

**Ex** Explosion protection for ATEX Zones 2 and 22  
Product information | Edition 02



**SCHMERSAL**

 **SCHMERSAL**

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# ATEX Directives

Two Directives basically govern the explosion protection of machinery and plants within the European member states.

- Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994
- Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999

Both Directives are also called the ATEX Directives (ATEX= Atmosphère Explosible).

Whereas the “Manufacturer’s Directive“ 94/9/EC lays down the essential requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres, the industrial safety regulation or Operator’s Directive 1999/92/EC divides the equipment and protective systems which it covers into equipment groups and categories; this Directive provides for a classification by the employer of the places where explosive atmospheres may occur in terms of zones and determines which equipment groups and categories should be used in each zone.

These zones, equipment categories and groups are basically determined as follows:

Flammable material	Zone (99/92/EC)		Group (94/9/EC)	Category (94/9/EC)
Methane, dust	Mining		I	M1
	Mining		I	M2 or M1
Gases, vapours	Zone 0:	The explosive atmosphere is present continuously or for long periods or frequently	II	1G
	Zone 1:	The explosive atmosphere is likely to occur in normal operation occasionally	II	2G or 1G
	Zone 2:	The explosive atmosphere is unlikely to occur in normal operation but, if it does occur, will persist for a short period only	II	3G or 2G or 1G
Dusts	Zone 20:	The explosive atmosphere is present continuously or for long periods or frequently	II	1D
	Zone 21:	The explosive atmosphere is likely to occur in normal operation occasionally	II	2D or 1D
	Zone 22:	The explosive atmosphere is unlikely to occur in normal operation but, if it does occur, will persist for a short period only	II	3D or 2D or 1D

In Zones 0, 1, 20 and 21, only electrical equipment with an approval in the form of an EC-type examination certificate may be used; in Zone 0 however only those products that are explicitly approved for this zone. For electrical equipment intended for use in Zones 2 and 22, compliance with all the essential safety requirements of Directive 94/9/EC as well as a written declaration of conformity from the manufacturer is required.

As one of the largest industrial switchgear manufacturers in the world, the Schmersal Group offers a comprehensive range of safety devices for any application in equipment category 2GD und 3GD from non-contact position switches (magnetic switches) up to safety switches with and without interlocking device for the protection of man.

The product range includes products for equipment categories 3G and 3D. They are suitable for zones 2 and 22. The SHGV trapped key systems meet the requirements of the equipment categories 2G and 2D and therefore are suitable for zones 1 and 21.



# ATEX Marking

Zone 2 :		Zone 22 :	
⊕ II 3G	EEx nC IIC T6 X	⊕ II 3D	Ex tD A22 IP67 T80°C X
⊕	ATEX marking proves that the equipment is suitable for use in potentially explosive atmospheres (Ex zones)	⊕	ATEX marking proves that the equipment is suitable for use in potentially explosive atmospheres (Ex zones)
II	Equipment group	II	Equipment group
3G	Equipment category - Zone 2 (gas and vapour) to IEC 60079-0	3D	Equipment category - Zone 22 (dust) to IEC 61241-0
EEx nC	Contact protection class to IEC 60079-15	Ex tD	Protection by housing (type of protection) to IEC 61241-1
IIC	Explosion protection group	A	Test method to IEC 61241-1
T6	The maximum surface temperature of the equipment may not ignite the potentially explosive atmosphere. The temperature is indicated in temperature classes.	22	Zone 22 equipment
X	Observe special application conditions.	IP67	Protection class to IEC 60529
		T80°C	The maximum surface temperature of the equipment may not ignite the potentially explosive atmosphere. The temperature is indicated in Celsius.
		X	Observe special application conditions.

Because of their low self-heating features, magnetic switches are particularly suitable for use at high ambient temperatures, as they never reach the ignition temperature of the gas or the dust, not even under live conditions.

The following table lists the maximum permitted surface temperature and the corresponding temperature classes:

Temperature classes and maximum permitted surface temperature for electrical equipment of Group II (IEC 60079-0)					
T1	T2	T3	T4	T5	T6
450°C	300°C	200°C	135°C	100°C	85°C

The standardized switches of the series 235 and 335 with metal enclosure are particularly suitable for heavyduty positioning applications of parts or machine axes.

The large variety of actuating heads provides for a flexible application.

The Schmersal Group can even offer a comprehensive programme of safety switches and solenoid interlocks of type 2 (with separate actuator) to protect operators against hazardous machine movements in potentially explosive atmospheres. The large variety of useful accessories allows for a flexible application of these switches under all circumstances.



# Flammable gases, vapours or mists

# Zone 2

**This may apply, amongst other things,  
to the following applications:**

- Printing machines
- Paint-spraying plants
- Fuel stations  
(areas accessible to customers)
- Weaving / Dying factories
- Chemical industry
- Waste processing plants
- Petrochemical industry
- Pharmaceutical industry
- Plastics manufacturers
- Furniture plants

**In Directive 1999/92/EC, zone 2 is defined  
in the following way:**

“A place, 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**”.



# Flammable dusts

# Zone 22

This may apply, amongst other things, to the following applications:

- Grain and corn mills
- Powder coating
- Textile industry
- Chemical industry
- Waste processing plants
- Pharmaceutical industry
- Woodworking machines
- Grain, beans and coffee warehouses

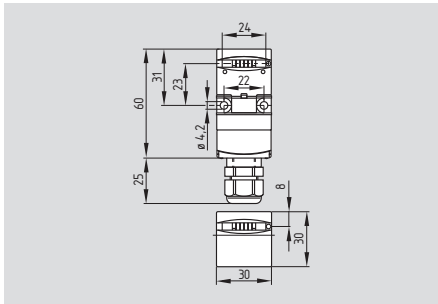
In Directive 1999/92/CE, Zone 22 is defined in the following way:

“A place, in which an explosive atmosphere in the form of a cloud 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**“.



# Safety switch with separate actuator

## EX-AZ 17-...-3D



- Ex certified
- Thermoplastic enclosure
- Small body
- Multiple coding
- Individual coding available on request
- Long life
- Double insulated  $\square$
- 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:  $\text{II}$  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  
 Max. actuating speed: 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:  $\ominus$  IEC 60947-5-1 slow action, NC contact with positive break

Connection: cut clamp terminals (IDC method)

Cable section: 0.75 – 1.0 mm<sup>2</sup>, flexible

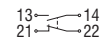
$U_{\text{imp}}$ : 4 kV  
 $U_i$ : 250 V  
 $I_{\text{the}}$ : 10 A  
 Utilisation category: AC-15  
 $I_e/U_e$ : 4 A / 230 VAC  
 Max. fuse rating: 6 A gG D-fuse  
 Positive break travel: 11 mm  
 Positive break force: 17 N for each NC contact fitted

Ambient temperature: – 15 °C ... + 60 °C  
 Mechanical life: > 1 million operations  
 Latching force: 30 N for ordering suffix r

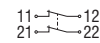
Cable cross-section of the cable glands: min.  $\varnothing$  4 mm max.  $\varnothing$  8 mm

## Contact variants

### 1 NO / 1 NC



### 2 NC



## Approvals



## 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

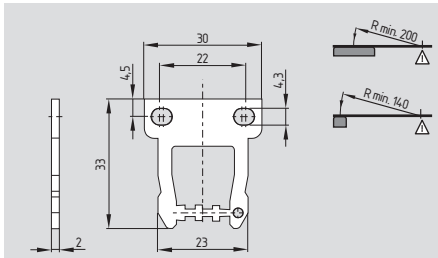
## Note

Actuators must be ordered separately.



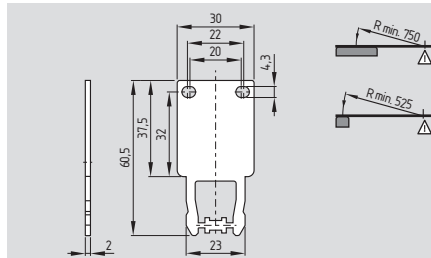
# Safety switch with separate actuator

## System components



**Straight actuator AZ 17/170-B1**

## System components

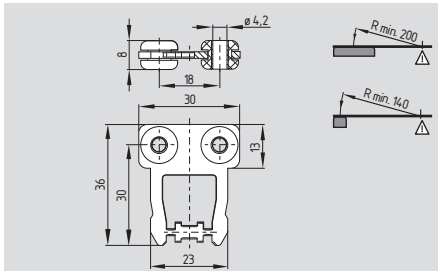


**Long straight actuator AZ 17/170-B11**

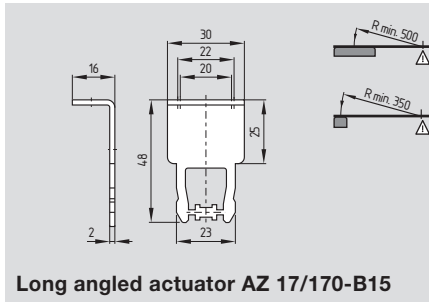
## System components



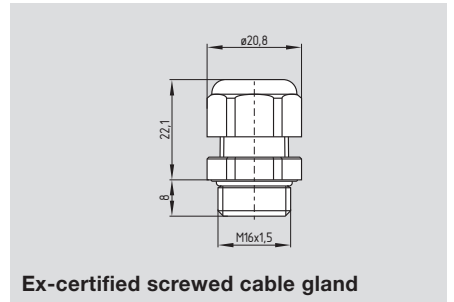
**Tamperproof screws**



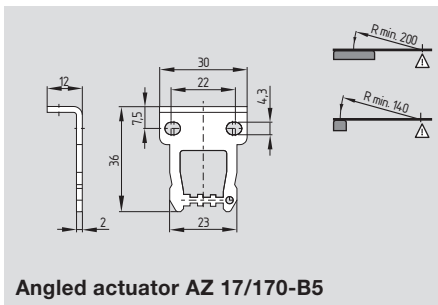
**With rubber mounting AZ 17/170-B1-2245**



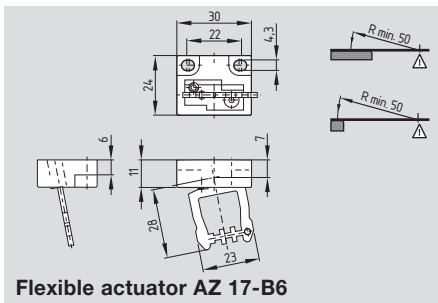
**Long angled actuator AZ 17/170-B15**



**Ex-certified screwed cable gland**



**Angled actuator AZ 17/170-B5**



**Flexible actuator AZ 17-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 **AZ 17-B6**

## Ordering details

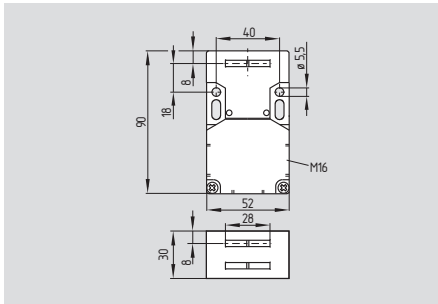
Long straight actuator **AZ 17/170-B11**  
 Long angled actuator **AZ 17/170-B15**

## Ordering details

Tamperproof screws with  
 unidirectional slots M4 x 8  
 (Quantity 2 pcs) **1122641**  
 Ex-certified screwed cable gland **1185045**

# Safety switch with separate actuator

## EX-AZ 16-...-3D



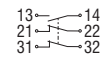
- Ex certified
- Thermoplastic enclosure
- Multiple coding
- Long life
- Double insulated  $\square$
- 3 cable entries M16 x 1.5
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Slotted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

## Technical data

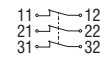
Equipment category:	⊕ II 3D
Ex protection:	Ex tD A22 IP67 T90°C X
Standards:	IEC 60947-5-1 IEC 61241-1 BG-GS-ET-15
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Max. impact energy:	1 J
Max. actuating speed:	1 m/s
Actuator:	stainless steel 1.4301
Protection class:	IP 67 to IEC/EN 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 mm <sup>2</sup> (incl. conductor ferrules)
Cable entry:	3 x M16 x 1.5
U <sub>imp</sub> :	6 kV
U <sub>i</sub> :	500 V
I <sub>the</sub> :	2,5 A
Utilisation category:	AC-15 DC-13
I <sub>e</sub> /U <sub>e</sub> :	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



## Ordering details

### EX-AZ16-①zv②k-③-3D

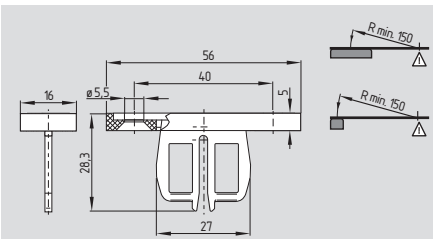
No.	Replace	Description
①	03	3 NC
	12	1 NO / 2 NC
②		Ejection force
	r	Latching force 30 N
③	2254	Latching force 5 N
	1762	Front mounting
	1637	Gold-plated contacts

## Note

Actuators must be ordered separately.

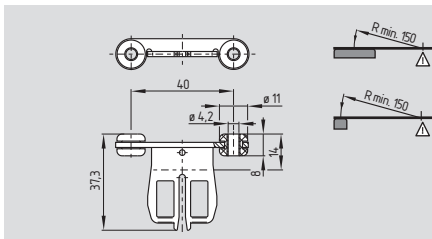
# Safety switch with separate actuator

## System components



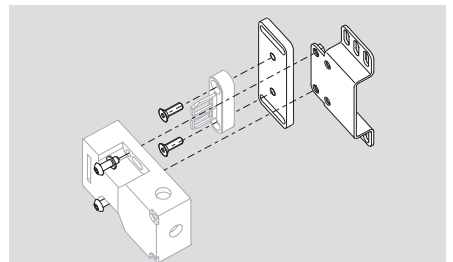
**Straight actuator AZ 15/16-B1**

## System components

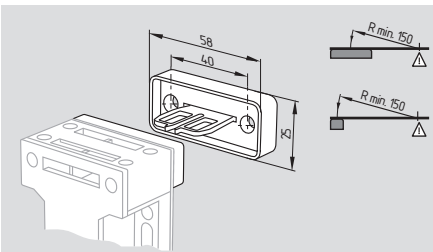


**AZ 15/16-B1-2245 with rubber mounting**

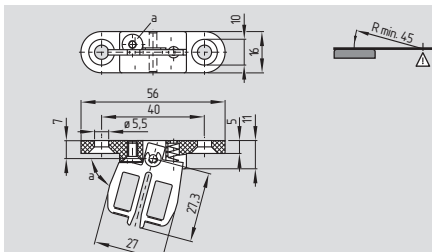
## System components



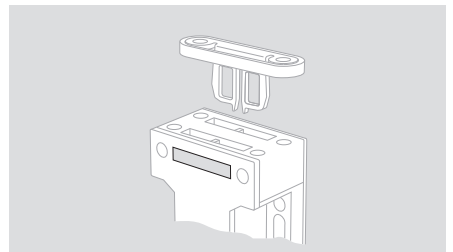
**Mounting set MS AZ 15/16**



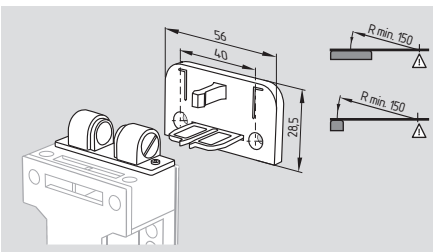
**AZ 15/16-B1-2024 with slot lip-seal**



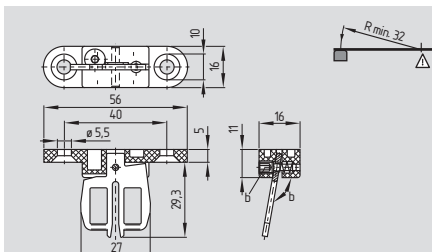
**Flexible actuator AZ 15/16-B2**



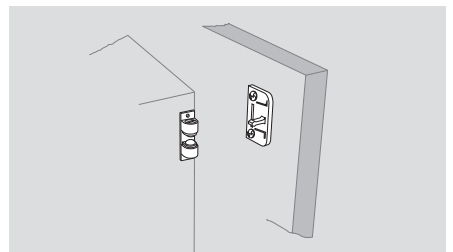
**Slot sealing plug AZ 15/16-1476**



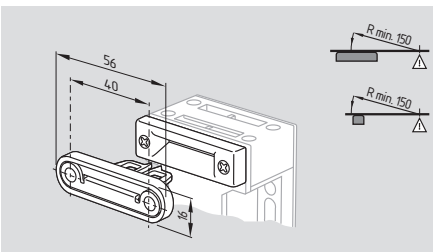
**AZ 15/16-B1-2053 with ball latch**



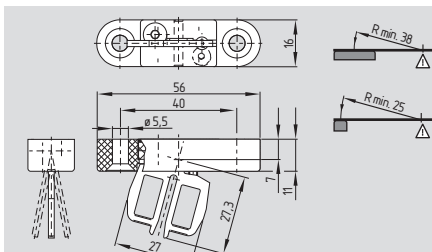
**Flexible actuator AZ 15/16-B3**



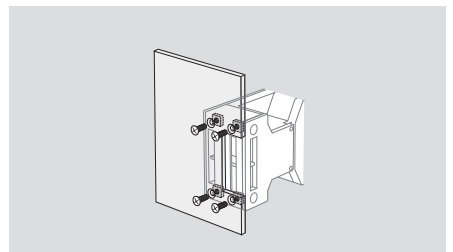
**Ball catch 2053-2**



**AZ 15/16-B1-2177 with centering guide**



**Flexible actuator AZ 15/16-B6**



**Front mounting AZ 15/16-1762**

## Ordering details

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

## Ordering details

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

## Ordering details

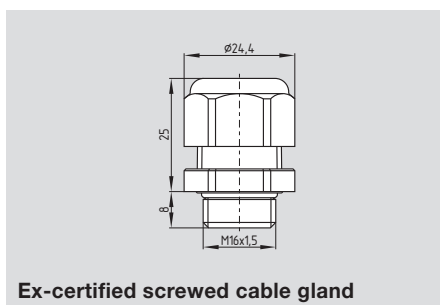
Mounting set                            **MS AZ 15/16**  
Slot sealing plug                      **AZ 15/16-1476**  
Ball catch                                **-2053-2**  
Front mounting with M5 nuts        **-1762**

## Safety switch with separate actuator

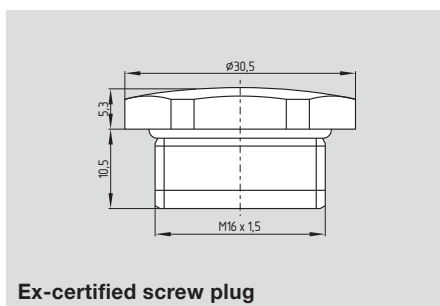
### System components



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**

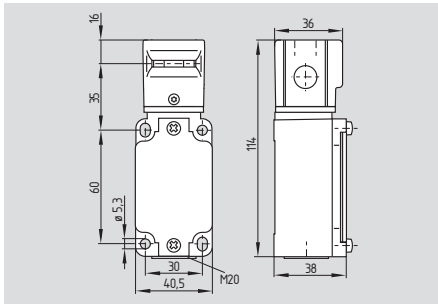
(Quantity 2 pcs)

Ex-certified screwed cable gland **1185046**

Ex-certified screw plug **1185048**

# Safety switch with separate actuator

## EX-AZ 335-...-3D



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

## Technical data

Equipment category:  $\text{II}$  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  
 Max. actuating speed: 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:  $\ominus$  IEC 60947-5-1  
 slow action,  
 NC contact with positive break

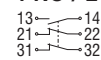
Connection: screw terminals  
 Cable section: max. 1.5 mm<sup>2</sup>,  
 min. 0.75 mm<sup>2</sup>  
 (incl. conductor ferrules)

Cable entry: 1 x M20 x 1.5  
 $U_{imp}$ : 4 kV  
 $U_i$ : 250 V  
 $I_{the}$ : 10 A  
 Utilisation category: AC-15  
 $I_e/U_e$ : 4 A / 230 V  
 Max. fuse rating: 6 A gG D-fuse  
 Positive break travel: 10.7 mm  
 Positive break force: 5 N for each  
 NC contact fitted

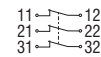
Ambient temperature: -20 °C ... +60 °C  
 Mechanical life: 10 million operations  
 Latching force: 30 N for ordering suffix r  
 Cable cross-section of the cable glands: min.  $\varnothing$  6 mm  
 max.  $\varnothing$  12 mm

## Contact variants

### 1 NO / 2 NC



### 3 NC



## Approvals

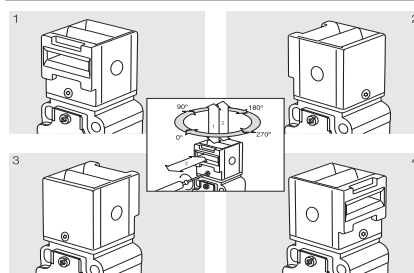


## Ordering details

### EX-AZ 335-①-z②k-③-3D

No.	Replace	Description
①	03	3 NC
	12	1 NO / 2 NC
②	r	Latching force 5 N
	ü	Latching force 30 N
		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.

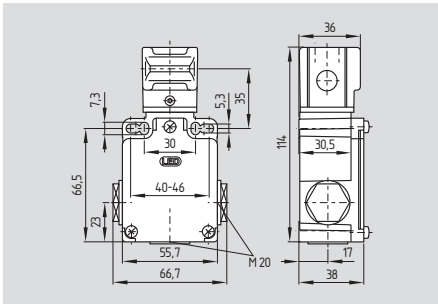
Even when the screw is removed, the head is self-retaining. The switch can still not be tampered.

## Note

Actuators must be ordered separately.

# Safety switch with separate actuator

## 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:  $\text{II}$  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  
 Max. actuating speed: 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

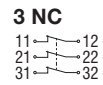
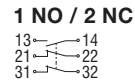
Switching system:  $\ominus$  IEC 60947-5-1 slow action, NC contact with positive break

Connection: screw terminals  
 Cable section: max. 1.5 mm<sup>2</sup>, min. 0.75 mm<sup>2</sup> (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  
 $I_e/U_e$ : 4 A / 230 V  
 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.  $\varnothing$  6 mm max.  $\varnothing$  12 mm

## Contact variants



### Approvals

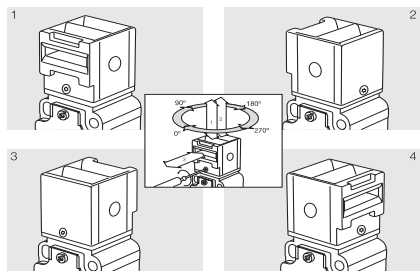


## Ordering details

EX-AZ 355-①-z②k-③-3D

No.	Replace	Description
①	03 12	3 NC 1 NO / 2 NC
②	r ü	Latching force 5 N Latching force 30 N 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.

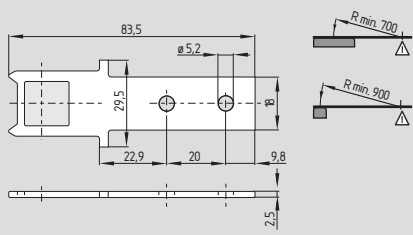
Even when the screw is removed, the head is self-retaining. The switch can still not be tampered.

## Note

Actuators must be ordered separately.

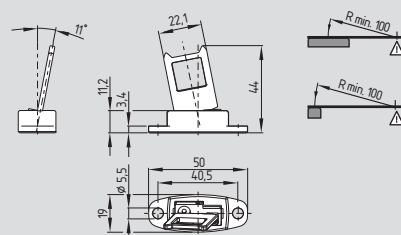
# Safety switch with separate actuator

## System components



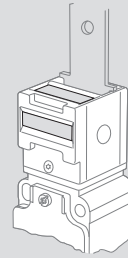
**Straight actuator AZ 335/355-B1**

## System components

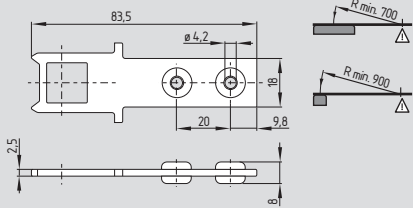


**Flexible actuator AZ 335/355-B6**

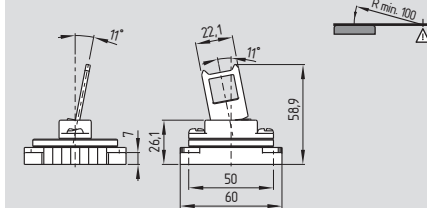
## System components



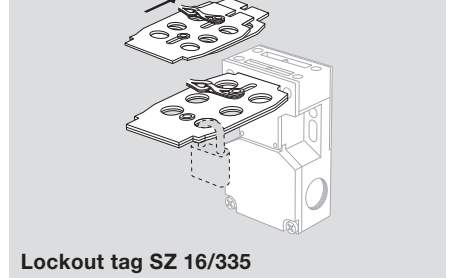
**Slot sealing plug AZ 335/355-1990**



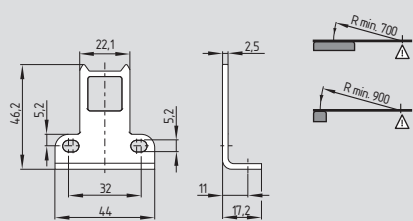
**AZ 335/355-B1-2245 with rubber mounting**



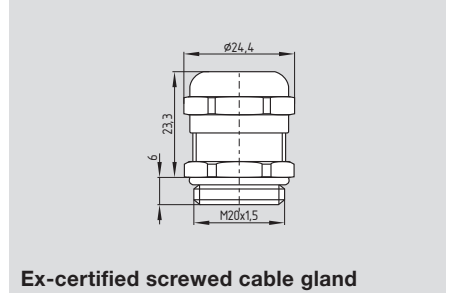
**Flexible actuator AZ 335/355-B6-Flex**



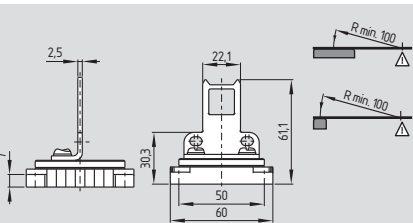
**Lockout tag SZ 16/335**



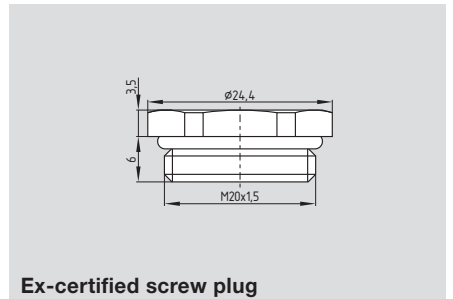
**Angled actuator AZ 335/355-B5**



**Ex-certified screwed cable gland**



**Angled actuator AZ 335/355-B5-Flex**



**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

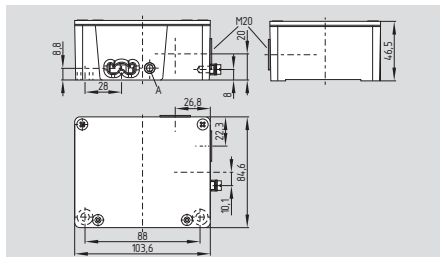
Flexible actuator **AZ 335/355-B6**  
 Flexible actuator **AZ 335/355-B6-Flex**

## Ordering details

Slot sealing plug **AZ 335/355-1990**  
 Lockout tag **SZ 16/335**  
 Ex-certified screwed cable gland **1185057**  
 Ex-certified screw plug **1185059**

# Safety switch with separate actuator

## EX-AZ 415-...-3D



A: Einstellschraube Kugelrastung 30 - 500 N

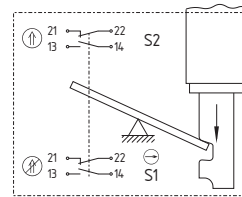
- Ex-Geprüft
- Metal enclosure
- 2 switches with different actuating functions in a single enclosure
- Long life
- High level of contact reliability with low voltages and currents
- Adjustable ball latch to 500 N
- Spring-loaded actuators
- 2 cable entries M20 x 1.5
- Including Ex-certified screwed cable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

## Technical data

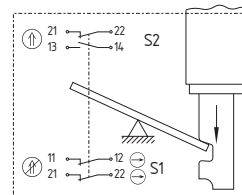
Equipment category: II 3D  
 Ex protection: Ex tD A22 IP67 T60°C X  
 Standards: IEC 60947-5-1  
 IEC 61241-1  
 BG-GS-ET-15  
 Enclosure: light-alloy diecast, paint finish  
 Max. impact energy: 4 J  
 Max. actuating speed: 1 m/s  
 Actuator: zinc-plated brass/aluminium  
 Protection class: IP 67 to 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 mm<sup>2</sup>, min. 0.75 mm<sup>2</sup> (incl. conductor ferrules)  
 Cable entry: 2 x M20 x 1.5  
 U<sub>imp</sub>: 4 kV  
 U<sub>i</sub>: 250 V  
 I<sub>the</sub>: 6 A  
 Utilisation category: AC-15  
 I<sub>e</sub>/U<sub>e</sub>: 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

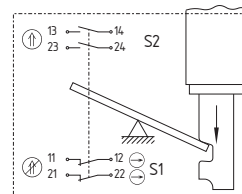
11/11 1 NO / 1 NC  
 1 NO / 1 NC



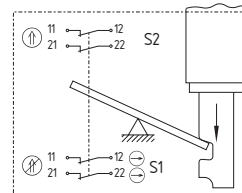
02/11 2 NC  
 1 NO / 1 NC



02/20 2 NO  
 2 NC



02/02 2 NC  
 2 NC



## Approvals



## Ordering details

Ex-AZ 415-①zpk-②-3D

No.	Replace	Description
①		<b>S1 / S2</b>
	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.

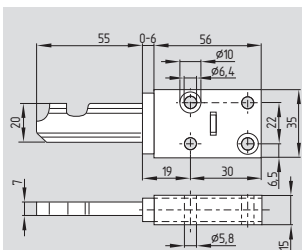
## Note

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

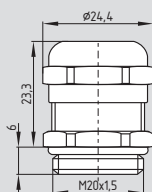


# Safety switch with separate actuator

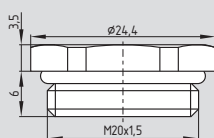
## System components



**Straight actuator AZ/AZM 415-B1**



**Ex-certified screwed cable gland**



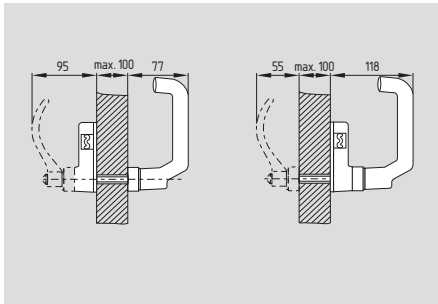
**Ex-certified screw plug**

## Ordering details

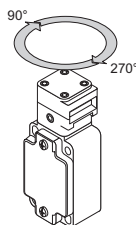
Straight actuator	<b>AZ/AZM 415-B1</b>
Ex-certified screwed cable gland	<b>1185057</b>
Ex-certified screw plug	<b>1185059</b>

# Safety switch with separate actuator

## EX-AZ 3350-...-3D



- Ex-Geprüft
  - 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



## Ordering details

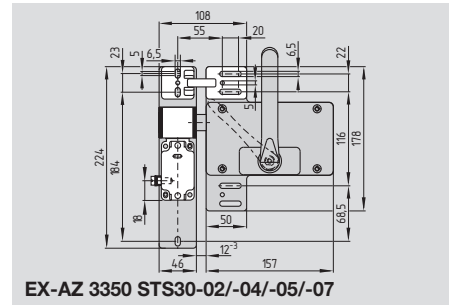
### EX-AZ 3350-①-②-③-3D

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

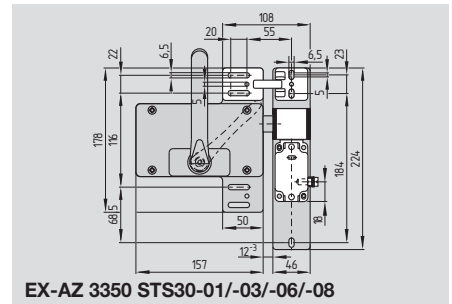
## Technical data

Equipment category:  $\text{II 3D}$   
 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  
 Max. actuating speed: 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:  $\ominus$  IEC 60947-5-1  
 BG-GS-ET-15  
 slow action, NC contact with positive break  
 Termination: screw terminals  
 Cable size: max. 1.5 mm<sup>2</sup> (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  
 $I_e/U_e$ : 4 A / 230 V  
 Max. fuse rating: 6 A gL/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.  $\varnothing$  6 mm  
 max.  $\varnothing$  12 mm

## EX-AZ 3350-ST330-...



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



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

## 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-ST330-02.

## Ordering details

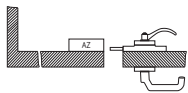
The drawings are always shown with a view to the switch.

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

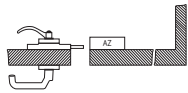
# Safety switch with separate actuator

## System variants

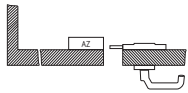
EX-AZ 3350-ST30-01



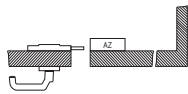
EX-AZ 3350-ST30-02



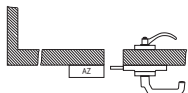
EX-AZ 3350-ST30-03



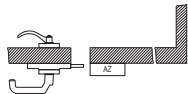
EX-AZ 3350-ST30-04



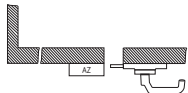
EX-AZ 3350-ST30-05



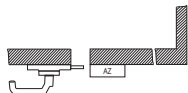
EX-AZ 3350-ST30-06



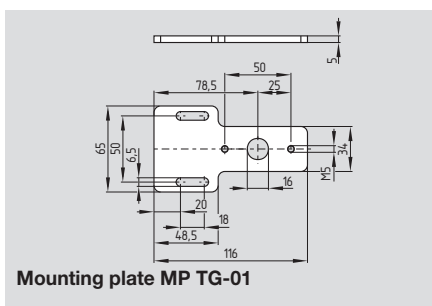
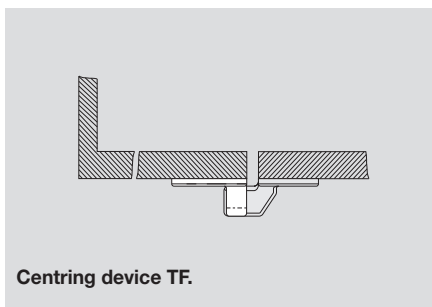
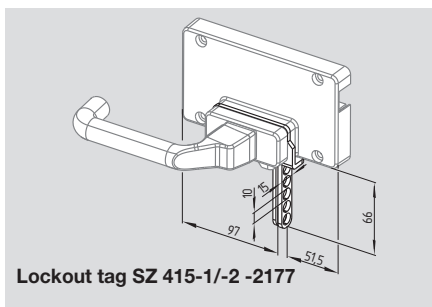
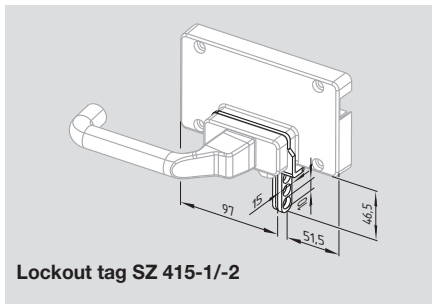
EX-AZ 3350-ST30-07



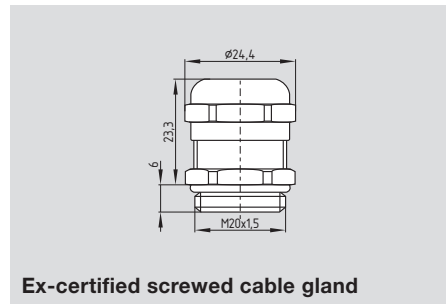
EX-AZ 3350-ST30-08



## System components



## System components



## Ordering details

### Mounting inside

#### with emergency handle

door hinge right EX-AZ 3350-ST30-01  
 door hinge left EX-AZ 3350-ST30-02

#### without emergency handle

door hinge right EX-AZ 3350-ST30-03  
 door hinge left EX-AZ 3350-ST30-04

### Mounting outside

#### with emergency handle

door hinge right EX-AZ 3350-ST30-05  
 door hinge left EX-AZ 3350-ST30-06

#### without emergency handle

door hinge right EX-AZ 3350-ST30-07  
 door hinge left EX-AZ 3350-ST30-08

## Ordering details

### Lockout tag

for ...ST30-01/-03/-06/-08 **SZ 415-1**  
 for ...ST30-02/-04/-05/-07 **SZ 415-2**

### Lockout tag with 5 bore holes

for ...ST30-01/-03/-06/-08 **SZ 415-1-2177**  
 for ...ST30-02/-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".

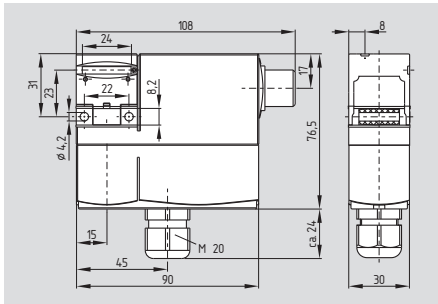
Mounting plate **MP TG-01**

## Ordering details

Ex-certified screwed cable gland **1185057**

# Solenoid interlocks

## 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

## Technical data

Equipment category: Ⓢ 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  
 Max. actuating speed: 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 mm<sup>2</sup>, 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

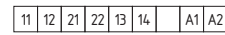
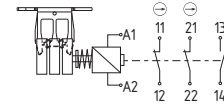
Latching force: 30 N for ordering suffix r

Cable cross-section of the cable glands: min. Ø 6,5 mm  
 max. Ø 12 mm

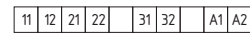
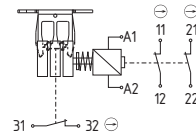
## Contact variants

### Power to unlock

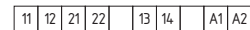
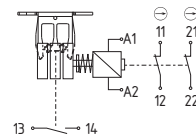
**1 NO 2 NC**  
 (ordering suffix -12/00)



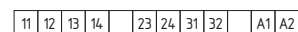
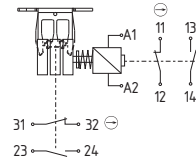
**2 NC / 1 NC**  
 (ordering suffix -02/01)



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



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



## Approvals

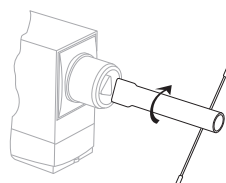


## Ordering details

### 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	r	Latching force 5 N
		Latching force 30 N
③	a	Power to unlock
		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).

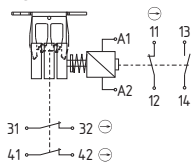
At least one magnetic contact with positive break ⊖ must be integrated in the safety circuit.

Actuators must be ordered separately.

# Solenoid interlocks

## Contact variants

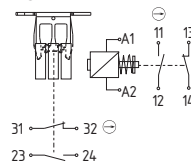
**Power to unlock**  
**1 NO 1 NC / 2 NC**  
**(ordering suffix -11/02)**



11	12	13	14	31	32	41	42	A1	A2
----	----	----	----	----	----	----	----	----	----

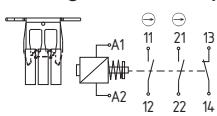
## Contact variants

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



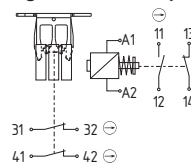
11	12	13	14	23	24	31	32	A1	A2
----	----	----	----	----	----	----	----	----	----

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



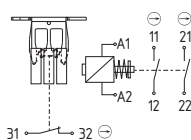
11	12	21	22	13	14	A1	A2
----	----	----	----	----	----	----	----

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



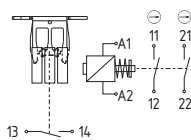
11	12	13	14	31	32	41	42	A1	A2
----	----	----	----	----	----	----	----	----	----

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



11	12	21	22	31	32	A1	A2
----	----	----	----	----	----	----	----

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



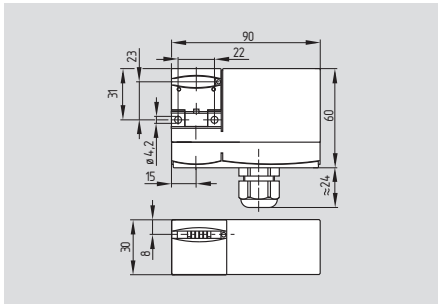
11	12	21	22	13	14	A1	A2
----	----	----	----	----	----	----	----

## 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.

# Solenoid interlocks

## 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  $\square$
- 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

## Technical data

Equipment category:  $\text{II}$  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  
 Max. actuating speed: 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:  $\ominus$  IEC 60947-5-1 slow action, NC contacts with positive break

Connection: cut clamp terminals (IDC method)

Cable section: 0.75 ... 1.0 mm<sup>2</sup>, 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

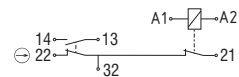
$F_{max}$ : 1000 N

Latching force: 30 N for ordering suffix r

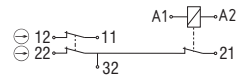
Cable cross-section of the cable glands: min.  $\varnothing$  6,5 mm  
 max.  $\varnothing$  12 mm

## Contact variants

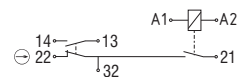
### Power to unlock 1 NO / 1 NC



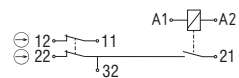
### 2 NC



### Power to lock 1 NO / 1 NC



### 2 NC



## Approvals

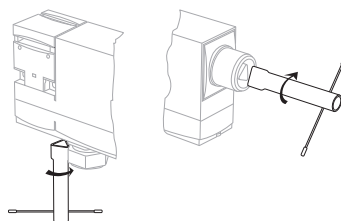


## Ordering details

### EX-AZM 170-①z②k③-24VAC/DC-④-3G/D

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

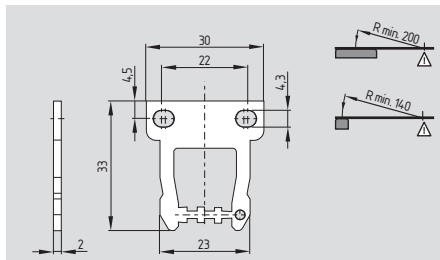
The contact 21-23 is actuated when A1-A2 is energised or de-energised.  
 At least one magnetic contact with positive break  $\ominus$  must be integrated in the safety circuit.  
 Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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.

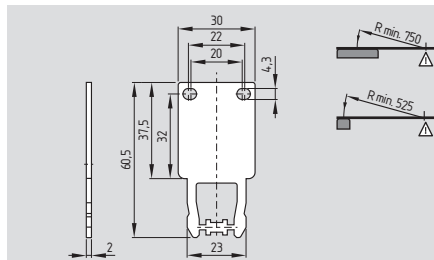
# Solenoid interlocks

## System components



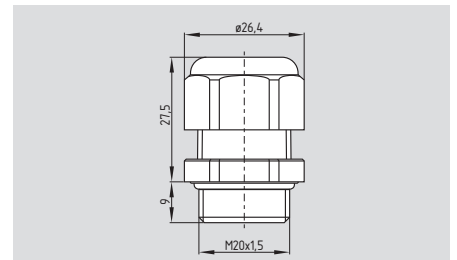
**Straight actuator AZ 17/170-B1**

## System components

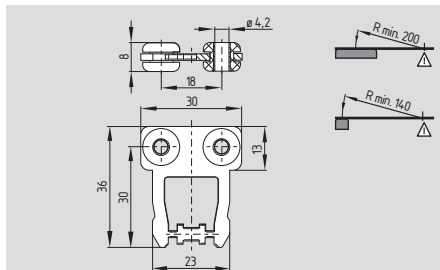


**Long straight actuator AZ 17/170-B11**

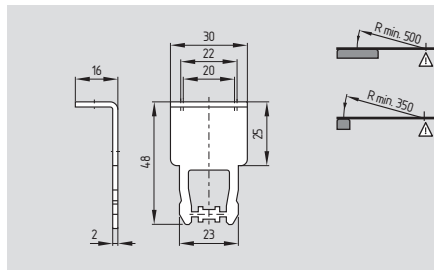
## System components



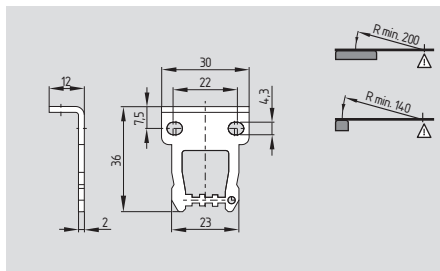
**Ex-certified screwed cable gland**



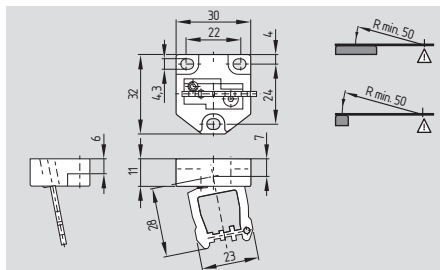
**AZ 17/170-B1-2245 with rubber mounting**



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



**Angled actuator AZ 17/170-B5**



**Flexible actuator AZM 170-B6**

## Ordering details

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

## Ordering details

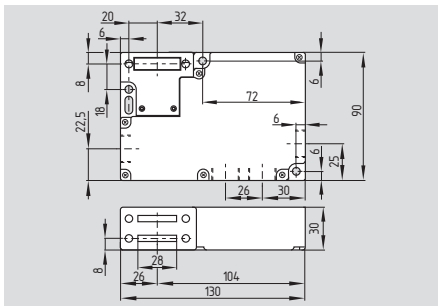
Long straight actuator **AZ 17/170-B11**  
 Long angled actuator **AZ 17/170-B15**

## Ordering details

Ex-certified screwed cable gland **1185047**

# Solenoid interlocks

## EX-AZM 161-...-3D



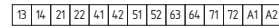
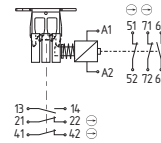
- Ex certified
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release, emergency exit or emergency release
- Long life
- Double insulated
- High holding force 2000 N
- Large wiring compartment
- Power to unlock / Power to lock
- Screw terminals or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

## Technical data

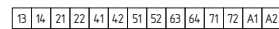
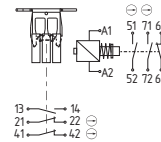
Equipment category: II 3D  
 Ex protection: Ex tD A22 IP67 T80°C X  
 Standards: IEC 60947-5-1  
 IEC 61241-1  
 BG-GS-ET-19  
 Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing  
 Actuator and locking bolt: stainless steel 1.4301  
 Max. impact energy: 1 J  
 Max. actuating speed: 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 mm<sup>2</sup> (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**



## Approvals

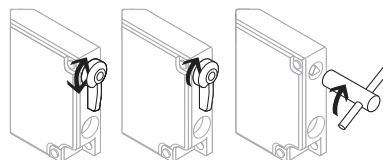


## Ordering details

EX-AZM 161 ①-12/12-②k③④-024-3D

No.	Replace	Description
①	SK CC	Screw terminals Cage clamps
②	r	Latching force 5 N Latching force 30 N
③	a	Power to unlock Power to lock
④	N T	Manual release Emergency release Emergency exit

## Note



### Emergency exit (left)

- For cases of danger
- Actuation from within the hazardous area
- Ordering suffix T

### Emergency release (middle)

- For cases of danger
- Mounting only outside the guarded area
- Ordering suffix N

### Manual release (right)

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

## Note

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

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

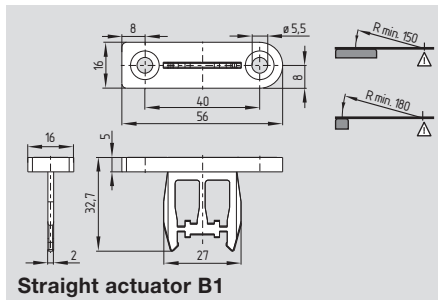
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Actuators must be ordered separately.

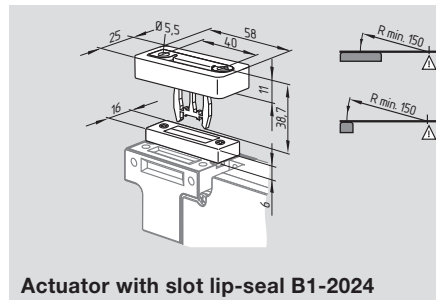


# Solenoid interlocks

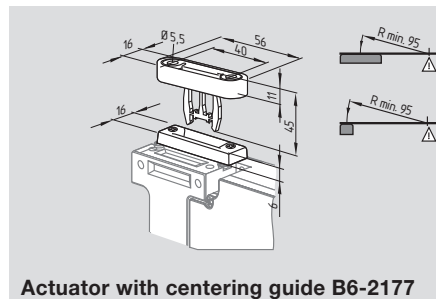
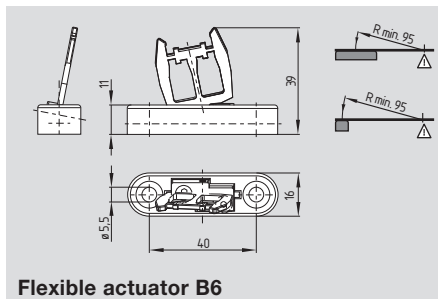
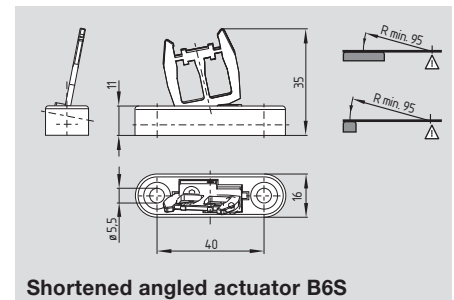
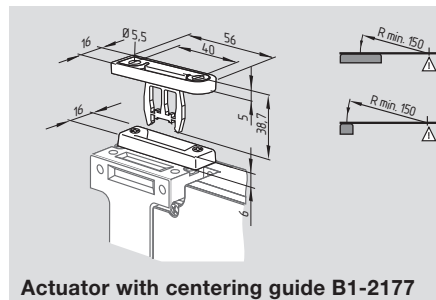
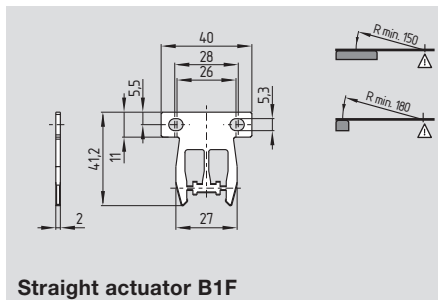
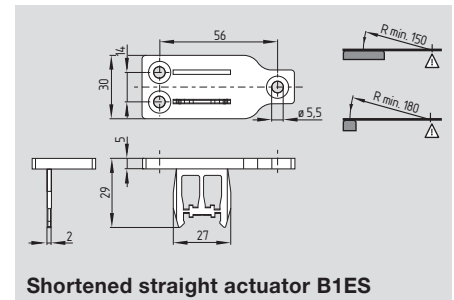
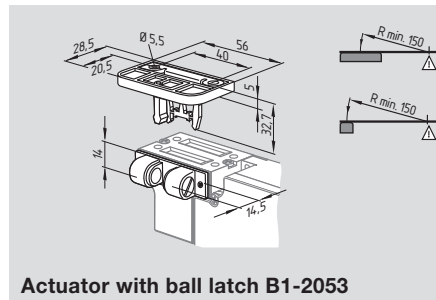
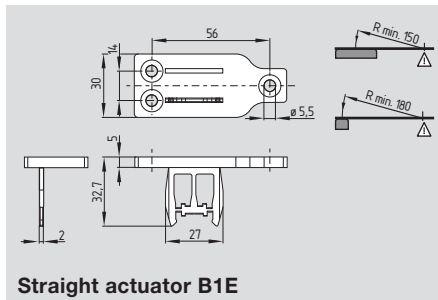
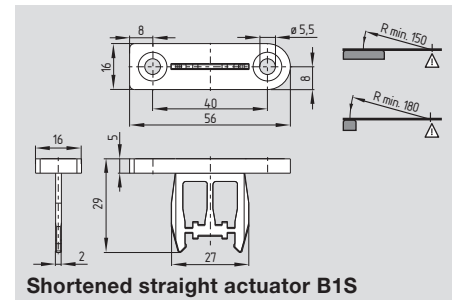
## System components



## System components



## System components



## Ordering details

Straight actuator  
Straight actuator  
Straight actuator  
Flexible actuator

**AZM 161-B1**  
**AZM 161-B1E**  
**AZM 161-B1F**  
**AZM 161-B6**

## Ordering details

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

**AZM 161-B1-2024**  
**AZM 161-B1-2053**  
**AZM 161-B1-2177**  
**AZM 161-B6-2177**

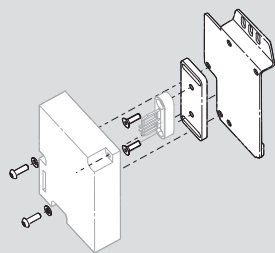
## Ordering details

Shortened straight actuator  
Shortened straight actuator  
Shortened angled actuator

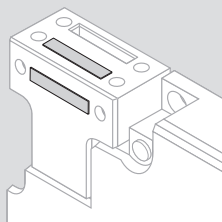
**AZM 161-B1S**  
**AZM 161-B1ES**  
**AZM 161-B6S**

## Solenoid interlocks

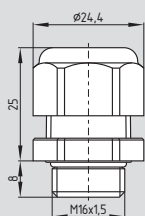
### System components



Mounting set MS AZM 161 P



Slot sealing plug AZM 161

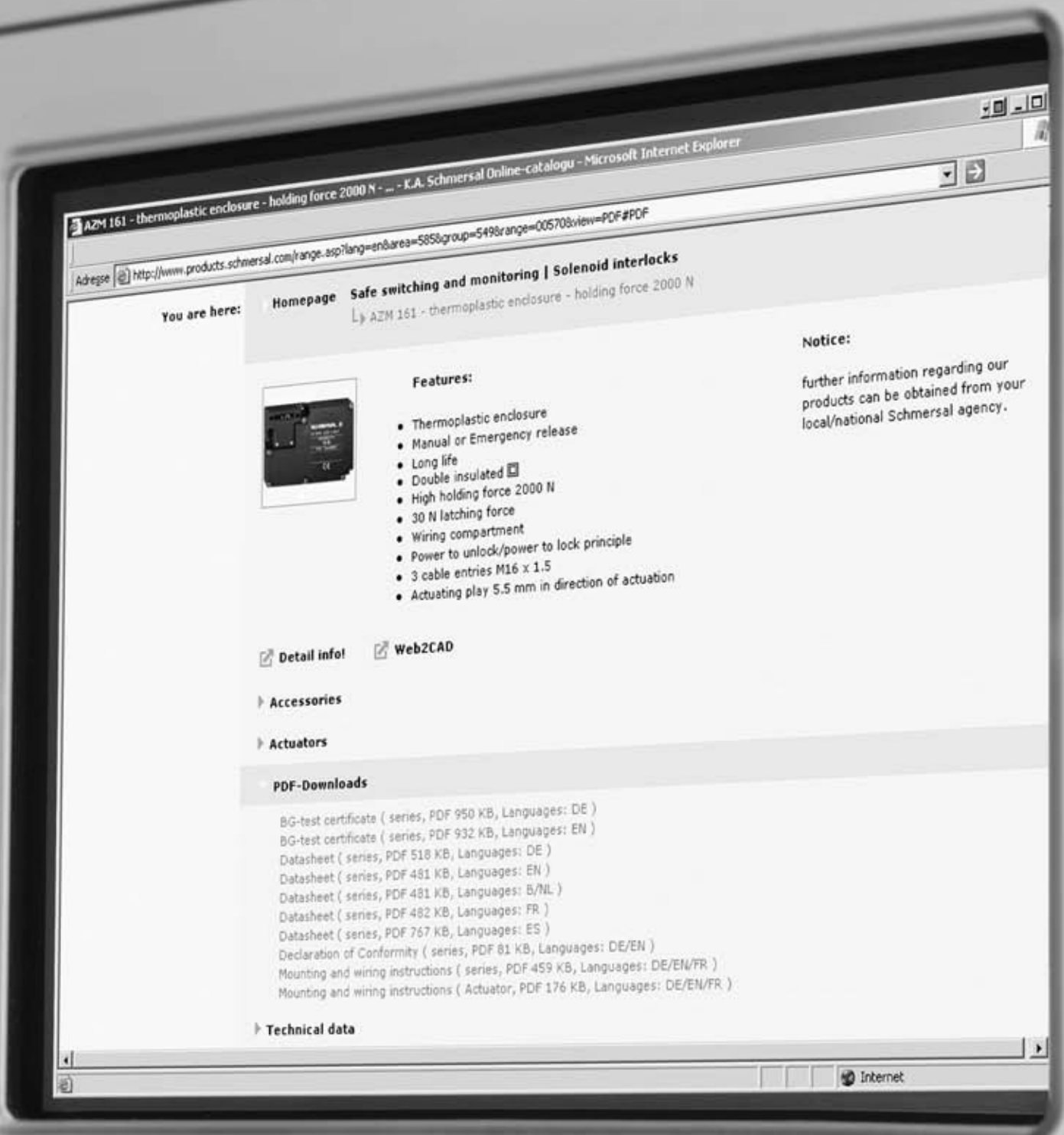


Ex-certified screwed cable gland

### Ordering details

Mounting set	<b>MS AZM 161 P</b>
	<b>MS AZM 161 R/P</b>
Slot sealing plug AZM 161	<b>1145379</b>
Tamperproof screws with unidirectional slots (without drawing)	
M5 x 12	<b>1135338</b>
M5 x 16	<b>1135339</b>
M5 x 20	<b>1135340</b>
(Quantity 2 pcs)	
Ex-certified screwed cable gland	<b>1185046</b>

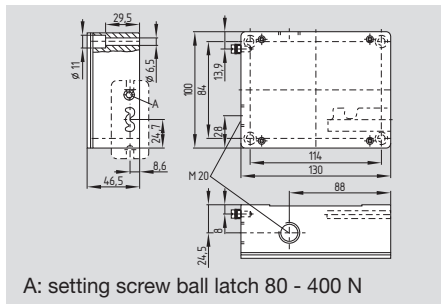
# Download now



Data sheets, mounting and wiring instructions, declaration of conformity and other information at: [www.schmersal.com](http://www.schmersal.com)

# Solenoid interlocks

## EX-AZM 415-...-3D



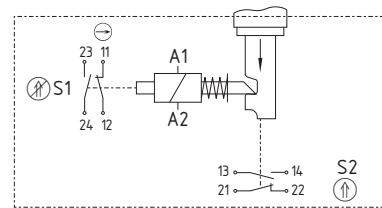
- Ex certified
- Interlock with protection against incorrect locking
- Metal enclosure
- Two switches in one enclosure
- Problem-free opening of stressed doors by means of bell-crank system
- Robust design
- Long life
- High holding force 3500 N
- Adjustable ball latch to 400 N
- Power to unlock / Power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

## Technical data

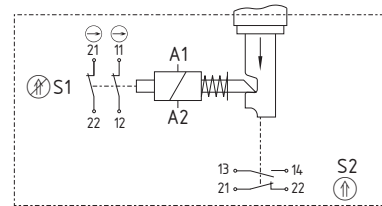
Equipment category:  $\text{II}$  3D  
 Ex protection: Ex tD A22 IP67 T65°C X  
 Standards: IEC 60947-5-1  
 IEC 61241-1  
 BG-GS-ET-19  
 Enclosure: light-alloy die-cast, enamel finish  
 Max. impact energy: 4 J  
 Max. actuating speed: 1 m/s  
 Actuator: zinc-plated brass / aluminium  
 Protection 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:  $\ominus$  IEC 60947-5-1 slow action, NC contacts with positive break  
 Connection: screw terminals  
 Cable section: max. 2.5 mm<sup>2</sup> (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: 80 - 400 N (adjustable)  
 Cable cross-section of the cable glands: min.  $\varnothing$  6 mm max.  $\varnothing$  12 mm

## Contact variants

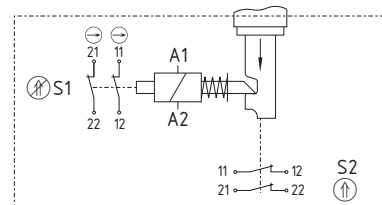
**Power to unlock**  
**11/11 2NC/2NO**



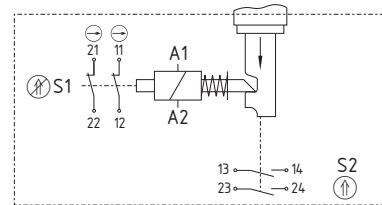
**02/11 3NC/1NO**



**02/02 4NC**



**02/20 2NC/2NO**



## Approvals



## 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	a	Power to unlock
		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.

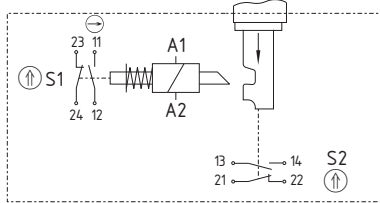
The contacts 11-12 and 23-24 are actuated when the solenoid A1-A2 is energised or de-energised.

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

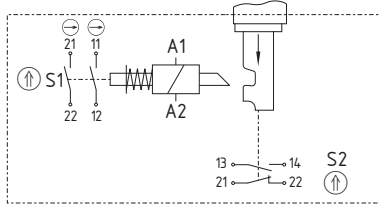
# Solenoid interlocks

## Contact variants

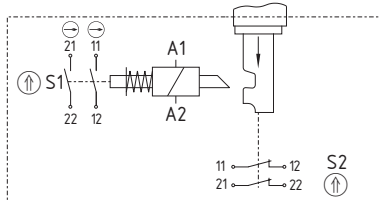
### Power to lock 11/11 2NC/2NO



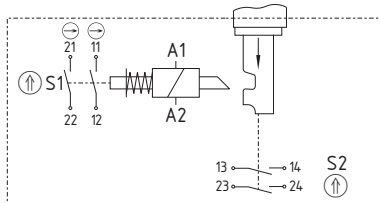
### 02/11 3NC/1NO



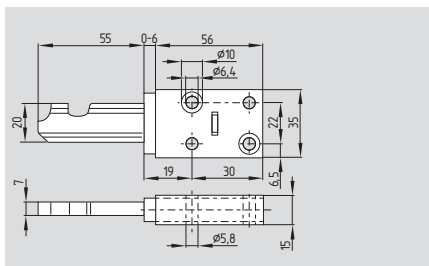
### 02/02 4NC



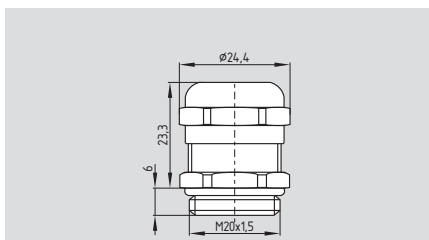
### 02/20 2NC/2NO



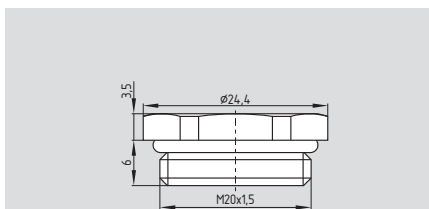
## System components



Straight actuator AZ/AZM 415-B1



Ex-certified screwed cable gland



Ex-certified screw plug

## Note

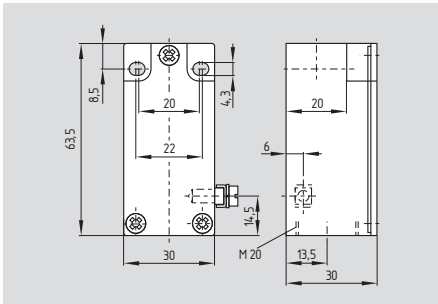
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

## Ordering details

Straight actuator	<b>AZ/AZM 415-B1</b>
Ex-certified screwed cable gland	<b>1185057</b>
Ex-certified screw plug	<b>1185059</b>

# Position switches with safety function

## EX-Z/T 235-...-3D

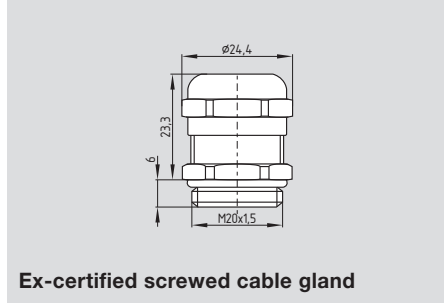


- Ex certified
- Mounting details to EN 50047
- Metal enclosure
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- Wiring compartment
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- 1 cable entry M20 x 1.5
- Including Ex-certified screwed cable gland

## Technical data

Equipment category: 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  
 Max. actuating speed: 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<sup>2</sup>, min. 0.75 mm<sup>2</sup> (incl. conductor ferrules)  
 Cable entry: 1 x M20 x 1.5  
 U<sub>imp</sub>: 6 kV  
 U<sub>i</sub>: 500 V  
 I<sub>the</sub>: 10 A  
 Utilisation category: AC-15, DC-13  
 I<sub>e</sub>/U<sub>e</sub>: 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

## Approvals



## 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 31	
③	02	2 NC
	11	1 NO / 1 NC
	20	2 NO*
④	h	Slow action with staggered contacts
	ü	with overlapping contacts

## Ordering details

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

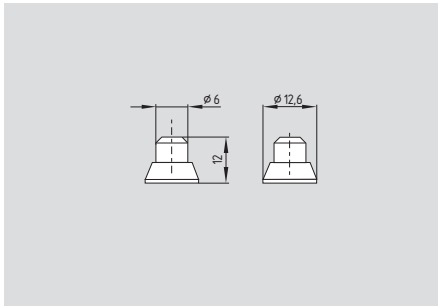
\* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

## Ordering details

Ex-certified screwed cable gland 1185057

# Position switches with safety function

## Plunger S

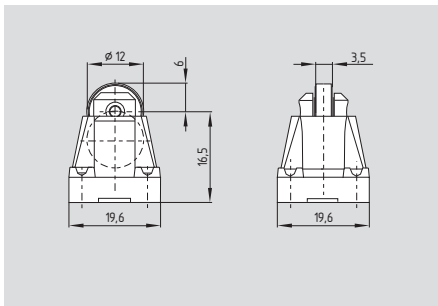


- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis  
 Snap action: Min. 10 mm/min, max. 1 m/s  
 Slow action: Min. 60 mm/min, max. 1 m/s

## Contact variants

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

## Roller plunger R



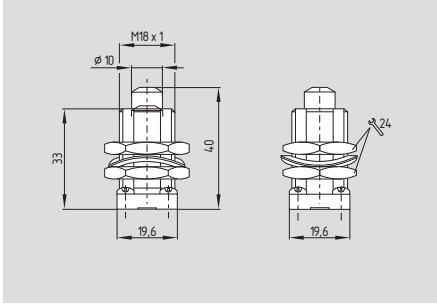
- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 20 mm/min, max. 1 m/s  
 Slow action: Min. 120 mm/min, max. 1 m/s

## Contact variants

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

# Position switches with safety function

## Plunger 4S

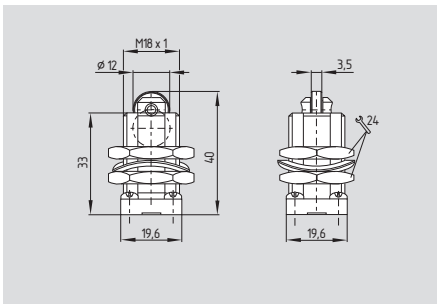


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis  
 Snap action: Min. 10 mm/min, max. 1 m/s  
 Slow action: Min. 60 mm/min, max. 1 m/s

## Contact variants

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

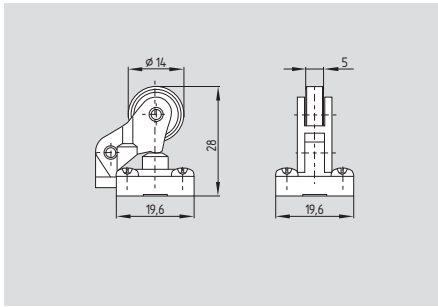
## Contact variants

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



# Position switches with safety function

## Offset roller lever 1R

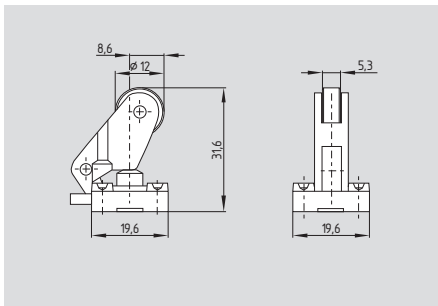


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 27 mm/min, max. 1 m/s  
 Slow action: Min. 160 mm/min, max. 1 m/s

## Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
<b>1 NO</b> <b>1 NC</b>	EX-Z1R 2...-11z-3D 	EX-T1R 2...-11z-3D 	EX-T1R 2...-11zü-3D 	
<b>2 NC</b>	EX-Z1R 2...-02z-3D 	EX-T1R 2...-02z-3D 		
<b>2 NO</b>		EX-T1R 2...-20z-3D 		

## Offset roller lever K



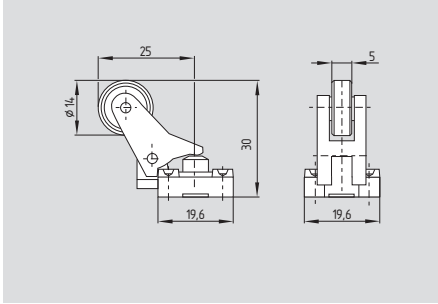
- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 24 mm/min, max. 1 m/s  
 Slow action: Min. 240 mm/min, max. 1 m/s

## Contact variants

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

# Position switches with safety function

## Angle roller lever 3K

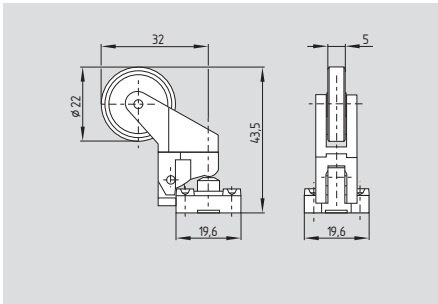


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 27 mm/min, max. 1 m/s  
 Slow action: Min. 160 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235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

## Contact variants

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

## Angle roller lever 4K



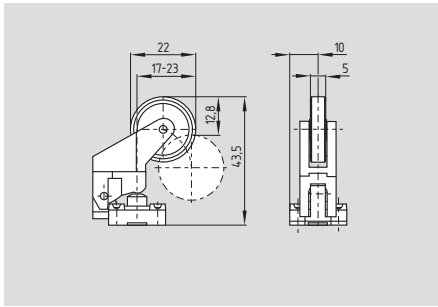
- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 44 mm/min, max. 1 m/s  
 Slow action: Min. 264 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235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

## Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
<b>1 NO</b> <b>1 NC</b>	EX-Z4K 2...-11z-3D 	EX-T4K 2...-11z-3D 	EX-T4K 2...-11zü-3D 	
<b>2 NC</b>	EX-Z4K 2...-02z-3D 	EX-T4K 2...-02z-3D 		EX-T4K 2...-02zh-3D 
<b>2 NO</b>		EX-T4K 2...-20z-3D 		EX-T4K 2...-20zh-3D 

# Position switches with safety function

## Angle roller lever K4

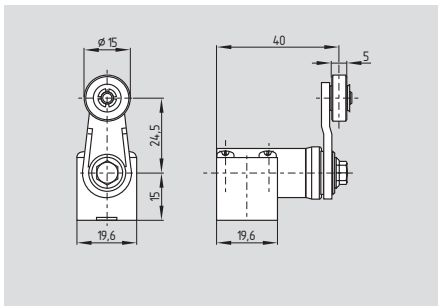


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 56 mm/min, max. 1 m/s  
 Slow action: Min. 336 mm/min, max. 1 m/s

## Contact variants

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

## Roller lever 1H



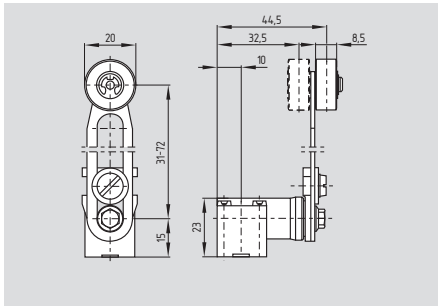
- Plastic lever
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis  
 Snap action: Min. 92 mm/min, max. 1 m/s  
 Slow action: Min. 492 mm/min, max. 1 m/s
- Actuator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

## Contact variants

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

# Position switches with safety function

## Roller lever 7H

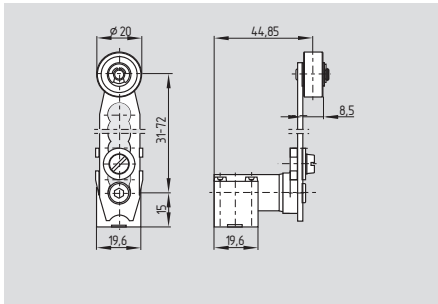


- Only for positioning tasks
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis  
Snap action: Min. 240 mm/min, max. 1 m/s  
Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

## Contact variants

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

## Roller lever 7H-2138



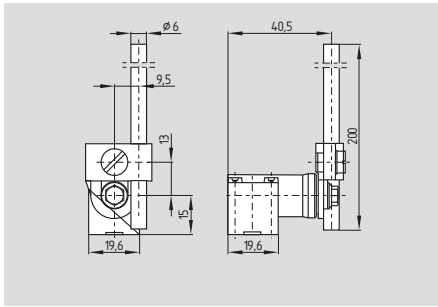
- For safety tasks ⊖, positive break, ordering suffix -2138
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis  
Snap action: Min. 240 mm/min, max. 1 m/s  
Slow action: Min. 1440 mm/min, max. 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
<b>1 NO 1 NC</b>	EX-ZV7H 2...-11z-2138-3D 	EX-TV7H 2...-11z-2138-3D 	EX-TV7H 2...-11zü-2138-3D 	
<b>2 NC</b>	EX-ZV7H 2...-02z-2138-3D 	EX-TV7H 2...-02z-2138-3D 		EX-TV7H 2...-02zh-2138-3D 
<b>2 NO</b>		EX-TV7H 2...-20z-2138-3D 		EX-TV7H 2...-20zh-2138-3D 

# Position switches with safety function

## Rod lever 10H

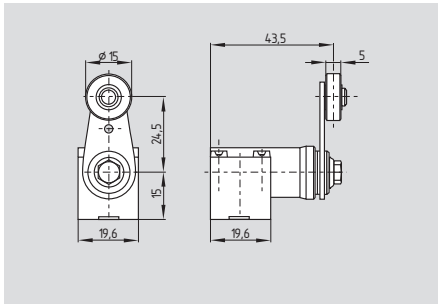


- Only for positioning tasks
- Lever angle adjustable in 10° steps
- Plastic rod
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis  
Snap action: Min. 687 mm/min, max. 1 m/s  
Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z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

## Contact variants

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

## Roller lever 12H



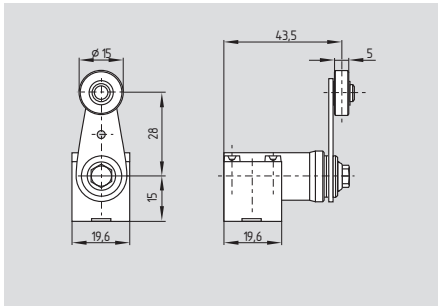
- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis  
Snap action: Min. 687 mm/min, max. 1 m/s  
Slow action: Min. 4122 mm/min, 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
<b>1 NO</b> <b>1 NC</b>	EX-ZV12H 2..-11z-3D 	EX-TV12H 2..-11z-3D 	EX-TV12H 2..-11zü-3D 	
<b>2 NC</b>	EX-ZV12H 2..-02z-3D 	EX-TV12H 2..-02z-3D 		EX-TV12H 2..-02zh-3D 
<b>2 NO</b>		EX-TV12H 2..-20z-3D 		EX-TV12H 2..-20zh-3D 

# Position switches with safety function

## 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
<b>1 NO</b> <b>1 NC</b>	EX-ZV14H 2..-11z-3D 	EX-TV14H 2..-11z-3D 	EX-TV14H 2..-11zi-3D 	
<b>2 NC</b>	EX-ZV14H 2..-02z-3D 	EX-TV14H 2..-02z-3D 		EX-TV14H 2..-02zh-3D 
<b>2 NO</b>		EX-TV14H 2..-20z-3D 		EX-TV14H 2..-20zh-3D 

# More Details



## Position switches with safety function Actuator

Series Z/T 335 - metal enclosure - design to EN 50041



### Features:

- 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
- 1 cable entry M20 x 1.5
- 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

### Z/T 335 Roller lever H

### Features:

- 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

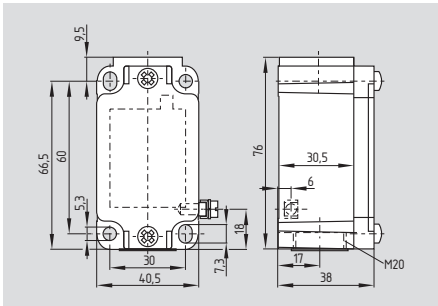
### Technical data

Standards:	IEC/EN 60947-5-1, BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP 67 to EN 60529
Contact material:	silver

Detailed technical information at:  
[www.schmersal.com](http://www.schmersal.com)

# Position switches with safety function

## 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

## Technical data

Equipment category: II 3GD  
 Ex protection: EEx nC IIC T5 X  
 Ex tD A22 IP67 T90°C X

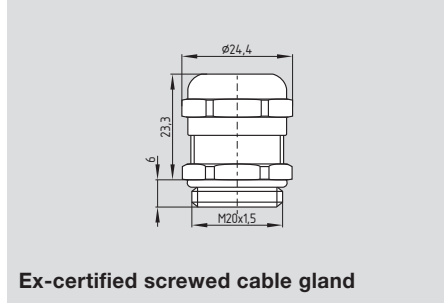
Standards: IEC 60947-5-1  
 IEC 61241-1  
 BG-GS-ET-15  
 Design: DIN EN 50041  
 Enclosure: light-alloy diecast, paint finish

Max. impact energy: 4 J  
 Max. actuating speed: 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<sup>2</sup> (incl. conductor ferrules)  
 Cable entry: 1 x M20 x 1.5  
 U<sub>imp</sub>: 6 kV  
 -03z, -12z: 4kV  
 U<sub>i</sub>: 500 V  
 -03z, -12z: 250 V  
 I<sub>the</sub>: 10 A  
 Utilisation category: AC-15; DC-13  
 I<sub>e</sub>/U<sub>e</sub>: 4 A / 230 VAC  
 1A / 24VDC  
 Max. fuse rating: 6 A gG D-fuse  
 Ambient temperature: - 20 °C ... + 60 °C  
 Mechanical life: 30 million operations  
 Switching frequency: max. 5000/h  
 Bounce duration: snap action: in accordance with actuating speed;  
 slow action: < 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

## Approvals



## 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!

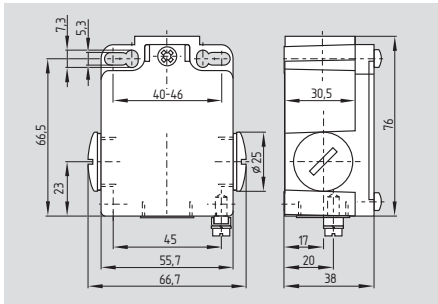
## Ordering details

Ex-certified screwed cable gland 1185057



# Position switches with safety function

## 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

## Technical data

Equipment category:  $\text{II}$  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  
 Max. actuating speed: 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:  $\ominus$  IEC 60947-5-1  
 slow or snap action, NC contacts with positive break

Connection: screw terminals

Cable section: max. 2.5 mm<sup>2</sup> (incl. conductor ferrules)

Cable entry: 3 x M20 x 1.5

$U_{imp}$ : 6 kV

$U_i$ : -03z, -12z: 4kV  
 500 V

$I_{the}$ : 10 A

Utilisation category: AC-15; DC-13

$I_e/U_e$ : 4 A / 230 VAC  
 1 A / 24VDC

Max. fuse rating: 6 A gG D-fuse

Ambient temperature: - 20 °C ... + 60 °C

Mechanical life: 30 million operations

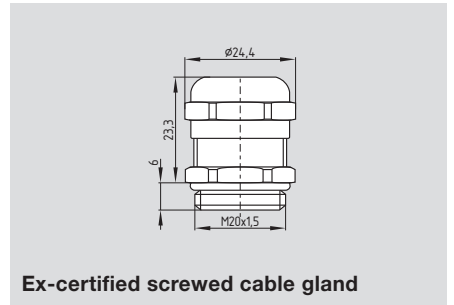
Switching frequency: max. 5000/h

Bounce duration: snap action: in accordance with actuating speed;  
 slow action: < 2ms

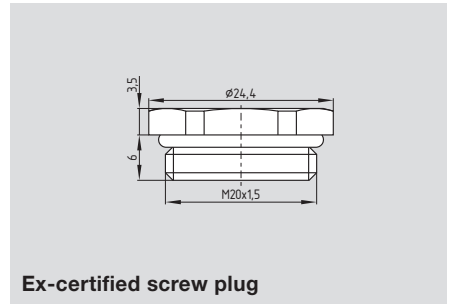
Switchover time: snap action: < 2 ms;  
 slow action: in accordance with actuating speed

Cable cross-section of the cable glands: min.  $\varnothing$  6 mm  
 max.  $\varnothing$  12 mm

## System components



Ex-certified screwed cable gland



Ex-certified screw plug

## Approvals



## Ordering details

EX-①② 355-③z④-⑤-⑥-⑦-3G/D

No.	Replace	Description
①	Z	Snap action $\ominus$
	T	Slow action $\ominus$
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

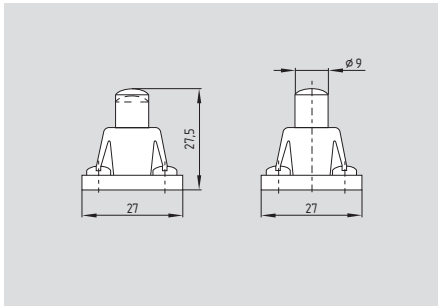
\* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

## Ordering details

Ex-certified screwed cable gland **1185057**  
 Ex-certified screw plug **1185059**

# Position switches with safety function

## Plunger S

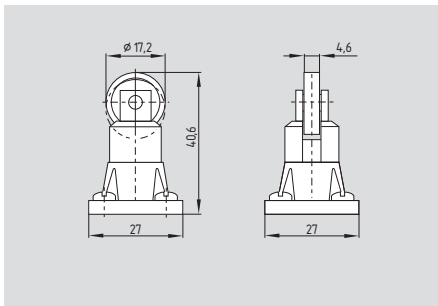


- Actuator type B to EN 50041
- Required actuating force:  
12 N for snap action,  
17 N for slow action
- Actuating speed with actuating angle 0° to switch axis, max. 0.5 m/s

## Contact variants

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

## Roller plunger R



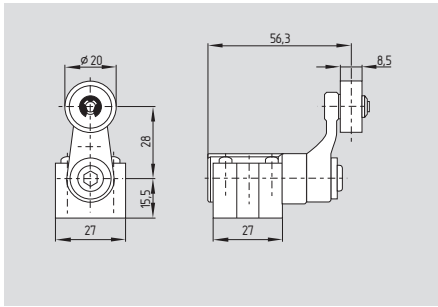
- Actuator type C to EN 50041
- Required actuating force:  
12 N for snap action,  
17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

## Contact variants

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

# Position switches with safety function

## Roller lever H



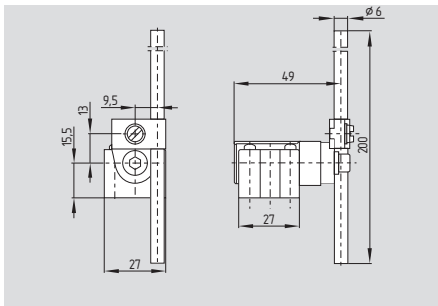
- Actuator type A to EN 50041
- Required actuating torque:  
26 Ncm for snap action,  
31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

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
<b>1 NO 1 NC</b>	EX-Z4VH 3..-11z-3G/D 	EX-T4VH 3..-11z-3G/D 	EX-T4VH 3..-11zü-3G/D 	
<b>2 NC</b>	EX-Z4VH 3..-02z-3G/D 	EX-T4VH 3..-02z-3G/D 		EX-T4VH 3..-02zh-3G/D 
<b>2 NO</b>		EX-T4VH 3..-20z-3G/D 		EX-T4VH 3..-20zh-3G/D 
<b>1 NC left 1 NC right</b>		EX-TVH 3..-01/01z-3G/D 		
<b>1 NO 2 NC</b>		EX-T4VH 3..-12z-3G/D 	EX-T4VH 3..-12zü-3G/D 	
<b>3 NC</b>		EX-T4VH 3..-03z-3G/D 		EX-T4VH 3..-03zh-3G/D 

## Rod lever 10H



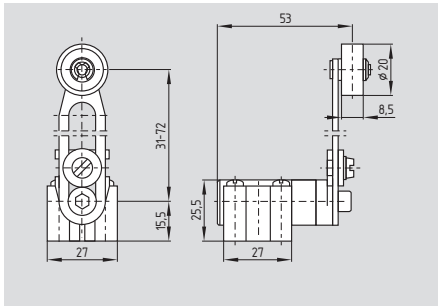
- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque:  
26 Ncm for snap action,  
31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix -1183

## Contact variants

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

# Position switches with safety function

## Roller lever 7H

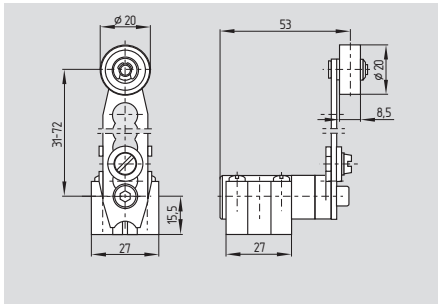


- Only for positioning tasks
- Required actuating torque:  
26 Ncm for snap action,  
31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

## Contact variants

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

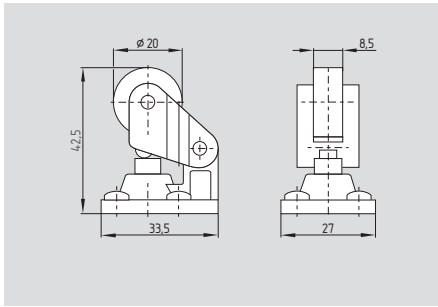
On version TV7H ...-01/01z-2138 positive break only to one side.

## Contact variants

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

# Position switches with safety function

## Offset roller lever 1K

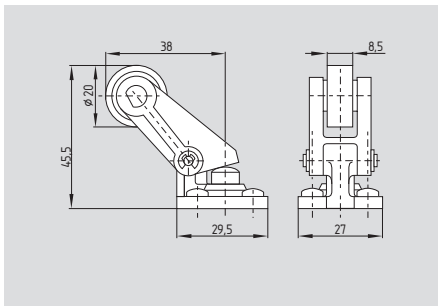


- Required actuating force:  
12 N for snap action,  
17 N for slow action
- Actuating speed with actuating  
angle 30° to switch axis: max. 0.5 m/s

## Contact variants

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

## Angle roller lever 3K



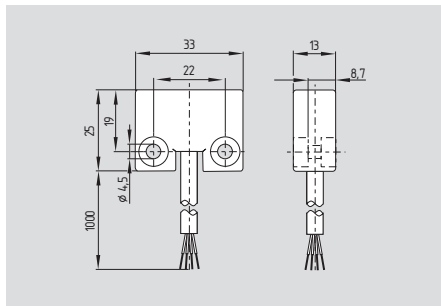
- Required actuating force:  
12 N for snap action,  
17 N for slow action
- Actuating speed with actuating  
angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch  
from below

## Contact variants

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

# Safety sensors

## 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

## Technical data

Equipment category: II 3GD  
 Ex protection: EEx nC IIC T6 X  
 EX-BNS 250: 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 mm<sup>2</sup>  
 ordering suffix -2187: 6 x 0,25 mm<sup>2</sup>  
 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<sub>ao</sub>: 4 mm  
 S<sub>ar</sub>: 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**  
 BK 13 → 14 BU  
 WH 21 → 22 BN

**1 NO / 2 NC**  
 BK 22 → 14 BU  
 WH 32 → C BN

**1 NO / 2 NC**  
**(ordering suffix -2187 without LED)**  
 GY 13 → 14 PK  
 GN 21 → 22 YE  
 WH 31 → 32 BN

## Approvals

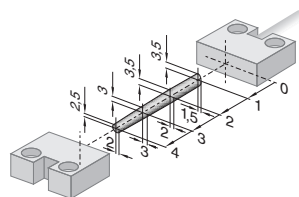


## Ordering details

### 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

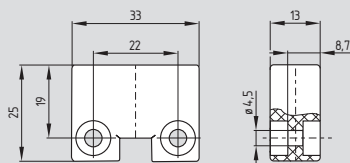
Contact symbols shown for the closed condition of the guard device.

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

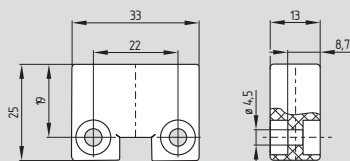
The LED is illuminated when the guard door is open.

# Safety sensors

## System components



**Actuating magnet EX-BPS 250**



**Spacer BN 250**

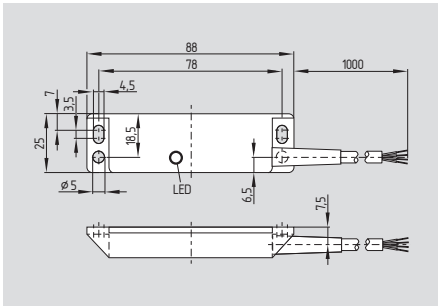
## Ordering details

Actuating magnet  
Spacer

**EX-BPS 250**  
**BN 250**

# Safety sensors

## 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

## Technical data

Equipment category: II 3GD  
 Ex protection: EEx nC IIC T6 X  
 EX-BNS 250: 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: 2 J  
 Protection class: IP 67 to IEC/EN 60529  
 Connection: Boflex cable  
 Cable section: 4 x 0.25 mm<sup>2</sup>  
 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  
 up to PDF-M  
 to IEC 60947-5-3  
 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<sub>ao</sub>: 5 mm  
 S<sub>ar</sub>: 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<sub>ao</sub>  
 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**  
 BK 13 → 14 BU  
 WH 21 → 22 BN

**1 NO / 2 NC**  
 BK 22 → 14 BU  
 WH 32 → C BN

**1 NO / 2 NC (ordering suffix -2187)**  
 GY 13 → 14 PK  
 GN 21 → 22 YE  
 WH 31 → 32 BN

**2 NC (ordering suffix -2187)**  
 BK 11 → 12 BU  
 WH 21 → 22 BN

### Approvals

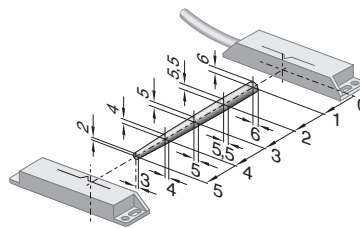


## Ordering details

### 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

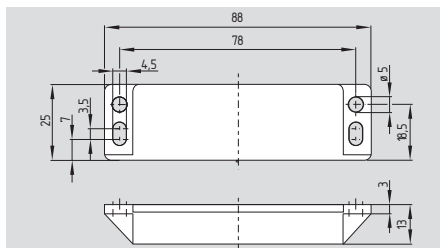
Contact symbols shown for the closed condition of the guard device.

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

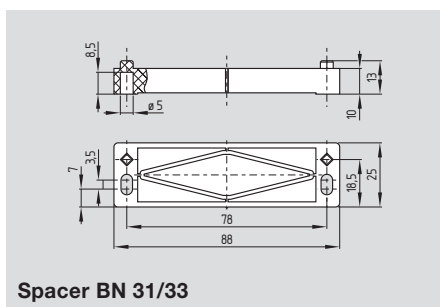


## Safety sensors

### System components



Actuating magnet EX-BPS 33



Spacer BN 31/33

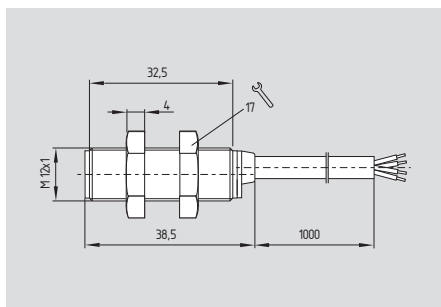
### Ordering details

Actuating magnet  
Spacer

**EX-BPS 33**  
**BN 31/33**

# Safety sensors

## 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:  $\text{II 3GD}$   
 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<sup>2</sup>  
 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  
 up to PDF-M  
 to IEC 60947-5-3  
 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<sub>ao</sub>: 10 mm (BP 6 / BP 8)  
 20 mm (BP 10 / BP 15 SS)  
 S<sub>ar</sub>: 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**  
 BK 13 → 14 BU  
 WH 21 → 22 BN

**1 NO / 2 NC**  
 BK 22 → 14 BU  
 WH 32 → C BN

**2 NC**  
 BK 11 → 12 BU  
 WH 21 → 22 BN

## Approvals

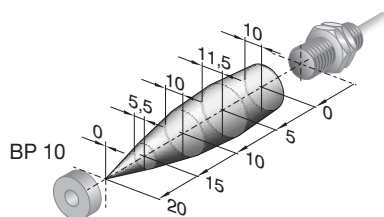


## Ordering details

### 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.

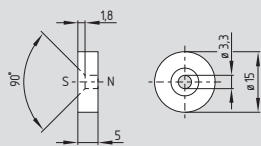
## Note

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

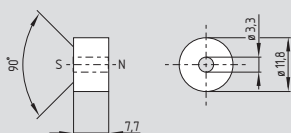
The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

# Safety sensors

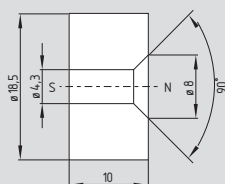
## System components



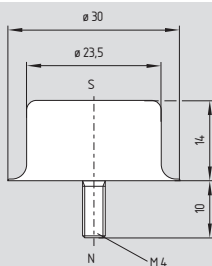
**BP 6**



**BP 8**



**BP 10**



**BP 15 SS**

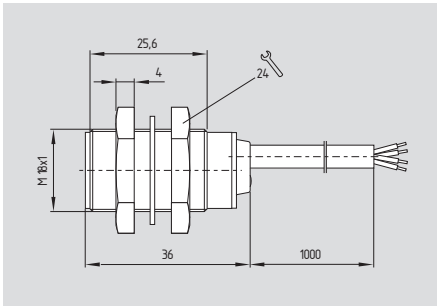
## Ordering details

Actuating magnets:  
without enclosure  
without enclosure  
without enclosure  
stainless steel

**BP 6**  
**BP 8**  
**BP 10**  
**BP 15 SS**

# Safety sensors

## 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

## 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 <sup>2</sup>
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 <sub>ao</sub> :	8 mm (BP 6 / BP 8) 18 mm (BP 10 / BP 15 SS)
S <sub>ar</sub> :	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

<b>1 NO / 2 NC</b>	
GY 13	→ 14 PK
GN 21	→ 22 YE
WH 31	→ 32 BN

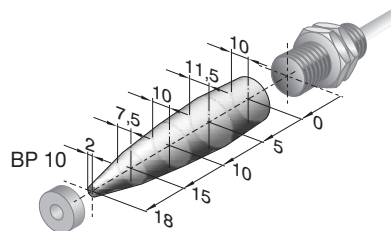
## Approvals



## Ordering details

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

## Note



### Enabling zone

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

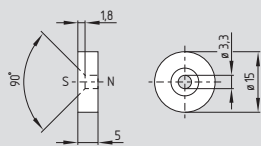
## Note

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

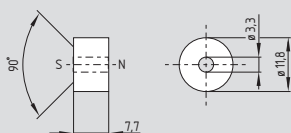
The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

# Safety sensors

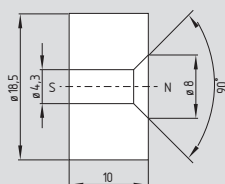
## System components



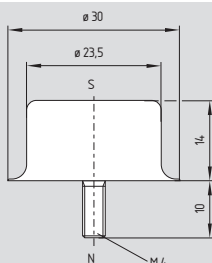
**BP 6**



**BP 8**



**BP 10**



**BP 15 SS**

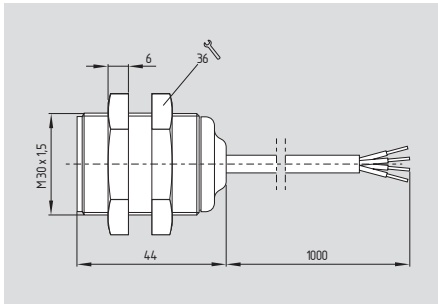
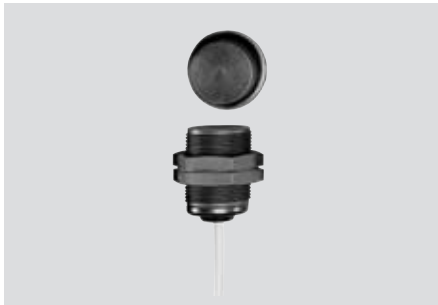
## Ordering details

Actuating magnets:  
without enclosure  
without enclosure  
without enclosure  
stainless steel

**BP 6**  
**BP 8**  
**BP 10**  
**BP 15 SS**

# Safety sensors

## 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

## Technical data

Equipment category:  $\text{II}$  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<sup>2</sup>  
 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<sub>ao</sub>: 5 mm  
 S<sub>ar</sub>: 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**  
 GY 13 14 PK  
 GN 21 22 YE  
 WH 31 32 BN

## Approvals

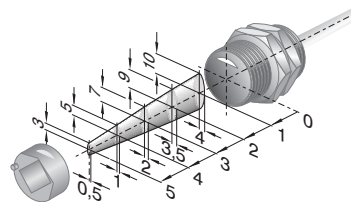


## Ordering details

EX-BNS 303-12z<sup>①</sup>-2187-3G/D

No.	Replace	Description
①	G	Without LED With LED

## Note



### Enabling zone

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

## Note

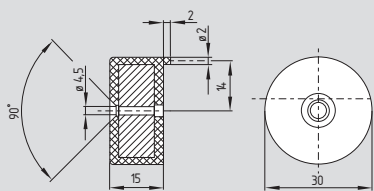
Contact symbols shown for the closed condition of the guard device.

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

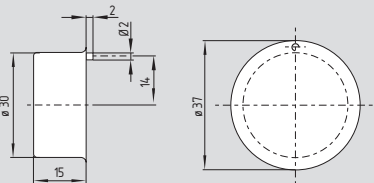
The LED is illuminated when the guard door is open.

## Safety sensors

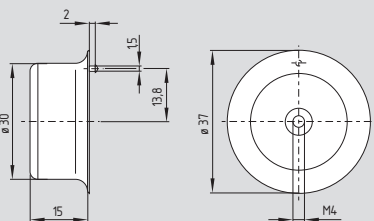
### System components



**BPS 300**



**BPS 303**



**BPS 303 SS**

### Ordering details

Actuating magnets:

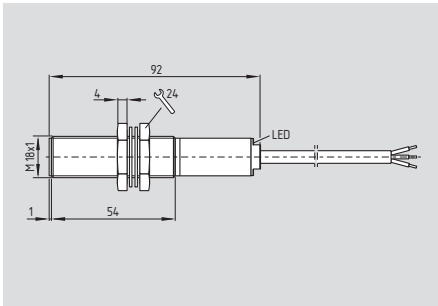
Thermoplastic **BPS 300**

Thermoplastic for  
food processing industry **BPS 303**

Stainless steel for  
food processing industry **BPS 303 SS**

# Safety sensors

## 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  $< 6.1 \times 10^{-9}$
- 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 tabel in appendix)
- Early warning when operating near the limit of the sensor's hysteresis range
- 2 short-circuit proof PNP safety outputs (24 VDC per 500 mA)

### Approvals



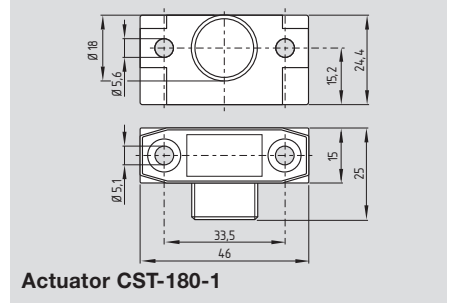
### Ordering details

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

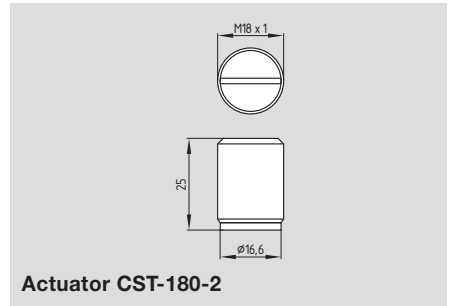
### Technical data

Equipment category:  $\text{II}$  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:  $7 \times 0,25 \text{ mm}^2$   
 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  $< 6.1 \times 10^{-9}$   
 Rated switching distance  $S_n$ : 8 mm  
 $S_{ao}$ : 7 mm  
 $S_{ar}$ : 10 mm  
 Hysteresis:  $\leq 0.7 \text{ mm}$   
 Repeat accuracy R:  $\leq 0.2 \text{ mm}$   
 Response time:  $< 30 \text{ ms}$   
 Duration of risk:  $\leq 30 \text{ ms}$   
 $U_e$ : 24 VDC - 15 % / + 10 %  
 $I_e$ : 1,0 A  
 $I_0$ : 0,05 A  
 Leakage current  $I_r$ :  $\leq 0.5 \text{ mA}$   
 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:  $-25 \text{ }^\circ\text{C} \dots +40 \text{ }^\circ\text{C}$   
 Storage/transport temp.:  $-25 \text{ }^\circ\text{C} \dots +85 \text{ }^\circ\text{C}$   
 Switching frequency f: 3 Hz  
 Resistance to shock: 30 g / 11 ms  
 Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

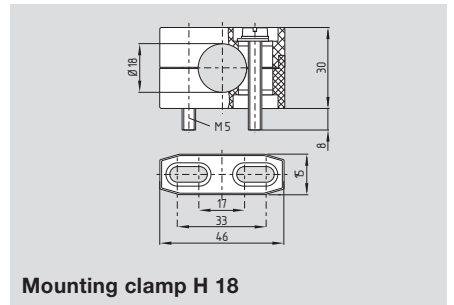
### System components



Actuator CST-180-1



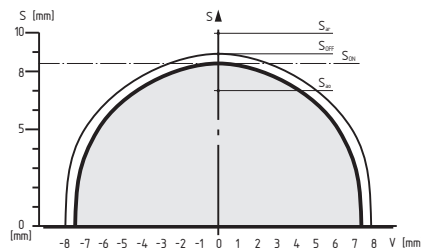
Actuator CST-180-2



Mounting clamp H 18

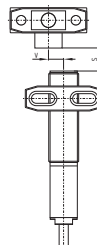
### Note

### 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.



# Safety sensors

## Connection

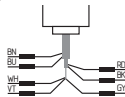
### Multifunction device:

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<sup>2</sup>



## Wiring

### Color

N (brown)  
BU (blue)  
VT (violet)  
WH (white)  
BK (black)  
RD (red)  
GY (grey)

### Wiring

A1 Ue  
A2 GND  
X1 safety input 1  
X2 safety input 2  
Y1 safety output 1  
Y2 safety output 2  
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).

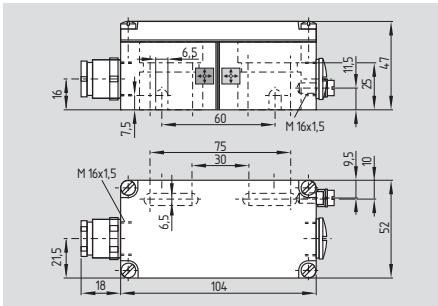
A range of suitable safety monitoring modules for these applications can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

## Note

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

# Magnetic reed switches

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



- Ex certified
- Aluminium enclosure
- 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

## Technical data

Equipment category:  $\text{II 3GD}$   
 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:  $\pm 0.25$  mm, T = constant

Resistance to shock: 30 g / 11 ms

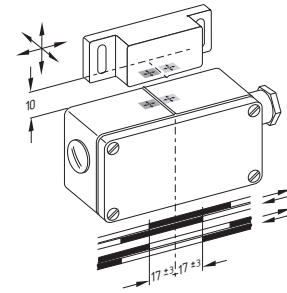
Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

Cable cross-section of the cable glands: min.  $\text{\O} 6$  mm  
 max.  $\text{\O} 10$  mm

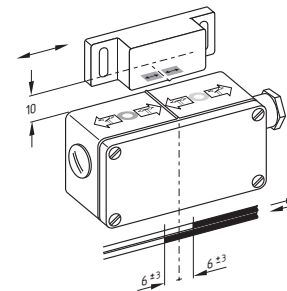
Switching distances, refer to next page.

## Contact variants

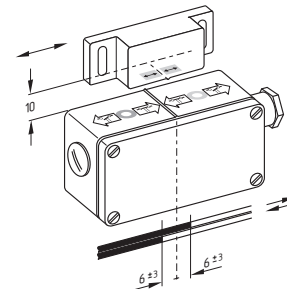
**1 NO contact EX-BN 20-10z**  
**1 NC contact EX-BN 20-01z**  
**with N-S actuating magnet BP 20**



**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**



## Approvals

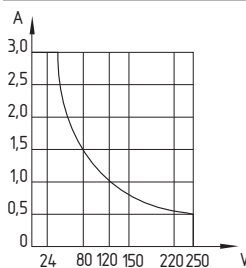


## Ordering details

### 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

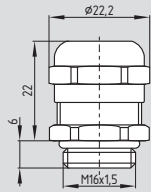
In version -10 and -01: When the switches and actuators come together, the colours must coincide: Red (S) to red (S) and green (N) to green (N).

The actuating magnets are not included in delivery.

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

# Magnetic reed switches

## System components



Ex-certified screwed cable gland

## Actuating distances

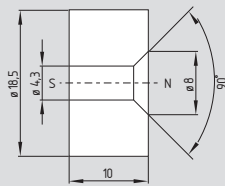
Actuating magnets	EX-BN 20-10z EX-BN 20-20z EX-BN 20-01z EX-BN 20-02z EX-BN 20-11z	EX-BN 20-rz EX-BN 20-2rz EX-BN 20-11rz
BP 10 N		5
BP 10 S		5
2 x BP 10	12	
2 x BP 10 N		10
2 x BP 10 S		10
BP 15 N		7
BP 15 S		7
2 x BP 15/2	12	
2 x BP 15/2 N		15
2 x BP 15/2 S		15
BP 34 N		10-25
BP 34 S		10-25
BP 20	15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

## Ordering details

Ex-certified screwed cable gland **1182498**

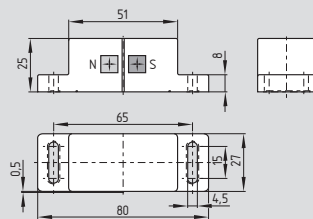
# Magnetic reed switches

## System components



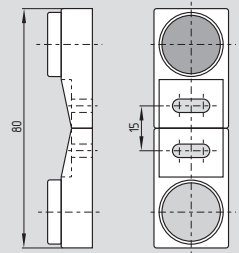
**BP 10**

## System components

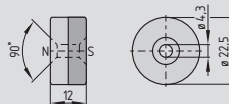


**BP 20**

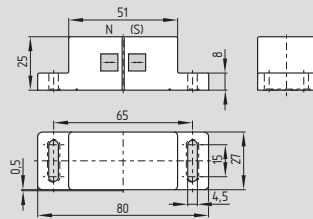
## System components



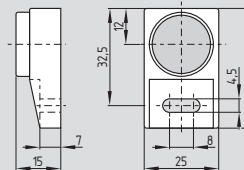
**BP 11**



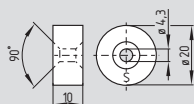
**BP 15**



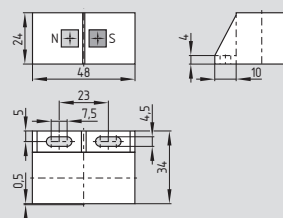
**BP 20 N / BP 20 S**



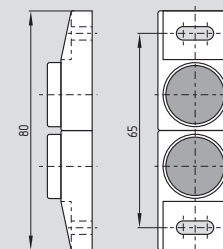
**BP 11 N / BP 11 S**



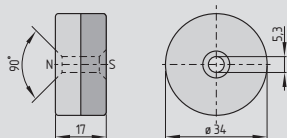
**BP 15/2**



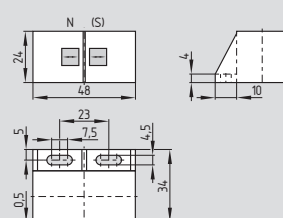
**BP 31**



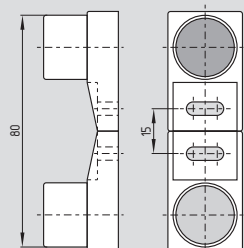
**2x BP 11 N / 2x BP 11 S**



**BP 34**



**BP 31 N / BP 31 S**



**BP 12**

## Ordering details

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

**BP 10** metal enclosure, N-S  
**BP 15** metal enclosure Al, N  
**BP 15/2** metal enclosure Al, S  
**BP 34** thermoplastic enclosure, N-S  
thermoplastic enclosure, N  
thermoplastic enclosure, S

## Ordering details

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

**BP 20** metal enclosure Al, N-S  
**BP 20 N** metal enclosure Al, N  
**BP 20 S** metal enclosure Al, S  
**BP 31** metal enclosure Al, 2x N  
**BP 31 N** metal enclosure Al, 2x S  
**BP 31 S** metal enclosure Al, N-S

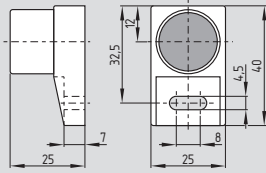
## Ordering details

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

**BP 11**  
**BP 11 N**  
**BP 11 S**  
**2x BP 11 N**  
**2x BP 11 S**  
**BP 12**

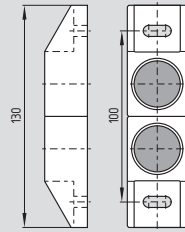
# Magnetic reed switches

## System components

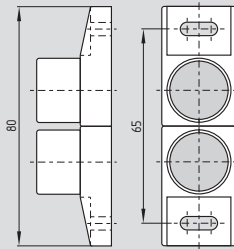


**BP 12 N / BP 12 S**

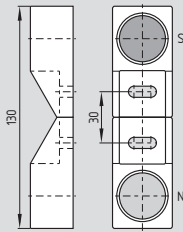
## System components



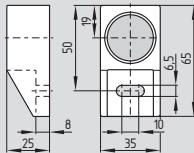
**2x BP 21 N / 2x BP 21 S**



**2x BP 12 N / 2x BP 12 S**



**BP 21**



**BP 21 N / BP 21 S**

## Ordering details

Actuating magnet

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

**BP 12 N**  
**BP 12 S**  
**2x BP 12 N**  
**2x BP 12 S**  
**BP 21**  
**BP 21 N**  
**BP 21 S**

## Ordering details

Actuating magnet

metal enclosure Al, 2x N  
 metal enclosure Al, 2x S

**2x BP 21 N**  
**2x BP 21 S**

## Key transfer system



### Functional characteristic

The fundamental functional characteristic of a key transfer 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 key transfer 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 key transfer 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 key transfer 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.

## Key transfer system



### SHGV/ESS key-operated selector switch

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



### 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.

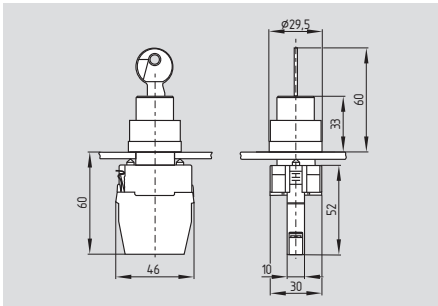


### SVM solenoid interlock with key-operated selector switch

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

# Key transfer system

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



- Ex certified
- Mounting hole 22.3 mm
- Metal front ring
- Oil and petroleum resistant

## Technical data

Equipment category: II 3GD  
 Ex protection: Ex nL IIC T5 X  
 Ex tD A22 IP65 T110°C X  
 Standards: IEC 60947-1  
 IEC 60947-5-1  
 IEC 61241-1  
 EN 60079-15  
 Mounting hole Ø: 22,3 mm  
 Front plate thickness: 1,5 ... max. 6 mm  
 Spacing: 50 x 50 mm  
 Impact energy: requires concealed mounting  
 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<sub>i</sub>: 250 V  
 I<sub>i</sub>: 6 A  
 P<sub>i</sub>: 1500 W  
 C<sub>i</sub>: ~ 0  
 L<sub>i</sub>: ~ 0  
 Utilisation category: AC-15, DC-13  
 I<sub>e</sub>/U<sub>e</sub>: 6 A / 250 VAC  
 4 A / 24 VDC  
 Max. fuse rating: 6 A gG D-fuse to DIN EN 60269-1  
 Ambient temperature: - 25 °C ... + 70 °C  
 Mechanical life: 10 million operations

## Contact variants

**1 NO / 1 NC**  
**EF 103.1**  
 23 → 24  
 11 → 12

**EF 103.2**  
 43 → 44  
 31 → 32

**2 NC**  
**EF 110.2**  
 31 → 32  
 41 → 22

**1 NC**  
**EF 10.3**  
 31 → 32

## Approvals



## Ordering details

EX-SHGV/ESS21S2/①/103-3G/D

No.	Replace	Description
①	z.B. 201	individual key numbers

## Note

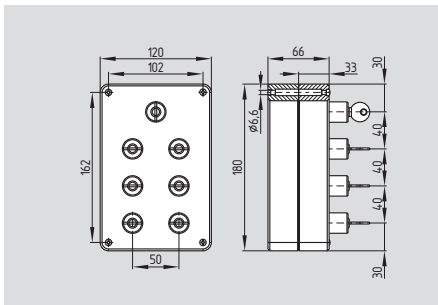
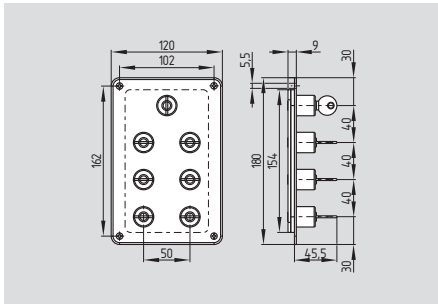
Contact variants  
 Contact element EF103.1 1 NC / 1 NO  
 included in delivery.

If more contacts are needed,  
 please order separately:  
 Contact element EF103.2 1 NC / 1 NO  
 Contact element EF 110.2 2 NC  
 Contact element EF10.2 1 NC



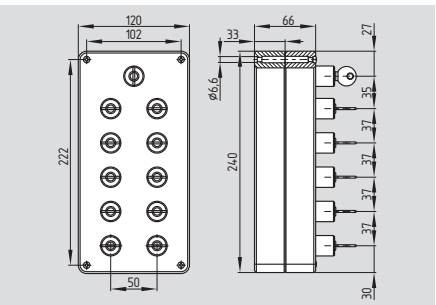
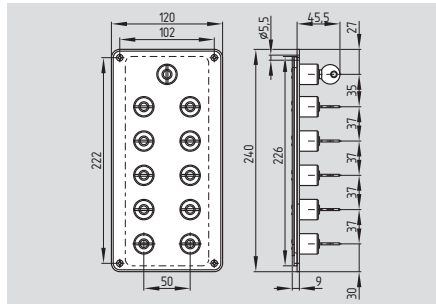
# Key transfer system

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



- Ex certified
- with 6 keys
- Metal enclosure
- Oil and petroleum resistant
- Metal front plate
- 6 Cylinder lock for solenoid keys SHGV..

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



- Ex certified
- with 10 keys
- Metal enclosure
- Oil and petroleum resistant
- Metal front plate
- 10 Cylinder lock for solenoid keys SHGV..

## Technical data

Equipment category: Ⓔ II 2GD  
 Ex protection: -  
 Standards: DIN EN 13463-1  
 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: 20 million operations

### Approvals



### Approvals



## Ordering details

### EX-SVM1/①-6②/③-2G/D

No.	Replace	Description
①	z.B. 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

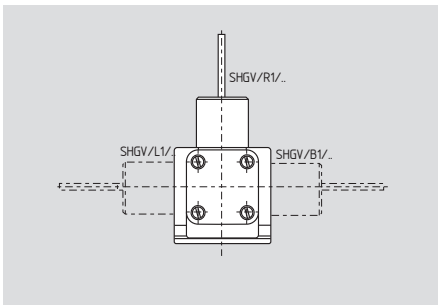
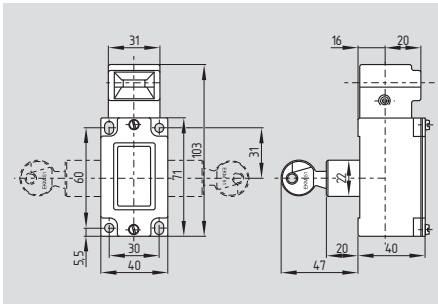
## Ordering details

### EX-SVM1/①-10②/③-2G/D

No.	Replace	Description
①	z.B. 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

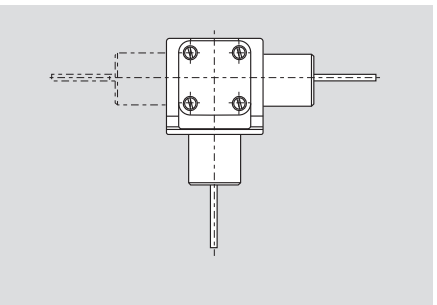
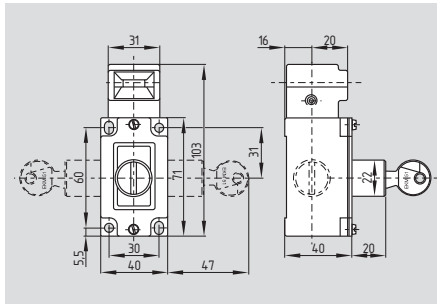
# Key transfer system

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



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

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



- with a second lock barrel

## Technical data

Equipment category:	Ⓔ II 2GD
Ex protection:	-
Standards:	DIN EN 13463-1
Design:	fixings to EN 50041
Enclosure:	Al Si12 die-casting, painted
Actuating speed:	max. 1 m/s
Mechanical life:	20 million operations

### Approvals



### Approvals



## Ordering details

### EX-SHGV/①01/②+③-2G/D

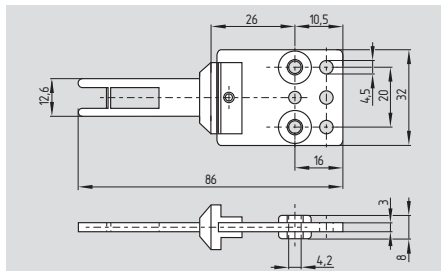
No.	Replace	Description
①	B L R	Cylinder lock on the back Cylinder lock on LHS Cylinder lock on RHS
②	z.B. 201	individual key numbers
③	z.B. BO	Actuator range from page 65

### EX-SHGV/①D1/②/③+④-2G/D

No.	Replace	Description
①	L R	Cylinder lock on LHS Cylinder lock on RHS
②	z.B. 201	individual key number for LHS or RHS cylinder lock
③	z.B. 34	individual key number for second cylinder lock
④	z.B. BO	Actuator range from page 65

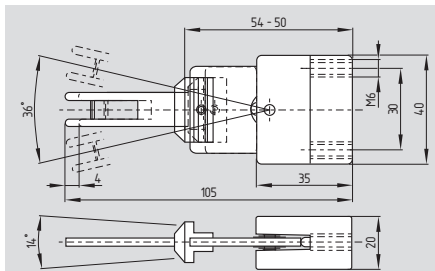
# Key transfer system

## System components

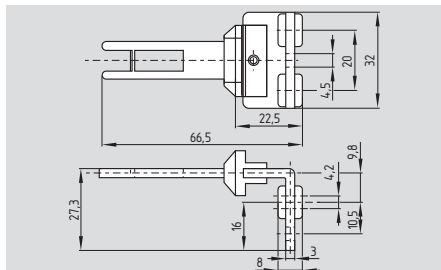


**Straight actuator BO**

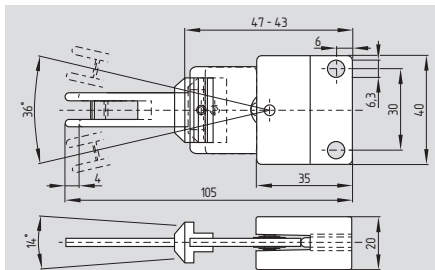
## System components



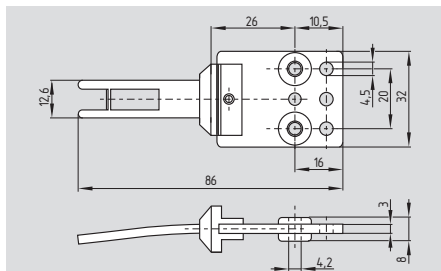
**Flexible actuator BOF/HIS.1**



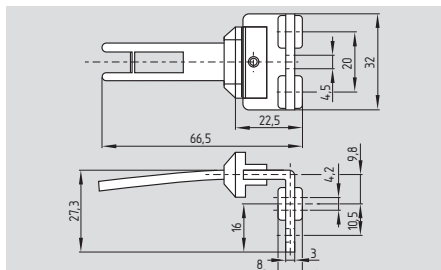
**Angled actuator BOW**



**Flexible actuator BOF/HIS.2**



**Straight radius actuator BOR**



**Angled radius actuator BOWR**

## Ordering details

Straight actuator

Angled actuator

Straight radius actuator

Angled radius actuator

**BO**

**BOW**

**BOR**

**BOWR**

## Ordering details

Flexible actuator,

rear fixation

fixation from top

**BOF/HIS.1**

**BOF/HIS.2**

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