Protection – ATEX

Explosion Protection Catalogue | Version 03

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The online catalogue also includes the technical drawings of our products – a special service to designers. In this way, they can be downloaded and directly imported into CAD-systems.
The Schmersal homepage furthermore contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings. To be bookmarked!

The direct way

If you need further information or you want personal advice, you can call us as well: + 49-(0) 2 02-64 74-0.

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

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Attention!

The devices presented in this range are not intended for private consumers, i.e. they are not consumer products within the meaning of the European Directives (in Germany within the meaning of Section 5 GPSG) or other national laws. Assembly and commissioning of the devices requires personnel with the appropriate basic electrotechnical training or personnel who have been instructed accordingly.

The data specified in this catalogue are carefully checked typical standard values.
Subject to technical modifications and error.

Content

The basics of explosion protection

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

Due to the internationalisation and the standardisation on EN basis, the standards defining the requirements on equipment to be used in explosive atmospheres will gradually be replaced by the European Standards series EN 60079. Hybrid mixtures from gas and dust are included in the standardisation work as well. The mechanical explosion protection required by the ATEX Directives however still is in its “infancy”.
The comprehensive product portfolio from Schmersal and Elan Schaltelemente complies with the requirements of the standards and directives. Our existing products and our innovations are consistently developed and refined on the basis of the current standards as well as the amendments, which are in the transitional stage.
In this way, both the standard requirements and safety technology are integrated in the potentially explosive areas.

Source of ignition	Examples of the cause
Sparks	Mechanically generated sparks (e.g. by friction, stroke or cutting removal operations), electric sparks
Electric arcs/flashovers	Short-circuit, switching operations
Hot surfaces	Current in electrical installations, heaters and radiators, machining, heating during operation
Flames and hot gases	By combustion reactions, spark projection during welding
Electrical installations	Even extra-low voltages (U < 50 V) still can generate sufficient energy to ignite an explosive atmosphere. Opening/closing of contacts, loose or defective contacts
Static electricity	Separately arranged conductive parts, many plastics
Equalizing currents	Reverse current from generators, earth connection in case of faults, induction
Electromagnetic waves in the 3×10^{11} ... 3×10^{15} Hz range	Laser beam for range finding, especially in case of beam focusing
High frequency 10^4 ... 3×10^{12} Hz	Radio signals, industrial high-frequency generators for heating, drying, cutting, etc.
Lightning	Atmospheric disturbances
Ionizing radiation	X-ray device, radioactive substances, energy absorption leads to heating
Ultrasonic	Energy absorption in solid/liquid substances leads to heating
Adiabatic compression and shock waves	Strokewise opening of valves
Exothermal reactions	Chemical reaction

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.
Order of magnitude of the speed of combustion

Deflagration	cm/s
Explosion	m/s
Detonation	km/s

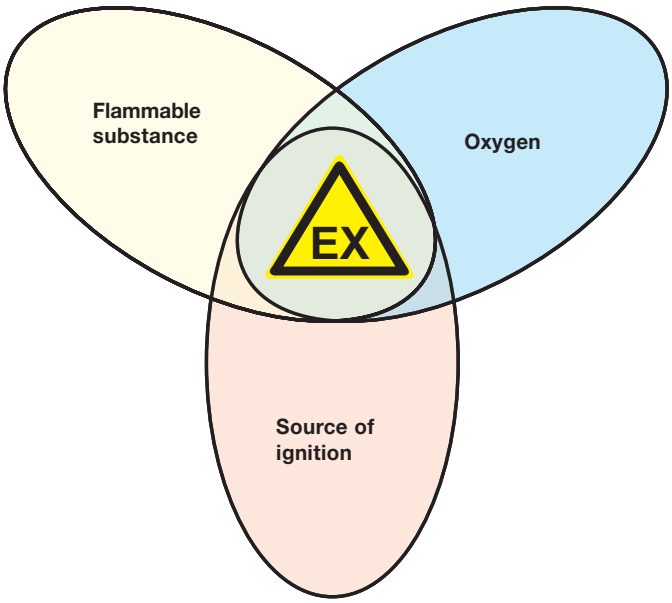
Explosion
An explosion can only occur, when three factors come together: flammable material in ignitable quantities, oxygen and an ignition source. If one component is missing, no exothermic reaction will occur.

Oxygen
When a flammable substance is mixed with oxygen, a potentially explosive mixture is created.
For gases, the concentration ratio determines whether an explosion is possible. The mixture can only be ignited if the concentration of the substance in air is within the lower and upper explosive limits. Mixtures with concentrations smaller or greater 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.
The question of possible risks of explosion must be addressed at the early stages of new facility planning. When assessing the risks of explosion, the user should take into account factors such as the likelihood that explosive atmospheres will occur and their persistence, the possible occurrence of chain reactions and interactions with other installations, the scale of the anticipated effects, e.g. damages to the building to be expected and the effect of the explosion on further components of the 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
- Procedure description, description of the installation under the scope of explosion protection
- Substance characteristics, list of all data including explosion-relevant parameters
- Risk analysis,
- 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 only inside containers, pipes, apparatus (evaporators, reaction chambers etc.).

Zone 1 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 likely to occur occasionally in normal operation.
- Example: areas in the immediate surroundings of zone 0, of intakes and inlets, the areas around filling units and discharging equipment, the immediate surroundings of highly fragile apparatus or conductors in glass, ceramics etc., the area around insufficiently sealing gaskets, e.g. on pumps and dampers, the interior of apparatus such as evaporators and reaction chambers.

Zone 2 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 not likely to occur in normal operation but, if it does occur, will persist for a short period only.
- Example: areas surrounding zone 0 or 1, specific storage plants

Zone 20 is an area, in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously or for long periods or frequently.
- Example: these conditions are usually found only inside containers, pipes, apparatus, e.g. mills and grinders, dryers, mixers, feed pipes, silos etc.

Zone 21 is an area, in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur occasionally in normal operation.
- Example: also areas in the vicinity of inlets or work stations where dust is poured into containers, as well as areas where there are dust deposits and where a combustible dust/air mixture could form in the course of normal operation.

Zone 22 is an area, in which an explosive atmosphere in the form of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
- Example: this could also include areas in the vicinity of devices containing dust, protection systems or components from which dust leaks and forms deposits (e.g. milling/grinding facilities, from which dust leaks and forms layers)

Dust Ex: selection according to the smouldering temperature and the ignition temperature
When selecting electrical apparatus for use in dust explosion risk areas, the **smouldering temperature** of the deposited dust and the ignition temperature of the potentially explosive dust/air mixture must be known, regardless of the zone.
The smouldering temperature is the lowest temperature of a hot surface on which a dust deposit of a defined thickness is ignited.
The ignition temperature of a dust cloud is the lowest temperature of a heated wall of an oven that ignites the dust/air mixture upon brief contact.
Combustible dusts are not divided into temperature classes like gases. The maximum surface temperature must be mentioned on the electrical equipment.
The table below summarizes the explosion parameters (ignition temperature, smouldering temperature and minimum ignition energy) of a few dusts.

Please note that for flammable substances a collective name, e.g. mill dust, designates different kinds of that product, each of them with diverging safety characteristics and parameters. Wheat flour for instance has other parameters than rye flour.
The specific parameters of the dust, which is permanent in each dust explosive area, must be determinated.
When the parameters of collective names are used, miscalculations can occur.

Substance	Ignition temperature T_i [°C]	Smouldering temperature T_s [°C]	ø Minimum energy ø E_{min} [mJ]
Flour	≥ 380	≥ 300	≥ 30
Wood	≥ 410	≥ 200	≥ 100
Brown coal	≥ 380	≥ 225	–
Coal	≥ 500	≥ 240	≥ 1000
PVC	≥ 530	≥ 340	≥ 5
Aluminium	≥ 560	≥ 270	≥ 5
Sulphur	≥ 240	≥ 250	10

Types of protection
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 re-written, so that the essential requirements are now described in the EN 60079-0.
This reflects for instance in the following way: The type of protection Ex nL has been replaced with the Ex ic type of protection relative to intrinsic safety. The sub-group is transferred from the EN 60079-15 into the EN 60079-11. This leads to changes, which could require a more accurate analysis.

Temperature classes for gases (EN 60079-0):

Classification of the maximum surface temperature into classes for electrical apparatus belonging to Equipment Group II

T1	T2	T3	T4	T5	T6
450°C	300°C	200°C	135°C	100°C	85°C

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

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

*different in North-America and Europe

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 voltage is limited in order to keep the electrical sparks below the ignition limit. The thermal effect, i.e. hot surfaces, is excluded by the current limitation.
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.

$I_{max} = I_o = U_o/R$

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, IIA, IIB and IIC, there are four ignition limit curves. The classification is done according to the ignition energy.
The ignition limit curves have been calculated by means of a spark tester, as described in the EN 60079-11 standard.

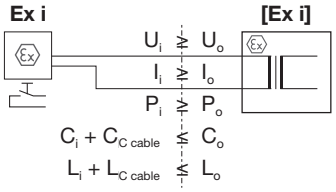
Ignition protection type and the main characteristics

Ignition protection type	Basic principle, main application
Oil immersion „o“	The source of ignition is permanently immersed in oil. Application: switchgear and transformers
Pressurized enclosures „p“	The formation of a potentially explosive atmosphere inside an enclosure is prevented by maintaining a positive internal pressure of protective gas in relation to the surrounding atmosphere. Application: machinery, commutation motors, control cabinets, monitors, keyboards, analysers
Powder filling „q“	A fine granular packing material surrounds the ignition source, thus making it impossible for an electric arc created in the enclosure under certain operating conditions to ignite a potentially explosive atmosphere surrounding the enclosure. Application: capacitors, condensers, electronic ballast, sensors
Flameproof enclosures „d“	Parts which can ignite a potentially explosive atmosphere are surrounded by an enclosure which withstands the pressure of an explosive mixture exploding inside the enclosure and prevents the transmission of the explosion to the atmosphere surrounding the enclosure. Application: switchgear, spark-generating parts, power engineering, heavy-current engineering
Increased safety „e“	Additional measures are applied to increase the level of safety, thus preventing the possibility of excessive temperatures and the occurrence of sparks or electric arcs within the enclosure or on exposed parts of electrical apparatus, where such ignition sources would not occur in normal service. Application: terminal and connection boxes (engines)
Encapsulation „m“	Parts that are capable of igniting an explosive atmosphere by either sparking or heating are enclosed in a compound in such way as to avoid ignition of an explosive atmosphere. Application: sensors, variable speed drives
Intrinsic safety „i“	An electric circuit is intrinsically safe if no sparks or thermal effects produced under specified test conditions are not capable of causing ignition of a given explosive atmosphere. Application: measurement and control technology
Intrinsically safe systems „i-SYST“	The entirety of interlinked and interconnected electrical apparatus, documented by a system description. Circuits used completely or partly inside hazardous areas are intrinsic safe.

Electrical apparatus and associated apparatus

An intrinsically safe electric circuit contains at least one electrical apparatus and one associated apparatus.
The electric circuits of the electrical apparatus meet the requirements of the intrinsic safety.
The electrical apparatus must only be connected to non-intrinsically safe circuits through associated apparatus. An associated apparatus possesses both intrinsically safe and non-intrinsically safe circuits. To separate the electric circuits, a zener diode or galvanic isolators are used. The EN 60079-11 describes this separation calls as a “safety barrier”.
Intrinsically safe electrical apparatus and intrinsically safe components from associated equipment are classified in different levels of protection “ia”, “ib” and “ic” according to EN 60079-11. This classification is included as of the 5th edition of the IEC Ex version.
The “ia” category basically offers the highest level of protection, “ib” a higher level of protection and “ic” a high level of protection.
The category “ia” or “ib” determines whether the protective circuit offers a single fault safety or a double fault safety. For protection level “ic”, no fault analysis is performed. Here the safety for normal operation is sufficient. Therefore, the standard EN 60079-14, chapter 12.3 recommends galvanic isolation for intrinsically safe circuits in zone 0, category “ia”.
For intrinsic safety, a fault analysis is performed to exclude explosion risks. However, no statement whatsoever is made with regard to the operational safety. This means that a functional total breakdown is, for the explosion protection standpoint, allowed.
The electrical apparatus may be used in zone 0 in accordance with the category. The associated apparatus are installed in the safe area, only the intrinsically safe electric circuits are installed in the potentially explosive area in accordance with the category.
Basically it is possible to apply further protection measures. So that the associated apparatus can be installed in zone 2 or even in zone 1.

Design of intrinsically safe electric circuits

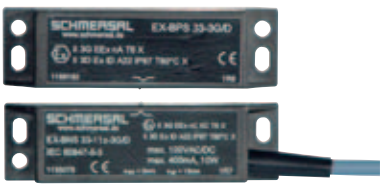


Design of intrinsically safe electric circuits (typical values)

Resistance (back/forth)	0,5 mm^2	72 Ohm/km
	0,75 mm^2	48 Ohm/km
	1,5 mm^2	24 Ohm/km
Capacity		180-200 nF/km
Inductivity		0,8-1 mH/km

Simple electrical apparatus – intrinsic safety

Type	Condition	Example
Passive components	None	Switches, terminal/junction boxes (modular enclosures), resistance, simple semi-conductor components
Energy storage	Values must be observed during calculation	Capacitors, coils
Energy source	≤ 1,5 V ≤ 100 mA ≤ 25 mW	Thermocouple, photocell



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.

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

- Protection against the ingress of external energy.
- Protection against external electric or magnetic fields.
  Possible cause: overhead highvoltage line or 1-phase highvoltage lines.
- The conductors of intrinsically safe and non-intrinsically safe electric circuits must not be laid in the same conduit.
- In case of armoured, metal sheathed or shielded cables, intrinsically safe and non-intrinsically safe electric circuits can be laid in the same conduit.

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

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

Multiple intrinsically safe electric circuits may be wired in multi-wire cables or conductors.

Cable	Requirement	
Stationary apparatus	Enclosure	Thermoplastic, duroplast, elastomer or metal insulated with metal enclosure
Mobile, transportable apparatus	External enclosure	Heavy polychloroprene, synthetic elastomer, heavy rubber hose pipe or similar robust design
	Minimum section surface	1,0 mm^2
Flexible	Design	• Light rubber hose pipe with/without polychloroprene enclosure • Heavy rubber hose pipe with/without polychloroprene enclosure • Plastic-insulated cable, similar to heavy rubber hose pipe

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

Criterion	Condition	Note
Insulated cables	Test voltage ≥ 500 VAC	Cable ground, cable shield and shield ground
Diameter of the individual conductors	≥ 0,1 mm	Also for flexible conductors
Flexible conductors	To be protected against splicing	e.g. by using conductor ferrules
Multi-wire cables	Acceptable	The requirements for the error analysis to EN 60079-14 must be observed
Parameters	(C_c and L_c) or (C_c and L_c/R_c)	In case of doubt: worst case

EN 13463

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: ⟨Ex⟩ II 1G c T4

Assessment of the ignition hazard for equipment of Group II (EN 13463-1), gas

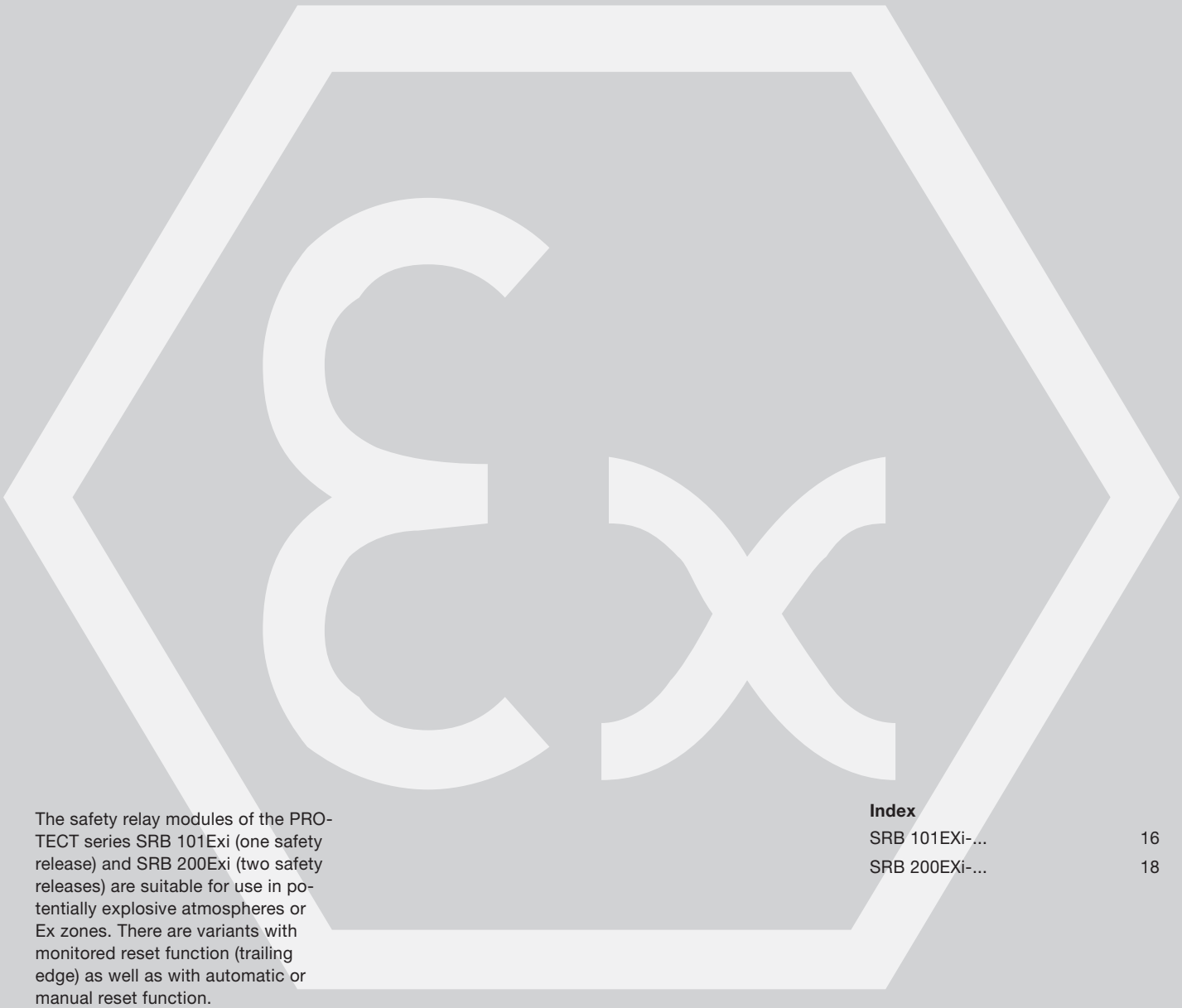
Potential ignition source (1)			Measures applied to prevent the source becoming effective (2)	Ignition protection used (3)
Normal operation (1a)	Expected malfunction (1b)	Rare malfunction (1c)		

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 did not had to meet the requirements of the ATEX 1999/92/EC.

Product designation

	1		2					3			4					
	Ignition hazard															
	a	b	a	b	c	d	e	a	b	c	a	b	c	d	e	f
No.	Potential ignition source		During normal operation	During expected malfunction	During rare malfunction	Not to be considered	Reasons for assessment	Description	Description of the protective measure (standards, technical rules, experimental results)	Proof (including relevant Ex features listed in column 1)	During normal operation	During expected malfunction	During rare malfunction	Not to be observed	Resulting equipment category in respect of this ignition hazard	Necessary restrictions
1																
2																
3																
															Resulting equipment category including all existing ignition hazards	

Products with the type of protection “intrinsic safety”



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.

Index

SRB 101EXi-...

- 1- or 2-channel control
- 1 safety enabling circuit
- 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 detection (through switch)
- Current and voltage limitation of the input circuits (intrinsically safe)
- Green LED indications for relays K1, K2, U_B, U_i and U_{EXi}
- DIN rail mounting to DIN EN 60 715:2001
- Thermoplastic enclosure to UL-94-V-0, graphite black RAL 9011
- Certification to DIN EN ISO 13 849-1:2007
- Certification to ATEX 94/9/CE
- Electric circuits up to zone 1/21
- Installation in zone 2 possible

Approvals

Technical data

Equipment category, explosion protection type:	Gas: ⟨Ex⟩ II 3 G Ex nAnC IIC T5 (SRB in zone 2)
	Gas/dust: ⟨Ex⟩ 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 U_o:	33,6 V
Current I_o:	57,0 mA
Capacity P_o:	478,8 mW (linear characteristic)
Maximum safety voltage U_m:	253 VAC
Isolation:	safe separation to EN 60079-11:
	Amplitude of the voltage 375 V
Rated operating voltage:	24 VDC –15%/+20%, residual ripple max. 10%
Recommended fuse for the operating voltage:	internal fuse F1: T 50 mA/250 V
	internal fuse F2: T 100 mA/250 V
Protection class:	enclosure: IP 40
	Terminals: IP 20
	Wiring compartment: IP 54
Power consumption:	max. 3,0 W
Switching capacity of the enabling paths:	230 V; 3 A ohmic
	(inductive with suitable protective circuit)
	AC-15: 230 VAC/3 A
	DC-13: 24 VDC/3 A
Recommended fuse for the enabling paths:	3,15 A slow blow
Min. switching capacity:	min. 10 V/10 mA
Contact resistance:	max. 100 mΩ in new state
Contact material/contacts:	AgSnO, self-cleaning, positive drive
Switching capacity of the auxiliary contacts (21-22):	24 VDC, 2 A
Recommended fuse for the auxiliary contacts:	2 A slow blow
Current and voltage at S11-S12, S21-S22:	24 VDC, 5 mA
Current limitation at S11-S12, S21-S22:	15 mA
Pull-in delay:	ca. 300 ms (Version -1A)
	ca. 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:	ca. 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 Teil 7)
Max. total line resistance:	30 Ohm
Ambient operating:	–25 °C ... +60 °C
EMV:	EN 61000-6-2:2005
Vibrations:	EN 60068-2-6:1996
Frequency:	10 … 55 Hz
Amplitude:	0,35 mm
Climatic resistance:	EN 60068-2-3:1986
Storage temperature:	–40 °C ... +85 °C
Mechanical life:	10^7 operations
Weight:	230 g
Dimensions:	22,5 x 100 x 121 mm

Ordering details

SRB 101EXi-1①

No.	Replace	Description No.
①	R	trailing edge
	A	automatic reset function

Note

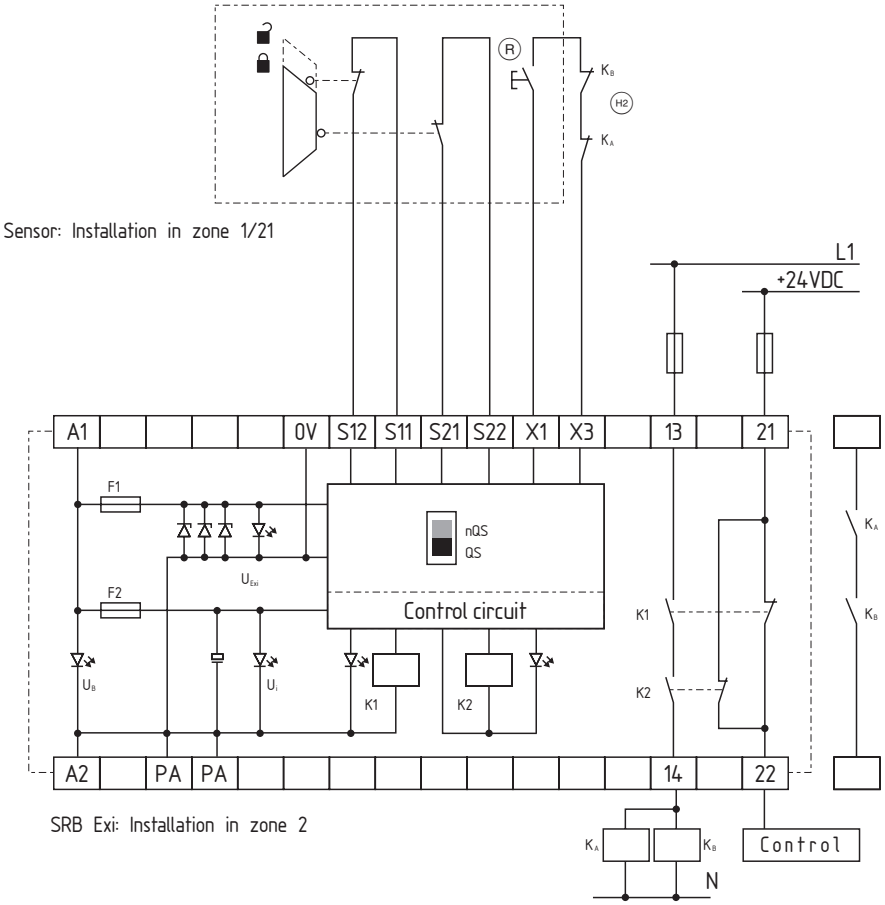
- Cable connections:
  single strand: rigid or flexible (with or without conductor ferrules) 0.25 … 2.5 mm²
  multi-strand with identical section: rigid or flexible (with conductor ferrules without plastic) 0.25 … 2.5 mm²; flexible (without or with TWIN conductor ferrules) 0.5 … 1.5 mm²
- Cable lengths (for nominal voltage):
  1-channel without cross-wire short detection:
  1.5 mm² = 1,500 m; 2.5 mm² = 2.500 m
  2-channel with/without cross-wire short detection:
  1.5 mm² = 1,500 m; 2.5 mm² = 2.500 m

SRB-EXi safety relay module

Note

- 2-channel control, shown for a guard door monitor with two position switches whereof one with positive break contact; with external reset button Ⓡ.
- Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts.
  Ⓗ2 = feedback circuits
- The control recognizes cable break, cross-wire shorts (switch in position “QS”) and earth leakages in the monitoring circuit.
- The safety function is defined as the opening of release 13-14 when the inputs S11-S12 or S21-S22 are opened.
- The safety-relevant current path with output contact 13-14 meets the following requirements under observation of a B10d value assessment (also refer to “Requirements of DIN EN ISO 13 849-1“):
  – Category 4 – PL “e”
  to DIN EN ISO 13 849-1:2007
  – SIL 3 to DIN EN 61 508-2:2002
  – SILCL 3 to DIN EN 62 061:2005 (meets the requirements of control category 4 to DIN EN 954-1:1997).
- To determine the Performance Level (PL) of the entire safety function (e.g. sensor, logic, actuator) to DIN EN ISO 13 849-1:2007, an analysis of all relevant components is required.

Wiring diagram



SRB-EXi safety relay module

SRB 200EXi-...

- 1- or 2-channel control
- 2 safety releases
- Suitable for signal processing of emergency stop control devices, interlocking devices, etc.
- Trailing edge (version -1R)
- Automatic reset function (version -1A)
- Optionally cross-wire short detection (through switch)
- Current and voltage limitation of the input circuits (intrinsically safe)
- Green LED indications for relays K1, K2, U_B, U_i and U_{EXi}
- DIN rail mounting to DIN EN 60 715:2001
- Thermoplastic enclosure to UL-94-V-0, graphite black RAL 9011
- Certification to DIN EN ISO 13 849-1:2007
- Certification to ATEX 94/9/EG
- Electric circuits up to zone 1/21
- Installation in zone 2 possible

Approvals

Technical data

Equipment category, explosion protection type:	Gas: ⟨Ex⟩ II 3 G Ex nAnC IIC T5 (SRB in zone 2)
	Gas/dust: ⟨Ex⟩ 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 U_o:	33,6 V
Current I_o:	57,0 mA
Capacity P_o:	478,8 mW (linear characteristic)
Maximum safety voltage U_m:	253 VAC
Isolation:	safe separation to EN 60079-11:
	Amplitude of the voltage 375 V
Rated operating voltage:	24 VDC –15%/+20%, residual ripple max. 10%
Recommended fuse for the operating voltage:	internal fuse F1: T 50 mA/250 V
	internal fuse F2: T 100 mA/250 V
Protection class:	enclosure: IP 40
	Terminals: IP 20
	Wiring compartment: IP 54
Power consumption:	max. 3,0 W
Switching capacity of the enabling paths:	230 V; 3 A ohmic
	(inductive with suitable protective circuit)
	AC-15: 230 VAC/3 A
	DC-13: 24 VDC/3 A
Recommended fuse for the enabling paths:	3,15 A slow blow
Min. switching capacity:	min. 10 V/10 mA
Contact resistance:	max. 100 mΩ in new state
Contact material/contacts:	AgSnO, self-cleaning, positive drive
Switching capacity of the auxiliary contacts (21-22):	24 VDC, 2 A
Recommended fuse for the auxiliary contacts:	2 A slow blow
Current and voltage at S11-S12, S21-S22:	24 VDC, 5 mA
Current limitation at S11-S12, S21-S22:	15 mA
Pull-in delay:	ca. 300 ms (Version -1A)
	ca. 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
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
Storage temperature:	–40 °C ... +85 °C
Mechanical life:	10^7 operations
Weight:	230 g
Dimensions:	22,5 x 100 x 121 mm

Ordering details

SRB 200EXi-1①

No.	Replace	Description
①	R	trailing edge
	A	Automatic reset function

Note

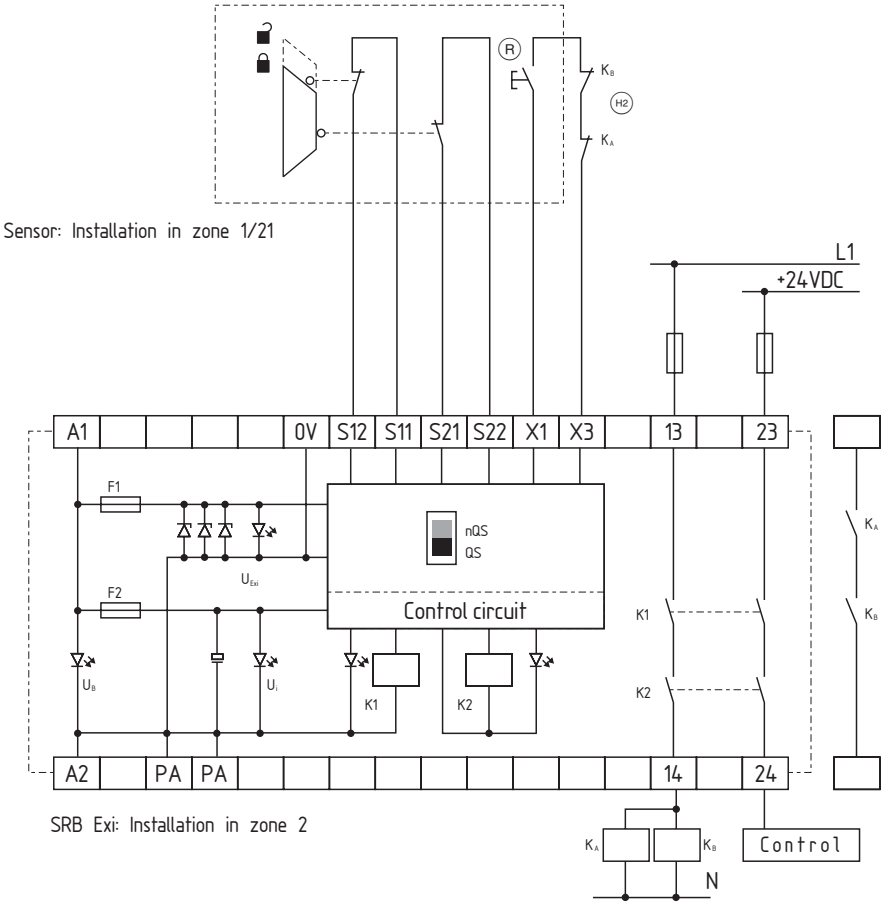
- Cable connections:
  single strand: rigid or flexible (with or without conductor ferrules) 0.25 … 2.5 mm²
  multi-strand with identical section: rigid or flexible (with conductor ferrules without plastic) 0.25 … 2.5 mm²; flexible (without or with TWIN conductor ferrules) 0.5 … 1.5 mm²
- Cable lengths (for nominal voltage):
  1-channel without cross-wire short detection:
  1.5 mm² = 1,500 m; 2.5 mm² = 2.500 m
  2-channel with/without cross-wire short detection:
  1.5 mm² = 1,500 m; 2.5 mm² = 2.500 m

SRB-EXi safety relay module

Note

- 2-channel control, shown for a guard door monitor with two position switches whereof one with positive break contact; with external reset button Ⓡ.
- Relay outputs: 2-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts.
  Ⓗ2 = feedback circuits
- The control recognizes cable break, cross-wire shorts (switch in position “QS”) and earth leakages in the monitoring circuit.
- The safety function is defined as the opening of release 13-14 when the inputs S11-S12 or S21-S22 are opened.
- The safety-relevant current path with output contact 13-14 meets the following requirements under observation of a B10d value assessment (also refer to “Requirements of DIN EN ISO 13 849-1“):
  – Category 4 – PL “e”
  to DIN EN ISO 13 849-1:2007
  – SIL 3 to DIN EN 61 508-2:2002
  – SILCL 3 to DIN EN 62 061:2005 (meets the requirements of control category 4 to DIN EN 954-1:1997).
- To determine the Performance Level (PL) of the entire safety function (e.g. sensor, logic, actuator) to DIN EN ISO 13 849-1:2007, an analysis of all relevant components is required.

Wiring diagram



Simple electric apparatus, type of protection “intrinsic safety”

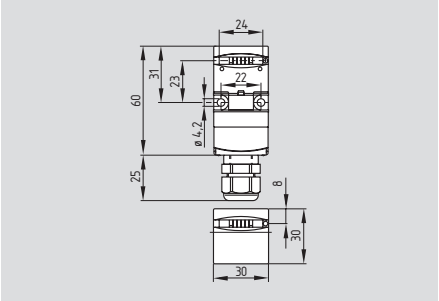
The described devices can be used as simple electric apparatus in intrinsically safe electric circuits to EN 60079-11. In combination with the aforementioned safety relay modules of the PROTECT SRB series, these products meet the requirements of intrinsic safety. Detailed information can be found in the operating instructions.

Safety switch with separate actuator

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.

Index

EX-AZ 17-...-3D



- Ex certified
- Thermoplastic enclosure
- Small body
- Multiple coding
- Individual coding available on request
- Long life
- Double insulated ⧈
- Slot sealing plug included
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- 8 actuating planes
- Insulation displacement connector (IDC method)
- Including EX-certified screwed cable gland

Technical data

Equipment category:	⟨Ex⟩ II 3D
Explosion protection:	Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Max. impact energy:	4 J
Actuating speed:	max. 1 m/s
Actuator:	stainless steel 1.4301
Protection class:	IP 67 to IEC/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:	cut clamp terminals (IDC method)
Cable section:	0.75 – 1.0 mm², flexible
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 230 VAC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	11 mm
Positive break force:	17 N for each NC contact fitted
Ambient temperature:	– 15 °C ... + 60 °C
Mechanical life:	> 1 million operations
Latching force:	30 N for ordering suffix r
Cable cross-section of the cable glands:	min. Ø 4 mm max. Ø 8 mm

Contact variants

1 NO / 1 NC

2 NC

Approvals

⟨Ex⟩ CE

Ordering details

EX-AZ 17-①z②k-3D

No.	Replace	Description
①	11	1 NO / 1 NC
	02	2 NC
②		Latching force 5 N
	r	Latching force 30 N

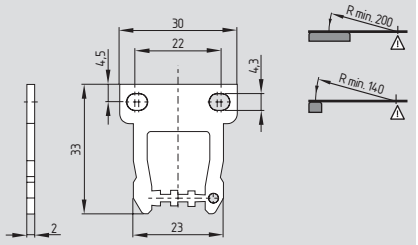
Note

Actuators must be ordered separately.

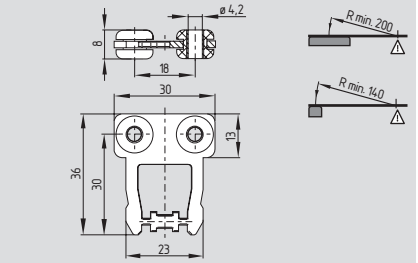
Dust zone 22

Safety switch with separate actuator

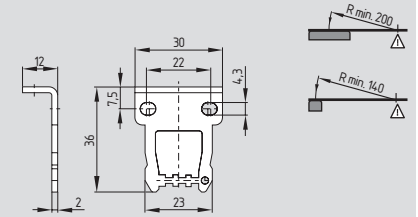
System components



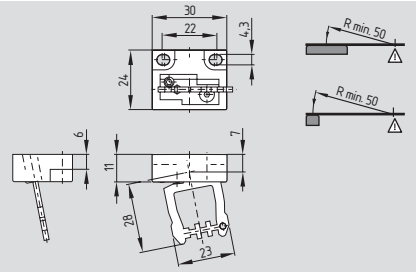
Straight actuator AZ 17/170-B1



With rubber mounting AZ 17/170-B1-2245

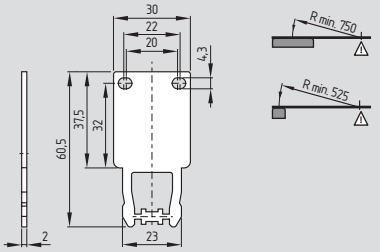


Angled actuator AZ 17/170-B5

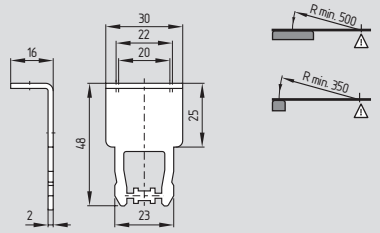


Flexible actuator AZ 17-B6

System components



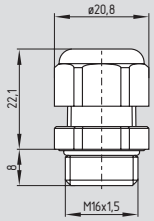
Long straight actuator AZ 17/170-B11



Long angled actuator AZ 17/170-B15

System components

Tamperproof screws



EX-certified screwed cable gland

Ordering details

Straight actuator	**AZ 17/170-B1**
with rubber mounting	**AZ 17/170-B1-2245**
Angled actuator	**AZ 17/170-B5**
Flexible actuator	**AZ 17-B6**

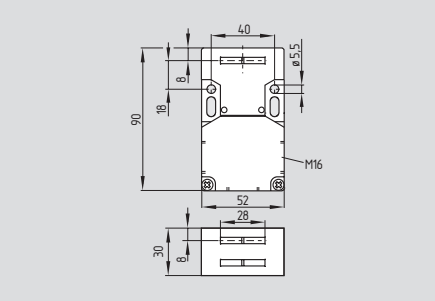
Ordering details

Long straight actuator	**AZ 17/170-B11**
Long angled actuator	**AZ 17/170-B15**

Ordering details

Tamperproof screws with unidirectional slots M4 x 8 (Quantity 2 pcs)	**1122641**
EX-certified screwed cable gland	**EX-KLE-M16x1,5**

EX-AZ 16-...-3D



- Ex certified
- Thermoplastic enclosure
- Multiple coding
- Long life
- Double insulated ⧈
- 3 cable entries M16 x 1.5
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Slotted holes for adjustment, circular holes for location
- Including EX-certified screwed cable gland and screw plug

Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Max. impact energy:	1 J
Actuating speed:	max. 1 m/s
Actuator:	stainless steel 1.4301
Protection class:	IP 67 to IEC/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 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	2,5 A
Utilisation category:	AC-15 DC-13
I_e/U_e:	2,5 A / 230 VAC 2,5 A / 24 VDC
Max. fuse rating:	4 A gG D-fuse
Positive break travel:	8 mm
Positive break force:	10 N for each NC contact fitted
Ambient temperature:	– 20 °C ... + 70 °C
Mechanical life:	> 1 million operations
Latching force:	30 N for ordering suffix r
Cable cross-section of the cable glands:	min. Ø 5 mm max. Ø 10 mm

Contact variants

1 NO / 2 NC

3 NC

Approvals

⟨Ex⟩ CE

Ordering details

EX-AZ16-①zv②k-③-3D

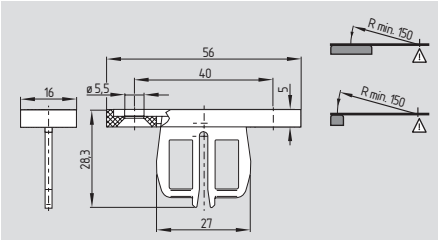
No.	Replace	Description
①	03	3 NC
	12	1 NO / 2 NC
②		Ejection force
	r	Latching force 30 N
③	2254	Latching force 5 N
	1762	Front mounting
	1637	Gold-plated contacts

Note

Actuators must be ordered separately.

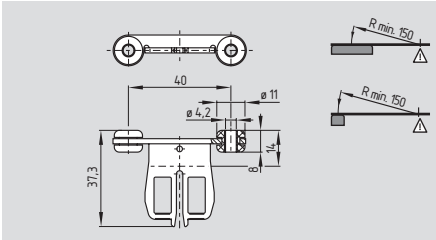
Dust zone 22

System components



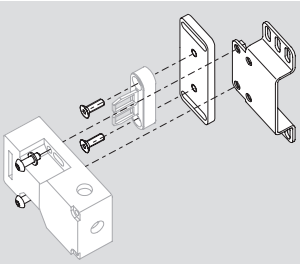
Straight actuator AZ 15/16-B1

System components

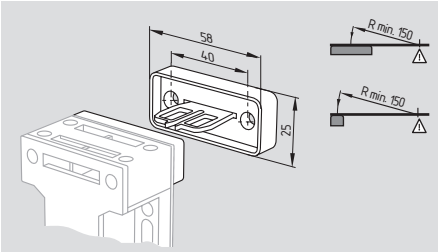


AZ 15/16-B1-2245 with rubber mounting

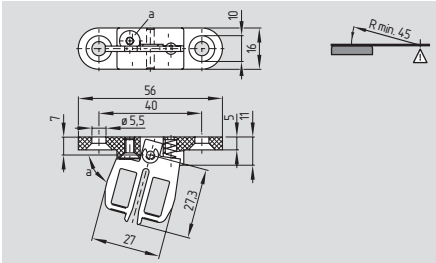
System components



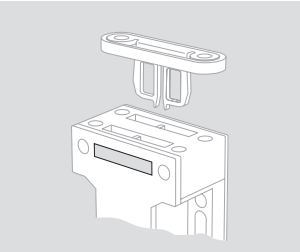
Mounting set MS AZ 15/16



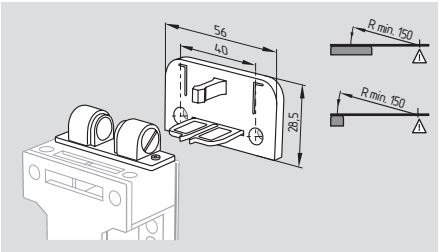
AZ 15/16-B1-2024 with slot lip-seal



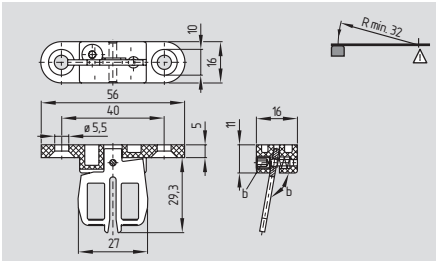
Flexible actuator AZ 15/16-B2



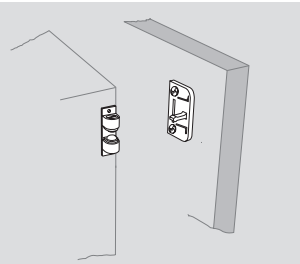
Slot sealing plug AZ 15/16-1476



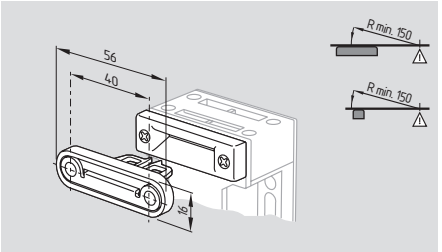
AZ 15/16-B1-2053 with ball latch



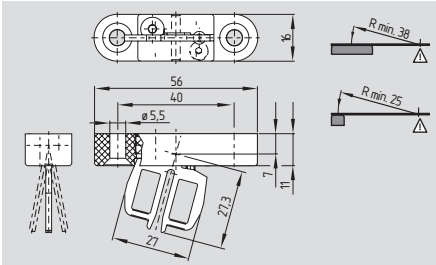
Flexible actuator AZ 15/16-B3



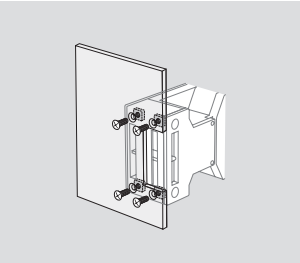
Ball catch 2053-2



AZ 15/16-B1-2177 with centering guide



Flexible actuator AZ 15/16-B6



Front mounting AZ 15/16 -1762

Ordering details

Straight actuator	**AZ 15/16-B1**
with slot lip-seal	**AZ 15/16-B1-2024**
with ball latch	**AZ 15/16-B1-2053**
with centering guide	**AZ 15/16-B1-2177**

Ordering details

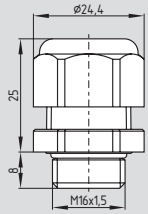
Straight actuator with rubber mounting	**AZ 15/16-B1-2245**
Flexible actuator	**AZ 15/16-B2**
Flexible actuator	**AZ 15/16-B3**
Flexible actuator	**AZ 15/16-B6**

Ordering details

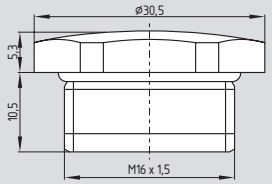
Mounting set	**MS AZ 15/16**
Slot sealing plug	**AZ 15/16-1476**
Ball catch	**-2053-2**
Front mounting with M5 nuts	**-1762**

System components

Tamperproof screws



EX-certified screwed cable gland

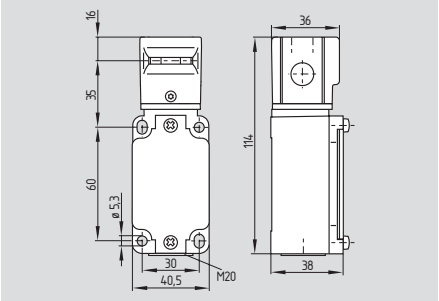


EX-certified screw plug

Ordering details

Tamperproof screws with unidirectional slots	
M5 x 12	**1135338**
M5 x 16	**1135339**
M5 x 20	**1135340**
(Quantity 2 pcs)	
EX-certified screwed cable gland	**EX-KLE-M16x1,5**
EX-certified screw plug	**EX-VS-M16x1,5**

EX-AZ 335-…-3D



- Ex certified
- Metal enclosure
- 3 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Slotted holes for adjustment, circular holes for location
- 1 cable entry M 20 x 1,5
- Including EX-certified screwed cable gland

Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 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:	IP 67 to IEC/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. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry:	1 x M20 x 1.5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
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:	5 N for each NC contact fitted
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 6 mm max. Ø 12 mm

Contact variants

1 NO / 2 NC

3 NC

Approvals

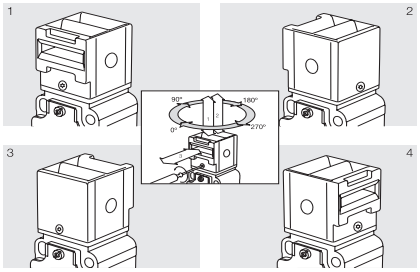
⟨Ex⟩ CE

Ordering details

EX-AZ 335-①-z②k-③-3D

No.	Replace	Description
①	03	3 NC
	12	1 NO / 2 NC
②		Latching force 5 N
	r	Latching force 30 N
	ü	With overlapping contacts
③	1637	Gold-plated contacts

Note



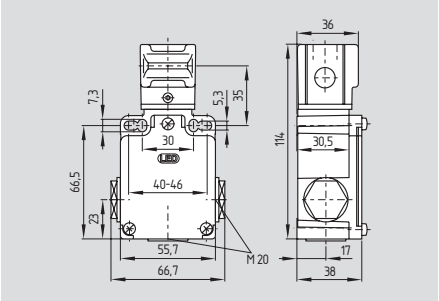
By turning the head in 90° steps, 8 actuating planes are possible. A Torx T10 screwdriver is needed for this purpose.

Note

Actuators must be ordered separately.

Dust zone 22

EX-AZ 355-…-3D



- Ex certified
- Metal enclosure
- 3 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Transverse and longitudinal slotted holes
- 3 cable entries M 20 x 1,5
- Including EX-certified screwed cable gland and screw plug

Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 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:	IP 67 to IEC/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. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry:	3x M 20 x 1.5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
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:	5 N for each NC contact fitted
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 6 mm max. Ø 12 mm

Contact variants

1 NO / 2 NC

3 NC

Approvals

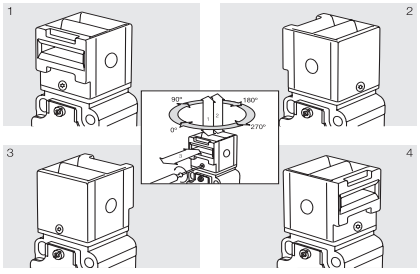
⟨Ex⟩ CE

Ordering details

EX-AZ 355-①-z②k-③-3D

No.	Replace	Description
①	03	3 NC
	12	1 NO / 2 NC
②		Latching force 5 N
	r	Latching force 30 N
	ü	With overlapping contacts
③	1637	Gold-plated contacts

Note



By turning the head in 90° steps, 8 actuating planes are possible. A Torx T10 screwdriver is needed for this purpose.

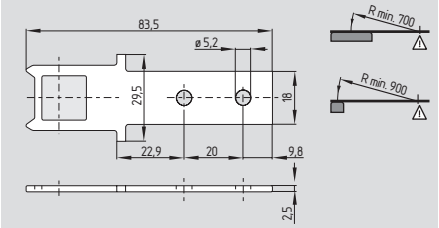
Note

Actuators must be ordered separately.

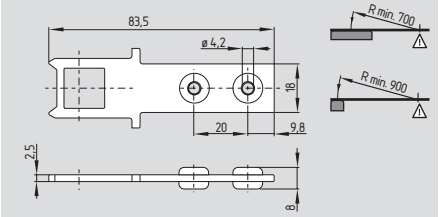
Dust zone 22

Safety switch with separate actuator

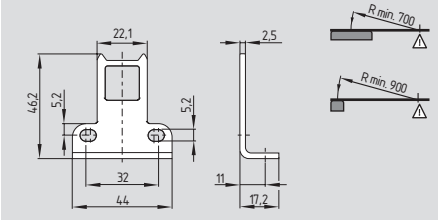
System components



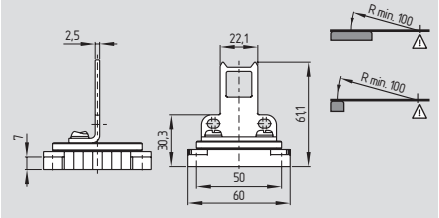
Straight actuator AZ 335/355-B1



AZ 335/355-B1-2245 with rubber mounting

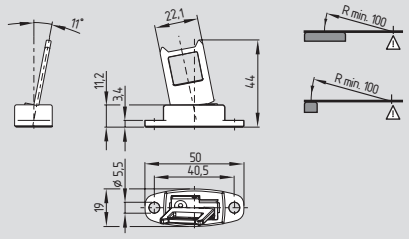


Angled actuator AZ 335/355-B5

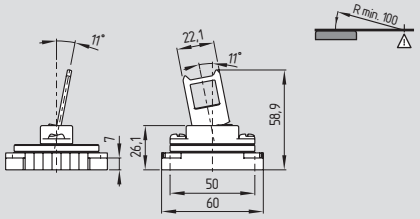


Angled actuator AZ 335/355-B5-Flex

System components

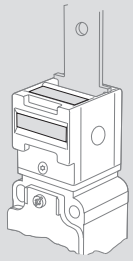


Flexible actuator AZ 335/355-B6

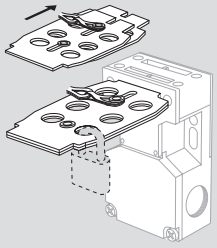


Flexible actuator AZ 335/355-B6-Flex

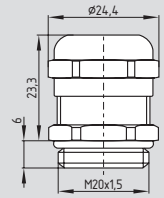
System components



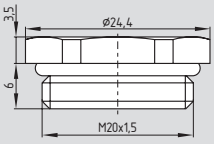
Slot sealing plug AZ 335/355-1990



Lockout tag SZ 16/335



EX-certified screwed cable gland



EX-certified screw plug

Ordering details

Straight actuator	**AZ 335/355-B1**
with rubber mounting	**AZ 335/355-B1-2245**
Angled actuator	**AZ 335/355-B5**
Angled actuator	**AZ 335/355-B5-Flex**

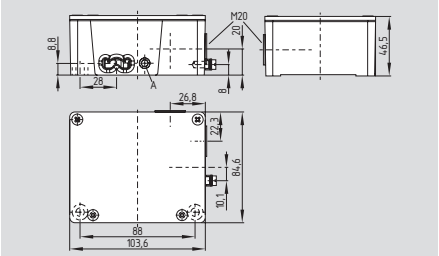
Ordering details

Flexible actuator	**AZ 335/355-B6**
Flexible actuator	**AZ 335/355-B6-Flex**

Ordering details

Slot sealing plug	**AZ 335/355-1990**
Lockout tag	**SZ 16/335**
EX-certified screwed cable gland	**EX-KLE-M20x1,5**
EX-certified screw plug	**EX-VS-M20x1,5**

EX-AZ 415-…-3D



A: setting screw ball latch 30 - 500 N

- Ex certified
- Metal enclosure
- 2 switches with different actuating functions in a single enclosure
- Long life
- High level of contact reliability with low voltages and currents
- Adjustable ball latch to 500 N
- Spring-loaded actuators
- 2 cable entries M20 x 1.5
- Including EX-certified screwed cable gland and screw plug

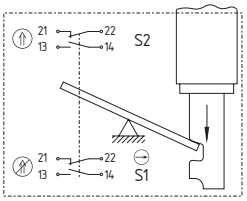
Dust zone 22

Technical data

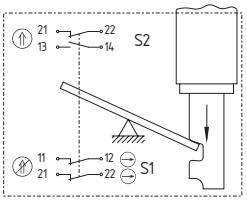
Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T60°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Enclosure:	light-alloy diecast, paint finish
Max. impact energy:	4 J
Actuating speed:	max. 1 m/s
Actuator:	zinc-plated brass/ aluminium
Protection class:	IP 67 to IEC/EN 60529
Contact 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 x 1.5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	4 A / 230 VAC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	3.8 mm
Positive break force:	min. 31 N
Ambient temperature:	– 0 °C … + 50 °C
Mechanical life:	> 1 million operations
Latching force:	30 - 500 N (adjustable)
Cable cross-section of the cable glands:	min. Ø 6 mm max. Ø 12 mm

Contact variants

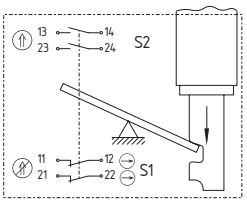
11/11 **1 NO / 1 NC**
1 NO / 1 NC



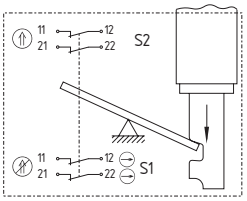
02/11 **2 NC**
1 NO / 1 NC



02/20 **2 NO**
2 NC



02/02 **2 NC**
2 NC



Approvals

⟨Ex⟩ CE

Ordering details

EX-AZ 415-①zpk-②-3D

No.	Replace	Description
①		**S1 / S2**
	11/11	1NO 1NC / 1NO 1NC
	02/11	2NC / 1NO 1NC
	02/20	2NC / 2NO
	02/02	2NC / 2NC
②	1637	Gold-plated contacts

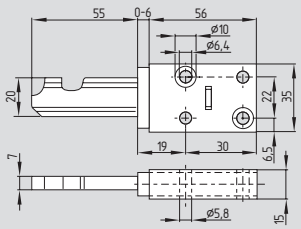
Note

Actuators must be ordered separately.

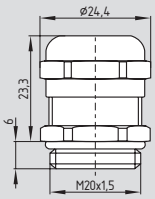
Note

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

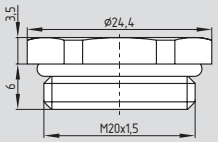
System components



Straight actuator AZ/AZM 415-B1



EX-certified screwed cable gland

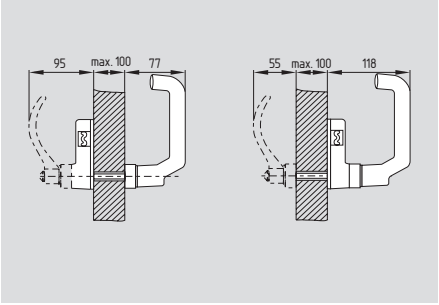


EX-certified screw plug

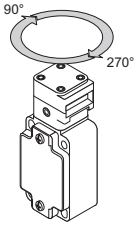
Ordering details

Straight actuator	**AZ/AZM 415-B1**
EX-certified screwed cable gland	**EX-KLE-M20x1,5**
EX-certified screw plug	**EX-VS-M20x1,5**

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 M 20 x 1.5
- Including EX-certified screwed cable gland
- Actuating head:

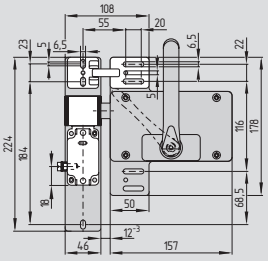


Approvals

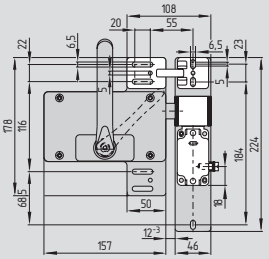
Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Enclosure:	light-alloy diecast, paint finish
Max. impact energy:	4 J
Actuating speed:	max. 1 m/s
Actuator:	brass, blue chrome-plated
Protection class:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	changeover 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
Termination:	screw terminals
Cable size:	max. 1.5 mm² (incl. conductor ferrules)
Cable entry:	1x M 20 x 1.5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	10 A
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:	5 N for each NC contact fitted
Ambient temperature:	– 10 °C … + 60 °C
Mechanical life:	1 million operations
Cable cross-section of the cable glands:	min. Ø 6 mm max. Ø 12 mm

EX-AZ 3350-STS30-…



EX-AZ 3350 STS30-02/-04/-05/-07



EX-AZ 3350 STS30-01/-03/-06/-08

Ordering details

EX-AZ 3350-①-②-③-3D

No.	Replace	Description
①	03-zk	3 NC
	12-zük	1 NO/2 NC
②	1637	Gold contacts
③	U90	Actuating head can be rotated 90° for door hinge left
	U270	270° rotation for door hinge right

Note

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

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

Ordering details

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

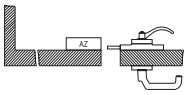
When the TF. centring device is used, the maximum actuating speed for closing the safety guard is limited to 1 m/s.

Dust zone 22

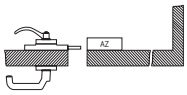
Safety switch with separate actuator

System variants

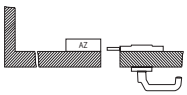
EX-AZ 3350-STS30-01



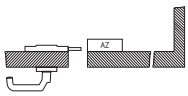
EX-AZ 3350-STS30-02



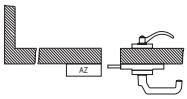
EX-AZ 3350-STS30-03



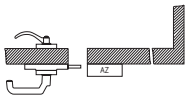
EX-AZ 3350-STS30-04



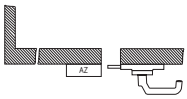
EX-AZ 3350-STS30-05



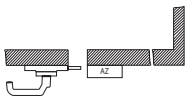
EX-AZ 3350-STS30-06



EX-AZ 3350-STS30-07

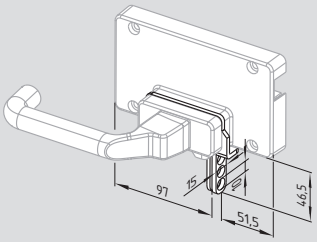


EX-AZ 3350-STS30-08

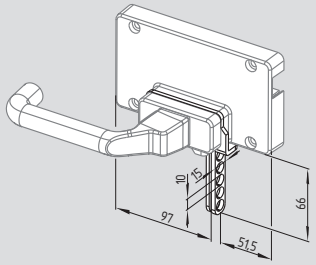


In all images, the guard opens outwards.

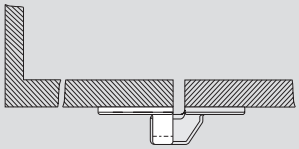
System components



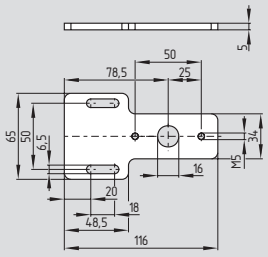
Lockout tag SZ 415-1/-2



Lockout tag SZ 415-1/-2 -2177

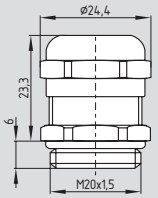


Centring device TF.



Mounting plate MP TG-01

System components



EX-certified screwed cable gland

Ordering details

Mounting inside
with emergency handle
door hinge right EX-AZ 3350-STS30-01
door hinge left EX-AZ 3350-STS30-02

without emergency handle
door hinge right EX-AZ 3350-STS30-03
door hinge left EX-AZ 3350-STS30-04

Mounting outside
with emergency handle
door hinge right EX-AZ 3350-STS30-05
door hinge left EX-AZ 3350-STS30-06

without emergency handle
door hinge right EX-AZ 3350-STS30-07
door hinge left EX-AZ 3350-STS30-08

Ordering details

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**
Centring 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**

Ordering details

EX-certified
screwed cable gland **EX-KLE-M20x1,5**

More Details

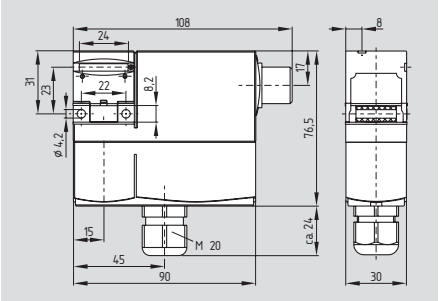
Detailed technical information at:
www.schmersal.com

Solenoid interlocks

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 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 blocking position. This is ensured by the contact monitoring of the latching bolt.

Index

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



- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- **Screw terminals**
- Compact design
- Manual release from side
- Long life
- Double insulated ⧈
- High holding force 1000 N
- Latching force 5 N or 30 N
- Power to unlock / Power to lock
- Individual coding available on request
- 1 cable entry M20 x 1.5
- Including EX-certified screwed cable gland

Approvals

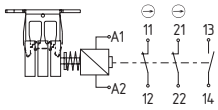
CE

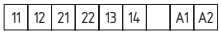
Technical data

Equipment category:	⟨Ex⟩ II 3GD
Ex protection:	EEx nC IIC T5 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-1 IEC 61241-1 IEC 60079-15 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Max. impact energy:	1 J
Actuating speed:	max. 1 m/s
Actuator and locking bolt:	stainless steel 1.4301
Protection class:	IP 67 to IEC/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 contacts with positive break
Connection:	Screw terminals
Cable section:	max. 1,5 mm², flexible
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	2 A
Utilisation category:	DC-13
I_e/U_e:	4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	11 mm
Positive break force:	6 N for each NC contact fitted
Magnet:	100% ED
U_s:	24 VDC
Power consumption:	max. 10 W
Ambient temperature:	– 15 °C … + 45 °C
Mechanical life:	> 1 million operations
F_{max}:	1000 N
Latching force:	30 N for ordering suffix r
Cable cross-section of the cable glands:	min. Ø 6,5 mm max. Ø 12 mm

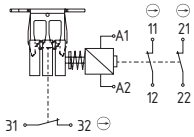
Contact variants

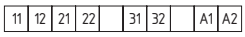
Power to unlock
1 NO 2 NC
(ordering suffix -12/00)



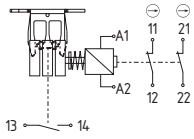


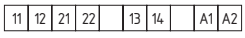
2 NC / 1 NC
(ordering suffix -02/01)



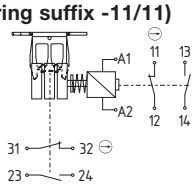


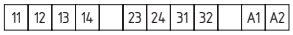
2 NC / 1 NO
(ordering suffix -02/10)





1 NO 1 NC / 1 NO 1 NC
(ordering suffix -11/11)



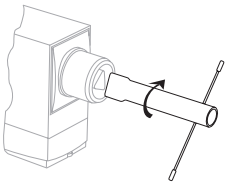


Ordering details

EX-AZM 170SK-①z②k③-④-⑤-024-3G/D

No.	Replace	Description
①	12/00	1NO 2NC / –
	11/11	1NO 1NC / 1NO 1NC
	11/02	1NO 1NC / 2NC
	02/01	2NC / 1NC
	02/10	2NC / 1NO
②		Latching force 5 N
	r	Latching force 30 N
③		Power to unlock
	a	Power to lock
④	1637	Gold-plated contacts
⑤	2197	Manual release from side for power to unlock principle

Note



Manual release from side
- For manual release using M5 triangular key, available as accessory
- Available for power to unlock principle
- Ordering suffix -2197

Note

Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

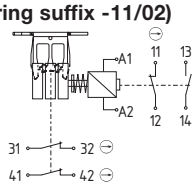
At least one magnetic contact with positive break ⊖ must be integrated in the safety circuit.

Actuators must be ordered separately.

Solenoid interlocks

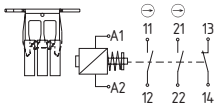
Contact variants

Power to unlock
1 NO 1 NC / 2 NC
(ordering suffix -11/02)



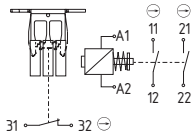
11	12	13	14		31	32	41	42		A1	A2

Power to lock
1 NO 2 NC
(ordering suffix -12/00)



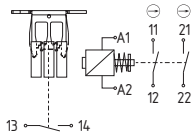
11	12	21	22	13	14		A1	A2

2 NC / 1 NC
(ordering suffix -02/01)



11	12	21	22		31	32		A1	A2

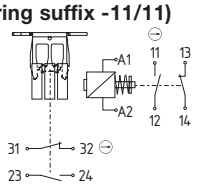
2 NC / 1 NO
(ordering suffix -02/10)



11	12	21	22		13	14		A1	A2

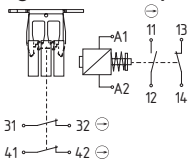
Contact variants

Power to lock
1 NO 1 NC / 1 NO 1 NC
(ordering suffix -11/11)



11	12	13	14		23	24	31	32		A1	A2

1 NO 1 NC / 2 NC
(ordering suffix -11/02)

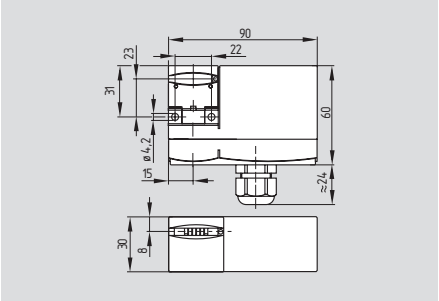


11	12	13	14		31	32	41	42		A1	A2

Note

Interlocks with 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.

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



- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- **Insulation displacement connector (IDC method)**
- Compact design
- Manual release
- Long life
- Double insulated ⧈
- High holding force 1000 N
- Latching force 5 N or 30 N
- Power to unlock / Power to lock
- Individual coding available on request
- 1 cable entry M20 x 1.5
- Including EX-certified screwed cable gland

Approvals

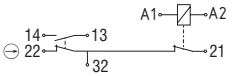
CE

Technical data

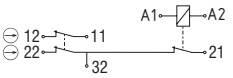
Equipment category:	⟨Ex⟩ II 3GD
Ex protection:	EEx nC IIC T5 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-1 IEC 61241-1 IEC 60079-15 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Max. impact energy:	1 J
Actuating speed:	max. 1 m/s
Actuator and locking bolt:	stainless steel 1.4301
Protection class:	IP 67 to IEC/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 contacts with positive break
Connection:	cut clamp terminals (IDC method)
Cable section:	0.75 ... 1.0 mm² , flexible
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	2 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	2 A / 230 VAC 2 A / 24 VDC
Max. fuse rating:	2 A gG D-fuse
Positive break travel:	11 mm
Positive break force:	6 N for each NC contact fitted
Magnet:	100% ED
U_s:	24 VAC/DC
Power consumption:	max. 10 W
Ambient temperature:	– 15 °C ... + 45 °C
Mechanical life:	> 1 million operations
F_{max}:	1000 N
Latching force:	30 N for ordering suffix r
Cable cross-section of the cable glands:	min. Ø 6,5 mm max. Ø 12 mm

Contact variants

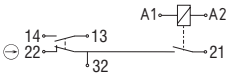
Power to unlock
1 NO / 1 NC



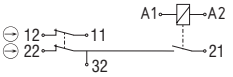
2 NC



Power to lock
1 NO / 1 NC



2 NC

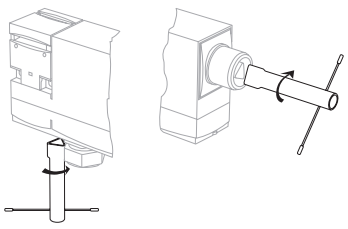


Ordering details

EX-AZM 170-①z②k③-24VAC/DC-④**-3G/D**

No.	Replace	Description
①	11	1NO/1NC
	02	2NC
②		Latching force 5 N
	r	Latching force 30 N
③		Power to unlock
	a	Power to lock
④		Manual release
	2197	Manual release from side
	1637	Gold-plated contacts

Note



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

Manual release from side (right)
- Additional manual release on side, ordering suffix -2197
- Only available for power to unlock principle

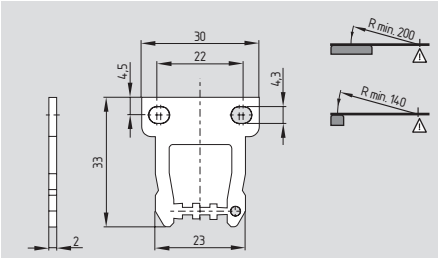
Note

The contact 21-23 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 de-energised condition with actuator inserted (0 in switch travel diagram).

Interlocks with 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.

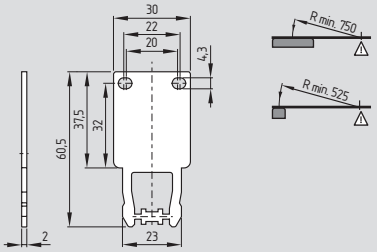
Actuators must be ordered separately.

System components



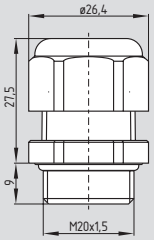
Straight actuator AZ 17/170-B1

System components

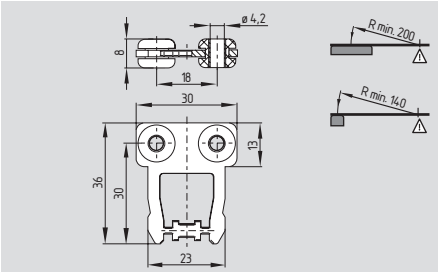


Long straight actuator AZ 17/170-B11

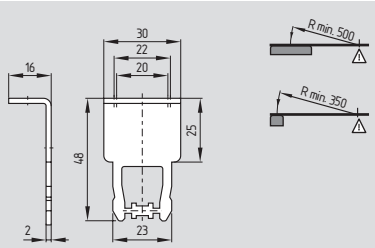
System components



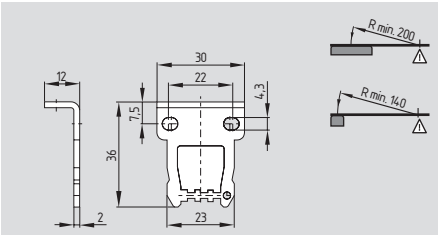
EX-certified screwed cable gland



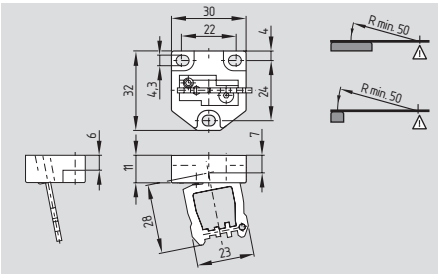
AZ 17/170-B1-2245 with rubber mounting



Long angled actuator AZ 17/170-B15



Angled actuator AZ 17/170-B5



Flexible actuator AZM 170-B6

Ordering details

Straight actuator	**AZ 17/170-B1**
with rubber mounting	**AZ 17/170-B1-2245**
Angled actuator	**AZ 17/170-B5**
Flexible actuator	**AZM 170-B6**

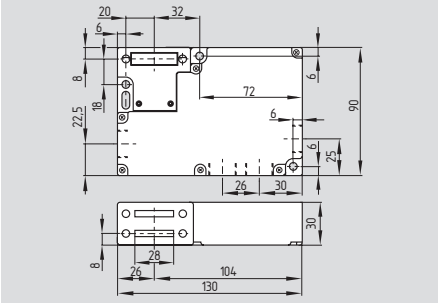
Ordering details

Long straight actuator	**AZ 17/170-B11**
Long angled actuator	**AZ 17/170-B15**

Ordering details

EX-certified screwed cable gland	**EX-KLE-M20x1,5**

EX-AZM 161-...-3D



- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release, emergency exit or emergency release
- Long life
- Double insulated ⧈
- High holding force 2000 N
- Large wiring compartment
- Power to unlock / Power to lock
- Screw terminals or cage clamps
- Actuating play 5.5 mm in direction of actuation
- 4 cable entries M16 x 1,5
- Including EX-certified screwed cable gland

Approvals

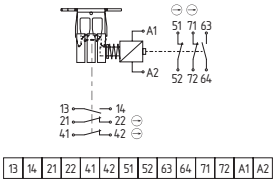
CE

Technical data

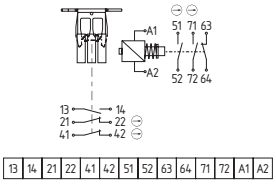
Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Actuator and locking bolt:	stainless steel 1.4301
Max. impact energy:	1 J
Actuating speed:	max. 1 m/s
Protection class:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow action, NC contacts with positive break
Connection:	screw terminals or cage clamps
Cable section:	max. 1.5 mm² (incl. conductor ferrules)
Cable entry:	4x M16 x 1,5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	5 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 2,5 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	9.5 mm
Positive break force:	10 N for each NC contact fitted
U_s:	24 VAC/DC
Magnet:	100% ED
Power consumption:	max. 10 W
Ambient temperature:	– 15 °C ... + 50 °C
Mechanical life:	> 1 million operations
F_{max}:	2000 N
Latching force:	30 N for ordering suffix r
Cable cross-section of the cable glands:	min. Ø 5 mm max. Ø 10 mm

Contact variants

2 NO / 4 NC (12/12)
Power to unlock



Power to lock

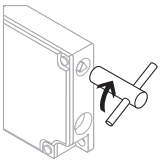


Ordering details

EX-AZM 161 ①-12/12-②k③-024-3D

No.	Replace	Description
①	SK	Screw terminals
	CC	Cage clamps
②		Latching force 5 N
	r	Latching force 30 N
③		Power to unlock
	a	Power to lock

Note



Manual release

- For manual release using M5 triangular key, available as accessory
- For maintenance, setting-up, etc.

Note

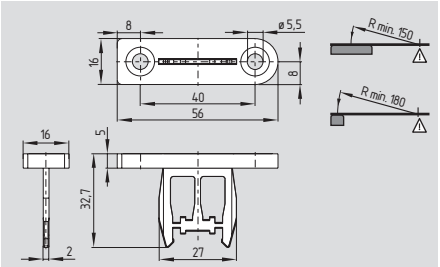
At least one magnetic contact with positive break ⊖ must be integrated in the safety circuit.

Contact variants show de-energised condition with actuator inserted (0 in switch travel diagram).

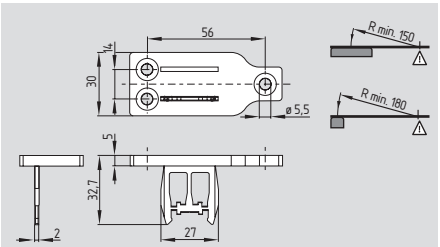
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Actuators must be ordered separately.

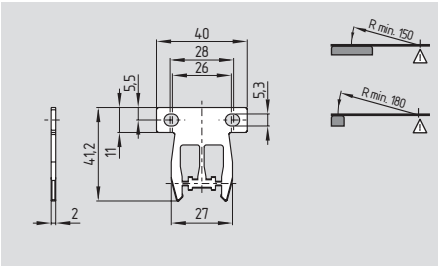
System components



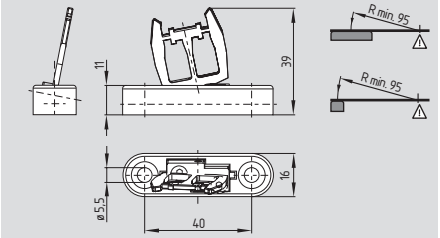
Straight actuator B1



Straight actuator B1E

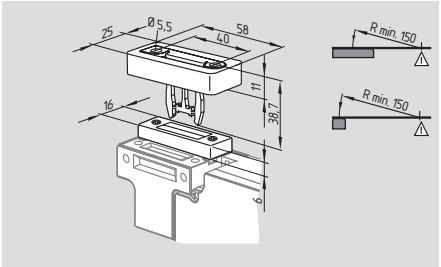


Straight actuator B1F

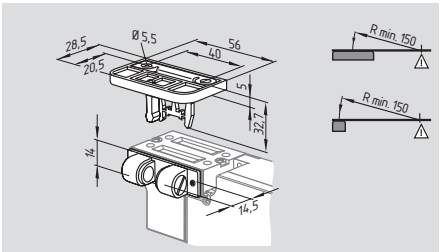


Flexible actuator B6

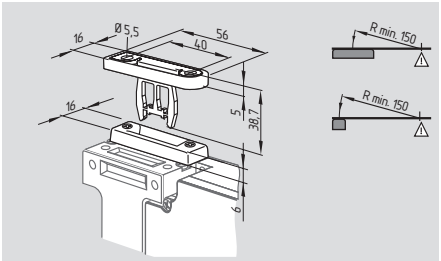
System components



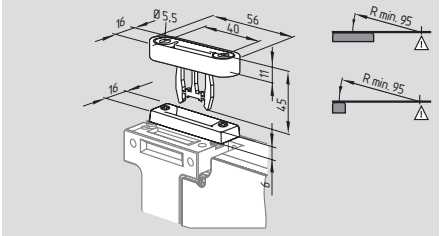
Actuator with slot lip-seal B1-2024



Actuator with ball latch B1-2053

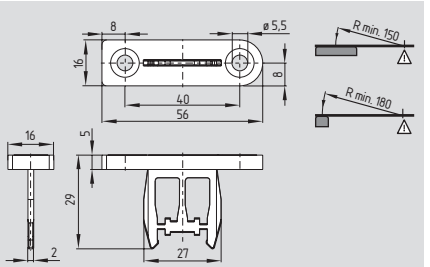


Actuator with centering guide B1-2177

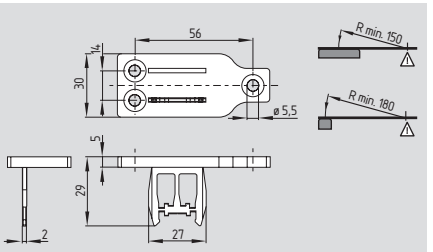


Actuator with centering guide B6-2177

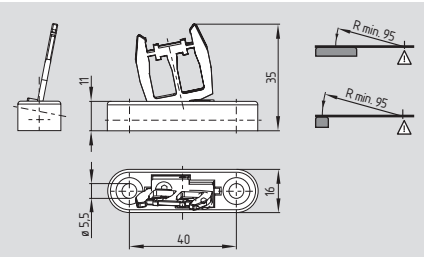
System components



Shortened straight actuator B1S



Shortened straight actuator B1ES



Shortened angled actuator B6S

Ordering details

Straight actuator	**AZM 161-B1**
Straight actuator	**AZM 161-B1E**
Straight actuator	**AZM 161-B1F**
Flexible actuator	**AZM 161-B6**

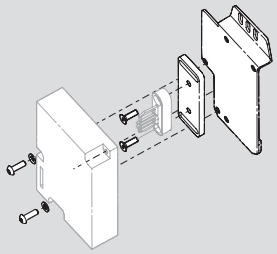
Ordering details

Straight actuator with slot lip-seal	**AZM 161-B1-2024**
Straight actuator with ball latch	**AZM 161-B1-2053**
Straight actuator with centering guide	**AZM 161-B1-2177**
Flexible actuator with centering guide	**AZM 161-B6-2177**

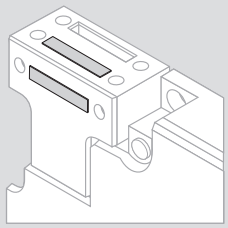
Ordering details

Shortened straight actuator	**AZM 161-B1S**
Shortened straight actuator	**AZM 161-B1ES**
Shortened angled actuator	**AZM 161-B6S**

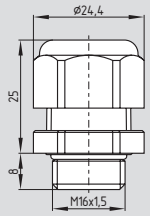
System components



Mounting set MS AZM 161 P



Slot sealing plug AZM 161



EX-certified screwed cable gland

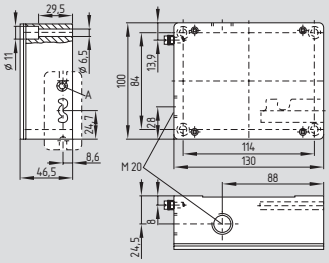
Ordering details

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

Download now

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

EX-AZM 415-...-3D



A: setting screw ball latch 30 - 400 N

- Ex certified
- Interlock with protection against incorrect locking
- Metal enclosure
- Two switches in one enclosure
- Problem-free opening of stressed doors by means of bell-crank system
- Robust design
- Long life
- High holding force 3500 N
- Adjustable ball latch to 400 N
- Power to unlock / Power to lock
- 2 cable entries M20 x 1,5
- Including EX-certified screwed cable gland and screw plug

Approvals

CE

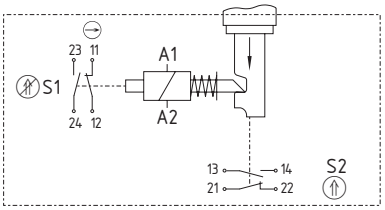
Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T65°C X
Standards:	IEC 60947-5-1 IEC 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:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	2 x M20 x 1.5
U_{imp}:	4 kV
U_i:	250 V
I_{the}:	6 A
Utilisation category:	AC-15
I_e/U_e:	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
U_s:	24 VAC/DC
Power consumption:	max. 10 W
Ambient temperature:	– 0 °C ... + 50 °C
Mechanical life:	> 1 million operations
F_{max}:	3500 N
Latching force:	30 - 400 N (adjustable)
Cable cross-section of the cable glands:	min. Ø 6 mm max. Ø 12 mm

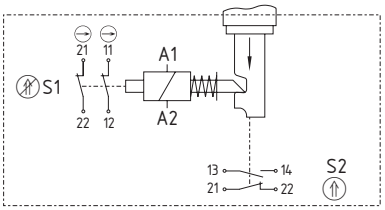
Contact variants

Power to unlock

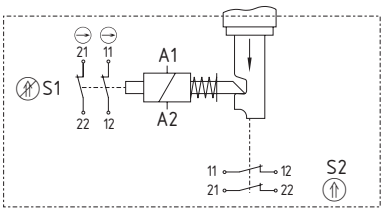
11/11 2NC/2NO



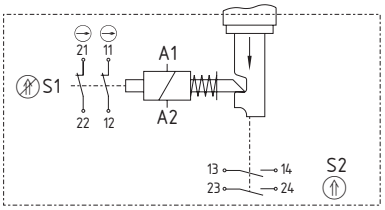
02/11 3NC/1NO



02/02 4NC



02/20 2NC/2NO



Ordering details

EX-AZM 415-①zpk②-24VAC/DC-③**-3D**

No.	Replace	Description
①	11/11	2NC/2NO
	02/11	3NC/1NO
	02/20	2NC/2NO
	02/02	4NC
②		Power to unlock
	a	Power to lock
③	1637	Gold-plated contacts

Note

Actuators must be ordered separately.

Note

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

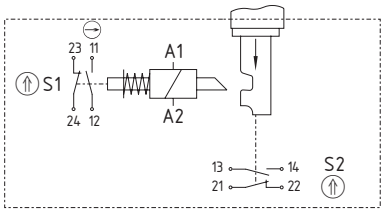
The contacts 11-12 and 23-24 are actuated when the solenoid A1-A2 is energised or de-energised.

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

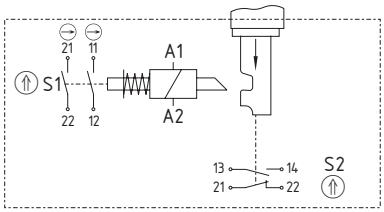
Contact variants

Power to lock

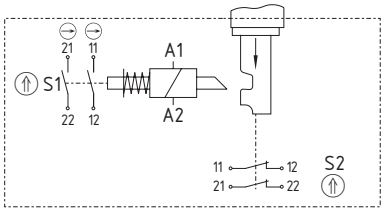
11/11 2NC/2NO



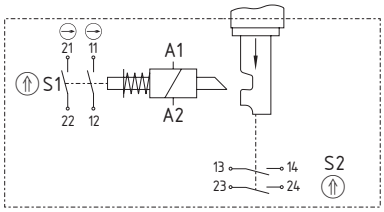
02/11 3NC/1NO



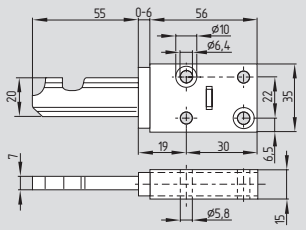
02/02 4NC



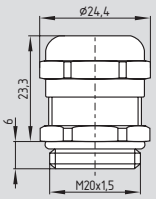
02/20 2NC/2NO



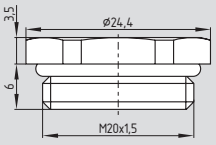
System components



Straight actuator AZ/AZM 415-B1



EX-certified screwed cable gland



EX-certified screw plug

Note

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

Ordering details

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

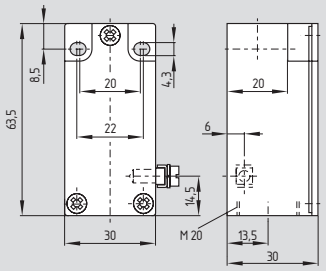
Detailed technical information at:
www.schmersal.com

Position switches with safety function

The position switches with safety function are suitable for sliding and hinged safety guards, which need to be closed to ensure the required operational safety.

Index

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 x 1.5
- Including EX-certified screwed cable gland

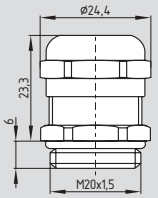
Approvals

CE

Technical data

Equipment category:	⟨Ex⟩ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Design:	fixings to EN 50047
Enclosure:	zinc die-cast, enamel finish
Max. impact energy:	1 J
Actuating speed:	max. 1 m/s
Protection class:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry:	1 x M20 x 1.5
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	4 A / 230 VAC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	– 20 °C ... + 60 °C
Mechanical life:	20 million operations
Switching frequency:	max. 5000/h
Bounce duration:	snap action: < 3 ms; slow action: in accordance with actuating speed
Switchover time:	snap action: > 5.5 ms; slow action: in accordance with actuating speed
Cable cross-section of the cable glands:	min. Ø 6 mm max. Ø 12 mm

System components



EX-certified screwed cable gland

Ordering details

EX-①② 235-③z④-⑤-⑥-⑦-3D

No.	Replace	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 45	
③	02	2 NC
	11	1 NO / 1 NC
	20	2 NO*
④	h	Slow action with staggered contacts
	ü	with overlapping contacts
⑤	1297	Enclosure with transversely slotted mounting holes

Ordering details

No.	Replace	Description
⑥	2138	Roller lever 7H for safety duties
⑦	1637	Gold-plated contacts

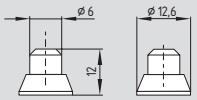
* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Ordering details

EX-certified screwed cable gland	**EX-KLE-M20x1,5**

Dust zone 22

Plunger S

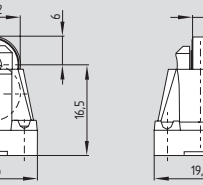


- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
  Snap action: Min. 10 mm/min, max. 1 m/s
  Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZS 235-11z-3D**	**EX-TS 235-11z-3D**	**EX-TS 235-11zü-3D**	
2 NC	**EX-ZS 235-02353D**	**EX-TS 235-02353D**		**EX-TS 235-0235-3D**
2 NO		**EX-TS 235-20z-3D**		**EX-TS 235-20zh-3D**

Roller plunger R

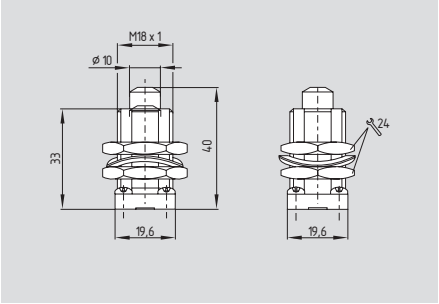


- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 20 mm/min, max. 1 m/s
  Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

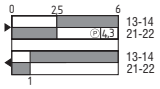
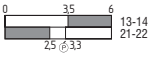
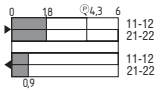
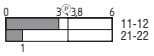
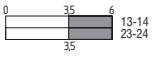
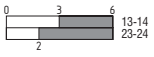
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZR 235-11z-3D**	**EX-TR 235-11z-3D**	**EX-TR 235-11zü-3D**	
2 NC	**EX-ZR 235-02z-3D**	**EX-TR 235-02z-3D**		**EX-TR 235-02zh-3D**
2 NO		**EX-TR 235-20z-3D**		**EX-TR 235-20zh-3D**

Plunger 4S

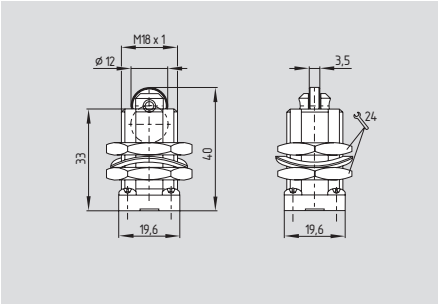


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
  Snap action: Min. 10 mm/min, max. 1 m/s
  Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

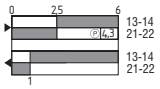
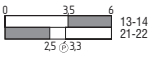
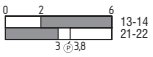
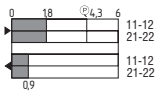
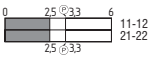
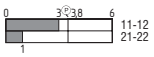
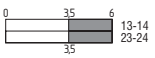
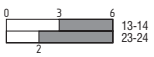
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z4S 235-11z-3D** 	**EX-T4S 235-11z-3D** 	**EX-T4S 235-11zü-3D** 	
2 NC	**EX-Z4S 235-02z-3D** 	**EX-T4S 235-02z-3D** 		**EX-T4S 235-02zh-3D** 
2 NO		**EX-T4S 235-20z-3D** 		**EX-T4S 235-20zh-3D** 

Roller plunger 4R



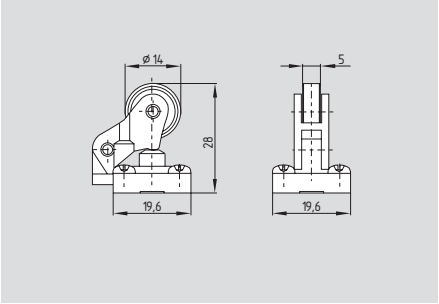
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 20 mm/min, max. 1 m/s
  Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z4R 235-11z-3D** 	**EX-T4R 235-11z-3D** 	**EX-T4R 235-11zü-3D** 	
2 NC	**EX-Z4R 235-02z-3D** 	**EX-T4R 235-02z-3D** 		**EX-T4R 235-02zh-3D** 
2 NO		**EX-T4R 235-20z-3D** 		**EX-T4R 235-20zh-3D** 

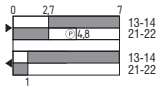
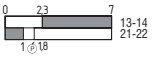
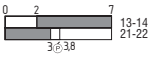
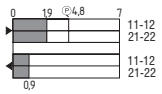
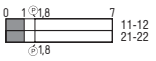
Dust zone 22

Offset roller lever 1R

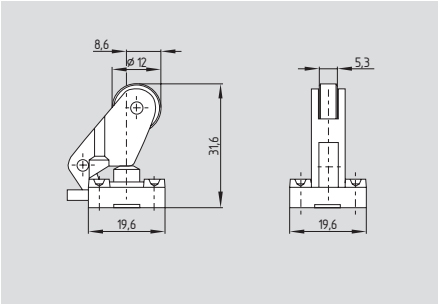


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 27 mm/min, max. 1 m/s
  Slow action: Min. 160 mm/min, max. 1 m/s

Contact variants

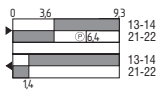
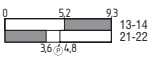
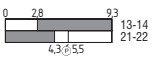
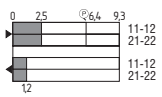
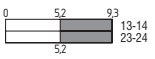
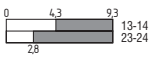
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	**EX-Z1R 235-11z-3D** 	**EX-T1R 235-11z-3D** 	**EX-T1R 235-11zü-3D** 
2 NC	**EX-Z1R 235-02z-3D** 	**EX-T1R 235-02z-3D** 	
2 NO		**EX-T1R 235-20z-3D** 	

Offset roller lever K

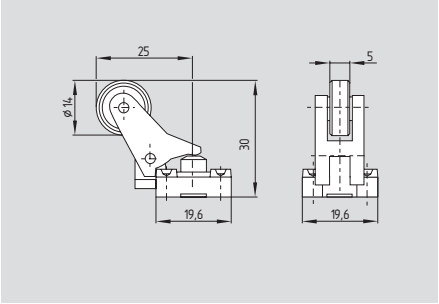


- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 24 mm/min, max. 1 m/s
  Slow action: Min. 240 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZK 235-11z-3D** 	**EX-TK 235-11z-3D** 	**EX-TK 235-11zü-3D** 	
2 NC	**EX-ZK 235-02z-3D** 	**EX-TK 235-02z-3D** 		**EX-TK 235-02zh-3D** 
2 NO		**EX-TK 235-20z-3D** 		**EX-TK 235-20zh-3D** 

Angle roller lever 3K



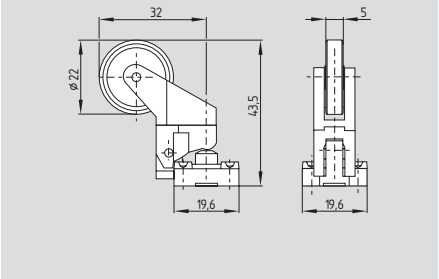
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 27 mm/min, max. 1 m/s
  Slow action: Min. 160 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings
  (Z/T 235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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z3K 235-11z-3D**	**EX-T3K 235-11z-3D**	**EX-T3K 235-11zü-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 235-20zh-3D**

Dust zone 22

Angle roller lever 4K

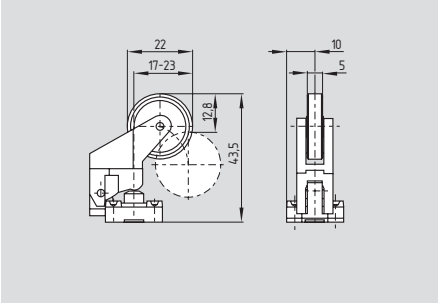


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 44 mm/min, max. 1 m/s
  Slow action: Min. 264 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings
  (Z/T 235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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z4K 235-11z-3D**	**EX-T4K 235-11z-3D**	**EX-T4K 235-11zü-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 235-20zh-3D**

Angle roller lever K4

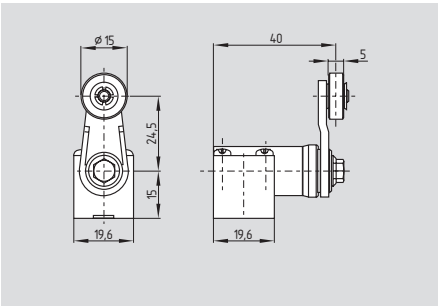


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 56 mm/min, max. 1 m/s
  Slow action: Min. 336 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZK4 235-11z-3D**	**EX-TK4 235-11z-3D**	**EX-TK4 235-11zü-3D**	
2 NC	**EX-ZK4 235-02z-3D**	**EX-TK4 235-02z-3D**		**EX-TK4 235-02zh-3D**
2 NO		**EX-TK4 235-20z-3D**		**EX-TK4 235-20zh-3D**

Roller lever 1H

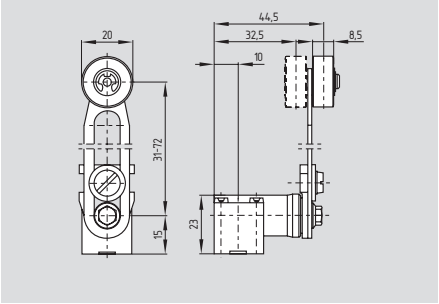


- Plastic lever
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 92 mm/min, max. 1 m/s
  Slow action: Min. 492 mm/min, max. 1 m/s
- Actuator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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV1H 235-11z-3D**	**EX-TV1H 235-11z-3D**	**EX-TV1H 235-11zü-3D**	
2 NC	**EX-ZV1H 235-02z-3D**	**EX-TV1H 235-02z-3D**		**EX-TV1H 235-02zh-3D**
2 NO		**EX-TV1H 235-20z-3D**		**EX-TV1H 235-20zh-3D**

Roller lever 7H

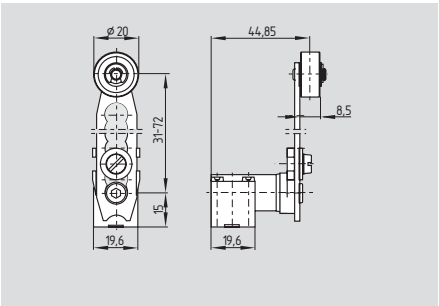


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV7H 235-11z-3D**	**EX-TV7H 235-11z-3D**	**EX-TV7H 235-11zü-3D**	
2 NC	**EX-ZV7H 235-02z-3D**	**EX-TV7H 235-02z-3D**		**EX-TV7H 235-02zh-3D**
2 NO		**EX-TV7H 235-20z-3D**		**EX-TV7H 235-20zh-3D**

Roller lever 7H-2138



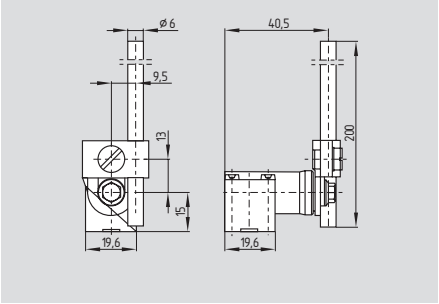
- For safety tasks ⊖, positive break, ordering suffix -2138
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 240 mm/min, max. 1 m/s
  Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV7H 235-11z -2138-3D**	**EX-TV7H 235-11z -2138-3D**	**EX-TV7H 235-11zü -2138-3D**	
2 NC	**EX-ZV7H 235-02z -2138-3D**	**EX-TV7H 235-02z -2138-3D**		**EX-TV7H 235-02zh -2138-3D**
2 NO		**EX-TV7H 235-20z -2138-3D**		**EX-TV7H 235-20zh -2138-3D**

Dust zone 22

Rod lever 10H

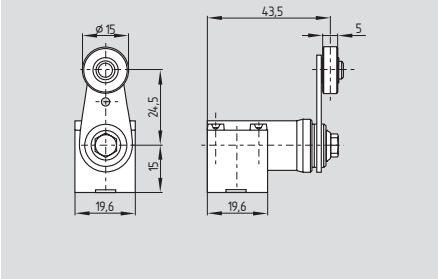


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Plastic rod
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV10H 235-11z-3D**	**EX-TV10H 235-11z-3D**	**EX-TV10H 235-11zü-3D**	
2 NC	**EX-ZV10H 235-02z-3D**	**EX-TV10H 235-02z-3D**		**EX-TV10H 235-02zh-3D**
2 NO		**EX-TV10H 235-20z-3D**		**EX-TV10H 235-20zh-3D**

Roller lever 12H

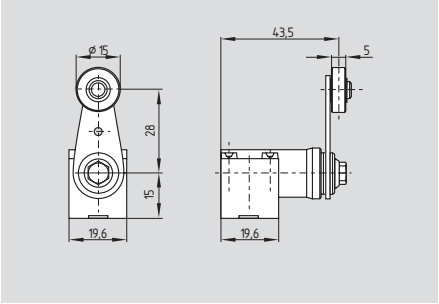


- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
  Snap action: Min. 687 mm/min, max. 1 m/s
  Slow action: Min. 4122 mm/min,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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV12H 235-11z-3D**	**EX-TV12H 235-11z-3D**	**EX-TV12H 235-11zü-3D**	
2 NC	**EX-ZV12H 235-02z-3D**	**EX-TV12H 235-02z-3D**		**EX-TV12H 235-02zh-3D**
2 NO		**EX-TV12H 235-20z-3D**		**EX-TV12H 235-20zh-3D**

Roller lever 14H



- Metal lever with plastic roller
- Lever angle 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

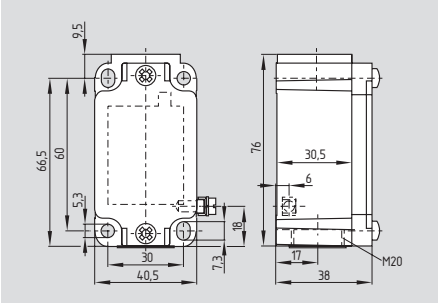
Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZV14H 235-11z-3D**	**EX-TV14H 235-11z-3D**	**EX-TV14H 235-11zü-3D**	
2 NC	**EX-ZV14H 235-02z-3D**	**EX-TV14H 235-02z-3D**		**EX-TV14H 235-02zh-3D**
2 NO		**EX-TV14H 235-20z-3D**		**EX-TV14H 235-20zh-3D**

More Details

Detailed technical information at:
www.schmersal.com

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



- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- 1 cable entry M20 x 1.5
- Including EX-certified screwed cable gland

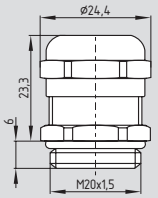
Approvals

CE

Technical data

Equipment category:	⟨Ex⟩ II 3GD
Ex protection:	EEx nC IIC T5 X Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 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:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm^2 (incl. conductor ferrules)
Cable entry:	1 x M20 x 1.5
U_{imp}:	6 kV -03z, -12z: 4kV
U_i:	500 V -03z, -12z: 250 V
I_{the}:	10 A
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
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 6 mm max. Ø 12 mm

System components



EX-certified screwed cable gland

Ordering details

EX-①② 335-③z④-⑤-⑥-⑦-3G/D

No.	Replace	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 42	
③	11	1 NO / 1 NC
	02	2 NC
	20	2 NO*
	01/01	1 NC left / 1 NC right
	12	1 NO / 2 NC
	03	3 NC
④	h	Slow action with staggered contacts
	ü	with overlapping contacts

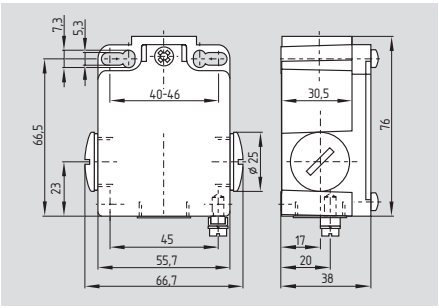
No.	Replace	Description
⑤	1297	Enclosure with transversely slotted mounting holes
⑥	2138	Roller lever 7H for safety duties
⑦	1637	Gold-plated contacts

* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Ordering details

EX-certified screwed cable gland	**EX-KLE-M20x1,5**

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



- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- 3 cable entries M20 x 1.5
- Including EX-certified screwed cable gland and screw plug

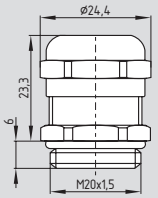
Approvals

CE

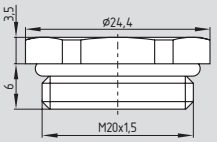
Technical data

Equipment category:	⟨Ex⟩ II 3GD
Ex protection:	EEx nC IIC T5 X Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 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:	IP 67 to IEC/EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching system:	⊖ IEC 60947-5-1 slow or snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	3 x M20 x 1.5
U_{imp}:	6 kV -03z, -12z: 4kV
U_i:	500 V -03z, -12z: 250 V
I_{the}:	10 A
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
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 6 mm max. Ø 12 mm

System components



EX-certified screwed cable gland



EX-certified screw plug

Ordering details

EX-①② 355-③z④-⑤-⑥-⑦-3G/D

No.	Replace	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 42	
③	11	1 NO / 1 NC
	02	2 NC
	20	2 NO*
	01/01	1 NC left / 1 NC right
	12	1 NO / 2 NC
	03	3 NC
④	h	Slow action with staggered contacts
	ü	with overlapping contacts

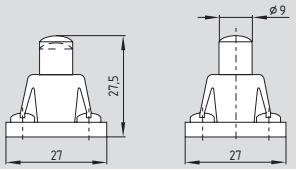
No.	Replace	Description
⑤	1297	Enclosure with transversely slotted mounting holes
⑥	2138	Roller lever 7H for safety duties
⑦	1637	Gold-plated contacts

* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Ordering details

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

Plunger S

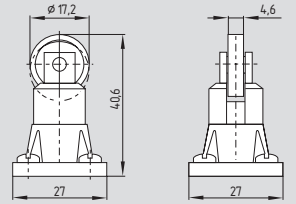


- Actuator type B to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 0° to switch axis, max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZS 3..-11z-3G/D**	**EX-TS 3..-11z-3G/D**	**EX-TS 3..-11zü -3G/D**	
2 NC	**EX-ZS 3..-02z-3G/D**	**EX-TS 3..-02z-3G/D**		**EX-TS 3..-02zh-3G/D**
2 NO		**EX-TS 3..-20z-3G/D**		**EX-TS 3..-20zh-3G/D**
1 NO 2 NC		**EX-TS 3..-12z-3G/D**	**EX-TS 3..-12zü -3G/D**	
3 NC		**EX-TS 3..-03z-3G/D**		**EX-TS 3..-03zh-3G/D**

Roller plunger R

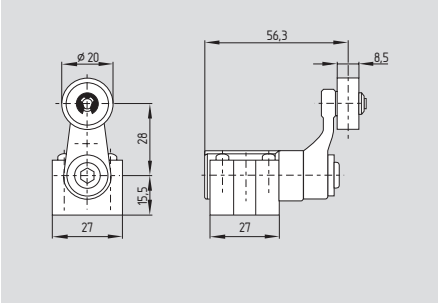


- Actuator type C to EN 50041
- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-ZR 3..-11z-3G/D**	**EX-TR 3..-11z-3G/D**	**EX-TR 3..-11zü-3G/D**	
2 NC	**EX-ZR 3..-02z-3G/D**	**EX-TR 3..-02z-3G/D**		**EX-TR 3..-02zh-3G/D**
2 NO		**EX-TR 3..-20z-3G/D**		**EX-TR 3..-20zh-3G/D**
1 NO 2 NC		**EX-TR 3..-12z-3G/D**	**EX-TR 3..-12zü-3G/D**	
3 NC		**EX-TR 3..-03z-3G/D**		**EX-TR 3..-03zh-3G/D**

Roller lever H



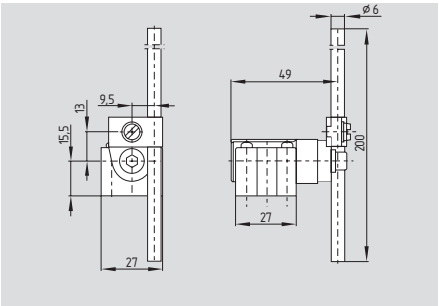
- Actuator type A to EN 50041
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

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

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	EX-Z4VH 3..-11z-3G/D	EX-T4VH 3..-11z-3G/D	EX-T4VH 3..-11zü-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 NO 2 NC		EX-TVH 3..-01/01z-3G/D		
3 NC		EX-T4VH 3..-12z-3G/D	EX-T4VH 3..-12zü-3G/D	
3 NC		EX-T4VH 3..-03z-3G/D		EX-T4VH 3..-03zh-3G/D

Rod lever 10H

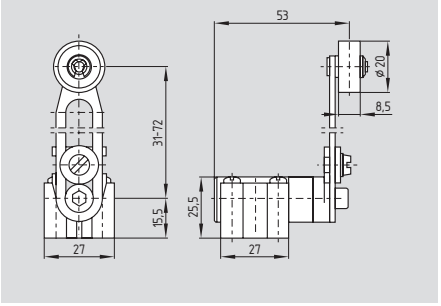


- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix -1183

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	EX-Z4V10H 3..-11z-3G/D	EX-T4V10H 3..-11z-3G/D	EX-T4V10H 3..-11zü-3G/D	
2 NC	EX-Z4V10H 3..-02z-3G/D	EX-T4V10H 3..-02z-3G/D		EX-T4V10H 3..-02zh-3G/D
2 NO		EX-T4V10H 3..-20z-3G/D		EX-T4V10H 3..-20zh-3G/D
1 NO 2 NC		EX-TV10H 3..-01/01z-3G/D		
3 NC		EX-T4V10H 3..-12z-3G/D	EX-T4V10H 3..-12zü-3G/D	
3 NC		EX-T4V10H 3..-03z-3G/D		EX-T4V10H 3..-03zh-3G/D

Roller lever 7H

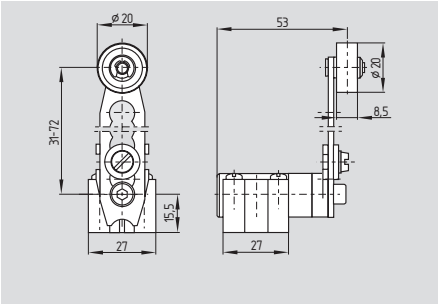


- **Only for positioning tasks**
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z4V7H 3..-11z-3G/D**	**EX-T4V7H 3..-11z-3G/D**	**EX-T4V7H 3..-11zü-3G/D**	
2 NC	**EX-Z4V7H 3..-02z-3G/D**	**EX-T4V7H 3..-02z-3G/D**		**EX-T4V7H 3..-02zh-3G/D**
2 NO		**EX-T4V7H 3..-20z-3G/D**		**EX-T4V7H 3..-20zh-3G/D**
1 NC left 1 NC right		**EX-TV7H 3..-01/01z-3G/D**		
1 NO 2 NC		**EX-T4V7H 3..-12z-3G/D**	**EX-T4V7H 3..-12zü-3G/D**	
3 NC		**EX-T4V7H 3..-03z-3G/D**		**EX-T4V7H 3..-03zh-3G/D**

Roller lever 7H-2138



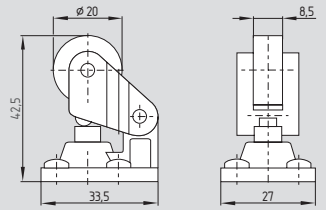
- For safety tasks ⊖, positive break, ordering suffix -2138
- Required actuating torque:
  26 Ncm for snap action,
  31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TV7H ...-01/01z-2138 positive break only to one side.

Contact variants

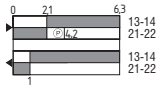
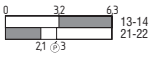
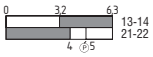
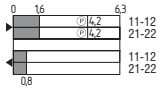
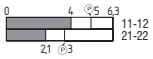
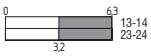
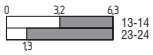
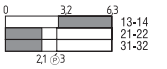
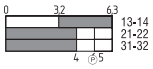
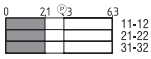
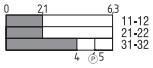
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z4V7H 3..-11z -2138-3G/D**	**EX-T4V7H 3..-11z -2138-3G/D**	**EX-T4V7H 3..-11zü- -2138 -3G/D**	
2 NC	**EX-Z4V7H 3..-02z -2138-3G/D**	**EX-T4V7H 3..-02z -2138-3G/D**		**EX-T4V7H 3..-02zh- -2138-3G/D**
2 NO		**EX-T4V7H 3..-20z -2138-3G/D**		**EX-T4V7H 3..-20zh- -2138-3G/D**
1 NC left 1 NC right		**EX-TV7H 3..-01/01z -2138-3G/D**		
1 NO 2 NC		**EX-T4V7H 3..-12z -2138-3G/D**	**EX-T4V7H 3..-12zü -2138-3G/D**	
3 NC		**EX-T4V7H 3..-03z -2138-3G/D**		**EX-T4V7H 3..-03zh- -2138-3G/D**

Offset roller lever 1K

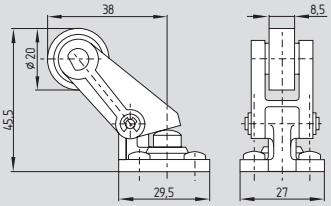


- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

Contact variants

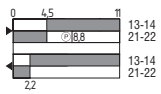
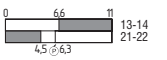
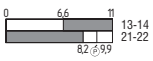
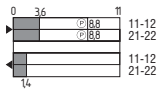
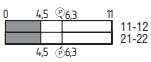
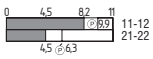
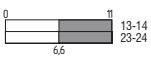
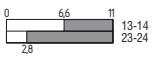
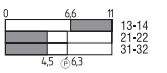
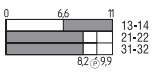
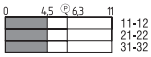
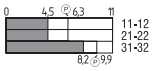
Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z1K 3..-11z-3G/D** 	**EX-T1K 3..-11z-3G/D** 	**EX-T1K 3..-11zü-3G/D** 	
2 NC	**EX-Z1K 3..-02z-3G/D** 	**EX-T1K 3..-02z-3G/D** 		**EX-T1K 3..-02zh-3G/D** 
2 NO		**EX-T1K 3..-20z-3G/D** 		**EX-T1K 3..-20zh-3G/D** 
1 NO 2 NC		**EX-T1K 3..-12z-3G/D** 	**EX-T1K 3..-12zü-3G/D** 	
3 NC		**EX-T1K 3..-03z-3G/D** 		**EX-T1K 3..-03zh-3G/D** 

Angle roller lever 3K

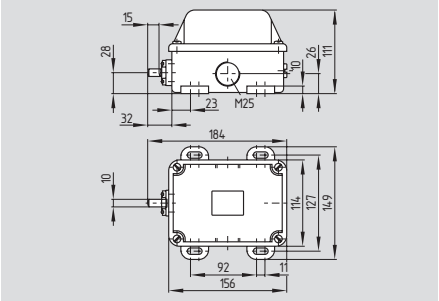


- Required actuating force:
  12 N for snap action,
  17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	**EX-Z3K 3..-11z-3G/D** 	**EX-T3K 3..-11z-3G/D** 	**EX-T3K 3..-11zü-3G/D** 	
2 NC	**EX-Z3K 3..-02z-3G/D** 	**EX-T3K 3..-02z-3G/D** 		**EX-T3K 3..-02zh-3G/D** 
2 NO		**EX-T3K 3..-20z-3G/D** 		**EX-T3K 3..-20zh-3G/D** 
1 NO 2 NC		**EX-T3K 3..-12z-3G/D** 	**EX-T3K 3..-12zü-3G/D** 	
3 NC		**EX-T3K 3..-03z-3G/D** 		**EX-T3K 3..-03zh-3G/D** 

EX-T... 064-...-2D



- 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 x 1.5
- Including Ex cable gland and locking screw
- Protection class IP 65

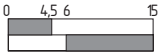
Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

Technical data

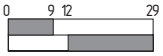
Equipment category:	⟨Ex⟩ II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1, EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	1 million operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 1 m/s, min. 0,01 m/s on plunger
Actuating angle:	max. 20°
Weight:	approx. 3.2 kg

Contact variants

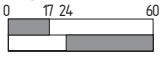
Plunger S



Angle roller lever J



Angle roller lever X



Approvals

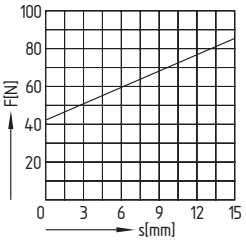
⟨Ex⟩ **under preparation** CE

Ordering details

EX-T① 064-②y-③-2D

No.	Replace	Description
①	For the appropriate actuator: see page 64	
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO
③	ü	Slow action with overlapping contacts
	h	with staggered contacts

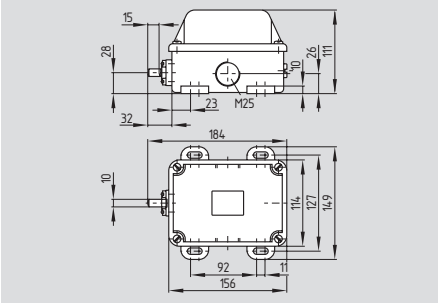
Force-travel diagram



Ordering details

EX-certified screwed cable gland	**EX-KLE-M25x1,5**

EX-MS 064-…-2D



- 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 x 1.5
- Including Ex cable gland and locking screw
- Protection class IP 65

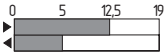
Actuation from the side of the plunger should be avoided, since this reduces the mechanical life of the position switch. Recommendation: use roller lever

Technical data

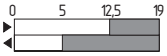
Equipment category:	⟨Ex⟩ II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1, EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	30000 operations
Switching frequency:	max. 1000/h
Actuating speed:	max. 1 m/s, min. 0,01 m/s on plunger
Actuating angle:	max. 20°
Weight:	approx. 3.6 kg

Contact variants

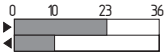
Plunger S
1 NC contact



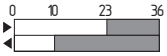
1 NO contact



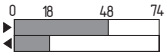
Angle roller lever J
1 NC contact



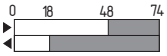
1 NO contact



Angle roller lever X
1 NC contact



1 NO contact



Approvals

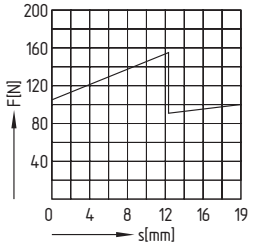
⟨Ex⟩ **under preparation** CE

Ordering details

EX-M① 064-②y-2D

No.	Replace	Description
①	For the appropriate actuator: see page 64	
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO

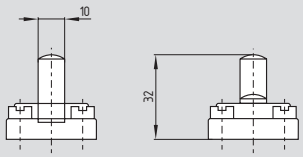
Force-travel diagram



Ordering details

EX-certified screwed cable gland	**EX-KLE-M25x1,5**

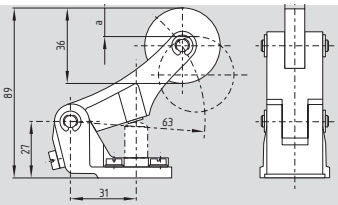
Plunger S



- 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

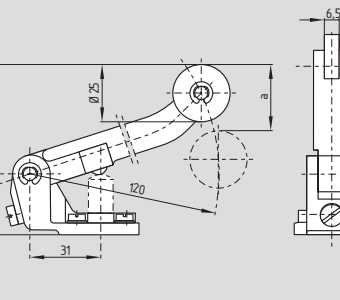
Offset roller lever J



- Actuating speed max. 0.5 m/s with an actuating angle of α = 45° and β = 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 should be avoided, since this reduces the mechanical life of the position switch.

Offset roller lever X

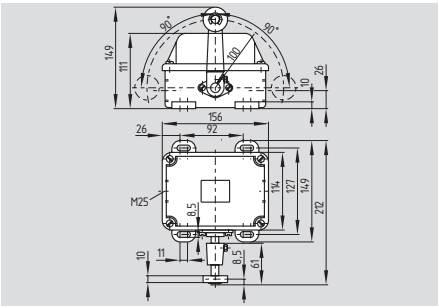


- Actuating speed max. 0.5 m/s with an actuating angle of α = 45° and β = 30°
- Plastic roller (metal roller on request)
- Actuator head can be repositioned in steps 4 x 90°

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

Legend
α: Actuating angle from right of switch axis
β: Actuating angle from left of switch axis

EX-T. 064-…-2D



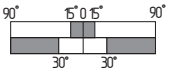
- Ex certified
- Metal enclosure
- 3 contact, slow action ⊖
- Actuating direction, each time 90° right-hand side and left-hand side rotation
- 2 cable entries M25 x 1.5
- Including Ex cable gland and locking screw
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

Technical data

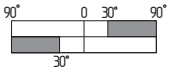
Equipment category:	⟨Ex⟩ II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1, EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow action, double break
Contact type:	positive break NC contacts ⊖
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °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

Contact variants

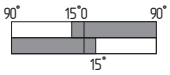
Roller lever
1 NO / 1 NC



only NO



only NC



Approvals

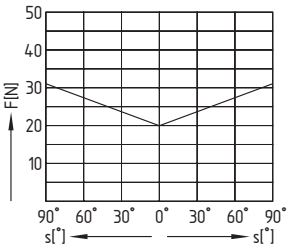
⟨Ex⟩ **under preparation** CE

Ordering details

EX-T① 064-②y-③-2D

No.	Replace	Description
①	For the appropriate actuator: see page 68	
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	01/02	1 NC left/2 NC right
	02/01	2 NC left/1 NC right
	10/20	1 NO left/2 NO right
	20/10	2 NO left/1 NO right
③	ü	Slow action with overlapping contacts
	h	with staggered contacts
	r	Position latching 2 x 45°

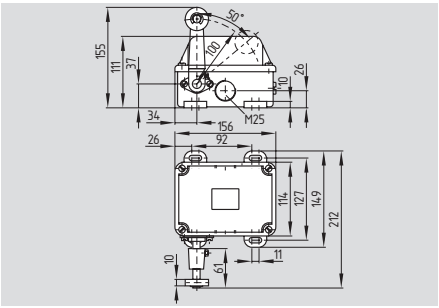
Force-travel diagram



Ordering details

EX-certified screwed cable gland	**EX-KLE-M25x1,5**

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 x 1.5
- Including Ex cable gland and locking screw
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

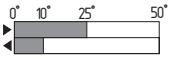
Technical data

Equipment category:	Ⓔx II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1, EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °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

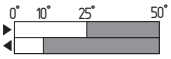
Contact variants

Roller lever

1 NC



1 NO



Approvals

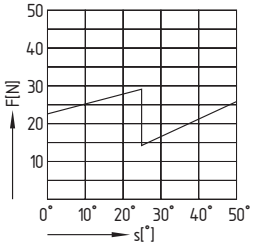
Ⓔx **under preparation** CE

Ordering details

EX-M① 064-②y-R-2D

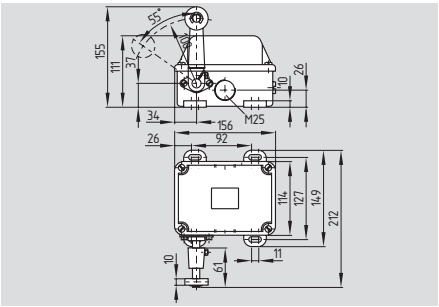
No.	Replace	Description
①	For the appropriate actuator: see page 68	
②	12	1 NO/2 NC
	21	2 NO/1 NC
	30	3 NO
	22	2 NO/2 NC
	31	3 NO/1 NC
	40	4 NO

Force-travel diagram



EX-certified screwed cable gland	**EX-KLE-M25x1,5**

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 x 1.5
- Including Ex cable gland and locking screw
- Protection class IP 65
- Splined shaft and lever available with 10° toothing

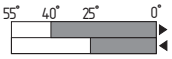
Technical data

Equipment category:	⟨Ex⟩ II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1, EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	snap action, double break
Contact type:	change-over contact, galvanically separated contact bridges
Termination:	screw terminals M 5
Cable section:	max. 4 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	25 A
I_e/U_e:	25 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	25 A gG D-fuse
Max. motor power consumption:	with 400 V 3-phase 5.5 kW (squirrel-cage rotor n = 1500 rpm)
Contact opening:	max. 2 x 4 mm
Ambient temperature:	– 30 °C … + 90 °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

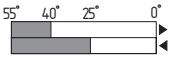
Contact variants

Roller lever

1 NC



1 NO



Approvals

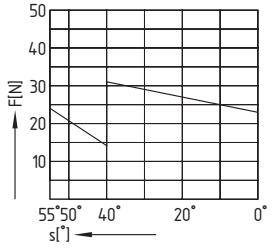
⟨Ex⟩ **under preparation** CE

Ordering details

EX-M① 064-②y-L-2D

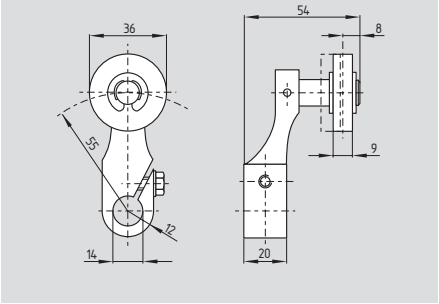
No.	Replace	Description
①	For the appropriate actuator: see page 68	
②	03	3 NC
	12	1 NO/2 NC
	21	2 NO/1 NC
	04	4 NC
	13	1 NO/3 NC
	22	2 NO/2 NC

Force-travel diagram



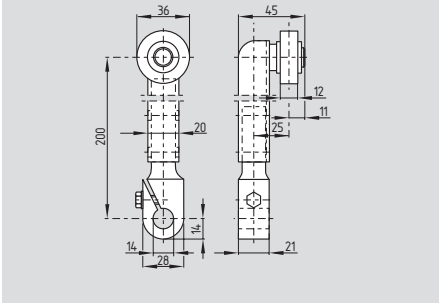
EX-certified screwed cable gland **EX-KLE-M25x1,5**

Roller lever L



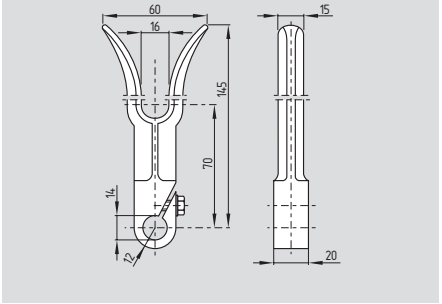
- Actuating speed max. 3 m/s with an actuating angle of a and b = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Roller lever V



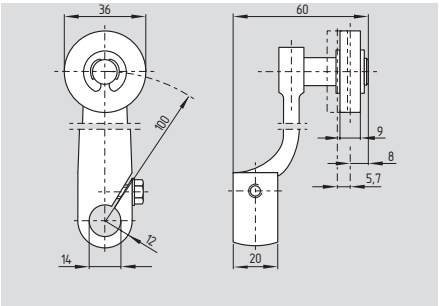
- Actuating speed max. 3 m/s with an actuating angle of a and b = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Fork lever C



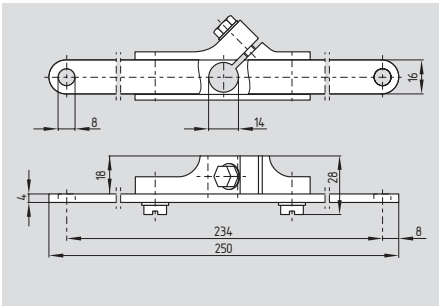
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever A



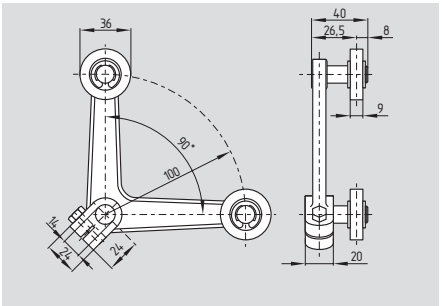
- Actuating speed max. 3 m/s with an actuating angle of a and b = 30°
- Plastic roller
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing
- Available with metal roller
- Available with rubber roller, ordering suffix -1

Pull lever Z



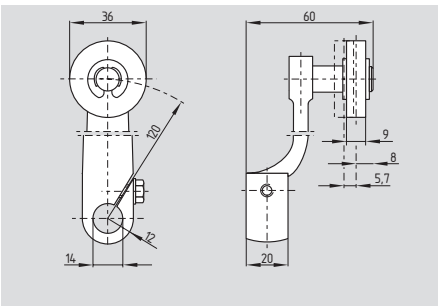
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Offset roller lever 4D



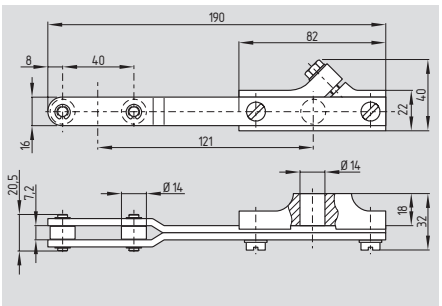
- Continuous adjustment of lever position 360°
- Splined shaft and lever available with 10° toothing

Roller lever 2A



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

Pull lever 2Z



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

Legend

α: Actuating angle from right of switch axis

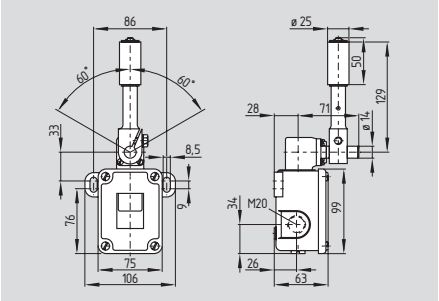
β: Actuating angle from left of switch axis

Belt alignment switches

The belt alignment and slack-wire switches are suitable for use on material handling equipment. The belt alignment switches are 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.

Index

EX-T/M 441-...-2D



- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Snap action, change-over contact with double break
- 2 cable entries
- Including Ex cable gland and locking screw
- Lever available with various lengths of roller
- Protection class IP 65
- Suitable for heavy duty

Approvals

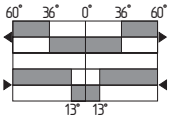
Ex **under preparation** CE

Technical data

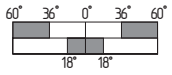
Equipment category:	Ex II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Switching system:	slow and snap action, double break
Contact type:	snap action: change-over contact, slow action: positive break NC contact ⊖ double break with 2 separate contact bridges
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	snap action: 4 kV slow action: 6 kV
U_i:	snap action: 250 V slow action: 400 V suffix -k or -t: 500 V
I_{the}:	16 A
I_e/U_e:	snap action: 4 A / 230 V slow action: 4 A / 400 V
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 6.0 mm
Switchover time:	snap action: 35 ms
Bounce duration:	snap action: 5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	10 million operations
Switching frequency:	max. 3000/h

Contact variants

Snap action
1 NO / 1 NC



Slow action

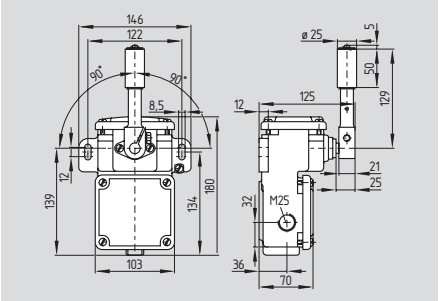


Ordering details

EX-①441-11y-②-③-④-2D

No.	Replace	Description
①	M.	Snap action
	T.	Slow action
②	11	1 NO / 1 NC
③	ü	Slow action with overlapping contacts
④	1276	Gold-plated contacts

EX-T/M 250-...-2D



- Ex certified
- Metal enclosure
- Slow action, change-over contact with double break
- Slow action available with overlapping or staggered contacts
- Snap action, change-over contact with double break
- 2 cable entries M25 x 1.5
- Including Ex cable gland and locking screw
- Lever available with various lengths of roller
- Protection class IP 65
- Suitable for heavy duty

Approvals

Ex **under preparation** CE

Ordering details

EX-①250-②z-③-④-2D

No.	Replace	Description
①	M.	Snap action
	T.	Slow action
②	11	1 NO / 1 NC
	22	2 NO / 2 NC
③	For the appropriate actuator: see page 66	
④	1276	Gold-plated contacts

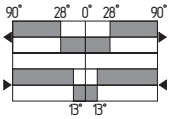
Technical data

Equipment category:	Ex II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 61241-1
Enclosure:	cast iron, galvanised, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver
Contact type:	snap action: change-over contact, with 2 galvanically separated contact bridges slow action: positive break NC contacts ⊖
Switching system:	slow and snap action
Termination:	screw terminals M 4
Cable section:	max. 2.5 mm² (incl. conductor ferrules)
U_{imp}:	6 kV
U_i:	500 V
I_{the}:	16 A
I_e/U_e:	4 A / 400 VAC
Utilisation category:	AC-15
Max. fuse rating:	16 A gG D-fuse
Contact opening:	snap action: max. 2 x 2.5 mm slow action: max. 2 x 2 mm
Switchover time:	35 ms
Bounce duration:	5 ms
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	10 million operations
Switching frequency:	max. 3000/h

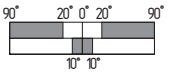
Contact variants

1 NO / 1 NC

Snap action

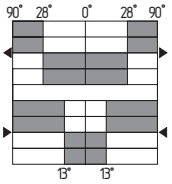


Slow action

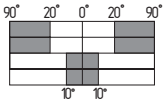


2 NO / 2 NC

Snap action

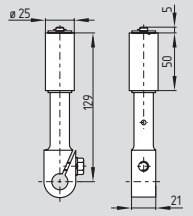


Slow action

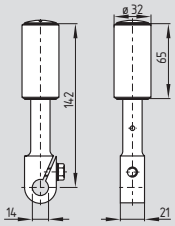


Belt alignment switches

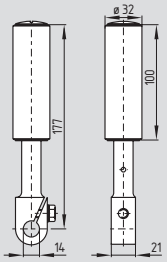
System components



Belt alignment lever 243

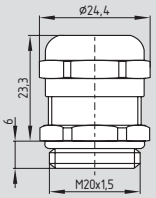


Belt alignment lever 966

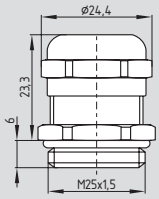


Belt alignment lever 1224

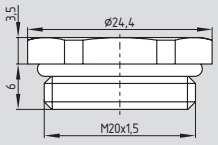
System components



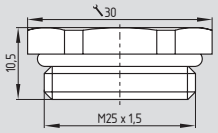
EX-certified screwed cable gland M20



EX-certified screwed cable gland M25



EX-certified screw plug M20



EX-certified screw plug M25

Ordering details

Belt alignment levers	
243	**ordering suffix -243**
966	**ordering suffix -966**
1224	**ordering suffix -1224**

Ordering details

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

Pull-wire emergency stop switches are fitted on machines and plant components, which cannot be protected by guards. Contrary to mushroom head emergency stop pushbuttons, the emergency stop function can be triggered from any point on the wire.

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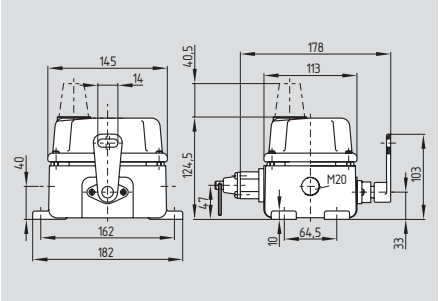
EX-T3Z 068-...-2D



- Ex certified
- To EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- Up to 6 contacts
- Robust design
- 2 cable entries M20 x 1.5
- Low actuating force
- Wire up to 2 x 50 m long
- Reset by pull-ring or key possible
- Signalling lamp available on request for various voltage

Approvals

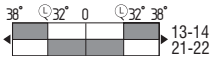
under preparation

Technical data

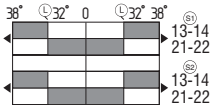
Equipment category:	II 2D
Ex protection:	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN ISO 13850; EN 61241-1
Enclosure:	cast iron, enamelled
Cover:	cast iron, enamel finish
Protection class:	IP 65 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, max. 3 NO and 3 NC contacts
Switching system:	IEC 60947-5-1 snap action with positive break NC contacts
Connection:	screw terminals
Cable section:	max. 1.5 mm² min. 0.75 mm² (incl. conductor ferrules)
Cable entry:	2 x M20 x 1.5
U_{imp}:	4 kV
U_i:	250 VAC
I_{the}:	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e:	2.5 A / 230 VAC 6 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Positive break torque:	1.8 Nm
Angle for positive break travel:	32°
Positive break force:	50 N
Actuating force:	max. 50 N (30 N in direction of rope)
Ambient temperature:	– 30 °C … + 90 °C
Mechanical life:	50,000 operations
Indicator lamp:	yellow 230 VAC/5 W, BA 15D screw socket
Maximum cable length:	2 x 50 m
Features:	wire pull and breakage detection

Contact variants

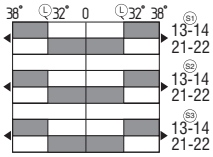
1 NO / 1 NC



2 NO / 2 NC



3 NO / 3 NC



Ordering details

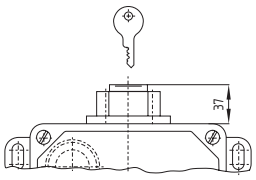
EX-T3Z 068-①yr② ③-2D

No.	Replace	Description
①	11	1NO/1NC
	22	2NO/2NC
	33	3NO/3NC
②		Pull-ring reset
	s	Key reset
③		Without indicator lamp
	G	With indicator lamp

Note

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

Note



Reset by key

Dust zone 21, 22

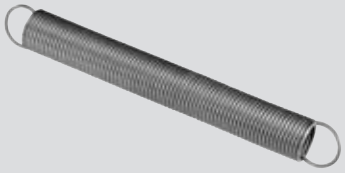
System components

Eyebolt

System components

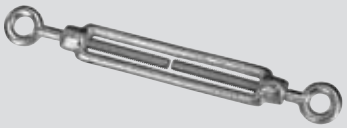
Pulley

System components



Tension spring

Wire clamp



Tensioner

Rope tensioner S 900

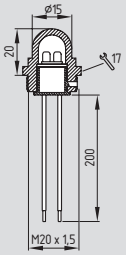
Egg-shaped wire clamp

Wire rope

Shackle

Wire thimble

Wire unit complete



Signalling lamp G24-M20

Ordering details

Eyebolt	
BM 10 x 40	**1084928**
BM 8 x 70 (stainless steel)	**1193046**
Wire clamp 3 mm (stainless steel)	**1190918**
Duplex wire clamp 3 mm (stainless steel)	**1190917**
Wire thimble 4 mm (stainless steel)	**1190919**
Egg-shaped wire clamp (without image)	**1077072**

Ordering details

Pulley (stainless steel)	**1192433**
Tensioner M6	**1087930**
Wire rope per m	**on request**
Wire unit complete	**on request**

Ordering details

Tension spring	**1186696**
Rope tensioner S 900	**1186704**
Shackle (stainless steel)	**1186490**
Signalling lamp G24-M20 (LED 24 VDC)	**1186263**

More Details

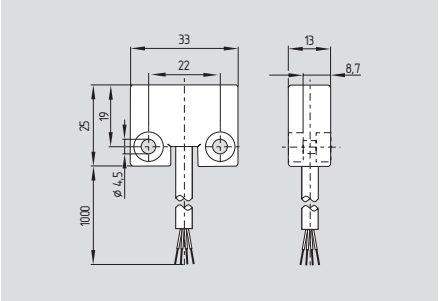
Detailed technical information at:
www.schmersal.com

Safety sensors

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 be used as well.

Index

EX-BNS 250-…-3G/D



- Ex certified
- Thermoplastic enclosure
- Coded
- Smallest design
- Long life, no mechanical wear
- Protection class IP 67
- Actuation only possible with EX-BPS 250
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling

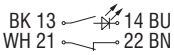
Approvals

Technical data

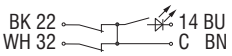
Equipment category:	Ⓔx II 3GD
Ex protection:	
EX-BNS 250:	EEx nC IIC T6 X Ex tD A22 IP67 T80°C X
EX-BPS 250:	EEx nA T6 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-3 IEC 61241-1 IEC 60079-15 BG-GS-ET-14
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Max. impact energy:	1 J
Protection class:	IP 67 to IEC/EN 60529
Connection:	Boflex cable
Cable section:	4 x 0.25 mm² ordering suffix -2187: 6 x 0,25 mm²
Mode of operation:	magnetic
Actuating magnet:	EX-BPS 250, coded
Control category:	up to 4 to EN 954-1 in combination with a safety monitoring module
Classification:	up to PDF-M to IEC 60947-5-3 in combination with a safety monitoring module
S_{ao}:	4 mm
S_{ar}:	14 mm
Switching conditions indicator:	LED only for 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 … 55 Hz, amplitude 1 mm

Contact variants

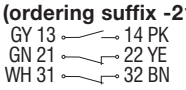
1 NO / 1 NC



1 NO / 2 NC



1 NO / 2 NC
(ordering suffix -2187 without LED)

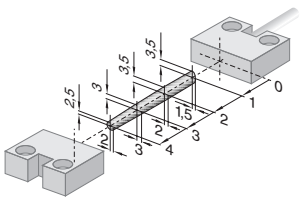


Ordering details

EX-BNS 250-①z②-③-3G/D

No.	Replace	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
②		Without LED
	G	With LED
③	2187	Individual contact outlet (only with 1 NO / 2 NC)

Note



Enabling zone

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

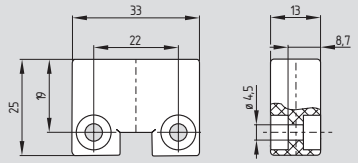
Note

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

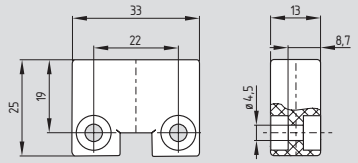
The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is open.

System components



Actuating magnet EX-BPS 250

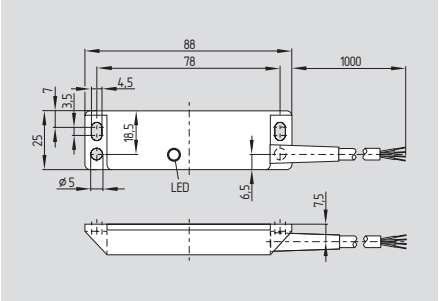


Spacer BN 250

Ordering details

Actuating magnet	**EX-BPS 250**
Spacer	**BN 250**

EX-BNS 33-…-3G/D



- Ex certified
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP 67
- Actuation only possible with EX-BPS 33
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling

Approvals

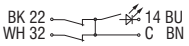
Technical data

Equipment category:	Ⓔx II 3GD
Ex protection:	
EX-BNS 33:	EEx nC IIC T6 X
	Ex tD A22 IP67 T80°C X
EX-BPS 33:	EEx nA T6 X
	Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-3
	IEC 61241-1
	IEC 60079-15
	BG-GS-ET-14
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Max. impact energy:	2 J
Protection class:	IP 67 to IEC/EN 60529
Connection:	Boflex cable
Cable section:	4 x 0.25 mm²
	ordering suffix ..-12-2187: 6 x 0,25 mm²
Mode of operation:	magnetic
Actuating magnet:	EX-BPS 33, coded
Control category:	up to 4 to EN 954-1 in combination with a safety monitoring module
Classification:	up to PDF-M to IEC 60947-5-3 in combination with a safety monitoring module
S_{ao}:	5 mm
S_{ar}:	15 mm
Switching conditions indicator:	LED only for ordering suffix G
Max. switching voltage	
without LED:	100 VAC/DC
with LED:	24 VDC
Max. switching current	
without LED:	400 mA
ordering suffix -2187:	250 mA
with LED:	10 mA
Max. switching capacity	
without LED:	10 W
ordering suffix -2187:	3 W
with LED:	240 mW
Ambient temperature:	– 25 °C … + 70 °C
Storage and transport temperature:	– 25 °C … + 70 °C
Repeat accuracy R:	≤ 0.1 x S_{ao}
Max. switching frequency:	approx. 1 kHz
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm

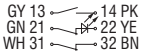
Contact variants

1 NO / 1 NC

1 NO / 2 NC



1 NO / 2 NC
(ordering suffix -2187)



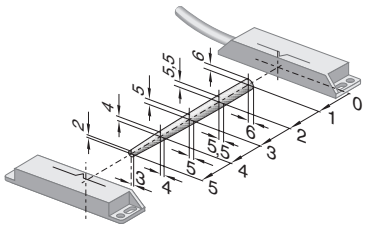
2 NC
(ordering suffix -2187)

Ordering details

EX-BNS 33-①z②-③-3G/D

No.	Replace	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC
②		Without LED
	G	With LED
③	2187	Individual contact outlet (not possible for 1 NO/1 NC)

Note



Enabling zone

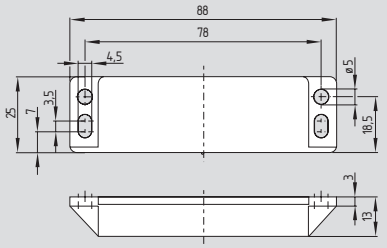
The actuators for the magnetic safety sensors must be ordered separately.

Note

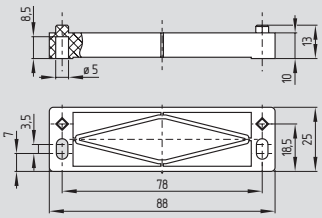
Contact symbols shown for the closed condition of the guard device.

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

System components



Actuating magnet EX-BPS 33

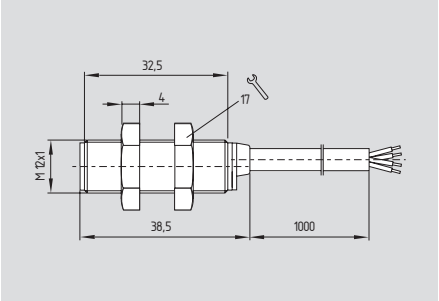


Spacer BN 31/33

Ordering details

Actuating magnet	**EX-BPS 33**
Spacer	**BN 31/33**

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



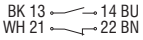
- Ex certified
- Thermoplastic enclosure
- Long life, no mechanical wear
- Protection class IP 67
- Insensitive to lateral misalignment
- Insensitive to soiling
- Particularly large switching distance
- Suitable for food processing industry

Technical data

Equipment category:	Ⓔx II 3GD
Ex protection:	EEx nC IIC T6 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-3 IEC 61241-1 IEC 60079-15 BG-GS-ET-14
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic, tightening force A/F 17 max. 90 Ncm
Max. impact energy:	2 J
Protection class:	IP 67 to IEC/EN 60529
Connection:	Boflex cable
Cable section:	4 x 0.25 mm^2
Mode of operation:	magnetic
Actuating magnet:	BP 6, BP 8, BP 10, BP 15 SS, uncoded
Control category:	up to 4 to EN 954-1 in combination with a safety monitoring module
Classification:	up to PDF-M to IEC 60947-5-3 in combination with a safety monitoring module
S_{ao}:	10 mm (BP 6 / BP 8) 20 mm (BP 10 / BP 15 SS)
S_{ar}:	22 mm (BP 6 / BP 8) 32 mm (BP 10 / BP 15 SS)
Switching conditions indicator:	–
Max. switching voltage:	100 VAC/DC
Max. switching current:	250 mA
Max. switching capacity:	-02z: 3 W -11z, -12z: 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

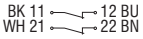
Contact variants

1 NO / 1 NC



1 NO / 2 NC

2 NC



Approvals

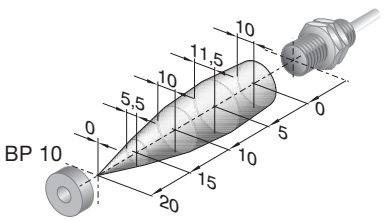
Ⓔx CE

Ordering details

EX-BNS 120-①z-3G/D

No.	Replace	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC

Note



Enabling zone

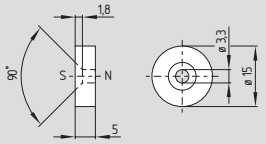
The actuators for the magnetic safety sensors must be ordered separately.

Note

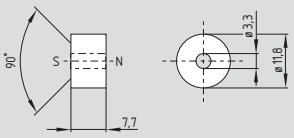
Contact symbols shown for the closed condition of the guard device.

The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

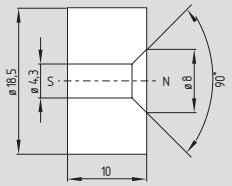
System components



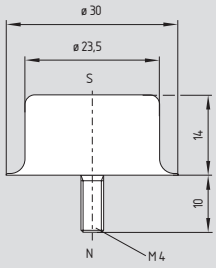
BP 6



BP 8



BP 10

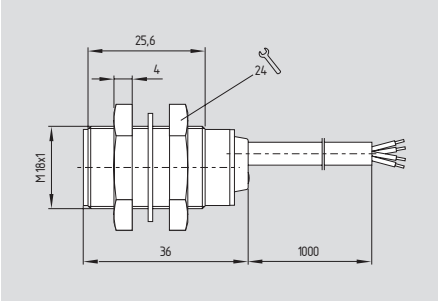


BP 15 SS

Ordering details

Actuating magnets:	
without enclosure	**BP 6**
without enclosure	**BP 8**
without enclosure	**BP 10**
stainless steel	**BP 15 SS**

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



- Ex certified
- Thermoplastic enclosure
- Long life, no mechanical wear
- Protection class IP 67
- Insensitive to lateral misalignment
- Insensitive to soiling
- Particularly large switching distance
- Suitable for food processing industry

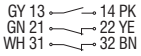
Approvals

Technical data

Equipment category:	II 3GD
Ex protection:	EEx nC IIC T6 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-3 IEC 61241-1 IEC 60079-15 BG-GS-ET-14
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic, tightening force A/F 24 max. 500 Ncm
Max. impact energy:	2 J
Protection class:	IP 67 to IEC/EN 60529
Connection:	Boflex cable
Cable section:	6 x 0.25 mm^2
Mode of operation:	magnetic
Actuating magnet:	BP 6, BP 8, BP 10, BP 15 SS, uncoded
Control category:	up to 4 to EN 954-1 in combination with a safety monitoring module
Classification:	up to PDF-M to IEC 60947-5-3 in combination with a safety monitoring module
S_{ao}:	8 mm (BP 6 / BP 8) 18 mm (BP 10 / BP 15 SS)
S_{ar}:	20 mm (BP 6 / BP 8) 28 mm (BP 10 / BP 15 SS)
Max. switching voltage:	120 VAC/DC
Max. switching current:	250 mA
Max. switching capacity:	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

Contact variants

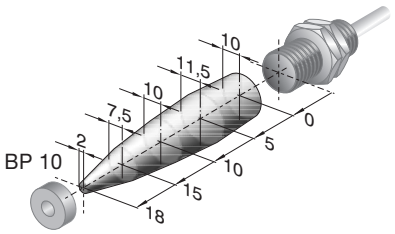
1 NO / 2 NC



Ordering details

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

Note



Enabling zone

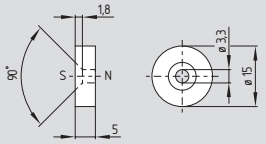
The actuators for the magnetic safety sensors must be ordered separately.

Note

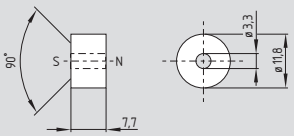
Contact symbols shown for the closed condition of the guard device.

The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

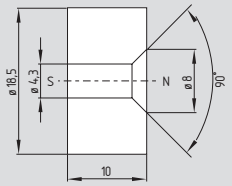
System components



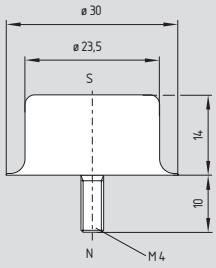
BP 6



BP 8



BP 10

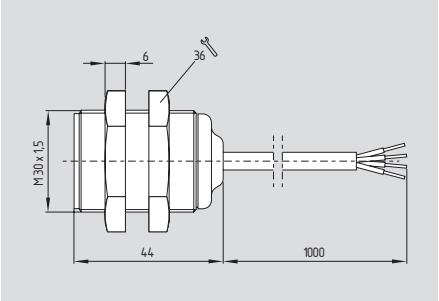


BP 15 SS

Ordering details

Actuating magnets:	
without enclosure	**BP 6**
without enclosure	**BP 8**
without enclosure	**BP 10**
stainless steel	**BP 15 SS**

EX-BNS 303-…-3G/D



- Ex certified
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP 67
- Insensitive to lateral misalignment
- Insensitive to soiling
- Suitable for food processing industry
- LED version available

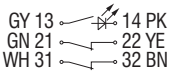
Approvals

Technical data

Equipment category:	II 3GD
Ex protection:	EEx nC IIC T6 X Ex tD A22 IP67 T80°C X
Standards:	IEC 60947-5-3 IEC 61241-1 IEC 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:	4 J
Protection class:	IP 67 to IEC/EN 60529
Connection:	Boflex cable
Cable section:	6 x 0.25 mm^2
Mode of operation:	magnetic
Actuating magnet:	BPS 300, BPS 303, BPS 303 SS, coded
Control category:	up to 3 to EN 954-1 in combination with a safety monitoring module
Classification:	up to PDF-M to IEC 60947-5-3 in combination with a safety monitoring module
S_{ao}:	5 mm
S_{ar}:	15 mm
Switching conditions indicator:	LED only for ordering suffix G
Max. switching voltage	
without LED:	100 VAC/DC
with LED:	24 VDC
Max. switching current	
without LED:	400 mA
with LED:	10 mA
Max. switching capacity	
without LED:	10 W
with LED:	240 mW
Ambient temperature:	– 25 °C … + 70 °C
Storage and transport temperature:	– 25 °C … + 70 °C
Max. switching frequency:	5 Hz
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	10 … 55 Hz, amplitude 1 mm

Contact variants

1 NO / 2 NC

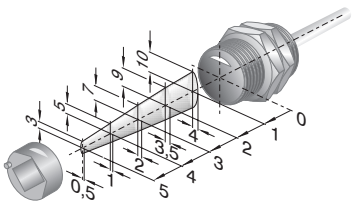


Ordering details

EX-BNS 303-12z①-2187-3G/D

No.	Replace	Description
①		Without LED
	G	With LED

Note



Enabling zone

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

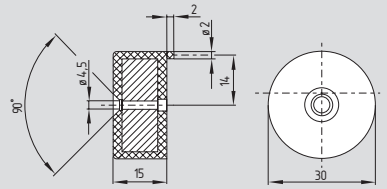
Note

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

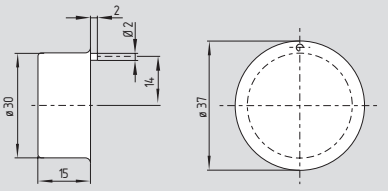
The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is open.

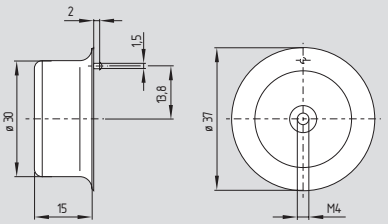
System components



BPS 300



BPS 303

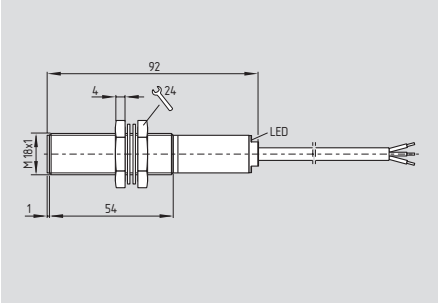


BPS 303 SS

Ordering details

Actuating magnets:	
Thermoplastic	**BPS 300**
Thermoplastic for food processing industry	**BPS 303**
Stainless steel for food processing industry	**BPS 303 SS**

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



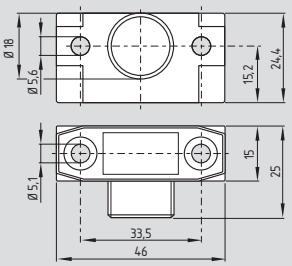
- Ex certified
- Thermoplastic enclosure
- Control Category 4 to EN 954-1
- Classification PDF-M to EN 60947-5-3
- Fit for SIL 3 applications to IEC 61508, PFH value < 6.1 x 10^{-9}
- Electronic contact-free, coded system
- Large switching distance
- Misaligned actuation possible
- High repeat accuracy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

Approvals

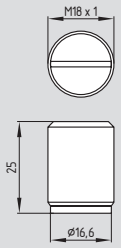
Technical data

Equipment category:	II 3GD
Ex protection:	EEx nA IIC T6 X Ex tD A22 IP67 T70°C X
Standards:	IEC 60947-5-3, EN 954-1, IEC 61508, IEC 61241-1, IEC 60079-15
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP 65 and IP 67
Connection:	cable
Cable section:	7 x 0,25 mm^2
Cable length:	max. 200 m
Mode of operation:	inductive
Actuator:	CST 180-1, CST 180-2
Control 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_n:	8 mm
S_{ao}:	7 mm
S_{ar}:	10 mm
Hysteresis:	≤ 0.7 mm
Repeat accuracy R:	≤ 0.2 mm
Response time:	< 30 ms
Duration of risk:	≤ 30 ms
U_e:	24 VDC – 15 % / + 10 %
I_e:	1,0 A
I_0:	0,05 A
Leakage current I_r:	≤ 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 per output
U_d:	max. 0.5 V
I_e/U_e:	0.5 A / 24 VDC
Signalling output:	short-circuit proof, p-type
I_e/U_e:	0.05 A / 24 VDC
Utilisation category:	DC-12, DC-13
Ambient temperature:	– 25 °C ... + 40 °C
Storage/transport temp.:	– 25 °C ... + 85 °C
Switching frequency f:	3 Hz
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	10 ... 55 Hz, amplitude 1 mm

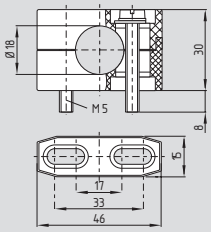
System components



Actuator CST-180-1



Actuator CST-180-2

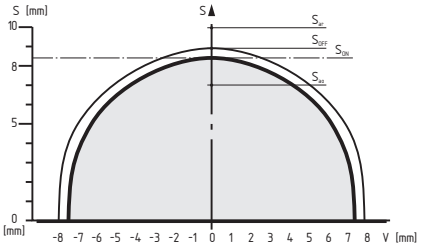


Mounting clamp H 18

Ordering details

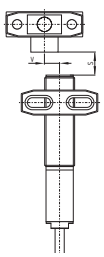
EX-CSS 8-180-2P+D-M-L-3G/D

Note



Legend

S	Switching distance
V	Axial offset
S_{on}	Switch-on point
S_{off}	Switch-off point
S_h	Hysteresis area
S_{ao}	Assured operation point
S_{ar}	Assured release point according to EN 60947-5-3



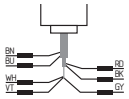
Ordering details

Actuator	**CST-180-1**
Actuator	**CST-180-2**
Mounting clamp	**H 18**

Actuators must be ordered separately.

Connection

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



Pre-wired cable:
2 m length;
cable section 7 poles: 7 x 0,25 mm^2

Wiring

Color	Wiring
N (brown)	A1 Ue
BU (blue)	A2 GND
VT (violet)	X1 safety input 1
WH (white)	X2 safety input 2
BK (black)	Y1 safety output 1
RD (red)	Y2 safety output 2
GY (grey)	diagnostic output

Evaluation

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 ot 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.

More Details

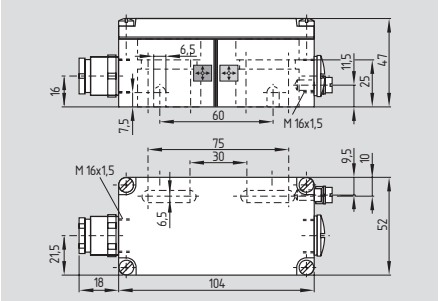
Detailed technical information at:
www.schmersal.com

Magnetic reed switches

Magnetic reed switches are often used to replace mechanically actuated limit switches with plungers, roller and turning levers and as important connecting element for non-contact limit switches.

Index

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



- Ex certified
- Aluminium enlosure
- Long life
- Non-contacting 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 terminal
- Protection class IP 67
- 2 cable entries M16 x 1.5
- Including EX-certified screwed cable gland

Approvals

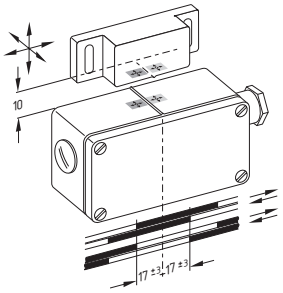
Technical data

Equipment category:	Ⓔx II 3GD
Ex protection:	EEx nC IIC T5 X Ex tD A22 IP67 T90°C X
Standards:	IEC 61241-1 EN 60079-15
Enclosure:	Al Si12 die-casting, painted
Max. impact energy:	4 J
Protection class:	IP 67 to IEC/EN 60529
Termination:	screw terminals
Cable entry:	2x M16 x 1.5
Mode of operation:	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
Switching time “Open”:	max. 0.5 ms
Bounce duration:	0.3 ms ... 0.6 ms
Ambient temperature:	– 15 °C ... + 70 °C
Storage and transport temperature:	– 25 °C ... + 70 °C
Mechanical life:	1 billion 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

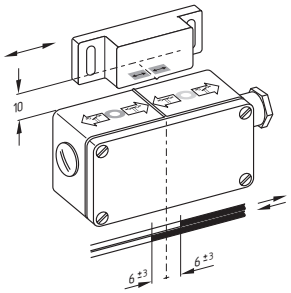
Switching distances, refer to next page.

Contact variants

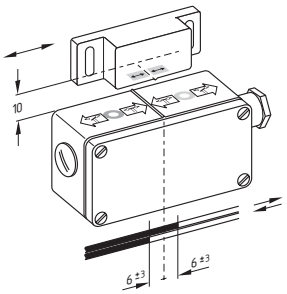
1 NO contact EX-BN 20-10z
1 NC contact EX-BN 20-01z
with N-S actuating magnet BP 20



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

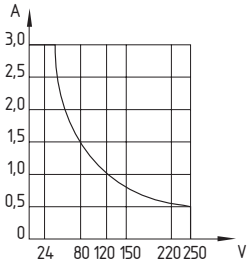


Ordering details

EX-BN 20-①z-3G/D

No.	Replace	Description
①	01	1 NC contact
	02	2 NC contacts
	10	1 NO contact
	20	2 NO contacts
	11	1 change-over contact
	r	1 bistable contact
	2r	2 bistable contacts
	11r	1 bistable change-over contact

Note



Switching capacity

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).

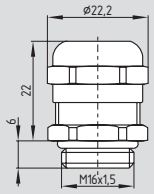
The actuating magnets are not included in delivery.

On the next pages, a range of suitable actuating magnets is presented.

Actuating distances

Actuating magnets	EX-BN 20-10z EX-BN 20-20z EX-BN 20-01z EX-BN 20-02z EX-BN 20-11z	EX-BN 20-rz EX-BN 20-2rz EX-BN 20-11rz
BP 10 N		5
BP 10 S		5
2 x BP 10	12	
2 x BP 10 N		10
2 x BP 10 S		10
BP 15 N		7
BP 15 S		7
2 x BP 15/2	12	
2 x BP 15/2 N		15
2 x BP 15/2 S		15
BP 34 N		10-25
BP 34 S		10-25
BP 20	15	
BP 20 N		15
BP 20 S		15
BP 31	15	
BP 31 N		15
BP 31 S		15
BP 11	15	
BP 11 N		5
BP 11 S		5
2 x BP 11 N		15
2 x BP 11 S		15
BP 12	25	
BP 12 N		10
BP 12 S		10
2 x BP 12 N		5-20
2 x BP 12 S		5-20
BP 21	20-45	
BP 21 N		10-35
BP 21 S		10-35
2 x BP 21 N		15-50
2 x BP 21 S		15-50

System components

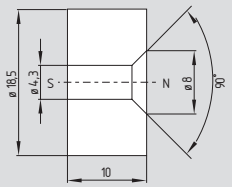


EX-certified screwed cable gland

Ordering details

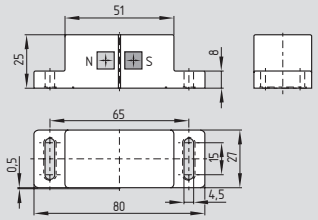
EX-certified screwed cable gland	**EX-KLE-M161,5**

System components



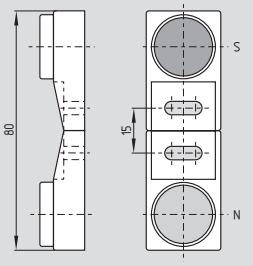
BP 10

System components

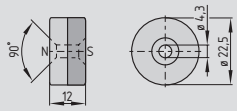


BP 20

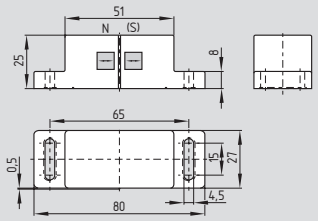
System components



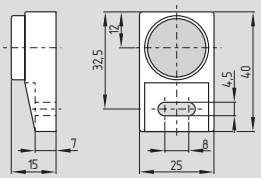
BP 11



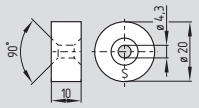
BP 15



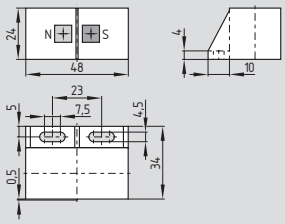
BP 20 N / BP 20 S



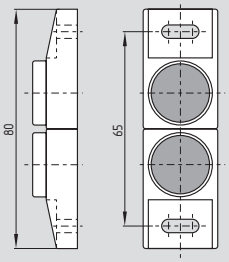
BP 11 N / BP 11 S



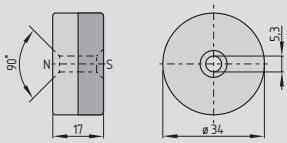
BP 15/2



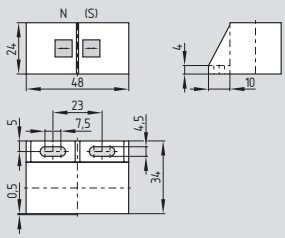
BP 31



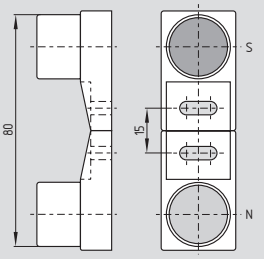
2x BP 11 N / 2x BP 11 S



BP 34



BP 31 N / BP 31 S



BP 12

Ordering details

Actuating magnet	
Unenclosed, N-S	**BP 10**
thermoplastic enclosure, N-S	**BP 15**
Unenclosed, N-S	**BP 15/2**
thermoplastic enclosure, N-S	**BP 34**

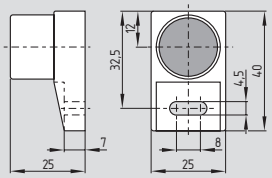
Ordering details

Actuating magnet	
metal enclosure, N-S	**BP 20**
metal enclosure Al, N	**BP 20 N**
metal enclosure Al, S	**BP 20 S**
thermoplastic enclosure, N-S	**BP 31**
thermoplastic enclosure, N	**BP 31 N**
thermoplastic enclosure, S	**BP 31 S**

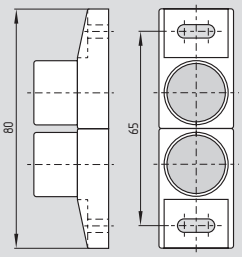
Ordering details

Actuating magnet	
metal enclosure Al, N-S	**BP 11**
metal enclosure Al, N	**BP 11 N**
metal enclosure Al, S	**BP 11 S**
metal enclosure Al, 2x N	**2x BP 11 N**
metal enclosure Al, 2x S	**2x BP 11 S**
metal enclosure Al, N-S	**BP 12**

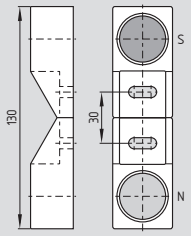
System components



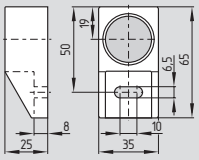
BP 12 N / BP 12 S



2x BP 12 N / 2x BP 12 S

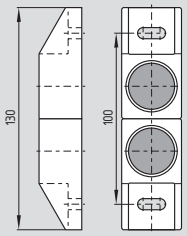


BP 21



BP 21 N / BP 21 S

System components



2x BP 21 N / 2x BP 21 S

Ordering details

Actuating magnet	
metal enclosure Al, N	**BP 12 N**
metal enclosure Al, S	**BP 12 S**
metal enclosure Al, 2x N	**2x BP 12 N**
metal enclosure Al, 2x S	**2x BP 12 S**
metal enclosure Al, N-S	**BP 21**
metal enclosure Al, N	**BP 21 N**
metal enclosure Al, S	**BP 21 S**

Ordering details

Actuating magnet	
metal enclosure Al, 2x N	**2x BP 21 N**
metal enclosure Al, 2x S	**2x BP 21 S**

More Details

Detailed technical information at:
www.schmersal.com

Control devices and indicator lights

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

Index

Control devices and indicator lights

Design
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 heads is in chrome-plated brass. The programme is characterised by large actuating surfaces of at least 28 mm. The material of the button is brass-coated.
The caps or lens covers of the illuminated pushbuttons and indicator lights are in shock-proof thermoplastic. In addition to the high mechanical strength, this material selection permits a more than average degree of resistance to heat and chemical effects.

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

Mechanical protection
The requirements placed on the enclosure or external parts of the enclosure, e.g. the pushbuttons, are defined in the standard EN 60 079-0. The mechanical resistance is tested by means of the shock resistance test, in which the devices must withstand a defined 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 fixation
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.

Grid dimensions
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

Simple electrical apparatus – intrinsic safety

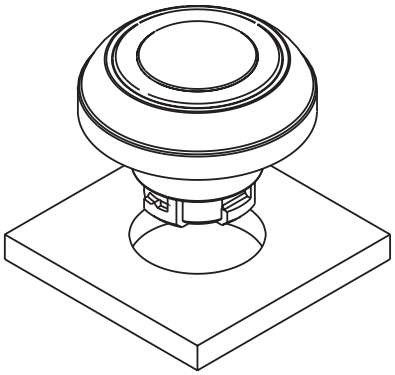
Type	Condition	Example
Passive components	None	Switches, terminal/junction boxes (modular enclosures), resistance, simple semiconductor components
Energy storage	Values must be observed during calculation	Capacitors, coils
Energy source	≤1,5 V ≤100 mA ≤25 mW	Thermocouple, photocell

Mechanical protection to EN 60 079-0

Risk of the mechanical hazard	High		Low	
Group	I	II	I	II
Enclosure and external accessible parts of the enclosure	20 Nm	7 Nm	7 Nm	4 Nm
Translucent parts without safety guard	7 Nm	4 Nm	4 Nm	2 Nm
	No further protective measures required		Mechanically protection fitting	

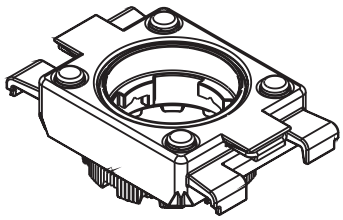
Assembly schema

Pushbutton (illuminated button)

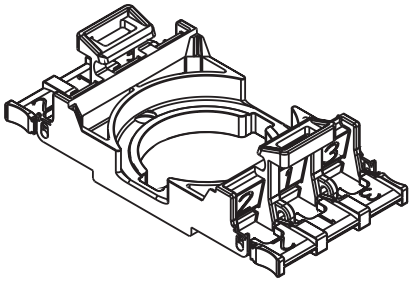


Fixing flange

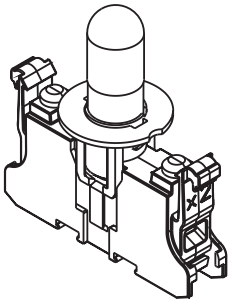
Mounting flange



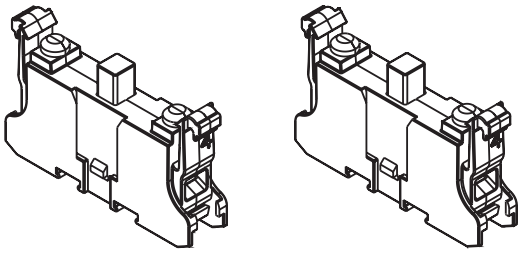
Contact carrier with contact lugs and 2 plunger elements



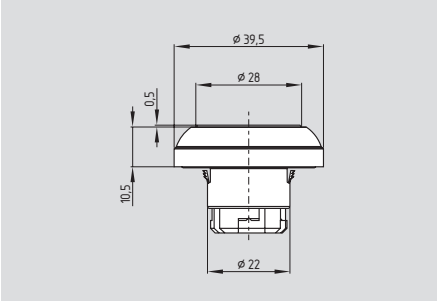
Light element with integrated multi-LED



Contact elements

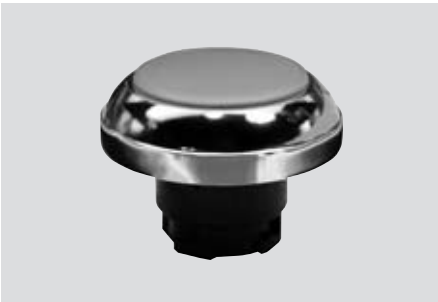


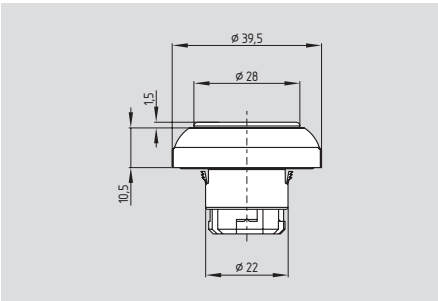
EX-RDT...



• Pushbutton

EX-RDM...





• Pushbutton with membrane

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy (EN 60079-0):	7 J
Design:	round
Installation-ø:	22,3 mm
Grid dimensions:	40 × 50 mm
Front plate thickness:	1 … 6 mm
Mounting position:	random
Designation:	identification plates, symbols
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	–20 °C … + 55 °C
Switching frequency:	1.000 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Membranes:	PC (good resistance to chemical agents)
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for fixation:	2 Nm
Resistance to shock 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:	1×10^6 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

EX-RDT ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

Approvals

⟨Ex⟩ CE

Ordering details

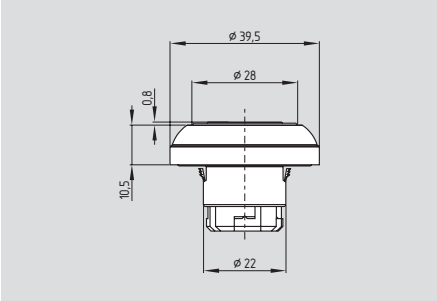
EX-RDM ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

Note

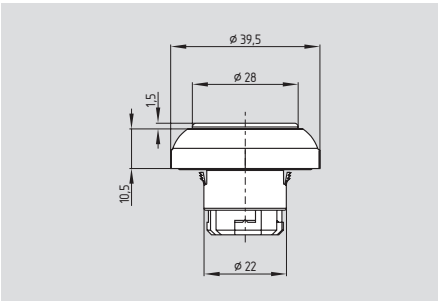
The EX-RLM fixing flange consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements is included in the delivery of the device heads (refer to page 115)

EX-RDL...



• Illuminated pushbutton

EX-RDLM...



• Illuminated pushbutton with membrane

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 ; EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	40 × 50 mm
Front plate thickness:	1 … 6 mm
Mounting position:	random
Designation:	identification plates, symbols
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	–20 °C … + 55 °C
Switching frequency:	1.000 s/h
Protection class to EN 60529:	IP 65
Full insulation	yes
Materials:	
Membranes:	PC (good resistance to chemical agents)
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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. 1,5 N
Mechanical life:	1×10^6 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

EX-RDL ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

Approvals

⟨Ex⟩ CE

Ordering details

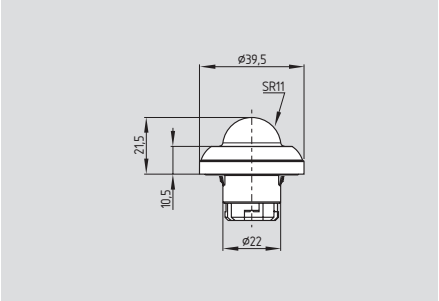
EX-RDLM ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is included in the delivery of the device heads (refer to page115)

EX-RMLH...



• Indicator light with domed cap

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	40 × 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
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Lens covers	PC (good resistance to chemical agents)
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	2 Nm
Resistance to shocks to EN 60068-2-27:	< 50 g
Resistance to vibrations to EN 60068-2-6:	5 g
	Indicator light with domed cap
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

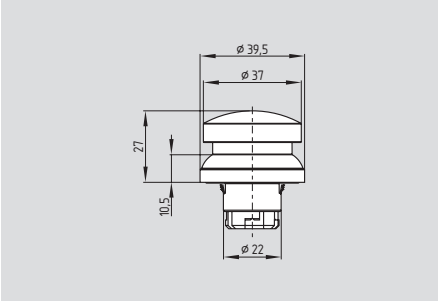
EX-RMLH ① ②

No.	Replace	Description
①	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

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 page115)

EX-RDP40...



• Mushroom button without latching function

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	50 × 60 mm
Front plate thickness:	1 … 6 mm
Mounting position:	random
Designation:	identification plates, symbols
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	–20 °C … + 55 °C
Switching frequency:	1.000 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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:	10×10^6 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

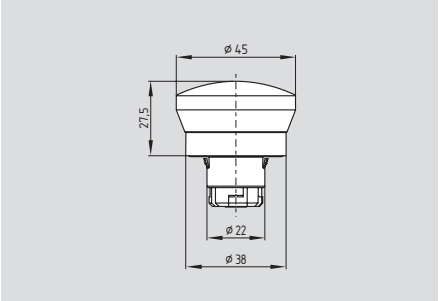
EX-RDP40 ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	rt	red
	gn	green
	ws	white
	bl	blue
②	Identification plate, symbols: refer to page 116	

Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is included in the delivery of the device heads (refer to page115)

EX-RDRZ45...



• Mushroom button with latching function

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X
	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5
	EN 60947-1; EN 61241-1
	EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	50 × 60 mm
Front plate thickness:	1 ... 6 mm
Mounting position:	random
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	–20 °C ... + 55 °C
Switching frequency:	600 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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:	1×10^5 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

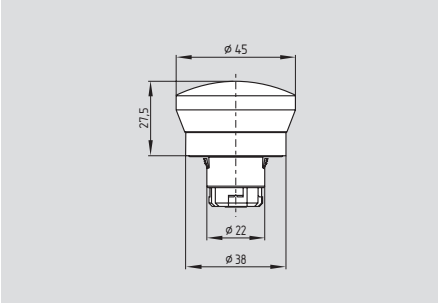
EX-RDRZ45 ① ②

No.	Replace	Description
①	sw	black
	gb	yellow
	gn	green
②	Identification plate, symbols: refer to page 116	

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 page115)

EX-RDRZ45rt



• Emergency stop button to ISO 13850, 2006

Technical data

Equipment category:	Ⓔx II 2GD
Ex protection:	Ex e ib IIC T4 X
	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5
	EN 60947-1; EN 61241-1
	EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	50 × 60 mm
Front plate thickness:	1 … 6 mm
Mounting position:	random
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	–20 °C … + 55 °C
Switching frequency:	600 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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:	1×10^5 operations
Rohs conformity:	yes

Approvals

Ⓔx CE

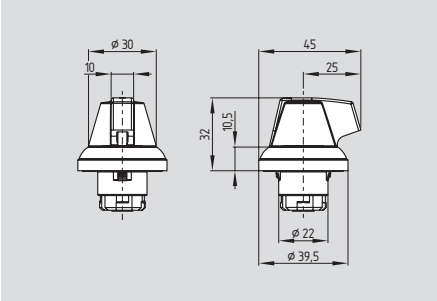
Ordering details

EX-RDRZ45 rt

Note

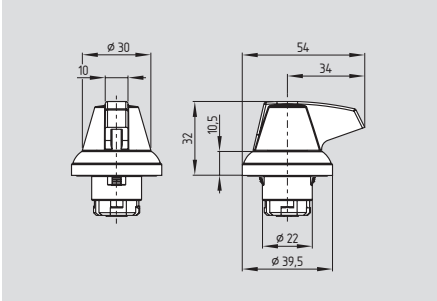
The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is not included in the delivery of the device heads (refer to page115)

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 e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	50 × 60 mm
Front plate thickness:	1 … 6 mm
Mounting position:	random
Designation:	identification plates, symbols
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	0 °C … + 55 °C
Switching frequency:	1.000 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
knob:	PC (good resistance to chemical agents)
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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:	3×10^5 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

EX-RW① ②

No.	Replace	Description
①	T	Spring-return rotary selector switch with 2 positions
	S	Selector switch with 2 latched positions
	ST	Selector switch pushbutton with 3 positions
	TS	Maintained spring-return rotary selector switch with 3 positions
②	21	2 positions
	32	3 positions

Approvals

⟨Ex⟩ CE

Ordering details

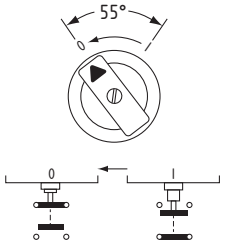
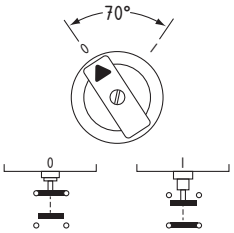
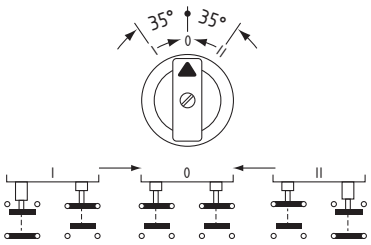
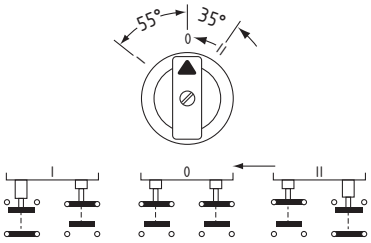
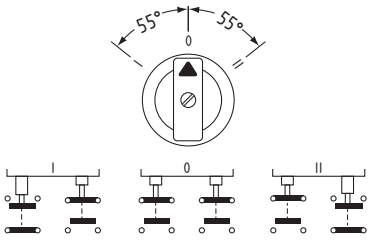
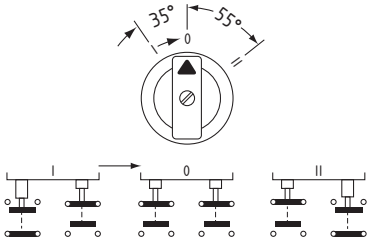
EX-RW① ②.1

No.	Replace	Description
①	T	Spring-return rotary selector switch with 2 positions
	S	Selector switch with 2 latched positions
	ST	Selector switch pushbutton with 3 positions
	TS	Maintained spring-return rotary selector switch with 3 positions
②	21	2 positions
	32	3 positions

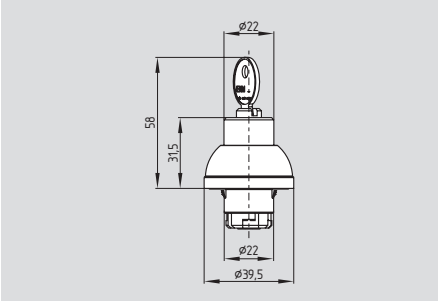
Note

The EX-RLM fixing flange, consisting of mounting flange, contact carrier with contact lugs and 2 plunger elements, is included in the delivery of the device heads (refer to page115)

Control devices and indicator lights

Brief description	Switching angle		Type
Spring-return rotary selector switch with 2 positions	1 × 55°		EX-RWT 21 EX-RWT 21.1
Selector switch with 2 latched positions	1 × 70°		EX-RWS 21 EX-RWS 21.1
Maintained spring-return rotary selector switch with 3 positions	2 × 35°		EX-RWT 32 EX-RWT 32.1
Selector switch with 3 positions; right: latching, left: switching	right 35° left 55°		EX-RWST 32 EX-RWST 32.1
Selector switch with 3 positions	2 × 55°		EX-RWS 32 EX-RWS 32.1
Maintained spring-return rotary selector switch with 3 positions, right: switching, left: latching	right 55° left 35°		EX-RWTS 32 EX-RWTS 32.1

EX-RS...



- Key-operated selector switch
- 1, 2 or 3 positions

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5 EN 60947-1; EN 61241-1 EN 60079-0; EN 60079-11
Max. impact energy:	4 J
Design:	round
Installation ø:	22,3 mm
Grid dimensions:	40 × 50 mm 50 × 60 mm (selector switch, impact switch with latching)
Front plate thickness:	1 … 6 mm
Mounting position:	random
Designation:	identification plates, symbols
Climatic resistance to DIN EN 60068:	Part 2-30
Ambient temperature:	0 °C … + 55 °C
Switching frequency:	1.000 s/h
Protection class to EN 60529:	IP 65
Full insulation:	yes
Materials:	
Front ring/buttons:	chrome-plated brass, powder-coated brass
Fixation:	with mounting flange
Max. torque for mounting:	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:	1×10^5 operations
Rohs conformity:	yes

Approvals

⟨Ex⟩ CE

Ordering details

EX-RS①②③S④

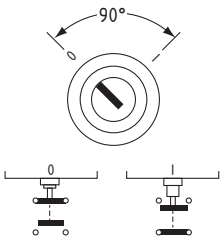
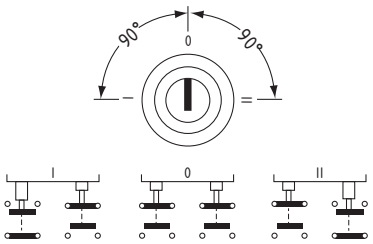
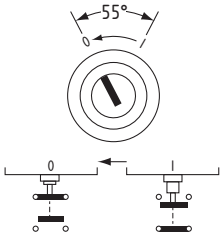
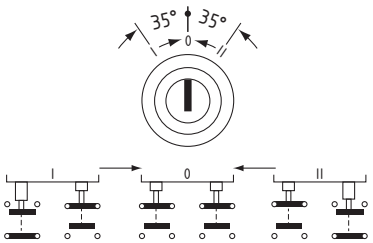
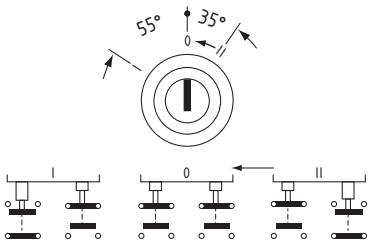
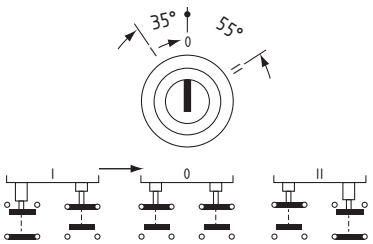
No.	Replace	Description
①	S	Key-operated selector sw
	ST	Key-operated spring-return elector switch
②	2	position of the key
	3	
③	2	number of plungers
	3	
④	1	position for key retraction
	2	
	3	

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 page115)

Control devices and indicator lights

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

Brief description		Key-withdrawal position	Type
Key-operated selector switch with 2 latched positions		only left only right in both positions	EX-RSS21S1 EX-RSS21S2 EX-RSS21S12
Key-operated selector switch with 3 latched positions		left middle right in all 3 positions	EX-RSS32S1 EX-RSS32S2 EX-RSS32S3 EX-RSS32S123
Key-operated spring-return selector switch with 1 touch position, automatic return to the zero position, latch position 55°		only left	EX-RST21S1
Key-operated spring-return selector switch with 2 touch positions left and right, automatic return to the zero position		only middle	EX-RST32S2
Key-operated selector switch pushbutton, touch position 35°, latch position 55° – left switching, right latching		S1 = only left S2 = only middle	EX-RSST32S1 EX-RSST32S2
Key-operated selector switch pushbutton with 3 positions, touch position 35°, latch position 55° – left switching, right latching		S2 = only middle S3 = only right	EX-RSTS32S2 EX-RSTS32S3
Spare key EKM 30 for CES lock (for EX-RSS../RST.., standard for the above listed versions)			SDS2

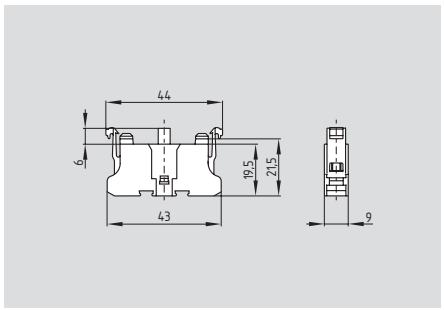
Special locks and master key function available: On request

Contact elements: See page 20

Techncal data: See page 30

2 keys belong to the delivery range of the above listed devices

EX-RF 10...



- NC
- Screw terminals
- Cable sections
  single-strand 2 × (0.5 … 2.5 mm²)
  multi-strand with conductor ferrules
  2 × (0.5 … 1.5mm²)
- Protection class
  terminals: IP 20 (protection against finger contact) Wiring
  compartments: IP 40

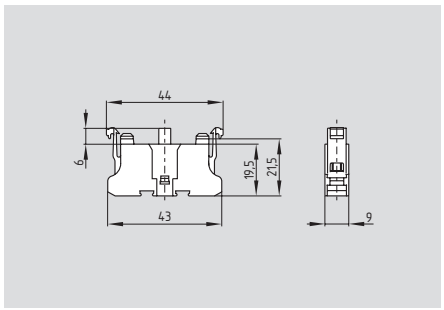
Approvals

Ordering details

EX-RF ①

No.	Replace	Description
①	10	Contact labelling 1,2
	10.1	Contact labelling 11,12

EX-RF 03...



- NO
- Screw terminals
- Cable sections
  single-strand 2 × (0.5 … 2.5 mm²)
  multi-strand with conductor ferrules
  2 × (0.5 … 1.5mm²)
- Protection class
  terminals: IP 20 (protection against finger contact) Wiring
  compartments: IP 40

Approvals

Ordering details

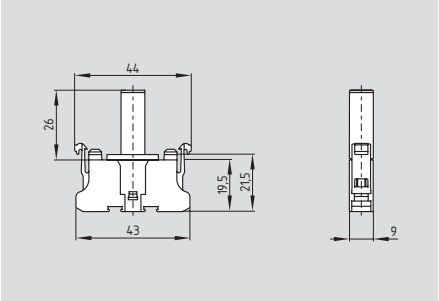
EX-RF ①

No.	Replace	Description
①	03	Contact labelling 3, 4
	03.1	Contact labelling 13, 14

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X
	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5
	EN 61241-1; EN 60079-11
U_i:	250 V
I_i:	Ex ic = 5 A;
	Ex ib = 3,3 A
P_i:	max. 1.500 W
C_i:	~ 0
L_i:	~ 0
U_e max.:	400 V
U_i at pollution degree 3 to EN 60 947-1:	400 V
U_{imp}:	4 kV
I_{th} (in air):	6 A
I_e depending on the utilisation category and U_e:	6 A, AC-15, 250 VAC
	3 A, DC-13, 24 VDC
Contact reliability:	5 VDC/1 mA
Short-circuit protection:	gG 6 A
Proof of positive opening:	2,5 kV impulse voltage
Positive opening path:	approx. 2 mm after achieving opening point
Air clearance and creepage distance to DIN EN 60 664-1:	4 kV/3
Switching frequency:	1.200 s/h
Switching points:	
NC:	approx. 1 mm
NO:	approx. 2,5 mm
Temperature range:	–20° C … + 55° C
Climatic resistance to DIN EN 60 068:	Part 2-20
Mounting position:	random
Mechanical life to EN 60 947-5-1:	10 × 10^6 operations
Actuating force at stroke end:	approx. 4,5 N
Terminal designations:	to EN 60947-1
Tightening torque of the connection terminals:	max. 1 Nm

EX-RLDE ws 24



- Light terminal block
- Screw terminals
- Cable sections
  single-strand 2 × (0.5 … 2.5 mm²)
  multi-strand with conductor ferrules
  2 × (0.5 … 1.5mm²)
- Protection class
  terminals: IP 20 (protection against finger contact) Wiring
  compartments: IP 40

Approvals

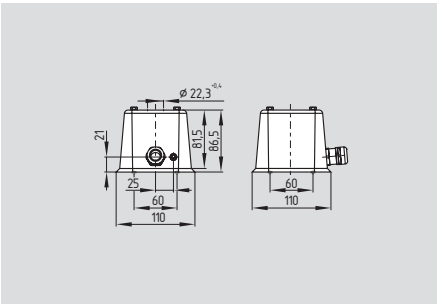
Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	Ex e ib IIC T4 X
	Ex tD A21 IP65 T110°C X
Standards:	EN 60947-5-1; EN 60947-5-5
	EN 61241-1; EN 60079-11
U_i:	24 V
I_i:	not relevant (max. 30 mA)
P_i:	not relevant
C_i:	~ 0
L_i:	~ 0
U_e max.:	24 V
U_i at pollution degree 3 to EN 60947-1:	400 V
U_{imp}:	4 kV
I_{th} (in air):	6 A
I_e depending on the utilization category and U_e:	6 A, AC-15, 250 VAC
	3 A, DC-13, 24 VDC
Contact reliability:	5 VDC/1 mA
LED:	max. 24 V/2 W
Air clearance and creepage distance to DIN EN 60664-1:	4 kV/3
Temperature range with LED (Elan):	–20° C … + 55° C
Climatic resistance to DIN EN 60068:	Part 2-20
Mounting position:	random
Terminal designations:	to EN 60947-1
Tightening torque of the connection terminals:	max. 1 Nm
Contact protection:	existing (to EN 50274 and BGV A2)

Ordering details

EX-RLDE ws 24

EX-EBG 311.O



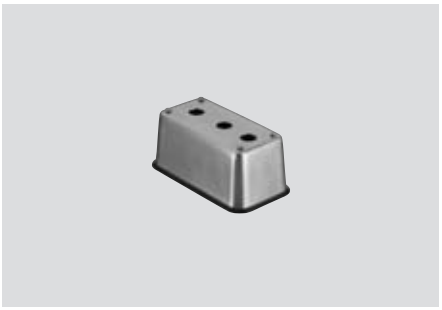
- Empty enclosure in V4A
- Version with 1 fitting hole for installation ø 22.3 mm
- incl. 1 cable gland M20 × 1.5

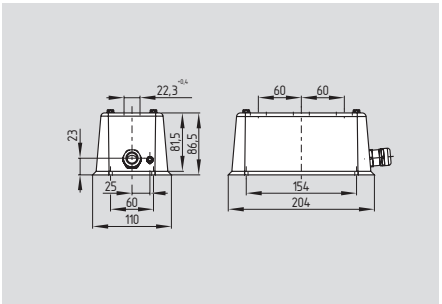
Approvals

Ordering details

EX-EBG 331.O

EX-EBG 633.O





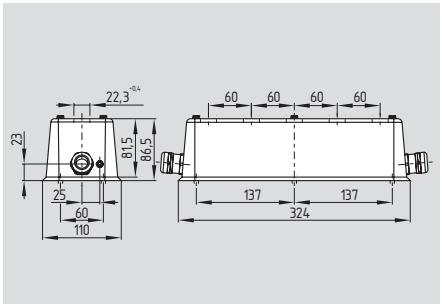
- Empty enclosure in V4A
- Version with 3 fitting holes for installation ø 22.3 mm
- incl. 1 cable gland M25 × 1.5

Approvals

Ordering details

EX-EBG 633.O

EX-EBG 665.O



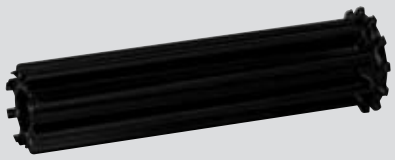
- Empty enclosure in V4A
- Versions with 5 fitting holes for installation ø 22.3 mm
- incl. 2 cable glands M25 × 1.5
- incl. 1 locking screw

Approvals

Ordering details

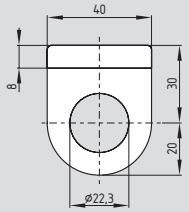
EX-EBG 665.O

System components



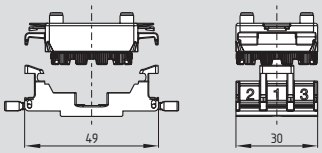
Mounting tool RMW

System components



Identification plate EX-RZSO

Adapter ring EX-RUE



Mounting flange EX-RLM

Ordering details

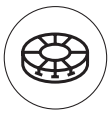
Mounting tool for mounting flange	**RMW**
Adapter ring for use of 22 mm diameter operating heads with 30 mm control devices	**EX-RUE**
Blanking plug	**EX-RB**

Ordering details

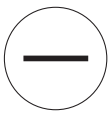
Identification plate	**EX-RZSO**
Mounting flange	**EX-RLM**

Control devices and indicator lights – Symbols

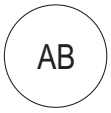
Drives

 **401** Electric motor	 **402** Pump general	 **403** Gear pump	 **405** Coolant
 **406** Oil lubrication	 **407** Rotary indexing table	 **408** Shuttle table forward	 **409** Backwards
 **410** Brake fan	 **411** Caution – live	 **412** Clamp table rectangular	 **413** Electrical machine

Signals

 **501** On	 **502** Jog	 **503** Automatic	 **504** Off
 **505** Everything off	 **506** On – off	 **507** Increase of a variable	 **508** Decrease of a variable
 **509** Pause (time elapse)	 **510** Manual operation	 **511** Visual	 **512** Hydraulics

Words

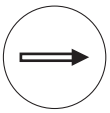
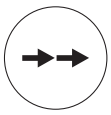
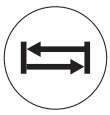
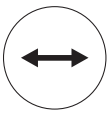
 **513**	 **514**	 **515**	 **516**
 **517**	 **518**	 **519**	 **520**
 **521**	 **522**	 **523**	 **524**

Letters

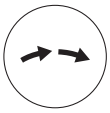
 **901**	 **902**	 **903**	 **904**

Control devices and indicator lights – Symbols

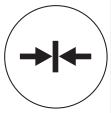
Linear motion

 **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*

 **700**	 **701**	 **702**	
 **801**	 **802**	 **803**	

weitere Zahlen lieferbar, z. B. für Zahl 9 Best.-Nr-. 709

More Details

Detailed technical information at:
www.schmersal.net

EX-Trapped key system

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 either

- 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, an essential feature of the system is that the removable key is trapped either in the guard locking device or in the switch lock.

Index

EX-Trapped key system

Functional characteristic

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

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

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 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 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 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.

SHGV/ESS key-operated selector switch

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

SVM solenoid interlock with key-operated selector switch
The SVM solenoid interlock with key-operated switch is used when multiple guards must be operated with one key selector switch.

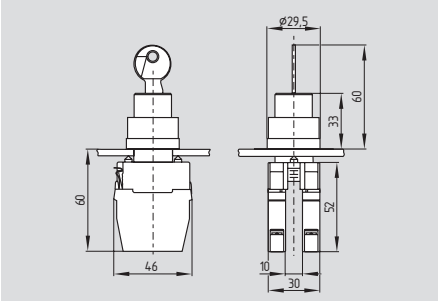
Guard locking device Type SHGV

The design of the Guard locking device 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-SHGV-...-3G/D



- Key-operated selector switch
- Ex certified
- Mounting hole 22.3 mm
- Metal front ring
- Oil and petroleum resistant

Approvals

CE

Technical data

Equipment category:	⟨Ex⟩ II 3GD
Ex protection:	Ex nL IIC T5 X Ex tD A22 IP65 T110°C X
Standards:	IEC 60947-1 IEC 60947-5-1 EN 61241-1 EN 60079-0 EN 60079-15
Mounting hole Ø:	22,3 mm
Front plate thickness:	1.5 … max. 6 mm
Spacing:	50 x 50 mm
Impact energy:	protection must be provided in fitted position
Actuating speed:	max. 1 m/s
Protection class:	Key-operated selector switch: IP 65 Contact element: IP 44
Contact type:	change-over contact with double break, type Zb, with galvanically separated contact bridges, NC contact with positive break
Contact material:	fine silver
Connection:	screw terminals
U_i:	36 VDC
I_i:	100 mA
P_i:	0,9 W
C_i:	~ 0
L_i:	~ 0
Utilisation category:	AC-15, DC-13
I_e/U_e:	6 A / 250 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse to DIN EN 60269-1
Ambient temperature:	0 °C … + 70 °C
Mechanical life:	10 million operations

Contact variants

1 NO / 1 NC

EF 103.1

EF 103.2

Ordering details

EX-SHGV/ESS21S2/①/11033-3G/D

No.	Replace	Description
①	e.g. 201	individual key numbers

Note

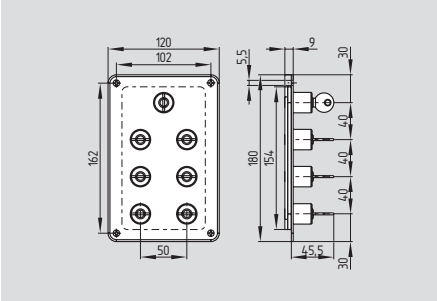
Contact variants

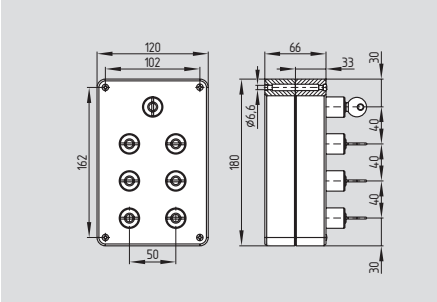
Contact element EF103.1	1 NC / 1 NO
Contact element EF103.2	1 NC / 1 NO

included in delivery.

If more contacts are needed, on request.

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





- Key-operated selector switch interlocking device
- Ex certified
- with 6 keys
- Metal enclosure
- Oil and petroleum resistant
- Metal front plate
- 6 Cylinder lock for solenoid keys SHGV..

Approvals

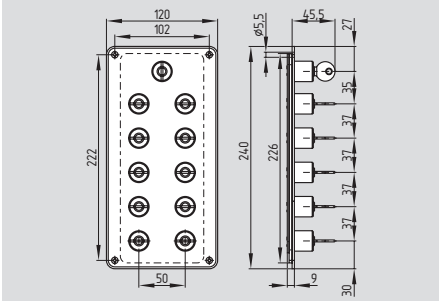
CE

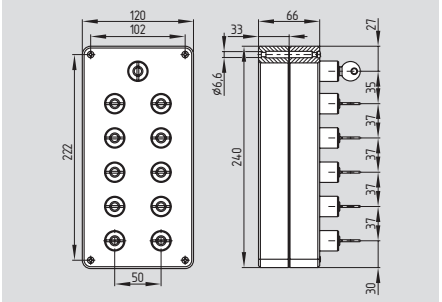
Ordering details

EX-SVM1/①-6②/③-2G/D

No.	Replace	Description
①	e.g. 34	individual key number for main cylinder lock
②	…	individual key number for solenoid key SHGV..
③	A	Enclosure for top mounting
	E	Front plate mounting

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





- Key-operated selector switch interlocking device
- Ex certified
- with 10 keys
- Metal enclosure
- Oil and petroleum resistant
- Metal front plate
- 10 Cylinder lock for solenoid keys SHGV..

Approvals

CE

Ordering details

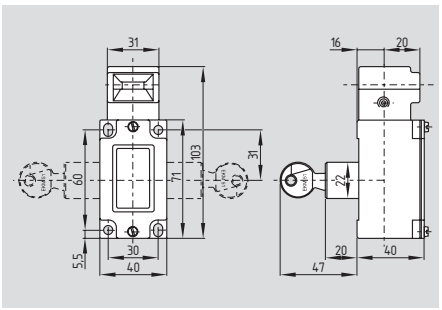
EX-SVM1/①-10②/③-2G/D

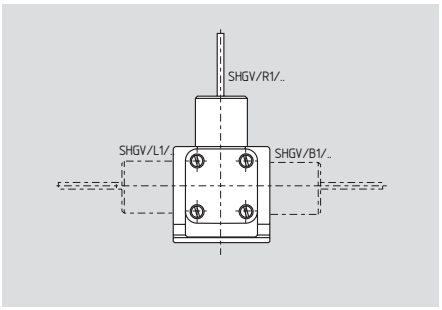
No.	Replace	Description
①	e.g. 34	individual key number for main cylinder lock
②	…	individual key number for solenoid key SHGV..
③	A	Enclosure for top mounting
	E	Front plate mounting

Technical data

Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	c 85°C X
Standards:	EN 13463-1, EN 61241-0
Design:	Enclosure for top mounting or front plate mounting
Material:	Enclosure for top mounting AlSi12 front plate 1.4301
Actuating speed:	max. 1 m/s
Mechanical life:	10 million operations

EX-SHGV-...-2G/D





- Interlock
- Ex certified
- Mounting details to EN 50041
- Metal enclosure
- Oil and petroleum resistant

Approvals

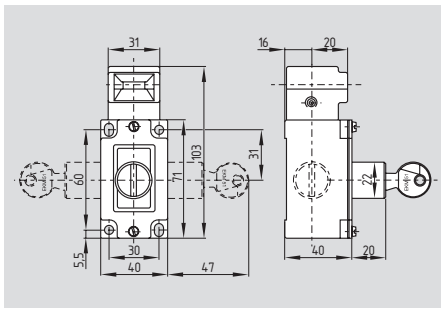
CE

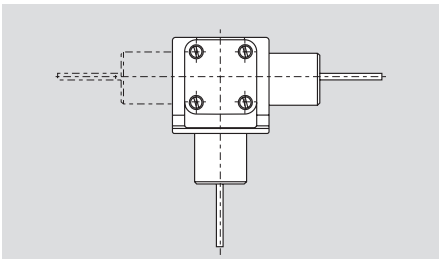
Ordering details

EX-SHGV/①01/②+③-2G/D

No.	Replace	Description
①	B	Cylinder lock on the back
	L	Cylinder lock on LHS
	R	Cylinder lock on RHS
②	e.g. 201	individual key numbers
③	e.g. BO	Actuator range from page 67

EX-SHGV-...-2G/D





- Interlock
- with a second lock barrel

Approvals

CE

EX-SHGV/①D1/②/③+④-2G/D

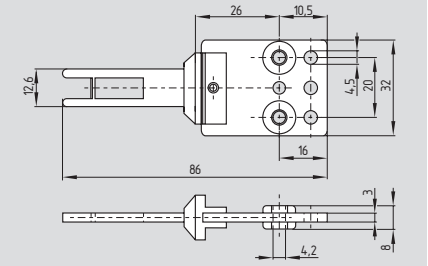
No.	Replace	Description
①	L	Cylinder lock on LHS
	R	Cylinder lock on RHS
②	e.g. 201	individual key number for LHS or RHS cylinder lock
③	e.g. 34	individual key number for second cylinder lock
④	e.g. BO	Actuator range from page 67

Technical data

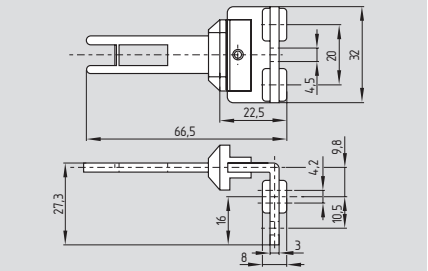
Equipment category:	⟨Ex⟩ II 2GD
Ex protection:	c 85°C X
Standards:	EN 13463-1, EN 61241-0
Design:	fixings to EN 50041
Enclosure:	Al Si12 die-casting, painted
Actuating speed:	max. 1 m/s
Mechanical life:	10 million operations

EX-Trapped key system

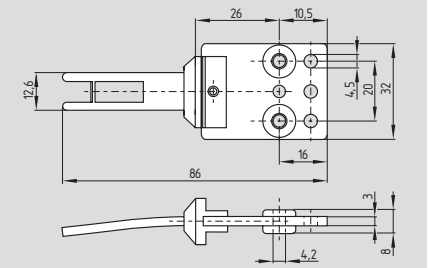
System components



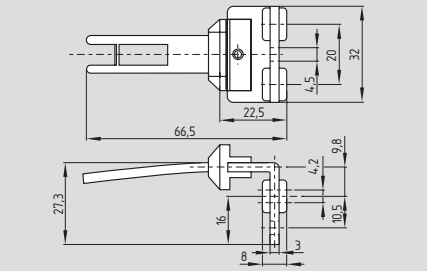
Straight actuator EX-BO



Angled actuator EX-BOW



Straight radius actuator EX-BOR

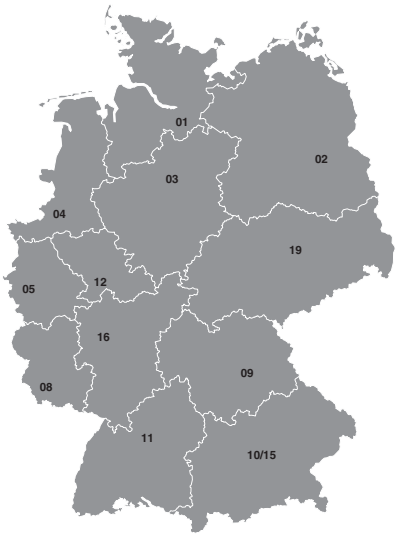


Angled radius actuator EX-BOWR

Ordering details

Straight actuator	**EX-BO**
Angled actuator	**EX-BOW**
Straight radius actuator	**EX-BOR**
Angled radius actuator	**EX-BOWR**

German agencies



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