 60529
- Cable section: 4 x 0.25 mm²
- Operating principle: magnetic
- Actuating magnet: BP 6, BP 8, BP 10, BP 15 SS, not coded
- Switching condition indication: –
- Switching voltage max.: 100 VAC/DC
- Switching current max.: 250 mA
- Switching capacity max.: 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
  - B10d NC/NO contact: 25,000,000 at 20% contact load
  - Service life: 20 years

Note

Classification:

- Standards: EN ISO 13849-1
- B10d NC/NO contact: 25,000,000 at 20% contact load
- Service life: 20 years

Contact variants

1 NO / 1 NC contacts

- BK 13
- WH 21
- BU 14

1 NO / 2 NC contacts

- BK 22
- WH 32
- BU 15

2 NC contacts

- BK 11
- WH 21
- BU 22

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.

Approvals

CE

Ordering details

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td></td>
<td>1 NO / 1 NC contacts</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1 NO / 2 NC contacts</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>2 NC contacts</td>
</tr>
</tbody>
</table>
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

Gas zone 2 / Dust zone 22
Safety sensors

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

- Ex certified
- Thermoplastic enclosure
- Long life, no mechanical wear
- Protection class IP67
- Intensive to transverse misalignment
- Particularly large switching distance
- Suitable for food processing industry

### Technical data

- **Equipment category:** II 3GD
- **Ex protection:** Ex nC IIC T6 X
- **Ex tD A22 IP67 T200°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:** IP67 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
  - Saₜ: 8 mm (BP 6 / BP 8)
  - 18 mm (BP 10 / BP 15 SS)
  - Sₚₜ: 20 mm (BP 6 / BP 8)
  - 28 mm (BP 10 / BP 15 SS)
- **Switching voltage max. without LED:** 120 VAC/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

- **Standards:** EN ISO 13849-1
- **B₁₀₀ NC/NO contact:** 25.000.000
  - at 20% contact load
- **Service life:** 20 years

\[
MTTF_d = \frac{B_{100}}{0.1 \times n_{op}} \\
\text{where:} \quad n_{op} = \frac{d_{act} \times h_{up} \times 3600 \text{ s/h}}{t_{op}}
\]

### Ordering details

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

### 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).

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 303-...-3G/D**

- Ex certified
- Thermoplastic enclosure
- with coding
- long life, no mechanical wear
- Protection class IP67
- Intensive to transverse misalignment
- Suitable for food processing industry
- LED version available

**Technical data**

| Equipment category: | II 3GD |
| Ex protection: | Ex n IIC T6 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: | IP67 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 |
| $S_{ap}$: | 5 mm |
| $S_{ap}$: | 15 mm |
| Switching condition indication: | LED only with ordering suffix G |
| Max. switching voltage without LED: | max. 100 VAC/DC |
| Max. switching current without LED: | max. 400 mA |
| Max. switching capacity without LED: | 10 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 ... 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 |

**Approvals**

- CE

**Ordering details**

<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</td>
</tr>
<tr>
<td>1</td>
<td>G</td>
<td>with LED</td>
</tr>
</tbody>
</table>

**Contact variants**

1. NO contacts
2. NC contacts
   - with LED
     - GY 13...14 PK
     - GN 21...22 YE
     - WH 31...32 BN

**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

BPS 300

BPS 303

BPS 303 SS

Ordering details

Actuating magnet:
with plastic enclosure
with plastic enclosure for food-processing industry
Stainless steel for food-processing industry

BPS 300
BPS 303
BPS 303 SS

Gas zone 2 / Dust zone 22
Safety sensors

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

**Technical data**

- Equipment category: Ex 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: IP65 and IP67
- 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 $S_{on}$: 8 mm
- $S_{off}$: 7 mm
- $S_{ar}$: 10 mm
- Hysteresis: $\leq$ 0.7 mm
- Repeat accuracy $R$: $\leq$ 0.2 mm
- Response time: $< 30$ ms
- Duration of risk: $\leq 30$ ms
- $U_e$: 24 VDC – 15 % / + 10 %
- $I_e$: 1.0 A
- $I_o$: 0.05 A
- Leakage current $I_{leak}$: $\leq 0.5$ mA
- Protection class: II
- Overvoltage category: III
- Degree of pollution: 3
- $U_{imp}$: 0.8 $kV$
- $U_i$: 32 VAC/DC
- Safety outputs: short-circuit proof, p-type
- Output current: max. 0.5 A each output
- $U_o$: max. 0.5 V
- $I_o/U_o$: 0.5 A / 24 VDC
- Signalling output: short-circuit proof, p-type
- $I_o/U_o$: 0.05 A / 24 VDC
- Utilisation category: AC-12, DC-13
- Ambient temperature: $-20^\circ C ... +40^\circ C$
- Storage and transport temperature: $-25^\circ C ... +85^\circ C$
- Switching frequency $f$: ca. 3 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55Hz, Amplitude 1 mm

**System components**

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

**Legend**

- S: $\text{switching distance}$
- V: $\text{axial misalignment}$
- $s_{on}$: $\text{switch-on point}$
- $s_{off}$: $\text{switch-off point}$
- $S_h$: $\text{hysteresis range}$
- $S_{ar}$: $\text{assured switch-on point}$
- $S_{ao}$: $\text{assured release point}$

**Approvals**

- CE

**Ordering details**

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

**Note**

Actuators must be ordered separately.
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
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 IP67
- 2 cable entries M 16
- Including Ex-certified screwed cable gland

Technical data

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

Switching distances, refer to next page.

Contact variants

1 NO contact EX-BN 20 - 10 z
1 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

Approvals

Ordering details

EX-BN 20-…Z-3G/D

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<thead>
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<td>11R</td>
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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>
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System components

EX-certified screwed cable gland

EX-certified screw plug

Gas zone 2 / Dust zone 22

Ordering details

EX-KLE-M16x1.5
EX-VS-M16x1.5

EX-certified screwed cable gland
EX-certified screw plug
Magnetic reed switches

System components

Actuating magnet
Unenclosed, N-S
Thermoplastic enclosure, N-S
Unenclosed, N-S
Thermoplastic enclosure, N-S

Ordering details

BP 10
BP 15
BP 15/2
BP 34

Ordering details

Actuating magnet
metal enclosure Al, N-S
metal enclosure Al, N
metal enclosure Al, S
Thermoplastic enclosure, N-S
Thermoplastic enclosure, N-S
Thermoplastic enclosure, N-S

Ordering details

BP 20
BP 20 N / BP 20 S
BP 31
BP 31 N / BP 31 S
BP 11
BP 11 N / BP 11 S

Ordering details

Actuating magnet
metal enclosure Al, N-S
metal enclosure Al, N
metal enclosure Al, S
metal enclosure Al, 2x N
metal enclosure Al, 2x S
metal enclosure Al, N-S

Ordering details

BP 20
BP 20 N / BP 20 S
BP 31
BP 31 N / BP 31 S
BP 11
BP 11 N / BP 11 S

Ordering details

BP 31
BP 31 N / BP 31 S
BP 12

Ordering details

BP 10
BP 15
BP 15/2
BP 34

Gas zone 2 / Dust zone 22
## Magnetic reed switches

### System components

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

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<th>2x BP 21 N</th>
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<tr>
<td>metal enclosure Al, S</td>
<td>BP 21 S</td>
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Gas zone 2 / Dust zone 22
Ordering details

Detailed technical information at:
www.schmersal.com
The entire EX-R programme has a modular structure. Each control device allows a great diversity of variants: various versions of push-buttons 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 IP65 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

Mechanical protection to EN 60 079-0

<table>
<thead>
<tr>
<th>Risk of mechanical hazard</th>
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<th>Low</th>
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<tbody>
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<tr>
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</table>
Control devices and indicator lights

Assembly schematic

Pushbutton

Fixing flange       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

- **Equipment category:** Ex II 2GD
- **Ex protection:** 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 (EN 60079-0):** 7 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:** IP65
- **Full insulation:** yes
- **Materials:** Membranes: 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:** 4 mm
- **Actuating force:** without membrane approx. 1.5 N with membrane approx. 2 N
- **Mechanical life:** 1 x 10⁶ operations
- **Rohs conformity:** yes

---

### Approvals

- Ex
- CE

### Ordering details

**Ex-RDT ➀ ➁**

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**Ex-RDM ➀ ➋**

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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:** 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:** IP65
- **Full insulation:** yes
- **Materials:**
  - Membranes: 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:** 4 mm
- **Actuating force:** ca. 1.5 N
- **Mechanical life:** 1 x 10^6 operations
- **Rohs conformity:** yes

**Approvals**

**Ordering details**

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<tr>
<td></td>
<td>bu</td>
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</tr>
<tr>
<td>②</td>
<td>Identification plate, symbols: refer to page 128</td>
<td></td>
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</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
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</tr>
<tr>
<td></td>
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</tr>
<tr>
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<td>rd</td>
<td>red</td>
</tr>
<tr>
<td></td>
<td>gn</td>
<td>green</td>
</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>Identification plate, symbols: refer to page 128</td>
<td></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)

---

Gas zone 1, 2 / Dust zone 21, 22
Control devices and indicator lights – Indicator lights

**EX-RMLH...**

- Indicator light with domed cap

**Technical data**

<table>
<thead>
<tr>
<th>Equipment category:</th>
<th>☑ II 2GD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex protection:</td>
<td>Ex ib IIC T4 X, Ex tD A21 IP65 T110°C X</td>
</tr>
<tr>
<td>Standards:</td>
<td>EN 60947-5-1, EN 60947-1, EN 61241-0, EN 61241-1, EN 60079-0, EN 60079-11</td>
</tr>
<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>Climate resistance</td>
<td>to DIN EN 60068: 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>IP65</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>Fixing:</td>
<td>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**

[Image: Ex, C, CE]

**Ordering details**

<table>
<thead>
<tr>
<th>N° Option</th>
<th>Description</th>
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<tbody>
<tr>
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<tr>
<td>rd</td>
<td>red</td>
</tr>
<tr>
<td>gn</td>
<td>green</td>
</tr>
<tr>
<td>wh</td>
<td>white</td>
</tr>
<tr>
<td>bu</td>
<td>blue</td>
</tr>
<tr>
<td>2</td>
<td>Identification plate, symbols: refer to page 128</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 – Mushroom buttons

**EX-RDP40...**

- Mushroom button without latching function

---

**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 × 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:** IP65
- **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 × 10⁶ operations
- **Rohs conformity:** yes

---

**Approvals**

- Ⓟ
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>bk</td>
<td>black</td>
</tr>
<tr>
<td></td>
<td>ye</td>
<td>yellow</td>
</tr>
<tr>
<td></td>
<td>rd</td>
<td>red</td>
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<tr>
<td></td>
<td>gn</td>
<td>green</td>
</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>
</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 – Mushroom buttons

**EX-RDRZ45...**

- Mushroom button with latching function

### 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
- **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:** IP65
- **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:** approx. 2 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>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>black</td>
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<tr>
<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></td>
<td>Identification plate, symbols: refer to page 128</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 – Emergency stop buttons

EX-RDRZ45rt

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 60947-5-5
- 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: IP65
- 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

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)

Approvals

Ordering details

Ex-RDRZ45 rt

Gas zone 1, 2 / Dust zone 21, 22
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:
 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:
 50 × 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:
 IP65
 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 × 10⁵ operations
 Rohs conformity:
 yes

Approvals

Ordering details

Ex-RW®

<table>
<thead>
<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></td>
<td>S</td>
<td>Selector switch</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Spring-return rotary selector switch</td>
</tr>
<tr>
<td></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></td>
<td>32</td>
<td>3 positions</td>
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</table>

Ex-RW® .1

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
<td>T</td>
<td>Selector switch</td>
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<tr>
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<td>S</td>
<td>Selector switch</td>
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<td>Spring-return rotary selector switch</td>
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<tr>
<td></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></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, Ex-RWT 21.1</td>
</tr>
<tr>
<td>Selector switch with 2 latched positions</td>
<td>1 × 70°</td>
<td>Ex-RWS 21, 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, Ex-RWT 32.1</td>
</tr>
<tr>
<td>Selector switch with 3 positions; right: latching, left: switching</td>
<td>right 35&lt;br&gt;left 55°</td>
<td>Ex-RWST 32, 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, 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&lt;br&gt;left 35°</td>
<td>Ex-RWTS 32, 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 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: 0 °C ... + 55 °C
Switching frequency: 1,000 s/h
Protection class to EN 60529: IP65
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 x 10⁶ operations
Rohs conformity: yes

Approvals

Ordering details

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>Key-operated selector switch</td>
</tr>
<tr>
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<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>position of the key</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>number of plungers</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>
<tr>
<td>2</td>
<td></td>
<td>position for key retraction</td>
</tr>
<tr>
<td>3</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></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-RSS32S123</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>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>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>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>
</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
(for EX-RSS../RST../, standard for the above listed versions)
Control devices and indicator lights – Contacts

### Equipment category
- Ex ib IIC T4 X
- Ex tD A21 IP65 T110°C X

### Standards
- EN 60947-5-1
- EN 61241-0
- EN 61241-1
- EN 60079-11

### Technical data

<table>
<thead>
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<th>Value</th>
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<tr>
<td>Ui</td>
<td>250 V</td>
</tr>
<tr>
<td>Ii</td>
<td>3.3 A for Ex ib</td>
</tr>
<tr>
<td>P</td>
<td>max. 1500 W</td>
</tr>
<tr>
<td>Contact reliability</td>
<td>5 VDC/1 mA</td>
</tr>
<tr>
<td>Positive opening</td>
<td>approx. 2 mm after achieving opening point</td>
</tr>
<tr>
<td>Voltage</td>
<td>4 kV/3</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>1.200 s/h</td>
</tr>
<tr>
<td>Switching points: NC contact</td>
<td>approx. 1 mm</td>
</tr>
<tr>
<td>Switching points: NO contact</td>
<td>approx. 2.5 mm</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>Mechanical life to EN 60 947-5-1:</td>
<td>$10 \times 10^6$ operations</td>
</tr>
<tr>
<td>Actuating force at stroke end:</td>
<td>approx. 4.5 N</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
- CE
- Ex

### Ordering details

#### Ex-RF

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

#### Ex-RF

<table>
<thead>
<tr>
<th>N°</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>03</td>
<td></td>
<td>Contact labelling 3, 4</td>
</tr>
<tr>
<td>03.1</td>
<td></td>
<td>Contact labelling 13, 14</td>
</tr>
</tbody>
</table>
EX-RLDE ws 24

**Technical data**

- **Equipment category:** II 2GD
- **Explosion protection:** Ex ib IIC T4 X
  - Ex tD A21 IP65 T110°C X
- **Standards:** EN 60947-5-1, EN 61241-0, EN 61241-1, EN 60079-11
- **U:** 30 V
- **I:** not relevant (max. 30 mA)
- **P:** not relevant (max. 30 mA)
- **G:** 0
- **L:** 0
- **U:** 24 V +/-10%
- **I:** 30 mA
- **P:** 0.9 W
- **Temperature range:** –20°C ... + 55°C
- **Climate resistance to:** DIN EN 60068: Part 2-20
- **Mounting position:** random
- **Terminal designations:** to EN 60947-1
- **Tightening torque for the connecting screw:** max. 1 Nm

**Approvals**

Ex, CE

**Ordering details**

Ex-RLDE ws 24

- **Gas zone 1, 2 / Dust zone 21, 22**
- **Equipment category:** L
  - **II 2GD**
- **Explosion protection:** Ex ib IIC T4 X
  - Ex tD A21 IP65 T110°C X
- **Standards:** EN 60947-5-1, EN 61241-0, EN 61241-1, EN 60079-11
- **Ui:** 30 V
- **Ii:** not relevant (max. 30 mA)
- **Pi:** not relevant (max. 30 mA)
- **Ci:** ~ 0
- **Li:** ~ 0
- **U:** 24 V +/-10%
- **I:** 30 mA
- **P:** 0.9 W
- **Temperature range:** –20°C ... + 55°C
- **Climate resistance to:** DIN EN 60068: Part 2-20
- **Mounting position:** random
- **Terminal designations:** to EN 60947-1
- **Tightening torque for the connecting screw:** max. 1 Nm

**Light terminal block**

- Screw connection
- Cable sections
  - single-strand 2 × (0.5 ... 2.5 mm²)
  - multi-strand with conductor ferrules 2 × (0.5 ... 1.5 mm²)

**Protection class**

- Connections: IP20 (finger-safe)
- Wiring compartments: IP40
Control devices and indicator lights – Enclosure

**EX-EBG 311.O**
- Empty enclosure in V4A
- Version with 1 fitting hole for installation ø 22.3 m
- incl. 1 cable gland M20

**EX-EBG 633.O**
- Empty enclosure in V4A
- Version with 3 fitting holes for installation ø 22.3 mm
- incl. 1 cable gland M25

**EX-EBG 665.O**
- Empty enclosure in V4A
- Versions with 5 fitting holes for installation ø 22.3 mm
- incl. 2 cable glands M25
- incl. 1 locking screw

**Approvals**

**Ordering details**
- EX-EBG 331.O
- EX-EBG 633.O
- EX-EBG 665.O
## Control devices and indicator lights – Accessories

### System components

<table>
<thead>
<tr>
<th>Mounting tool RMW</th>
<th>Identification label EX-RZSO</th>
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</thead>
</table>

### System components

<table>
<thead>
<tr>
<th>Mounting flange EX-RLM</th>
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### Ordering details

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<thead>
<tr>
<th>Mounting tool for mounting flange</th>
<th>Identification label</th>
<th>Mounting flange</th>
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<tr>
<td>RMW EX-RB</td>
<td>EX-RZSO</td>
<td>EX-RLM</td>
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**Gas zone 1, 2 / Dust zone 21, 22**
### Control devices and indicator lights – Symbols

#### Drives

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Electric motor" /></td>
<td>Electric motor</td>
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<tr>
<td><img src="image" alt="Pump general" /></td>
<td>Pump general</td>
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<tr>
<td><img src="image" alt="Gear pump" /></td>
<td>Gear pump</td>
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<tr>
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<td>Coolant</td>
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<tr>
<td><img src="image" alt="Oil lubrication" /></td>
<td>Oil lubrication</td>
</tr>
<tr>
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<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>
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<tr>
<td><img src="image" alt="Clamp table rectangular" /></td>
<td>Clamp table rectangular</td>
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<td><img src="image" alt="Electrical machine" /></td>
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#### Signals

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<tr>
<td><img src="image" alt="Jog" /></td>
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<tr>
<td><img src="image" alt="Automatic" /></td>
<td>Automatic</td>
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<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>
</tr>
<tr>
<td><img src="image" alt="Increase of a variable" /></td>
<td>Increase of a variable</td>
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<tr>
<td><img src="image" alt="Decrease of a variable" /></td>
<td>Decrease of a variable</td>
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<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>
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#### Words

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<td><img src="image" alt="AUF" /></td>
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<tr>
<td><img src="image" alt="AB" /></td>
<td>AB</td>
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<tr>
<td><img src="image" alt="ZU" /></td>
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<tr>
<td><img src="image" alt="HALT" /></td>
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<tr>
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#### Letters

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</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>
</tbody>
</table>

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

**Linear motion**

| 101 | Working motion feed |
| 102 | Rapid motion or idling |
| 103 | Rapid motion |
| 104 | Feed |
| 105 | Interrupted motion jogging |
| 106 | Reciprocating motion |
| 107 | Limited motion |
| 108 | Indexing |
| 109 | Motion in 2 directions |

**Rotary motion**

| 201 | Continuous clockwise rotation |
| 202 | Anti-clockwise rotation |
| 203 | Clockwise rotation STOP |
| 204 | Anti-clockwise rotation STOP |
| 205 | 1 revolution clockwise |
| 206 | Anti-clockwise |
| 207 | Rotary indexing |
| 208 | Interrupted rotary motion |
| 209 | Clockwise motion restricted |
| 210 | Anti-clockwise motion restricted |
| 211 | Clockwise motion from a restriction |
| 211 | Anti-clockwise motion from a restriction |

**Additional options**

| 301 | Clamping, chucking |
| 302 | Release |
| 303 | Braking |
| 304 | Release brake |
| 305 | Unlock |
| 306 | Lock |

**Arabic numerals**

| 0 | 700 |
| 1 | 701 |
| 2 | 702 |
| 801 | 702 |
| 802 | 702 |
| 803 | 702 |
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
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 (fail-safe). 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

**Technical data**

- **Equipment category:** II 3GD
- **Ex protection:**
  - nL IIC T5 X
  - 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 to 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: IP65
  - Contact element: IP44
- **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
- **Utilisation category:** AC-15, DC-13
- **Ie/Ue:** 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

**Contact variants**

<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>
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</tbody>
</table>

**Approvals**

Gas zone 2 / Dust zone 22

**Ordering details**

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

**Note**

- **Contact variants**
  - Contact element EF103.1 1 NC / 1 NO included in delivery.
  - Contact element EF103.2 1 NC / 1 NO

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..

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>e.g. 34</td>
<td>individual key number for main cylinder lock</td>
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<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>
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<tr>
<td></td>
<td>E</td>
<td>Front plate mounting</td>
</tr>
</tbody>
</table>

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..

Approvals

Ordering details

<table>
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<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
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<td>e.g. 34</td>
<td>individual key number for main cylinder lock</td>
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<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>

Technical data

- Equipment category: II 2GD
- Ex protection: c 85°C X
- Standards: EN 13463-1, EN 61241-0
- Design:
  - Enclosure for top mounting
  - Enclosure for front plate mounting
- Material:
  - AISi12 front plate 1.4301
- Actuating speed: max. 1 m/s
- Mechanical life: 10 million operations

Gas zone 1, 2 / Dust zone 21, 22
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: 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**

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<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<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>
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<tr>
<td></td>
<td>e.g. 201</td>
<td>individual key numbers</td>
</tr>
<tr>
<td></td>
<td>e.g. BO</td>
<td>For the appropriate actuator see page 137</td>
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</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<td>L</td>
<td>Lock barrel to left</td>
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<tr>
<td></td>
<td>R</td>
<td>Lock barrel to the right</td>
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<tr>
<td></td>
<td>e.g. 201</td>
<td>individual key number for LHS or RHS cylinder lock</td>
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<td>e.g. 34</td>
<td>individual key number for second cylinder lock</td>
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<td></td>
<td>e.g. BO</td>
<td>For the appropriate actuator see page 137</td>
</tr>
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</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>Order Code</th>
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<tbody>
<tr>
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<td>Angled actuator</td>
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<td>Straight radius actuator</td>
<td>EX-BOR</td>
</tr>
<tr>
<td>Angled radius actuator</td>
<td>EX-BOWR</td>
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Germany - Northern region

Wittenberg
K.A. Schmersal GmbH & Co. KG
Vertriebsbüro Wittenberg
Im Ostpark 2
D-35435 Wittenberg
Phone: +49-56 16-70 10 28-0
Fax: +49-56 16-70 24 05
info@ksa-gmbh.de
www.ksa-gmbh.de

Hamburg / Münster
K.A. Schmersal GmbH & Co. KG
Vertriebsbüro Hamburg
Innungsstraße 3
D-21244 Buchholz i.d.N.
Phone: +49-40 816 20 2-0
Fax: +49-40 816 20 2-0
info@ksa-gmbh.de
www.ksa-gmbh.de

Nürnberg
K.A. Schmersal GmbH & Co. KG
Vertriebsbüro Nürnberg
Lechstraße 21
D-90451 Nürnberg
Phone: +49-911- 8 49 60 53
Fax: +49-911- 8 49 60 53
vbnuernberg@ksa-gmbh.de

Hamburg - Southern region

Nürnberg
K.A. Schmersal GmbH & Co. KG
Vertriebsbüro Nürnberg
Lechstraße 21
D-90451 Nürnberg
Phone: +49-911- 8 49 60 53
Fax: +49-911- 8 49 60 53
vbnuernberg@ksa-gmbh.de

Germany - Southern region

Nürnberg
K.A. Schmersal GmbH & Co. KG
Vertriebsbüro Nürnberg
Lechstraße 21
D-90451 Nürnberg
Phone: +49-911- 8 49 60 53
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vbnuernberg@ksa-gmbh.de

The privately-owned Schmersal Group has been developing and manufacturing products to enhance the safety at work for decades. The company was founded in 1945 and is represented by seven manufacturing sites on three continents and with its own companies and sales partners in more than 60 nations. In the demanding field of machine safety, the Schmersal Group is one of the international market and competence leaders. Based on a comprehensive product range, the company’s approximately 2000 employees develop and design complete solutions for the safety of man and machine.

Customers of the Schmersal Group include „global players“ from mechanical engineering and plant manufacturing and machine users. They benefit from the comprehensive know-how of the company when it comes to the standard-compliant integration of safety technology in the production processes. Furthermore, Schmersal has special sector expertise in the application fields that demand high quality and special characteristics from safety switching systems. These include food production, the packaging industry, machine tool construction, lift engineering, heavy industry and the automotive industry.

Against the backdrop of increasing numbers of standards and directives, tec.nicum offers a comprehensive range of safety services as part of the Schmersal Group services division: Certified functional safety engineers advise customers on selecting suitable safety equipment, CE compliance assessments and risk assessment, on a word-wide basis.

Product ranges
- Elevators and Escalators
- Packaging
- Food
- Automotive
- Machine tools
- Heavy industry

Industries
- Machine safety
- Automation
- Explosion protection
- Hygienic design

Services
- Application support
- CE conformity assessment
- Risk assessment
- Upgrading / Retrofit
- Technical planning and implementation
- Training courses

Competences
- Safe switching and monitoring
  - Guard door monitoring (Safety switches)
  - Command devices with safety function
  - Tactile safety devices
  - Optoelectronic safety devices
- Safe signal processing
  - Safety relay components
  - Safety controllers
  - Safety bus systems
- Automation
  - Position detection
  - Command and signalling devices

Precautions have been taken to assure accuracy of the information in this catalogue. Typographic or pictorial errors that are brought to our attention will be corrected in subsequent issues.