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.steute

Extreme

Extreme switchgear

// SWITCH CONTROL UNDER EXTREME CONDITIONS

Catalogue


.steute

// SAFE SWITCHGEAR FOR DEMANDING AND CRITICAL APPLICATIONS

»Safe switchgear for demanding and critical applications«. True to this motto, steute has been providing its customers with innovative, practical and durable switchgear solutions – for over 50 years.

When our customers are successful, so are we. Because we always focus on our customers, our company has grown steadily and sustainably over the last decades. Steute is committed to continuing this growth – in close cooperation with our customers.

We are situated in East Westphalia, a key region for machine building and electrical goods manufacturing. It is home to qualified specialists committed to developing and manufacturing innovative products. It is also the location of renowned universities, research and educational institutions to which we maintain healthy contacts.

Markets are no longer restricted by national borders. This is why our products are developed and tested for extreme conditions all over the world. We take care to ensure that our products are always certified according to the latest international standards. In every industrial or emerging nation in the world, steute has access to qualified specialists who can guarantee competent support and a quick service.

As a medium-sized company we are able to react with speed to customer wishes and market trends. We are continually developing innovative products and using new technologies as we consistently open up new fields of application for our switchgear.

steute is currently active in four different business fields, producing switchgear, sensors and control units for use in industry and in medical equipment:

Wireless
Cable free switchgear and sensors for use in machinery and process plants. These industrial-strength wireless switches communicate with higher level control systems via reliable radio transmission. »Energy harvesting« can play a major role in these products.

Automation
Standard and customised switchgear for machinery and process plants. Tried and tested electromechanical and non-contact technologies for classical applications in industrial automation and process control – always with a view to the latest global requirements.

Extreme
Switchgear and sensors for use in extreme environments or under extreme conditions. Certified products for use in hazardous areas worldwide (e. g. ATEX, IECEx, EAC).

Meditec
A comprehensive range of standard and customised foot and hand controls for medical devices, meeting the highest ergonomic and availability requirements. Produced in accordance with the certified EN ISO 13485 quality management system for medical products.

The following information provides an overview of our standard range of switchgear for complex and demanding applications. We will be happy to provide you with any additional information you require. If you cannot find the solution for your application: just get in touch. We have already helped numerous customers by developing »tailor-made« switchgear for their individual needs.

Marc Stanesby
Managing Director
steute Schaltgeräte GmbH & Co. KG

Door contacts with positive break

Thermoplastic enclosure
// Series ES 14 AZ Extreme
from page 12

ES 95 AZ


01.08.00

Door contacts with positive break

Range of application

Door contacts with positive break are suitable for monitoring the closed condition of lift cabin doors to ensure the required operational safety. They monitor the closed condition and the locking of lift cabin doors. They can also be used for modernisation.

Design and mode of operation

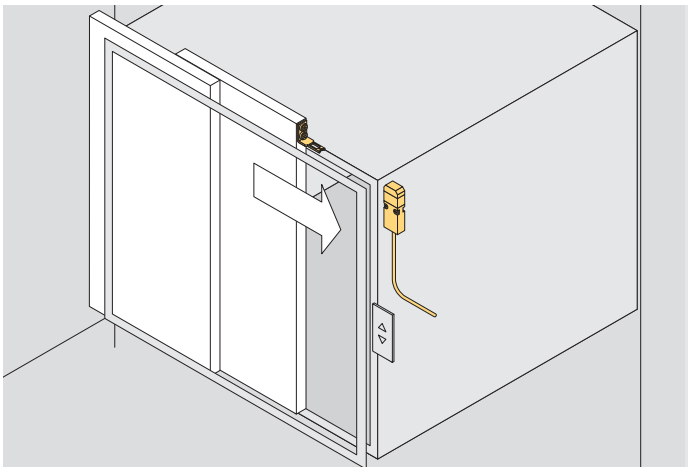
On the door contacts with positive break, the switching element is not physically connected to the actuator but functionally brought together or separated by switching. When the lift cabin door is opened, the actuator is separated from the base unit. During this process, the NC contacts of the safety switch are positively opened and the NO contacts closed.

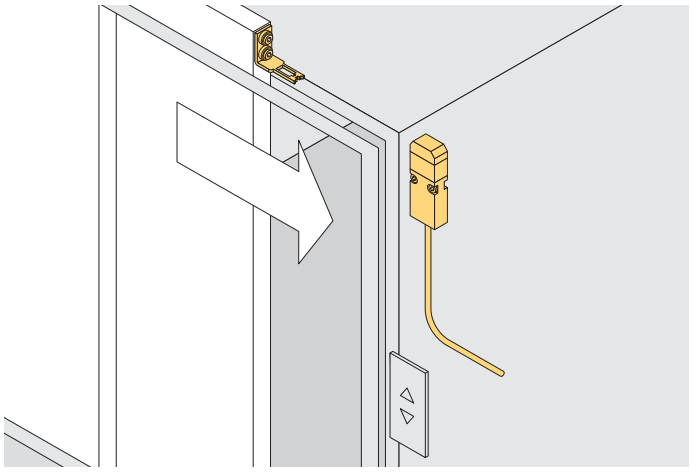
The degree of protection of all door contacts with positive break is IP 67. The safety switches can be fitted in any desired mounting position.

The door contacts with positive break presented in this section have the CE marking as per Low Voltage Directive 06/95/EC.

Application

On a lift cabin door in an open condition

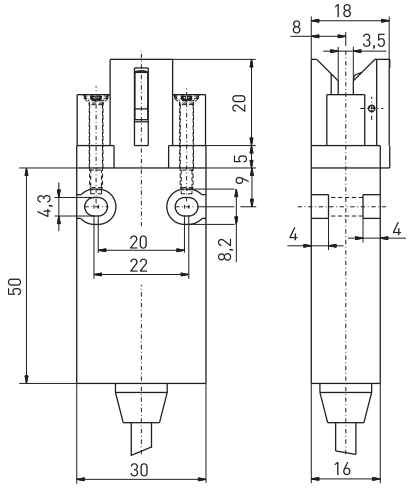




Door contacts with positive break
// Series ES 14 AZ Extreme

Features/Options
- High degree of protection IP 67
- Thermoplastic enclosure
- Double insulation ⧈
- Slow action ⊖, 1 NC contact
- Version with cable entry on side available on request
- With pre-wired cable
- Ex version available on request

// ES 14 AZ



Technical data

Standards	IEC/EN 60947-5-1; 95/16/EG, EN 81-1, EN 81-2, EN 81-20, EN 81-50
Enclosure	glass-fibre reinforced, shock-resistant thermoplastic, auto-extinguishing UL 94-V0
Actuator	stainless steel 1.4301
Switch type	Type 2
Coding level	low coding
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	slow action, NC contact with positive break ⊖
Switching elements	1 NC contact
Connection	pre-wired cable H03VV-F
Cable cross-section	2 x 0.75 mm²
Cable length	1.5, 3 or 5 m
B_{10d} (10 % Load)	2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	250 V
I_{the}	2 A
I_e/U_e	2 A/230 VAC; 0.25 A/230 VDC
Utilisation category	AC-15, DC-13
Max. fuse rating	2 A gG/gN fuse
Ambient temperature	–20 °C ... +65 °C
Mechanical life	> 1 million operations
Operation cycles	1800/h
Repeat accuracy of switching points	± 0.1 mm
Contact opening	max. 2 x 2.5 mm
Actuating force	ca. 2 ... 3.5 N
Approvals	TÜV, cULus, EAC

Contact variants: Switch travel/contacts

	Slow action	Material number
1 NC contact	ES 14 AZ 1Ö 0 ⊖ BN-BU 2 3,5	on request

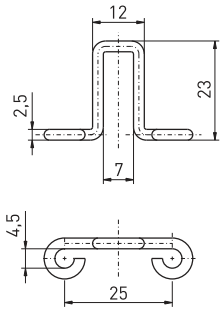
Ordering details ES 14 AZ 1Ö-s-1,5m

- Cable length 1.5 m, (3 m, 5 m)
- Pre-wired cable on side
- 1 NC contact
- Separate actuator AZ
- Series
- Slow action

Door contacts with positive break
// ES 14 AZ range, actuator

Features/Options
- Stainless steel actuator
- Actuating radius on hinged lift cabin/shaft doors
  a = 100 mm and b = 100 mm
- Axial misalignment x = 2.5 mm

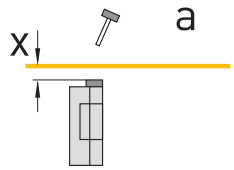
// Straight actuator 14 AZ

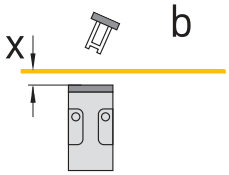


Note
The actuator is not included in the delivery of the switches.

Actuator	Material Number
14 AZ	1179003

// Actuating radius





- The axis of the hinge should be x mm above the top of the edge of the safety switch and in the same plane.
- a Actuating radius to the plane of the actuator
- b Actuating radius in line with the plane of the actuator
- x Axial misalignment

Safety switches with separate actuators

Thermoplastic enclosure
// Series ES 95 AZ Extreme
from page 18

ES 95 AZ Extreme


01.08.00

Safety switches with separate actuator

Range of application

These safety switches with a separate actuator are suitable for sliding, hinged and particularly removable safety guards, which need to be closed to ensure the necessary operational safety. They are also suitable for mounting on profile sections and retrofitting on existing equipment.

In combination with a safety relay module series SRM, all safety switches shown in this chapter achieve PL »e« per EN ISO 13849-1 or up to SIL 3 per EN 62061, subject to suitable circuit arrangements.

Design and operating principle

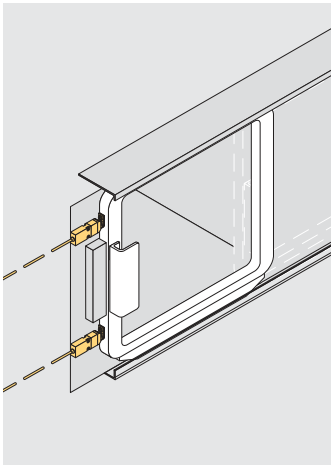
On the safety switches with a separate actuator, the switching element is not physically connected to the actuator, but functionally united or separated by switching. When the guard device is opened, the actuator is separated from the base unit. In this process, NC contacts are positively opened and NO contacts closed.

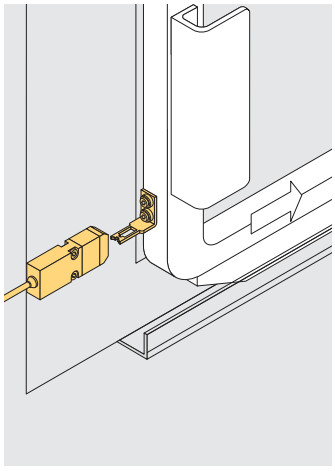
The degree of protection of all the safety switches is IP 66. The safety switches can be fitted in any desired mounting position.

All safety switches shown in this chapter bear the CE mark according to the Machinery Directive 2006/42/EC.

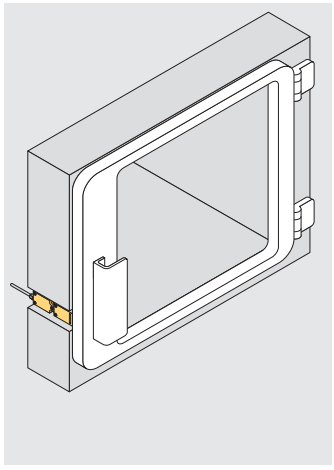
Application

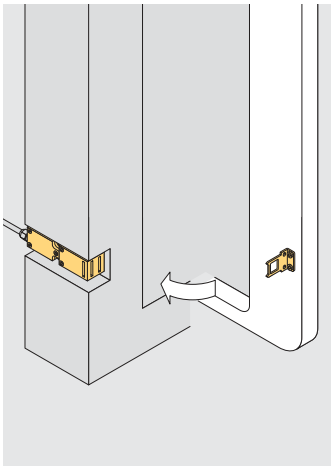
on sliding guards



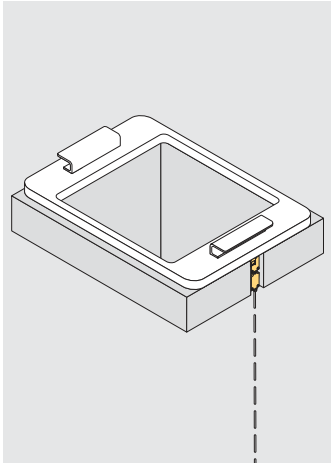


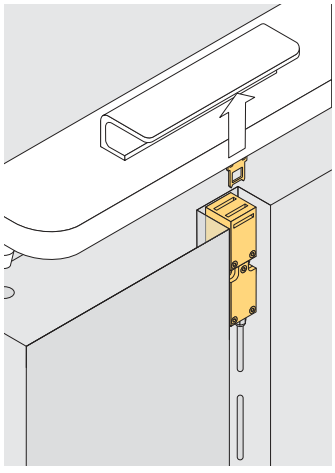
on hinged guards





on removable guards

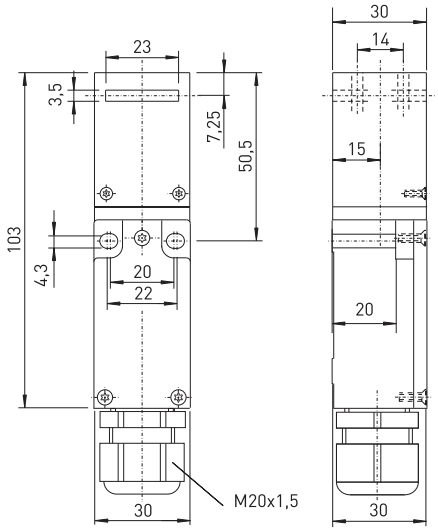




Safety switches with separate actuator
// Series ES 95 AZ Extreme

Features/Options
- Version with higher degree of protection IP 66
- Salt-mist proof
- With stainless steel screws and plunger
- Thermoplastic enclosure, double insulated
- Slow action, change-over contact with double break
- Wiring compartment
- Mounting details to EN 50 047
- Horizontally slotted mounting holes

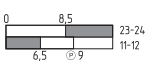
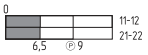
// ES 95 AZ EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 14119; EN ISO 13849-1
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, self-extinguishing UL 94-V0
Actuator	stainless steel 1.4301
Switch type	type 2
Coding level	low coding
Degree of protection	IP 66 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contact
Switching elements	1 NC/1 NO contact with double break type Zb or 2 NC contacts, galvanically separated contact bridges
Connection	screw connection terminals
Cable cross-section	max. 1.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
B_{10d} (10 % load)	2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	400 V
I_{the}	6 A
I_e/U_e	6 A/400 VAC; 0.25 A/230 VDC
Utilisation category	AC-15, DC-13
Max. fuse rating	6 A gG/gN fuse
Positive break travel	9 mm
Ambient temperature	–20 °C ... +80 °C
Mechanical life	> 1 million operations
Approvals	

Contact variants: switch travel/contacts

	Slow action	Material number
1 NC/1 NO contact	**ES 95 AZ 1Ö/1S** 	**1190422**
2 NC contacts	**ES 95 AZ 2Ö** 	**on request**

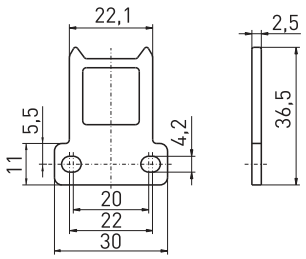
Type code

ES 95 AZ 1Ö/1S IP66 Niro Extreme

- ES 95 AZ 1Ö/1S IP66 Niro Extreme
  - Slow action
  - Series
  - Separate actuator AZ
  - Contact type 1NC/1NO, (2Ö)
  - Degree of protection IP 66
  - Stainless steel version

✓ in stock

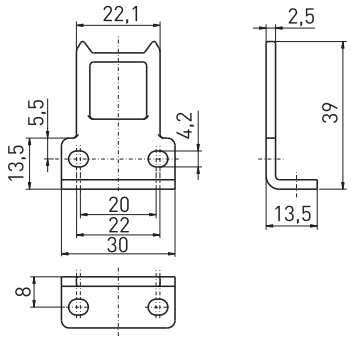
// Straight actuator 95 AZ-B1



Features/Options
- Actuating radius on hinged guards
  a = 350 mm and b = 700 mm
- x = 11 mm

Actuator	Material Number
AZ 95-B1	✓ 1178645

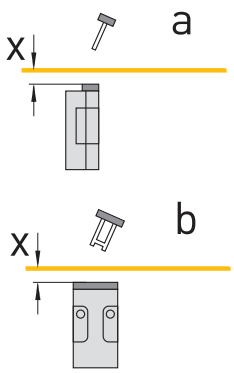
// Angled actuator 95 AZ-B5



Features/Options
- Especially suitable for hinged guards
- Actuating radius on hinged guards
  a = 350 mm and b = 700 mm
- x = 13.5 mm

Actuator	Material Number
AZ 95-B5	✓ 1178646

// Actuating radii



Features/Options
- The axis of the hinge should be x mm above the top edge of the safety switch and in the same plane
- a Actuating radius to the plane of the actuator
- b Actuating radius in line with the plane of the actuator
- x Axial misalignment referring to the surface of the enclosure and not to the inserted actuator!

Note
Inserted position of actuator = 0 in switch travel diagram
The actuators are not included with the switches.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Safety sensors

RC Si 56 Extreme

Safety sensors

Range of application

The safety sensors are suitable for monitoring the position of sliding, hinged and removable protective doors. They can only be used for safety duties to DIN VDE 0660-209 in combination with a safety guard monitor for protection up to safety level PL »e« per EN ISO 13849-1 or up to SILCL 3 per EN 62061.

The use of safety sensors is of particular advantage in cases where extremely dirty conditions can occur or high hygienic standards need to be maintained. This is provided by the simplicity of cleaning the units. A further advantage is the facility for concealed mounting behind non-magnetic materials.

Working surfaces and storage areas can be arranged without the need for dust-collecting edges or other functionally required cutouts or projections. The safety sensors can also be applied in cases where a precise approach is not possible and greater tolerances are required.

Design and operating principle

These devices comprise a multi-channel safety sensor and an actuating magnet. The safety sensors are actuated by a coded actuator without any mechanical contact. The devices can be selected with one NC and one NO contact or with two NC contacts. The safety sensor BZ 16 has a wiring compartment. All other described safety sensors are supplied with a pre-wired cable.

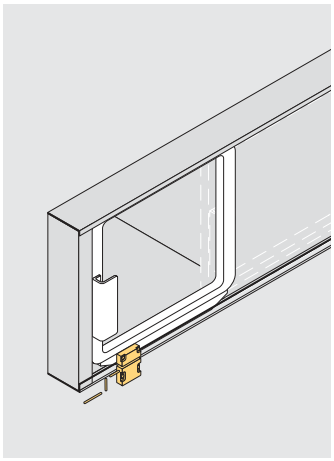
The Safety sensors are protected to degree of protection IP 69.

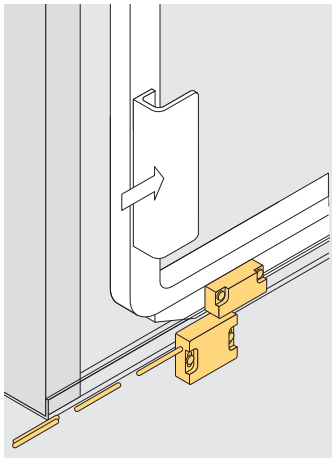
The mounting site of safety sensors must be free of magnetic fields.

All safety sensors shown in this chapter bear the CE mark according to the Machinery Directive 2006/42/EC.

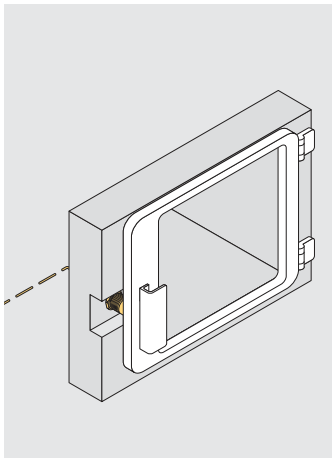
Application

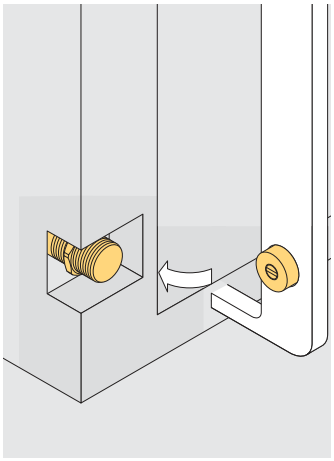
On sliding doors





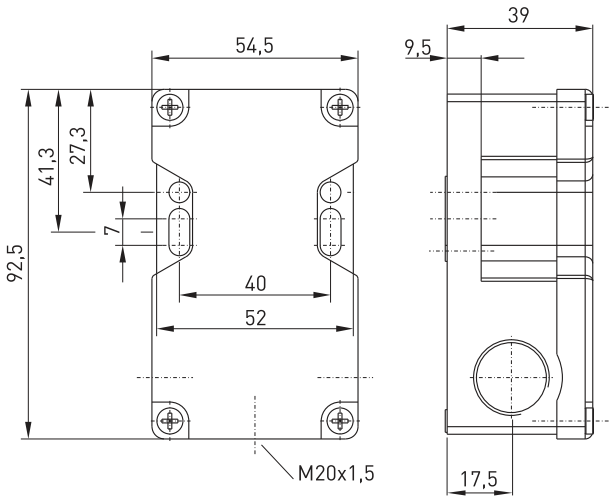
On hinged doors





Features/Options
- IP 69 suitable for cleaning with 80 °C hot water at 100 bar pressure at a distance of 100 mm from different directions
- Differential inputs: induction/Hall sensor operating principle
- Internal monitoring, high manipulation protection
- Potential-free outputs
- 1 NC/1 NO contact or 2 NC contacts and 1 signalling contact
- 2 different actuating planes possible
- Switching capacity s_{ao} 10 mm, s_{ar} 20 mm
- With wiring compartment

// BZ 16 EXTREME

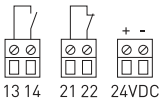
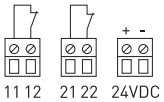


Technical data

Standards	EN 61000-6-1, -2, -3, -4; EN 60947-5-2; EN 60947-5-3; EN ISO 14119; EN 60204-1; EN ISO 13849-1; DIN EN 62061; 2004/108/EG
Enclosure	glass-fibre reinforced thermoplastic, self-extinguishing
Defined object	BZ 16-B1
Sensor type	Type 4 interlocking device
Coding level	low coding
Degree of protection	IP 69 to IEC/EN 60529
Switching system	Hall effect technology
Switching elements	two enabling paths (2 NC or 1 NC/1NO)/ 1 signalling contact (1 NC)
Connection	Cable entry M20 x 1.5, wiring compartment with pin block screw clamps 8-pole, AWG 28 (0.14 mm²) bis AWG 16 (1.5 mm²)
Cable entry	3 x M20 x 1.5
Utilisation category	outputs: AC-15, DC-13; signalling contact: AC-12, DC-12
I_e/U_e outputs	max. 4 A/24 VAC/DC, min. 4 mA/5 VDC
Signalling contact	max. 1 A/24 VAC/DC, min. 100 µA/100 mVDC
U_i	250 VAC
U_{imp}	1.5 kV
Voltage drop	< 0.6 V
Max. fuse rating	4 A gG/gN-fuse
Switching frequency	max. 1 Hz
Ambient temperature	0 °C ... +55 °C
Mechanical life	50 Mio. operations
Risk time	< 200 ms
Switching distances	s_n = 12 mm , 10 mm with flush actuator mounting, s_{ao} = 10 mm* , s_{ar} = 20 mm*
Hysteresis	approx. 6 mm
Axial misalignment	max. 3 mm
Approvals	

* Values change with flush mounting

Contact variants: Switch travel/contacts

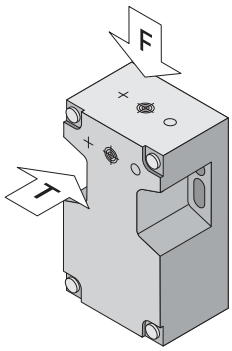
1 NC/1 NO contact	**BZ 16 12T** 
2 NC contacts	**BZ 16 03T** 

✓ in stock

Type code **BZ 16 11D-IP69**

- Degree of protection IP 69
- Actuating directions (U, V)
- 1 NC/1 NO (2 NC)
- Series
- Safety sensor

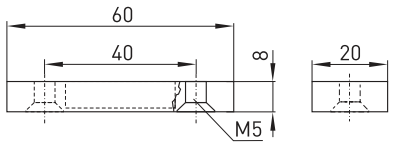
// Actuating planes

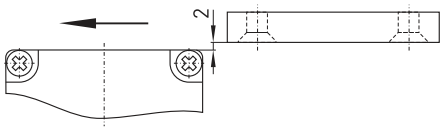


Features/Options
- Please indicate the desired actuating plane when ordering.

Actuating planes	Material Number
BZ 16-12F IP69	1355627
BZ 16-12T IP69	1355630
BZ 16-03F IP69	✓ 1355632
BZ 16-03T IP69	1355634

// Actuator BZ 16-B1

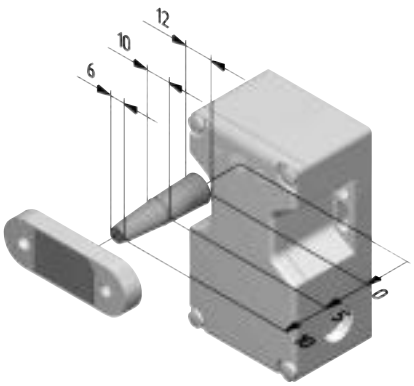




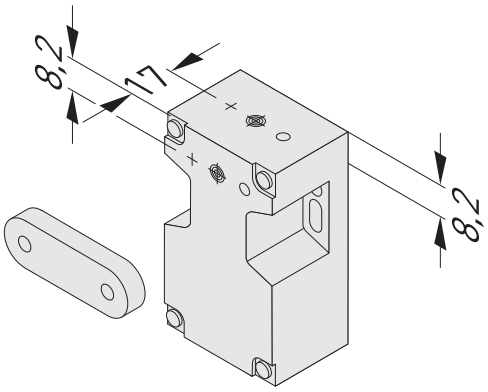
Note
The actuator is not included in the delivery of the switches.
The distance for actuation from side must be observed.

Actuator	Material Number
BZ 16-B1	1165032

// Switching capacity



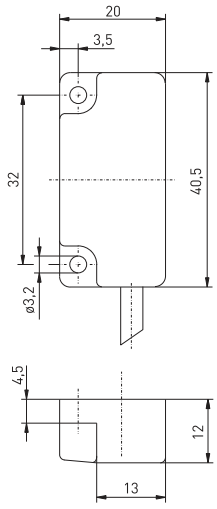
// Actuator positioning



Safety sensors, rectangular form
// Series HS Si 4 Extreme

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 69
- Thermoplastic enclosure
- Hall sensor 1 NC/1 NO or 2 NC contacts
- Galvanically separated channels
- With pre-wired cable
- Corrosion-proof design
- High shock- and vibration resistance

// HS SI 4 EXTREME



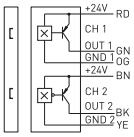
Technical data

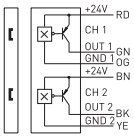
Standards	EN 60947-5-2; EN ISO 14119; EN ISO 13849-1
Enclosure	glass-fibre reinforced thermoplastic, self-extinguishing, A3XZG5
Defined object	actuator MC 4
Sensor type	Type 4 interlocking device
Coding level	low coding
Switching system	hall sensor, 2 galvanically separated channels, 1 NC/1 NO or 2 NC contacts
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Connection	cable, 6 x AWG 26, length 2 or 5 m, max. 15 m
Safety-relevant data*	
EN ISO 13849-1	PL e, category 4
T_M	max. 20 years
$MTTF_d$	>100 years
DC / DC_{avg}	>99 %
Utilisation category	DC-12
I_e/U_e	40 mA / 24 VDC
Operating voltage	10 ... 30 VDC
No-Load supply current I_0	≤ 6 mA per channel
Voltage drop at I_e	max. 2.5 VDC
Switch-on/switch-off time	< 1 ms
Attendance delay t_v	< 100 ms
Max. fuse rating	< 50 mA internal reversible fuse
Switching frequency	max. 100 Hz
Degree of pollution	3
Safety class	II
Ambient temperature	–40 °C ... +70 °C
Switching distances	s_{ao} 6 mm, s_{ar} 20 mm, s_n 7 mm
Approvals	c SP us

* only achieved in combination with a safety module.

Contact variants: switch travel/contacts

		Material Number
1 NC/1 NO contact	HS Si 4 1Ö/1S-2m	✓ 1189889
2 NC contacts	HS Si 4 2Ö-2m	1189899



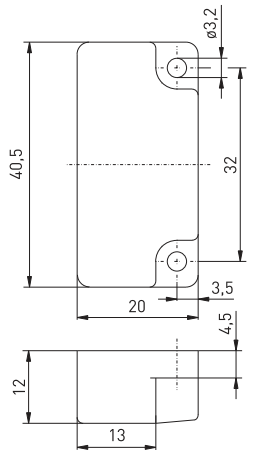


✓ in stock

Type code HS Si 4 1Ö/1S-2m -40°C-IP69 Extreme

- Degree of protection IP 69
- Temperature to -40 °C
- Cable length 2 m (5 m)
- 1 NC/1 NO contact (2Ö)
- Series
- Safety
- Hall sensor

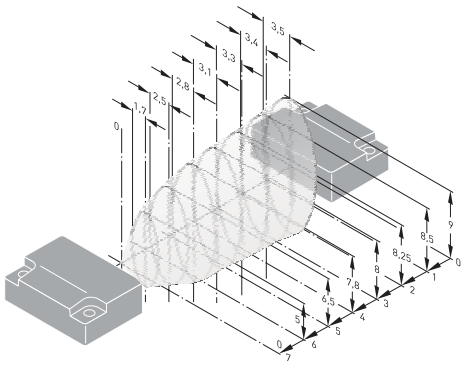
// Actuator MC 4



Note
The actuator is not included in the delivery of the switches.

Actuator	Material Number
MC 4	✓ 1181771

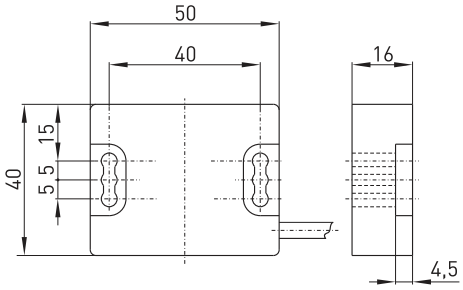
// Switching capacity



Safety sensors, rectangular form
// Series RC Si 56 Extreme

Features/Options
- IP 69 suitable for cleaning with 80 °C hot water at 100 bar pressure at a distance of 100 mm from different directions
- Thermoplastic enclosure
- Long life
- Reed contacts, coded
- Actuation from front
- Switching distance up to 6 mm
- With pre-wired cable

// RC SI 56 EXTREME

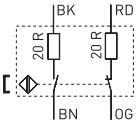
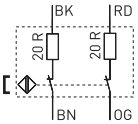


Technical data

Standards	EN ISO 13849-1; EN 60947-5-2; EN ISO 14119
Enclosure	glass-fibre reinforced thermoplastic, self-extinguishing, A3XZG5
Defined object	actuator MC 56 or MC 56-3
Sensor type	Type 4 interlocking device
Coding level	low coding
Switching system	reed contacts, 1 NC/1 NO or 2 NC contacts
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Connection	cable, 4 x AWG 24 UL, 4 x 0.22 mm², length 2 or 5 m
Safety-relevant data*	
EN ISO 13849-1	PL e, category 4
B_{10d} (10% load)	20 million
T_M	max. 20 years
$MTTF_d$	>100 years
DC / DC_{avg}	>99 %
Utilisation category	DC-12
Switching voltage	max. 30 VDC
I_e/U_e	max. 157 mA , with LED: max. 20 mA/24 VDC
Voltage drop at I_e	3.15 V, with LED: 3 V
Short-circuit current	max. 750 mA for 50 ms, with LED: max. 30 mA for 50 ms
Switching frequency	5 Hz
Degree of pollution	3
Safety class	II
Ambient temperature	–20 °C ... +85 °C
Mechanical life	> 10 mio. operations
Repeatability	< 0.5 mm
Switching distances	s_{max} 6 mm, s_{ao} 4 mm, s_{ar} 30 mm
Approvals	c SP us GL on request

* is only achieved in combination with a safety module.

Contact variants: switch travel/contacts

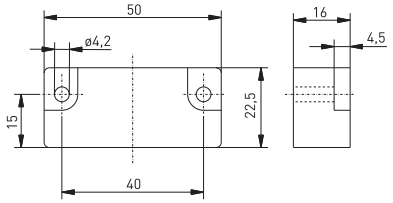
	without LED	Material Number
1 NC/1 NO contact	**RC Si 56 1Ö/1S-2m** 	✓ 1188983
2 NC contacts	**RC Si 56 2Ö-2m** 	1188993

✓ in stock

Type code RC Si 56 1Ö/1S-2m-LED-IP69 Extreme

- Degree of protection IP 69
- Built-in LED
- Cable length 2 m (5 m)
- 1 NC/1 NO contact (2Ö)
- Series, Enclosure diameter M30
- Safety
- Magnetic sensor

// Actuating magnet MC 56

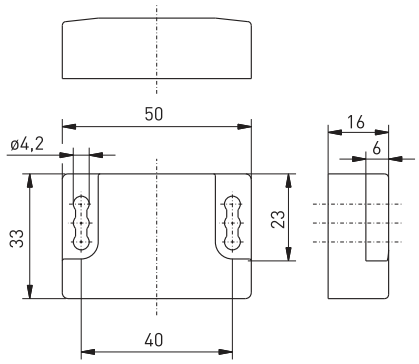


Features/Options
MC 56
- compact design
- suitable for 30 mm profiles

Note
The actuator is not included in the delivery of the switches.

Actuator	Material Number
MC 56	✓ 1180987

// Actuating magnet MC 56-3

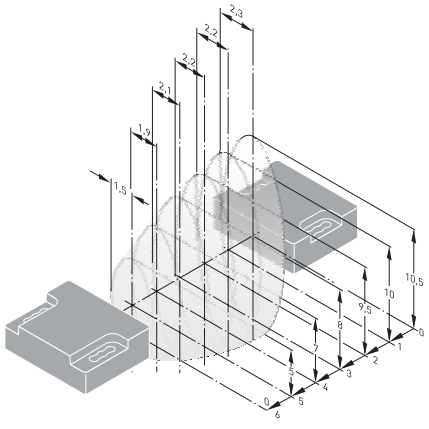


Features/Options
MC 56-3
- suitable for 30, 40 and 50 mm profiles

Note
The actuator is not included in the delivery of the switches.

Actuator	Material Number
MC 56-3	✓ 1182053

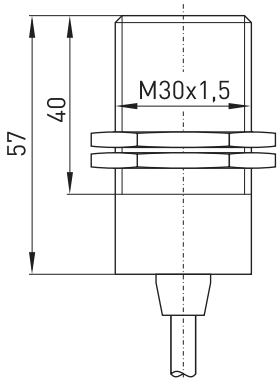
// Switching capacity



Safety sensors, cylindrical form
// Series RC Si M30 Extreme

Features/Options
- IP 69: suitable for cleaning with 80 °C hot water at 100 bar pressure at a distance of 100 mm from different directions
- Stainless steel version
- Reed contacts, coded
- Actuation from front
- Switching distance up to 10 mm
- With pre-wired cable

// RC SI M30 EXTREME

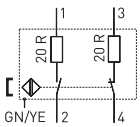
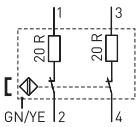


Technical data

Standards	EN ISO 13849-1; EN 60947-5-2, -3; EN ISO 14119
Enclosure	stainless steel 1.4539
Defined object	actuator MC 30-NIRO
Sensor type	Type 4 interlocking device
Coding level	low coding
Switching system	reed contacts, 1 NC/1 NO or 2 NC contacts
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Connection	cable, H03 VV-F, 4 x 0.5 mm², length 2 or 5 m
Safety-relevant data*	
EN ISO 13849-1	PL e, category 4
B_{10d} (10% load)	20 million
T_M	max. 20 years
$MTTF_d$	>100 years
DC / DC_{avg}	>99 %
Utilisation category	DC-12
I_e/U_e	max. 157 mA, with LED: 20 mA/24 VDC
Switching voltage	max. 30 VDC
Voltage drop at I_e	3.15 V, with LED: 3 V
Short-circuit current	max. 750 mA for 50 ms, with LED: max. 30 mA for 50 ms
Switching frequency	max. 5 Hz
Degree of pollution	3
Safety class	II
Switching distances	s_{ao} 8 mm, s_{ar} 24 mm, s_n 10 mm
Repeatability	< 0.5 mm
Ambient temperature	-20 °C ... +85 °C
Mechanical life	> 10 million operations
Approvals	c SP us GL on request

* is only valid in combination with a safety module.

Contact variants: switch travel/contacts

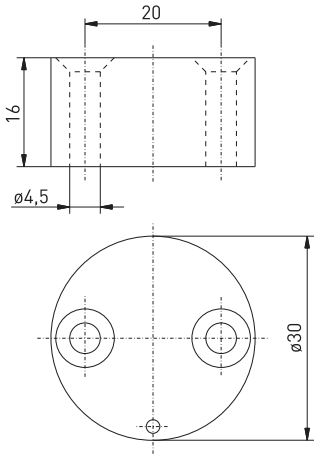
	without LED	Material Number
1 NC/1 NO contact	RC Si M30 1Ö/1S-2m 	✓ 1188973
2 NC contacts	RC Si M30 2Ö-2m 	1188981

✓ in stock

Type code RC Si M30 2Ö-LED-2m-Niro-IP69 Extreme

- Degree of protection IP 69
- Stainless steel version
- Cable length 2 m (5 m)
- Built-in LED
- 2 NC contacts (1Ö/1S)
- Series, Enclosure diameter M30
- Safety
- Magnetic sensor

// Actuating magnet MC 30 Niro

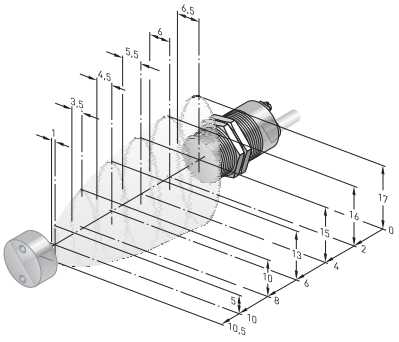


Features/Options
- Stainless steel enclosure 1.4571

Note
The actuator is not included in the delivery of the switches.

Actuator	Material Number
MC 30 Niro	✓ 1182385

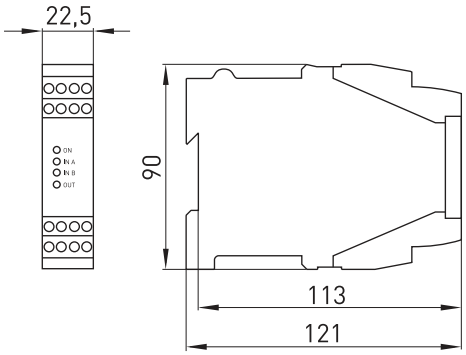
// Switching capacity



Safety relay module
// Series SRM 21 RT2

Features/Options
- Enclosure width: 22.5 mm
- 2 NC contacts or NC/NO combination can be connected
- Feedback circuit
- 2 enabling paths
- 1 transistor output
- Manual or automatic reset
- Switching position indication by LED
- Cross-wire monitoring

// SRM 21 RT2



Technical data

Standards	EN ISO 13849-1; EN 62061; EN ISO 14119, EN 60204-1, BG-GS-ET 20; EN 60947-5-1; EN 60947-5-3*
Enclosure	polycarbonate, terminal block polyamide V0
Mounting	top hat section rail mounting, screw clamps with + and - screws
Degree of protection	enclosure IP 40, terminals IP 20 to IEC/EN 60529
Safety-relevant data	
EN 60204-1	stop category 0
EN 62061	SILCL 3
EN ISO 13849-1	PL e
h_{op}	8 h/d
d_{op}	220 d/a
t_{Zyklus}	30 s
PFHD	⩾ 3 x 10-8
T_M	max. 20 years
MTTFd	39.5 years
DC/ DC_{avg}	>99 %
U_e	24 VDC ±15 %
I_e	0.125 A
Inputs	1 NC/1 NO or 2 NC inputs, 1 feedback circuit, 1 start input (monitored)
Outputs	2 enabling paths, 1 transistor output as signalling output
I_e/ U_e of enabling paths	3 A/ 230 VAC, 2 A/ 24 VDC
Utilisation category	AC-15; DC-13
Max. fuse rating	U_e 2A gG/gN fuse enabling paths 6A gG/gN fuse
Display	1 LED for supply voltage, 1 LED each for input A and B, 1 LED for authorisation
Ambient temperature	0 °C ... +55 °C
Approvals	

* only valid in combination with RC Si M30...

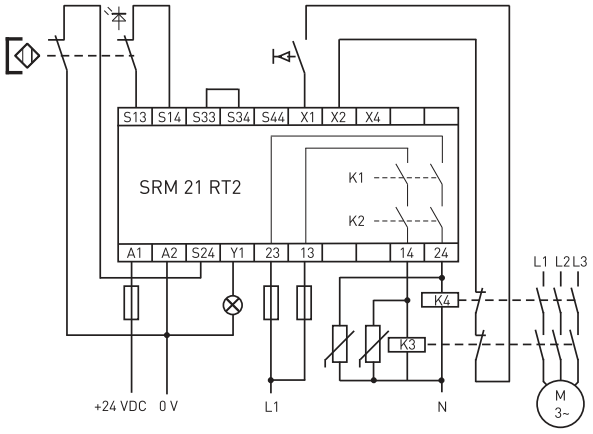
Safety relay module	Material Number
SRM 21 RT2	✓ 1179203

Type code SRM 21 RT2

- 2 inputs
- automatic reset
- manual reset
- 1 transistor output
- 2 enabling paths
- Safety relay module

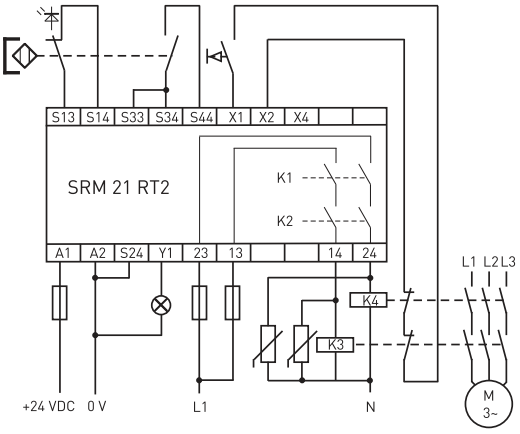
✓ in stock

// Wiring example



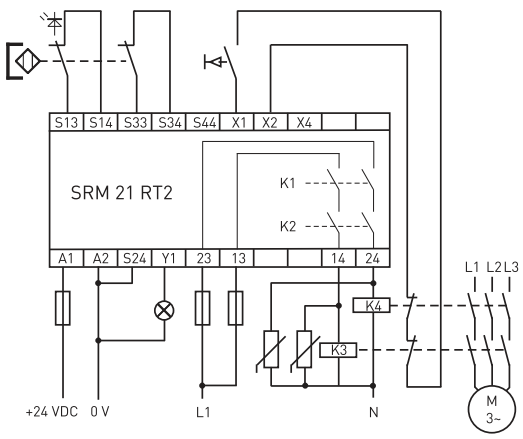
- 2-channel: monitoring of one magnetic safety sensor with 2 NC contacts
- Feedback circuit
- Cross-wire detection
- With manual reset/start
- Y1 high upon authorisation
- Up to PL e or SILCL 3

// Wiring example



- 2-channel: monitoring of one magnetic safety sensor with 2 NC contacts
- Feedback circuit
- Without cross-wire detection
- With manual reset/start
- Y1 high upon authorisation
- Up to PL e or SILCL 3

// Wiring example

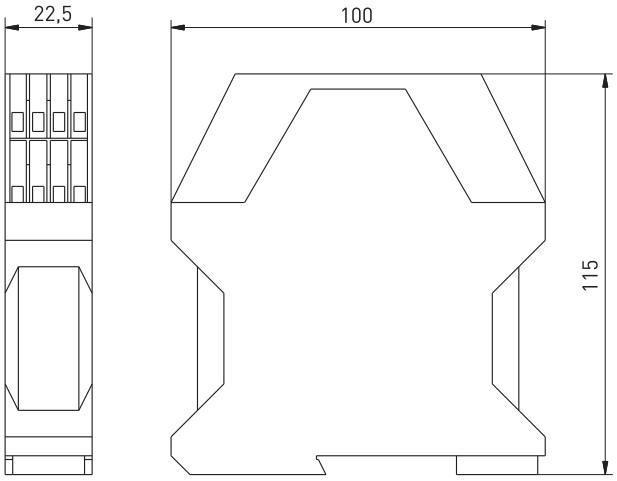


- 2-channel: monitoring of one magnetic safety sensor with 1 NC and 1 NO contact
- Feedback circuit
- Without cross-wire detection
- With manual reset/start
- Y1 high upon authorisation
- Up to PL e or SILCL 3

Safety relay module
// Series SRM 21 Multi

Features/Options
- Enclosure width: 22.5 mm
- 2 NC contacts combination can be connected
- Feedback circuit
- 2 potential-free enabling paths
- 1 auxiliary output
- Manual or automatic reset
- Switching position indication by LED

// SRM 21 MULTI



Technical data

Standards	EN ISO 13849-1; EN 62061; EN ISO 14119, EN 60204-1, EN 60947-5-1, EN 61508, 2004/108/EC
Enclosure	polyamid PA 6.6 V0
Mounting	top hat section rail mounting
Degree of protection	IP 20 to IEC/EN 60529
Safety-relevant data	
EN 60204-1	stop category 0
EN 61508	SIL 3
PFH	2.2 x 10-9
PFD	4.64 x 10-6
EN ISO 13849-1	PL e
T_M	max. 20 years
MTTFd	100 years
DC/ DC_{avg}	>99 %
U_e	24 VDC -20 % ... +25 %
I_e	0.125 A
Inputs	2 NC inputs, 1 feedback circuit, 1 start input (monitored)
Outputs	2 enabling paths, 1 transistor output as signalling output
I_e/ U_e of enabling paths	3A/ 230VAC, 5A/ 24VDC
Utilisation category	AC-15; DC-13
Max. fuse rating	power supply 2 A slow blow, enabling paths 4 A gG/gN fuse
Display	2 LEDs for inputs, 2 LEDs for outputs, 1 LED for supply voltage, 1 LED for fault
Ambient temperature	-25 °C ... +55 °C
Shock resistance	10g
Approvals	TÜV

Safety relay module
SRM 21 Multi

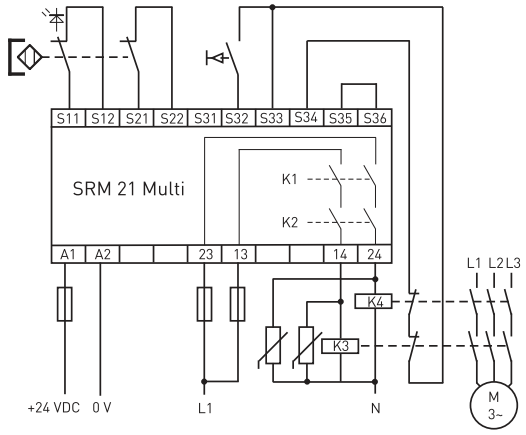
Material Number
✓ 1185607

Type code	SRM 21 Multi

SRM 21 Multi
- Safety relay module
- 2 enabling paths
- 1 transistor output
- multi-functional

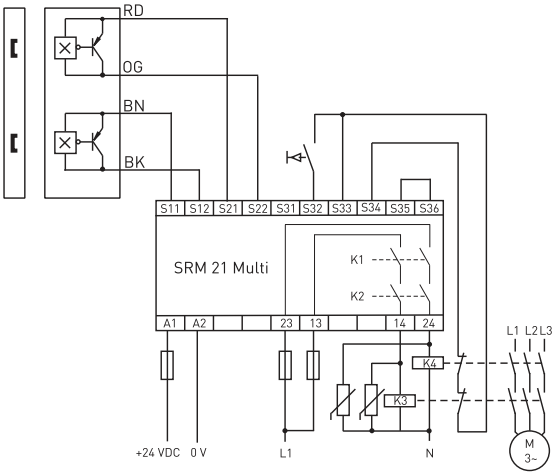
✓ in stock

// Wiring example



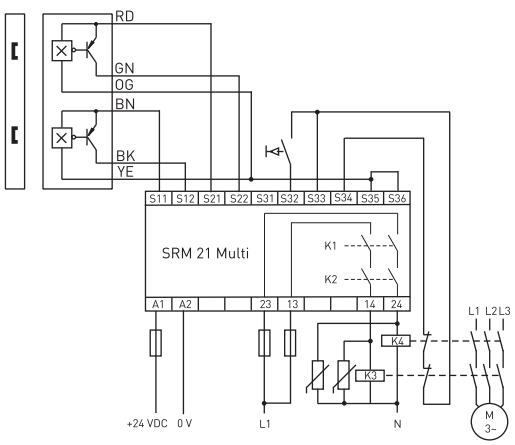
- 2-channel: monitoring of one magnetic safety sensor with two NC contacts
- Cross-wire detection, monitored start and feedback circuit
- S31 is high on authorisation
- Up to PL e

// Wiring example



- 2-channel: monitoring of one safety hall sensor with two semiconductor outputs as NC
- Cross-wire detection, monitored start and feedback circuit
- S31 is high on authorisation
- Up to PL e

// Wiring example



- 2-channel: monitoring of one safety hall sensor with two semiconductor outputs as NC
- cross-wire detection, monitored start and feedback circuit
- S31 is high on authorisation
- up to PL e

Position switches with/without safety function

ES 61 WHK Extreme


Auftragsdaten
Prüfergebnisse
Schalter anschliessen und Startknopf betätigen.

Position switches with/without safety function

Range of application

Position switches are used where moving parts of machines and industrial plants have to be positioned, controlled and monitored.

The safety position switches are suitable for sliding and hinged safety guards, which need to be closed to ensure the necessary operational security. In combination with guard door monitors, all switches shown in this chapter achieve PL »e« per EN ISO 13849-1 or up to SIL 3 per EN 62061, subject to suitable circuit arrangements.

Design and operating principle

Many of the position switches fulfil the requirements of the IEC/EN 60947-5-1 standard and can therefore also be used as position switches with safety function. On the safety position switches, the guard device and the positive break NC contact are positively linked. When the guard device is closed, the position switch is not actuated. On sliding guards one switch is actuated and one switch is not actuated so that there is a change when opening and closing the guard door. These products are identified by the symbol ⊖ for positive break.

Some position switches fulfil the requirements for standardised switches to EN 50 047 or EN 50 041.

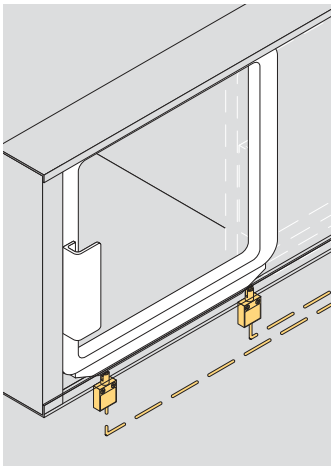
The position switches are available with snap and slow action and are available with different contact configurations. A wide range of actuators completes the program. Most of the switches can be supplied with a metal roller on request.

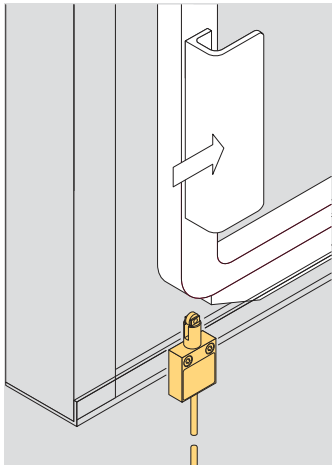
The devices are listed in the order of enclosure dimensions and materials, starting with the smallest and the plastic enclosures.

All position switches shown in this chapter bear the CE mark according to the Low Voltage Directive 06/95/EC. All position switches with safety function bear the CE mark according to the Machinery Directive 2006/42/EC

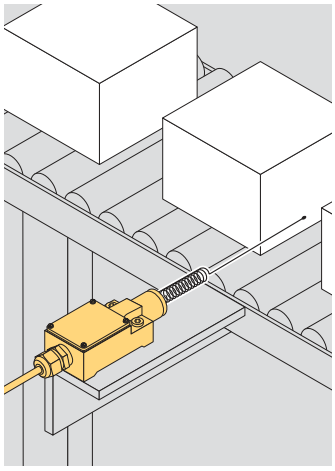
Application

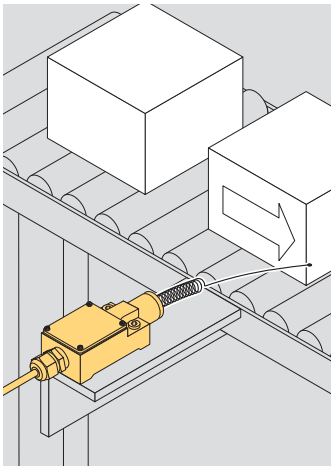
on sliding guards





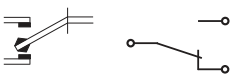
As a piece counter



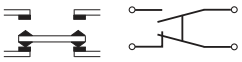


Contacts per IEC 60617

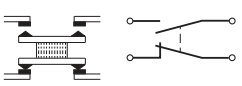
Type C
Change-over contact with single break with 3 terminals



Type Za
Change-over contact with double break with 4 terminals. The contacts have the same polarity.

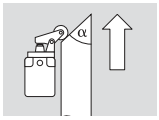


Type Zb
Change-over contact with double break with 4 terminals. The two movable contacts are electrically insulated from each other.



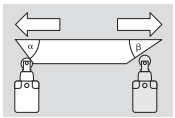
Legend

a: **Actuating angle from bottom of switch axis as shown in picture**

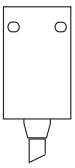
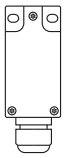
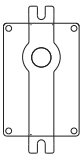
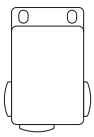
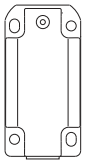


a: **Actuating angle from right of switch axis**

b: **Actuating angle from left of switch axis as shown in picture**



Selection table
Position switches with/without safety function

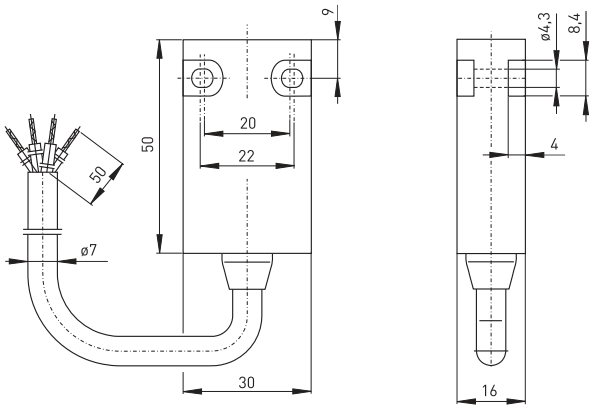
// Series		// Actuator							
		↓	↓	↻	↻	↻	↔	↔	↔
									
ES/EM 14, from page 42 - ES 14: Safety switch - Thermoplastic enclosure - Cable		W		WKU			WR		
ES 95, from page 46 - Safety switch - Thermoplastic enclosure - Wiring compartment - 1 cable entry - Design to EN 50 047		W						RL	
ES/EM 91, from page 50 - Safety switch - Thermoplastic enclosure - Wiring compartment									
ES 41, from page 52 - Safety switch - Metal enclosure - Wiring compartment		+ W		KU			R		
ES /EM 98 and HS 98, from page 58 - ES/EM 98: Safety switch HS 98: Position switch with analogue output - Metal enclosure - Wiring compartment		+					R		
+ Standard: plunger without water-tight collar									

Actuating direction ↓ / Free movement of actuator →

	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↻	↻	↻		
																
						D							TF			
		WH		WPH		D								TK		
							DL									
		H	HL	PH		D	DL			DF						
		H				D		DS								

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 66
- ES 14: Slow action, 1 NC/1 NO or 2 NC/1 NO contact with double break
- EM 14: Snap action, change-over contact with single break
- Double insulated ⧈
- Suitable for in-line mounting
- With pre-wired cable, cable length 2 metres
- Mounting details to EN 50047
- Ex version available

// ES/EM 14 EXTREME



Technical data

Standards	EN 60947-5-1 EN ISO 13849-1; EN ISO 14119
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, self-extinguishing UL 94-V0
Switch type	type 1
Coding level	low coding
Degree of protection	IP 66 to IEC/EN 60529
Contact material	silver
Switching system	slow or snap action, slow action: positive break NC contacts ⊖
Switching elements	ES 14: 1 NC/1 NO or 2 NC/1 NO contact type Zb; EM 14: change-over contact type C
Connection	cable, ES 14 1Ö/1S: 4 x AWG 20; ES 14 2Ö/1S: 6 x AWG 26; EM 14: 3 x AWG 20
Cable cross-section	ES 14 1Ö/1S: 4 x 0.56 mm²; ES 14 2Ö/1S: 6 x 0.14 mm²; EM 14: 3 x 0.56 mm²
B_{10d} (10 % load)	ES 14: 2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	250 V
I_{the}	ES 14: 6 A; EM 14: 5 A
I_e/U_e	ES 14: 6 A/250 VAC; 0.25 A/230 VDC; EM 14: 5 A/250 VAC; 0,16 A/230 VDC
Utilisation category	AC-15, DC-13
Max. fuse rating	ES 14: 6 A gG/gN fuse; EM 14: 5 A gG/gN fuse
Ambient temperature	–40 °C ... +75 °C
Mechanical life	> 1 million operations
Operation cycles	1800/h
Repeat accuracy	± 0.1 mm
Contact opening	max. 2 x 4 mm
Approvals	c SP us EAC

Type code EM 14 WR 1Ö/1S-2m -40°C IP66 Extreme

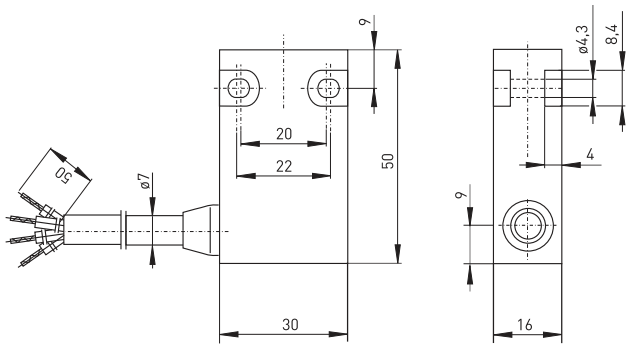
- high degree of protection IP 66
- Cold-resistant down to -40 °C
- Cable length 2 m (5 m)
- Contact type 1 NC/1 NO, (2Ö/1S)
- Actuator R (H, TK, D, etc. ...)
- Collar
- Series
- M Snap action (S slow action)

✓ in stock

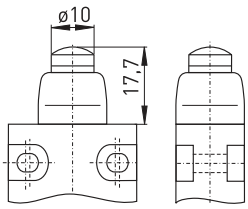
Features/Options
- With gold-plated contacts available on request

Features/Options
- Safety switch only version with slow action
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 0°
- Silicone watertight collar for protection against penetration of dirt

// Cable entry on side S



// Plunger with watertight collar W



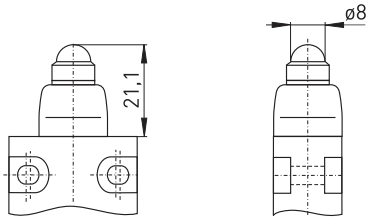
Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		**ES 14 W1Ö/1S** **1189396** ✓ 0 3 5,5 BK-GY 1,5 2,8 BN-BU
1 change-over contact Material Number	**EM 14 W** **1189410** 0 1,5 5,5 GY-BK GY-BN	
2 NC/1 NO contact Material Number		**ES 14 W 2Ö/1S** **1189441** 0 5,5 BK-GY 1,5 2,8 BN-BU

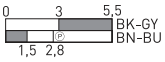
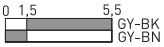
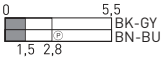
Position switches with/without safety function
// Series ES/EM 14 Extreme, actuators

Features/Options
- Safety switch only version with slow action
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 20°
- Vertical actuation or actuation from side possible
- Actuator head with captive stainless steel ball actuator
- Exact repeatability of switching point
- Silicone watertight collar for protection against penetration of dirt

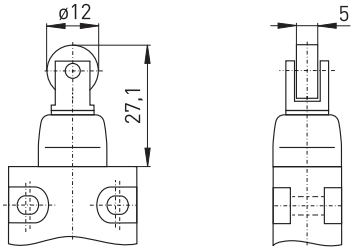
// Ball plunger with collar WKU



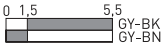
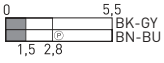
Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		**ES 14 WKU 1Ö/1S** **1189397** 
1 change-over contact Material Number	**EM 14 WKU** **1189411** 	
2 NC/1 NO contact Material Number		**ES 14 WKU 2Ö/1S** **1189442** 

// Roller plunger with collar WR

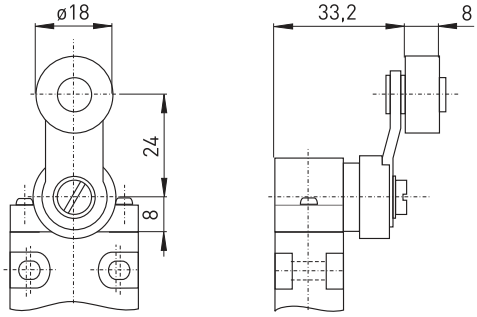


Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		**ES 14 WR 1Ö/1S** **1189398** ✓ 
1 change-over contact Material Number	**EM 14 WR** **1189412** 	
2 NC/1 NO contact Material Number		**ES 14 WR 2Ö/1S** **1189443** 

Features/Options
- Safety switch only version with slow action
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 45°
- Wear-resistant thermoplastic roller
- Lever can be repositioned in 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- With metal roller available on request

// Rocking lever D

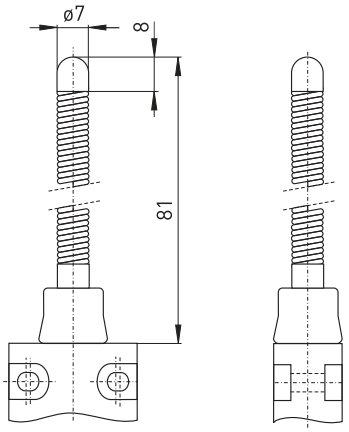


Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		**ES 14 D 1Ö/1S** **1189401** ✓ 70° 22° 0° 22° 70° BK-GY BN-BU 7° 7°
1 change-over contact Material Number	**EM 14 D** **1189413** 70° 0° 70° GY-BK GY-BN 7° 7°	
2 NC/1 NO contact Material Number		**ES 14 D 2Ö/1S** **1189446** 70° 0° 70° BK-GY BN-BU 7° 7°

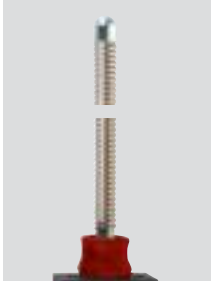
Features/Options
- No safety switch!
- With rounded steel tip
- Spring rod can be actuated from any direction
- Elasticity of spring allows for deflection above the max. switching angle of 18°

// Spring rod with steel tip TF



Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		**ES 14 TF 1Ö/1S** **1189402** 18° 15° 0° 15° 18° BK-GY BN-BU 10° 10°
1 change-over contact Material Number	**EM 14 TF** **1189424** 18° 0° 18° GY-BK GY-BN 10° 10°	



Position switches with/without safety function
// Series ES 95 Extreme

Features/Options
- High degree of protection IP 66
- Salt-mist proof
- Thermoplastic enclosure with stainless steel screws and stainless steel 1.4571 plunger
- Design according to EN 50 047
- Wiring compartment
- Double insulated ⧈
- With gold-plated contacts available on request
- Ex version available

// ES 95 EXTREME

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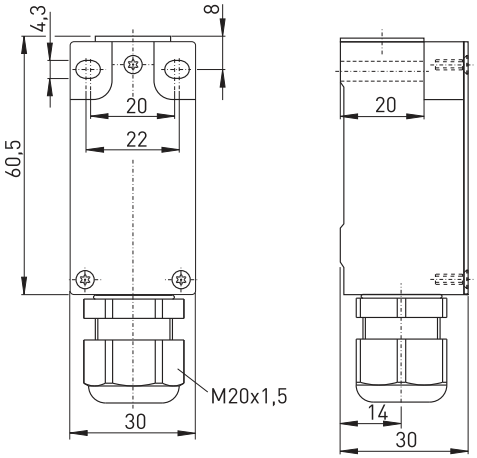


Technical data

Standards	EN 60947-5-1; EN ISO 13849-1; EN ISO 14119
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, self-extinguishing UL 94-V0
Switch type	type 1
Coding level	low coding
Degree of protection	IP 66 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contact ⊖
Switching elements	1 NC/1 NO contact or 2 NC contacts Zb, galvanically separated contact bridges
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
B_{10d} (10 % load)	2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	400 V
I_{the}	6 A
I_e/U_e	6 A/400 VAC; 0.25 A/230 VDC
Utilisation category	AC-15, DC-13
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–20 °C ... +80 °C
Mechanical life	> 1 million operations
Operation cycles	1800/h
Contact opening	max. 2 x 3.5 mm
Approvals	c SP us EAC

Type code ES 95 WH 1Ö/1S IP66 Niro Extreme

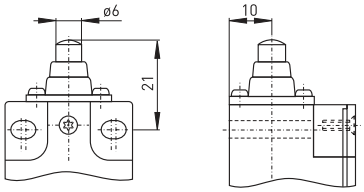
- Stainless steel screws and plunger
- high degree of protection IP 66
- Contact type 1Ö/1S, (2Ö, UE)
- Actuator H (R, D, DS, etc. ...)
- Collar
- Series
- S slow action

✓ in stock

Features/Options
- Actuator type B to EN 50 047
- Watertight collar for protection against penetration of dirt

Features/Options
- Wear-resistant plastic roller
- Metal roller available on request
- Actuator can be repositioned by 4 x 90°

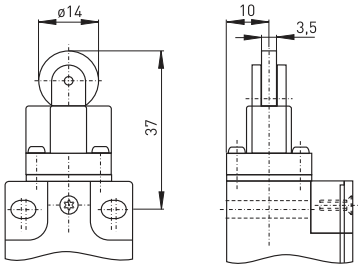
// Plunger with collar W



Contact variants: switch travel/contacts

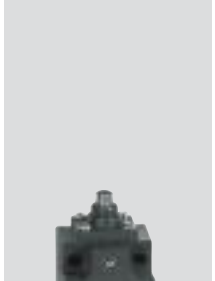
	Slow action
1 NC/1 NO contact Material Number	ES 95 W 1Ö/1S 1183363 ✓ 

// Long roller plunger RL



Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 95 RL 1Ö/1S 1183365 ✓ 

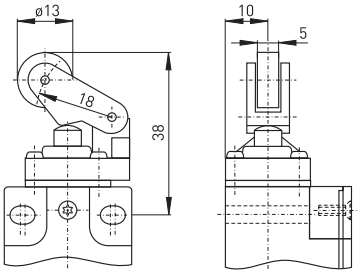


Position switches with/without safety function
// Series ES 95 Extreme, actuators

Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of a = 40° and b = 25°
- Actuator type E to EN 50 047
- Watertight collar for protection against penetration of dirt
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- Metal roller available on request

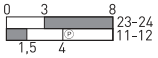
Note
Actuation from left should be avoided since this reduces the mechanical life of the position switch.

// Roller lever with collar WH



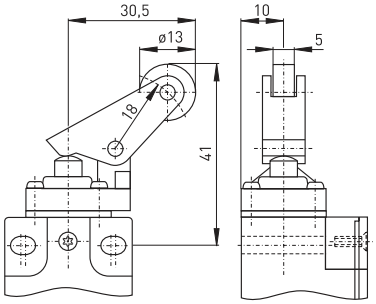
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 95 WH 1Ö/1S 1183366



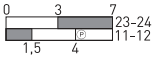
Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of a = 30°
- Actuation parallel to switch from below
- Watertight collar for protection against penetration of dirt
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- Metal roller available on request

// Parallel roller lever with collar WPH



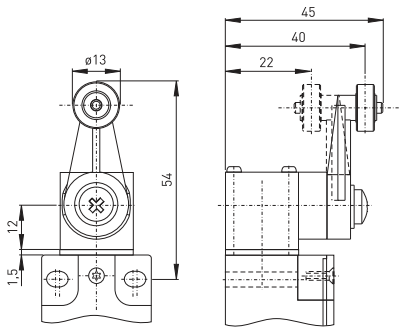
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 95 WPH 1Ö/1S 1183367 ✓

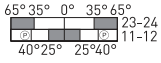


Features/Options
- Lever angle adjustable in 10° steps
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- Metal roller available on request

// Rocking lever D

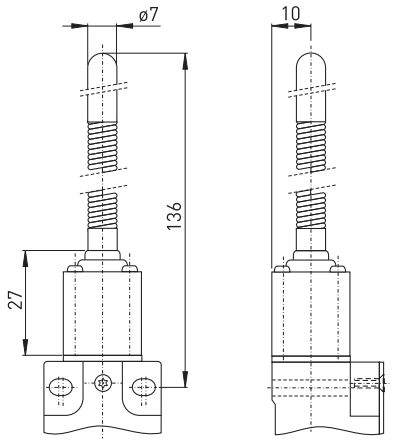


Contact variants: switch travel/contacts

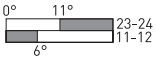
	Slow action
1 NC/1 NO contact Material Number	ES 95 D 1Ö/1S 1183368 ✓ 

Features/Options
- No safety switch!
- Wear-resistant plastic roller
- Spring rod can be actuated from any direction

// Spring rod with plastic tip TK

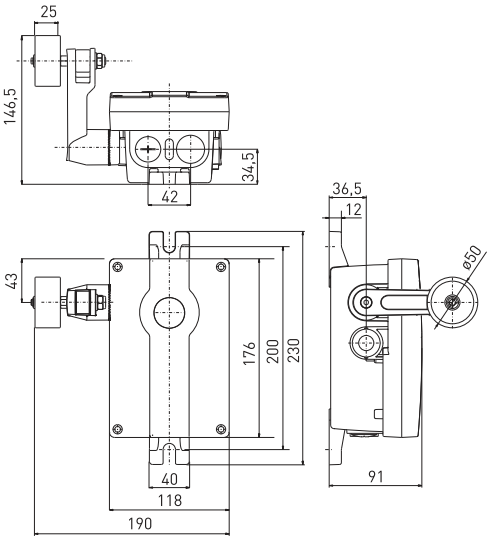


Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 95 TK 1Ö/1S 1248248 ✓ 

Features/Options
- Temperature resistant from -40 °C to +85 °C
- High degree of protection IP 66 / IP 67
- Thermoplastic enclosure
- ES 91: Slow action, 4 or 6 contacts
- EM 91: Snap action, 4 or 6 contacts
- Wiring compartment

// ES/EM 91 EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1; EN ISO 14119
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, UV resistant to EN ISO 4892
Switch type	type 1
Coding level	low coding
Tightening torque	cover screws: max. 0.8 Nm, actuator screw: max. 3.3 Nm
Degree of protection	IP 66/67 to IEC/EN 60529
Switch insert	ES 232 or EM 232
Contact material	silver
Switching system	slow or snap action, positive break NC contacts ⊖
Switching elements	2 NC/2NO, 4 NC/2 NO or 3 NC/3 NO contacts with double break Zb, galvanically separated contact bridges
Positive break torque	2.9 Nm
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M25 x 1.5
B_{10d} (10 % load)	2 million
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Conditional short-circuit current	1100 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Operation cycles	max. 720/h
Mechanical life	> 1 million operations
Ambient temperature	–40 °C ... +85 °C
Approvals	

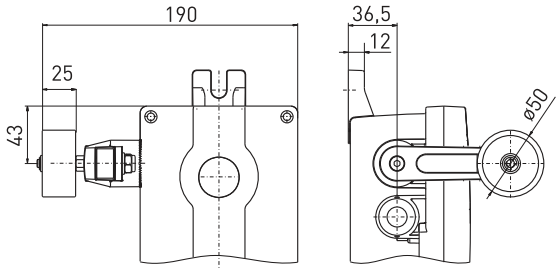
Type code	EM 91 DL-2Ö/2S -40°C...+85°C IP66/67 Extr.

- EM 91 DL-2Ö/2S -40°C...+85°C IP66/67 Extr.
- M Snap action (S Slow action)
- Series 91
- Actuator DL
- Contact type 2NC/2NO (4Ö/2S, 3Ö/3S)
- Heat-resistant up to +85 °C, cold-resistant down to -40 °C)
- High degree of protection IP 66 (IP 67)

✓ in stock

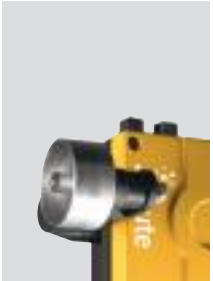
Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 45°
- Metal roller
- Lever can be repositioned in 6° steps clockwise or counter-clockwise

// Long rocking lever DL



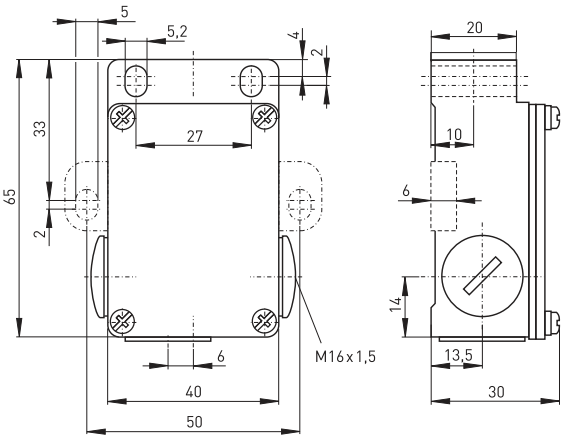
Contact variants: switch travel/contacts

	Snap action	Slow action
2 NC/2 NO contact Material Number	EM 91 DL 2Ö/2S 1211724 ✓	ES 91 DL 2Ö/2S 1242734 ✓
4 NC/2 NO contact Material Number	EM 91 DL 1Ö/1S 1242732	ES 91 DL 1Ö/1S 1215301
3 NC/3 NO contacts Material Number	EM 91 DL 3Ö/3S 1215105	ES 91 DL 3Ö/3S 1213694



Features/Options
- Cold-resistant down to -35 °C or heat-resistant up to +180 °C
- Metal enclosure
- Slow action ⊖, 1 NC/1 NO or 2 NC contacts Za
- 3 cable entries M16 x 1.5
- Locking screws, brass nickel-plated

// ES 41 EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1; EN ISO 14119
Enclosure	aluminium die-cast, powder-coated
Cover	steel, powder-coated
Switch type	type 1
Coding level	low coding
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contacts ⊖
Switching elements	1 NC/1 NO or 2 NC contacts Za
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	3 x M16 x 1.5
B_{10d} (10 % load)	2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Mechanical life	> 1 million operations
Operation cycles	1800/h
Ambient temperature	–35 °C ... +180 °C
Approvals	cSPus EAC

Type code ES 41 WH 1Ö/1S +180°C Extreme

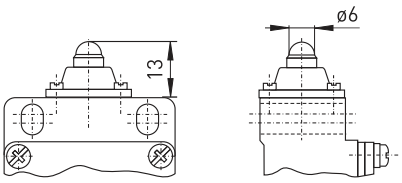
- Heat-resistant up to +180 °C (Cold-resistant down to -35 °C)
- Contact type 1NC/1NO, (2Ö)
- Actuator H (R, TK, D, etc. ...)
- Watertight collar
- Series 41
- S Slow action

✓ in stock

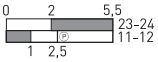
Position switches with/without safety function
// Series ES 41 Extreme, actuators

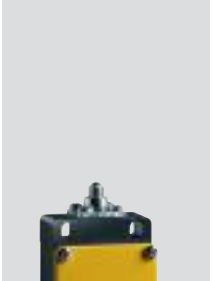
Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 20°
- Vertical actuation or actuation from side possible
- Actuator with captive stainless steel ball
- Exact repeatability of switching point

// Plunger



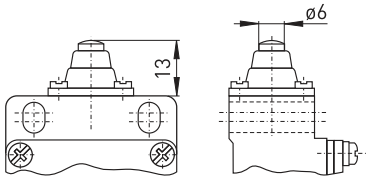
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	**ES 41 1Ö/1S +180°C** **1046259** ✓ 

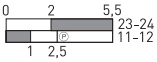


Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 0°
- Exact repeatability of switching point
- Watertight collar for protection against penetration of dirt

// Plunger with collar W



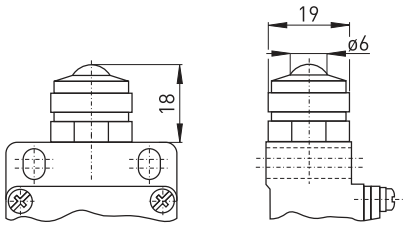
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	**ES 41 W 1Ö/1S +180°C** **1046273** 

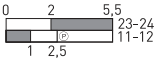
Position switches with/without safety function
// Series ES 41 Extreme, actuators

Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 20°
- Vertical actuation or actuation from side possible
- Actuator with captive stainless steel ball
- Exact repeatability of switching point

// Ball plunger KU

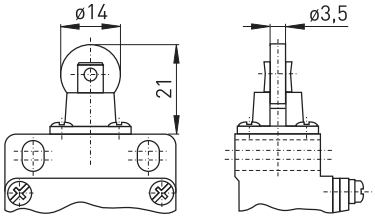


Contact variants: switch travel/contacts

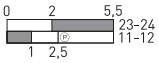
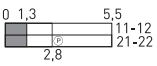
	Slow action
1 NC/1 NO contact Material Number	**ES 41 KU 1Ö/1S +180°C** **1175888** 

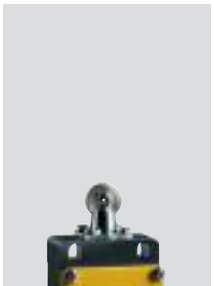
Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 30°
- Metal roller
- Actuator can be repositioned by 4 x 90°

// Roller plunger R



Contact variants: switch travel/contacts

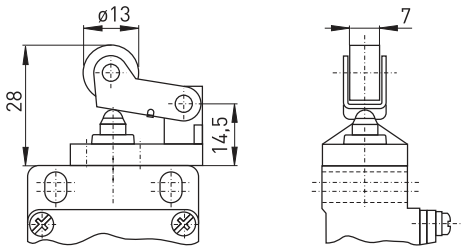
	Slow action
1 NC/1 NO contact Material Number	**ES 41 R 1Ö/1S -35°C** **1179246** ✓
Material Number	**ES 41 R 1Ö/1S +180°C** **1046291** ✓ 
2 NC contacts Material Number	**ES 41 R 2Ö-ST -35°C** **1053506** 



Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of α = 40° and β = 25°
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- With metal roller available on request

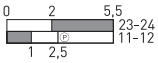
Note
Actuation from the left should be avoided since this reduces the mechanical life of the position switch.

// Roller lever H



Contact variants: switch travel/contacts

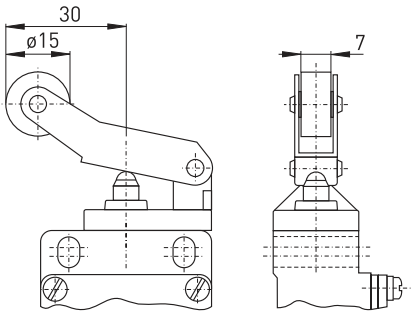
	Slow action
1 NC/1 NO contact Material Number	**ES 41 H 1Ö/1S +180°C** **1046303**
Material Number	**ES 41 H/90° 1Ö/1S +180°C** **1171799** ✓



Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of α = 40° and β = 30°
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- With metal roller available on request

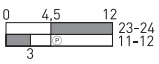
Note
Actuation from the left should be avoided since this reduces the mechanical life of the position switch.

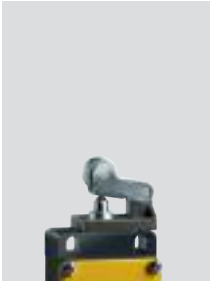
// Long roller lever HL



Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	**ES 41 HL 1Ö/1S +180°C** **1183482**



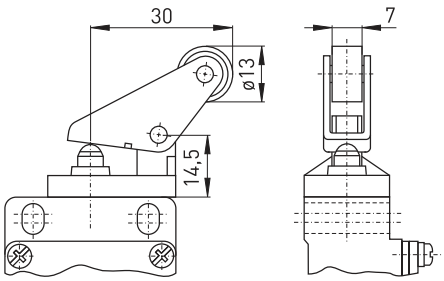


Position switches with/without safety function
// Series ES 41 Extreme, actuators

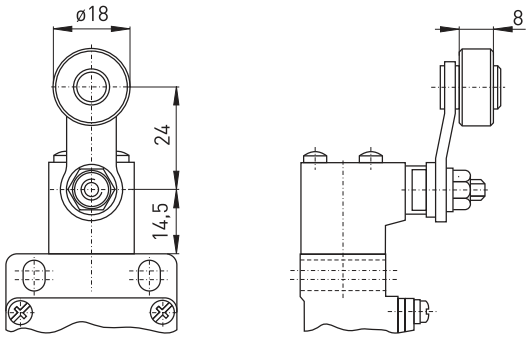
Features/Options
- Actuating speed max. 0.5 m/s with an actuating angle of 30°
- Actuation parallel to switch from below
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- With metal roller available on request

Features/Options
- No safety switch!
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 45°
- Wear-resistant plastic roller
- Lever can be repositioned in 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- With metal roller available on request
- Variant with plug-in connector available:
  ES 41 D 1Ö/1S-ST -35 °C, material number 1179431 and
  ES 41 D 2Ö-ST -35°C, material number 1032150

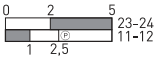
// Parallel roller lever PH



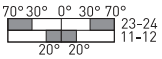
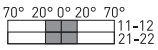
// Rocking lever D



Contact variants: switch travel/contacts

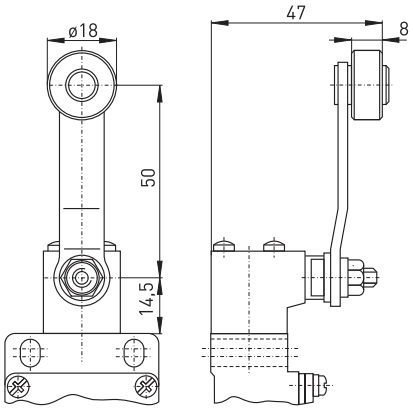
	Slow action
1 NC/1 NO contact Material Number	**ES 41 PH/180° 1Ö/1S +180°C** **1181167** 

Contact variants: switch travel/contacts

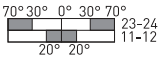
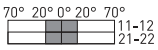
	Slow action
1 NC/1 NO contact Material Number	**ES 41 D 1Ö/1S -35°C** **1046335**
Material Number	**ES 41 D 1Ö/1S +180°C** **1178272** ✓ 
2 NC contacts Material Number	**ES 41 D 2Ö -35°C** **1046541** 

Features/Options
- No safety switch!
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 45°
- Wear-resistant plastic roller
- Lever can be repositioned in 10° steps clockwise or counter-clockwise
- Actuator can be repositioned by 180°
- With metal roller available on request
- Variant with plug-in connector available:
  ES 41 D 1Ö/1S-ST -35 °C, material number 1181772

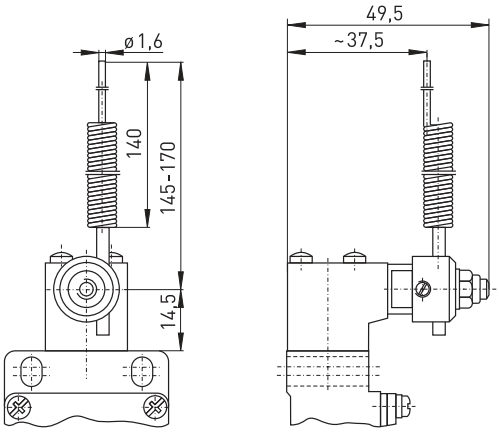
// Long rocking lever DL



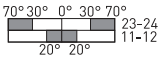
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 41 DL 1Ö/1S -35°C 1158076
Material Number	ES 41 DL 1Ö/1S +180°C 1046340 ✓
	
2 NC contacts Material Number	ES 41 DL 2Ö -35°C 1183533
	

// Spring lever DF



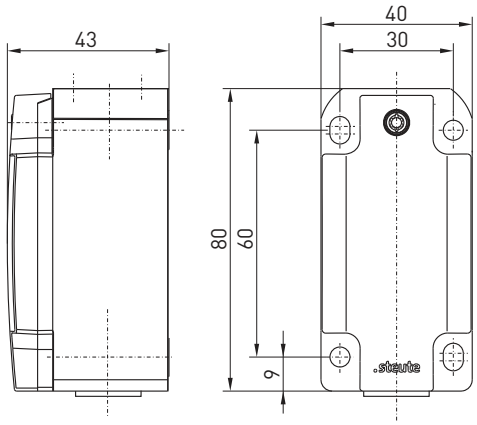
Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact Material Number	ES 41 DF 1Ö/1S +180°C 1179712
	

Position switches with analogue output
// Series HS 98 Extreme

Features/Options
- With analogue output
- Design to EN 50041
- Wiring compartment
- High degree of protection IP 66 / IP 67
- Various output values available:
  0 ... 10 VDC, 0 ... 20 mA or 4 ... 20 mA

// HS 98 EXTREME



Technical data

Standards	EN 60947-5-2; EN 60947-5-7
Enclosure	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016
Cover	Stainless steel 1.4401, powder-coated, similar to RAL 1003
Degree of protection	IP 66/67 to IEC/EN 60529
Switching system	Hall sensor with analogue output
Linearity	2 %
Connection	Cage clamps
Cable entry	1 x M20 x 1.5 for cable diameter 5 ... 9 mm
Over temperature protection	monitoring via µ controller + NTC
U_e	24 VDC
Operating voltage range	18-30 VDC
Rated output current	IB (Q2) ⩽ 100 mA short-circuit protected
Rated output voltage	UB (Q2) ⩽ Ue - 2 V min.

Variants with output current

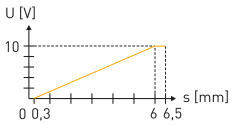
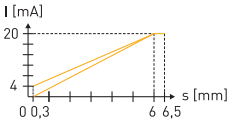
I_e	⩽ 135 mA at max. output current (Q1+Q2)
Rated output current	IB (Q1) (0) 4 ... 20 mA; max. 20.4 mA
Working resistance	⩽ 400 Ω

Variants with output voltage

I_e	⩽ 25 mA
Rated output voltage	UB (Q1) 0 ... 10 V; max. 10.2 V
Working resistance	⩾ 1 kΩ

Attendance delay tv	⩽ 0.5 s
Max. fuse rating	internal fuse 0.375 mA F
Ambient temperature	–40 °C ... +85 °C
Mechanical life	> 1 million operations

Contact variants: Travel/contacts

	Hall sensor	Material Number
U_a	**HS 98 R 0-10 VDC ...**	**on request**
		
I_a	**HS 98 R 0-20 mA ...**	**on request**
	HS 98 R 4-20 mA ...	**on request**
		

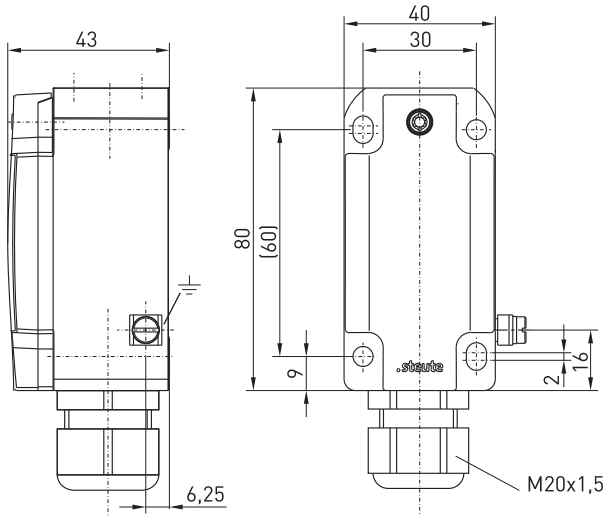
✓ in stock

Type code **HS 98 R 0-10V IP66 Extreme**

- High degree of protection IP 66 (IP 67)
- Output value 0-10 V (0-20 mA, 4-20 mA)
- Actuator R (H, D, etc. ...)
- Series
- Hall sensor

Features/Options
- Heat-resistant up to +90 °C or cold-resistant down to -40 °C
- High degree of protection IP 66 or IP 69K
- Metal enclosure
- Design to EN 50041
- Slow action ⊖ , change-over contact, 1 NC/1 NO or 2 NC/1 NO with double break
- Snap action ⊖, 2 NC/1 NO contact with double break
- Ex version available

// ES/EM 98 EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1; EN ISO 14119
Enclosure	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016
Cover	Stainless steel 1.4401, powder-coated, similar to RAL 1003
Switch type	type 1
Coding level	low coding
Degree of protection	IP 66 or 69K to IEC/EN 60529
Contact material	silver
Switching system	slow or snap action, positive break NC contacts ⊖
Switching elements	1 NC/1 NO or 2 NC/1 NO contacts Zb, galvanically separated contact bridges
Connection	screw connection terminals
Cable cross-section	2 contacts: max. 2.5 mm², 3 contacts: max. 1.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
B_{10d} (10 % load)	2 million
T_M	max. 20 years
U_{imp}	4 kV
U_i	400 V
I_{the}	2 contacts: 6 A, 3 contacts: 1.5 A
I_e/U_e	2 contacts: 6 A/250 VAC; 0.25 A/230 VDC 3 contacts: 1.5 A/230 VAC; 0.27 A/250 VDC
Utilisation category	AC-15; DC-13
Max. fuse rating	2 contacts: 6 A gG/gN fuse 3 contacts: 1.5 A gG/gN fuse
Mechanical life	> 1 million operations
Operation cycles	1800/h
Ambient temperature	–40 °C ... +60 °C; -20 °C ... +90 °C
Approvals	cSPus EAC

Type code	EM 98 H-12 +90°C IP69K Extreme

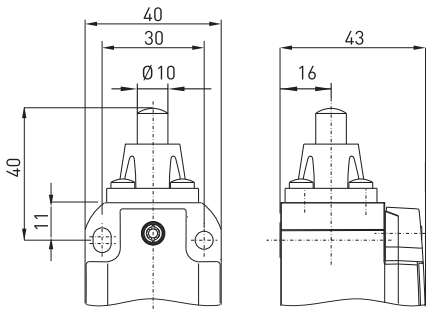
- High degree of protection IP 69K (IP 66)
- Heat-resistant up to +90 °C (Cold-resistant down to -40 °C)
- Contact type 2 NC/1 NO (-11)
- Actuator H (R, D, etc. ...)
- Series
- M Snap action (S Slow action)

Position switches with/without safety function
// Series ES/EM 98 Extreme, actuators

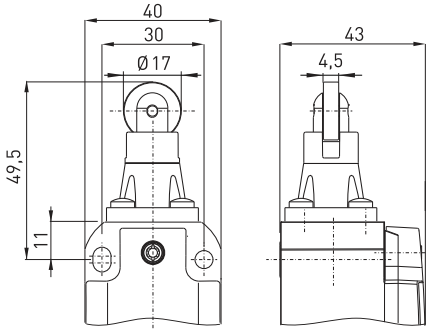
Features/Options
- Actuator type B to EN 50041
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 0°

Features/Options
- Actuator type C to EN 50041
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 30°

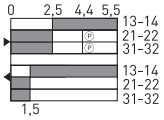
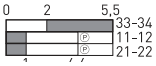
// Plunger



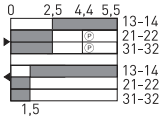
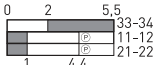
// Roller plunger R

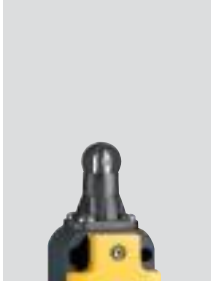


Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number Material Number		ES 98-11 -40°C 1189516 ✓ ES 98-11 +90°C 1212085 ✓ 
2 NC/1 NO contacts Material Number Material Number	EM 98-12 -40°C 1188870 ✓ EM 98-12 +90°C 1256169 ✓ 	ES 98-12 -40°C 1188869 ES 98-12 +90°C 1305551 

Contact variants: switch travel/contacts

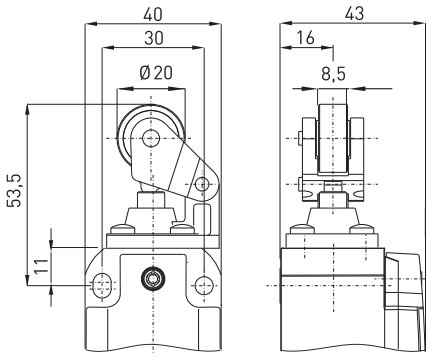
	Snap action	Slow action
1 NC/1 NO contact Material Number Material Number		ES 98 R-11 -40°C 1190438 ✓ ES 98 R-11 +90°C 1229018 ✓ 
2 NC/1 NO contacts Material Number Material Number	EM 98 R-12-40°C 1305268 EM 98 R-12 +90°C 1305795 	ES 98 R-12-40°C 1305005 ES 98 R-12 +90°C 1305609 



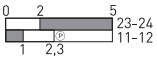
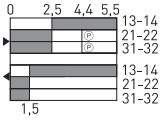
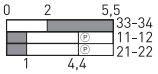
Features/Options
- Actuating speed max. 0.5 m/s with a vertical actuating angle of 30°
- Actuation parallel to switch from right
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°

Note
Actuation from the left should be avoided since this reduces the mechanical life of the position switch.

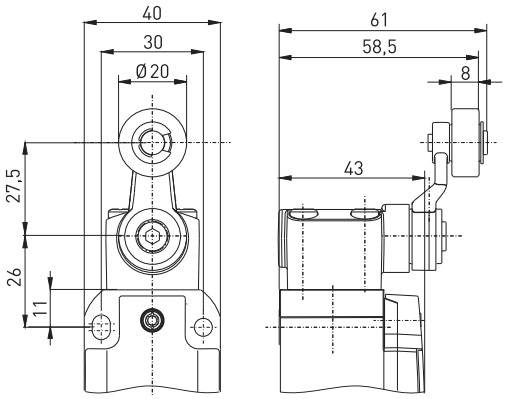
// Roller Lever H



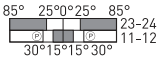
Contact variants: switch travel/contacts

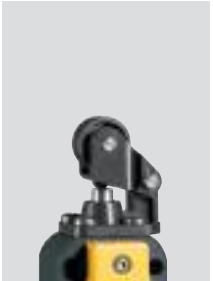
	Snap action	Slow action
1 NC/1 NO contact Material Number		ES 98 H-11 -40°C 1228867 ✓ ES 98 H-11 +90°C
Material Number		1230421 ✓
		
2 NC/1 NO contacts Material Number	EM 98 H-12 -40°C 1305353 EM 98 H-12 +90°C	ES 98 H-12 -40°C 1305071 ES 98 H-12 +90°C
Material Number	1306175	1305666
		

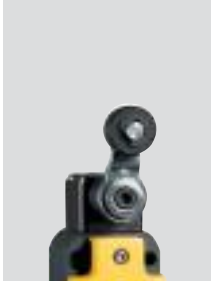
// Rocking lever D



Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number		ES 98 D-11-40°C 1228941 ✓ ES 98 D-11 +90°C
Material Number		1230498 ✓
		
2 NC/1 NO contacts Material Number	EM 98 D-12-40°C 1284042 EM 98 D-12 +90°C	ES 98 D-12-40°C 1305135 ES 98 D-12 +90°C
Material Number	1301013	1305729

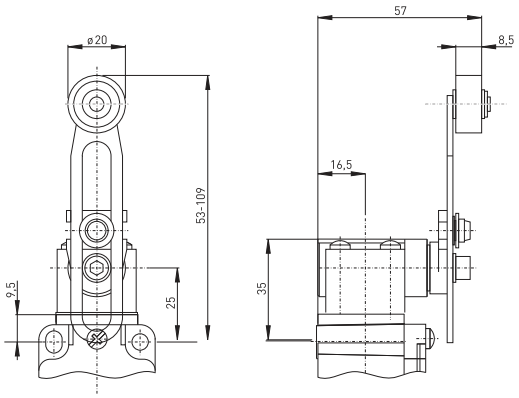




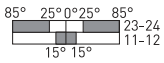
Position switches with/without safety function
// Series ES/EM 98 Extreme, actuators

Features/Options
- No safety switch!
- Actuating speed max. 2.5 m/s with a vertical actuating angle of 30°
- Wear-resistant plastic roller
- Actuator can be repositioned by 4 x 90°
- Lever angle can be adjusted in 10° steps

// Adjustable rocking lever DS



Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact Material Number Material Number		ES 98 DS-11 -40°C 1243979 ✓ ES 98 DS-11 +90°C 1306842 ✓ 
2 NC/1 NO contacts Material Number Material Number	EM 98 DS-12 -40°C 1305454 EM 98 DS-12 +90°C 1306941	ES 98 DS-12 -40°C 1305199 ES 98 DS-12 +90°C 1281705

QUALITY TEST
IP TEST: WATER JET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Foot switches

GFSI Extreme

Single-pedal types
// Series GFS KST Extreme
from page 68
// Series GFI Extreme
from page 70
// Series GFSI Extreme
from page 72

Foot switches

Range of application

Foot switches are mounted on machines and plants in cases where operation by hand is not possible. They are used to start and stop operations and production processes. Depending on the environmental conditions and mechanical duty, different versions of foot switches are used.

Design and operating principle

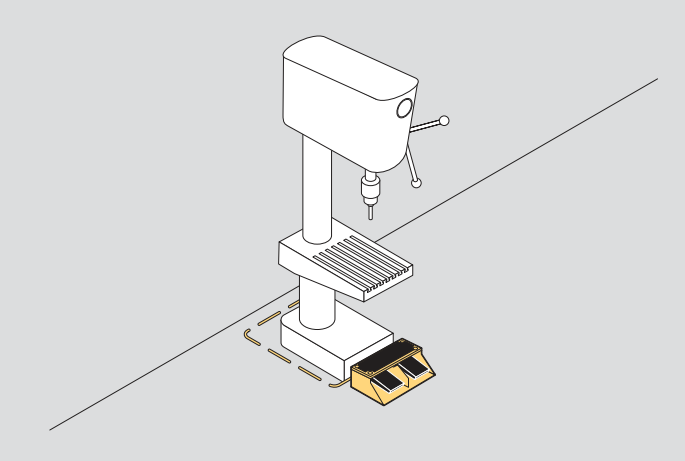
The GFS and GFSI range foot switches are mounted with a shield to protect against unintentional actuation.

All foot switches are equipped with slow or snap action contacts. They have depending on the variant IP 66, IP 67 or IP 69 degree of protection.

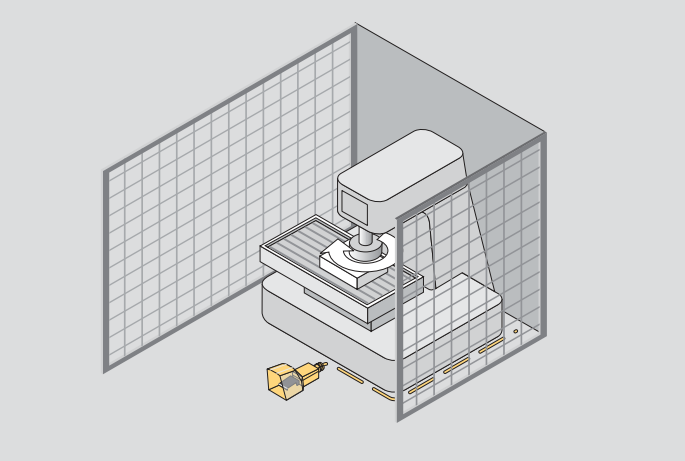
The foot switches bear the CE mark according to the Low Voltage Directive 06/95/EC

Application

Foot switch at a drill machine

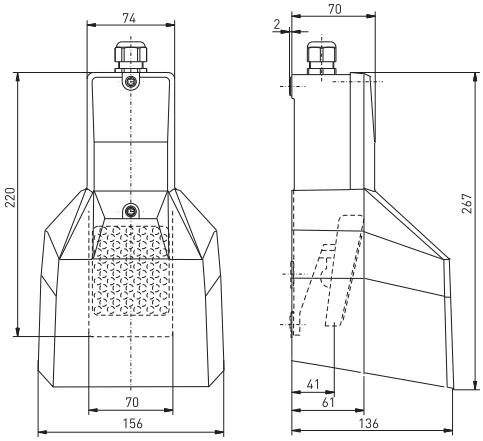


Foot switch at a CNC machining centre



Features/Options
- Single-pedal
- Version with higher degree of protection IP 69: suitable for cleaning with 80 °C hot water at 100 bar pressure at a distance of 100 mm from different directions
- Metal enclosure with thermoplastic protective shield
- Max. 4 contacts
- Version with pressure point GFS D ...: 2-step switch
- Low pedal height
- Wiring compartment

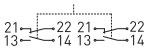
// GFS KST EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish, RAL 5011
Pedal	glass-fibre reinforced thermoplastic
Protective shield	glass-fibre reinforced thermoplastic
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
Contact material	silver
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Switching system	slow or snap action with double break, positive break NC contacts ⊖
Switch insert	Slow action: 2 contacts: ES 60 GF 4 contacts: ES 40 GF Snap action: 2 and 4 contacts: ZS 232 GFS D ...: 2 x ES 40 GF
Switching elements	GFS D ...: 2-step switching: 1 NC/1 NO contact, pressure point: 1 NC/1 NO contact
Actuating force	GFS D ...: approx. 240 N
B_{10d} (10 % load)	2 million
T_M	max. 20 years
Utilisation category	AC-15
I_e/U_e	Slow action: 4 contacts: 6 A/400 VAC 2 contacts: 16 A/400 VAC; snap action: 2 and 4 contacts: 4 A/230 VAC; 2.5 A/400 VAC; 1 A/500 VAC
Max. fuse rating	Slow action: 4 contacts: 6 A gG/gN fuse; 2 contacts: 16 A gG/gN fuse; snap action: 4 A gG/gN fuse
Ambient temperature	–25 °C ... +80 °C
Mechanical life	> 1 million operations
Approvals	c SP us EAC

Contact variants: Travel/contacts

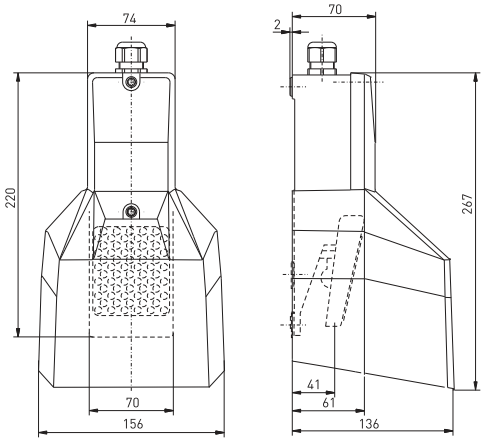
	Snap action	Slow action
1 NC/1 NO contact	GFSM 1Ö/1S IP69... 	GFS 1Ö/1S IP69...
2 NC/2 NO contacts	GFSM 2Ö/2S IP69 ... 	GFS 2Ö/2S IP69 ...

Type code

GFSM 1Ö/1S IP69 KST Extreme

- Thermoplastic protective shield
- High degree of protection IP 69 (IP 66, IP 67)
- 1 NC/1 NO contact
- M Snap action (Slow action)
- S Protective shield
- Series

// GFS KST Extreme



Snap action	Material Number
GFSM 1Ö/1S IP69 KST Extreme	on request
GFSM 2Ö/2S IP69 KST Extreme	1207937

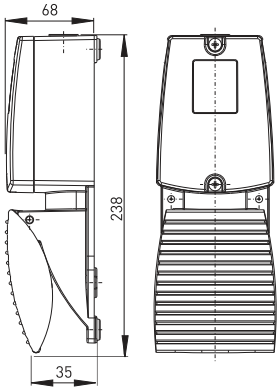
Slow action	Material Number
GFS 1Ö/1S IP69 KST Extreme	1184570
GFS 1Ö/1S IP69 KST hard-coated Extreme	1252778

Slow action / with pressure point	Material Number
GFS 1ÖS D 1ÖS IP69 KST Extreme	1184972

Foot switches
// Series GFI Extreme

Features/Options
- Corrosion-resistant aluminium enclosure
- Screws and metal parts made of stainless steel
- Salt-mist spray test to DIN EN ISO 9227
- High degree of protection IP66, IP67 or IP69 depending on selected cable gland
- Temperature resistant from -40 °C up to +90 °C
- Without protective shield
- Max. 4 contacts
- Wiring compartment

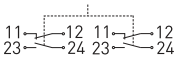
// GFI EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016 and RAL 1003
Pedal	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
Contact material	silver
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Switching system	slow action, positive break NC contact ⊖
Switching elements	1 NC/1 NO contact or 2 NC/2 NO contacts with double break Zb, galvanically separated contact bridges
Switch insert	ES 60 GF
B_{10d} (10 % load)	2 million
T_M	max. 20 years
Utilisation category	AC-15
I_{the}	16 A
I_e/U_e	16 A/400 VAC
Max. fuse rating	16 A gG/gN-fuse
Ambient temperature	–40 °C ... +90 °C
Mechanical life	> 1 million operations

Contact variants: switch travel/contacts

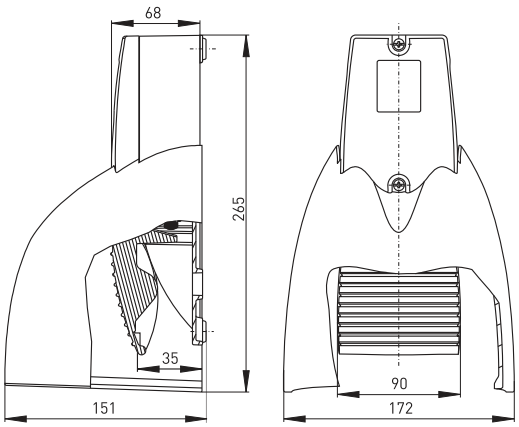
	Slow action	Material Number
1 NC/1 NO contact	**GFI 1Ö/1S -40°C...** 	**1318443**
2 NC/2 NO contact	**GFI 2Ö/2S -40°C...** 	**on request**

Type code **GFI 1Ö/1S -40°C...+90°C IP69 Extreme**

- IP 69 degree of protection (IP 66 or IP 67)
- Heat-resistant up to +90 °C (Cold-resistant down to -40 °C)
- 1 NC/1 NO contact (2Ö/2S)
- Series

Features/Options
- Corrosion-resistant aluminium enclosure
- Screws and metal parts made of stainless steel
- Salt-mist spray test to DIN EN ISO 9227
- High degree of protection IP66, IP67 or IP69 depending on selected cable gland
- Temperature resistant from -40 °C up to +90 °C
- With protective shield
- Max. 4 contacts
- Wiring compartment

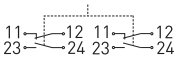
// GFSI EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016 and RAL 1003
Pedal	Corrosion-resistant aluminium, powder-coated, similar to RAL 7016
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
Contact material	silver
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Switching system	slow action, positive break NC contact ⊖
Switching elements	1 NC/1 NO contact or 2 NC/2 NO contacts with double break Zb, galvanically separated contact bridges
Switch insert	ES 60 GF
B_{10d} (10 % load)	2 million
T_M	max. 20 years
Utilisation category	AC-15
I_{the}	16 A
I_e/U_e	16 A/400 VAC
Max. fuse rating	16 A gG/gN-fuse
Ambient temperature	–40 °C ... +90 °C
Mechanical life	> 1 million operations

Contact variants: switch travel/contacts

	Slow action	Material Number
1 NC/1 NO contact	**GFSI 1Ö/1S -40°C...** 	**1318331** ✓
2 NC/2 NO contact	**GFSI 2Ö/2S -40°C...** 	**on request**

Type code GFSI 1Ö/1S -40°C...+90°C IP69 Extreme

- IP 69 degree of protection (IP 66 or IP 67)
- Heat-resistant up to +90 °C (Cold-resistant down to -40 °C)
- 1 NC/1 NO contact (2Ö/2S)
- S Protective shield
- Series

✓ in stock

Emergency pull-wire switches

ZS 80 Extreme


steute

Emergency pull-wire switches

Application

Emergency pull-wire switches are of great importance for the man-machine interface in the area of industrial applications. They are, for example, applied on transport and conveyor systems. After manual actuation, work and functional processes are initiated or switched off.

When the new harmonised European standard EN ISO 13850 and IEC/EN 60947-5-5 concerning functional aspects and design guidelines for emergency-stop devices has come into effect, new requirements must have to be met by these command devices. All emergency pull-wire switches described in this chapter meet the requirements of this standard.

Design and mode of operation

On emergency pull-wire switches the emergency-stop command can be initiated from any point along the pull-wire. They have a positive linkage between the NC contacts and the pull-wire. The emergency pull-wire switches are brought into the operational condition by pre-tensioning the pull-wire, i.e. the NC contacts are then closed and the NO contacts are open. All devices are equipped with wire-breakage detection. In the chapter accessories of the appendix the required accessories for installation are presented.

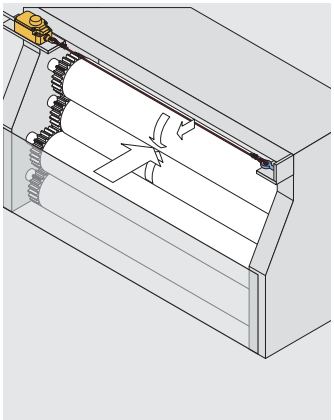
Emergency pull-wire switches without mechanical latching VD do not conform to the EN ISO 13850 and IEC/EN 609745-5-5. It is possible to meet the requirements of these two standards by suitable measurement of the circuitry and control technology.

There are devices with one- and two-side actuation. The wire length, the number of contacts and the mounting position, in the middle or on one side of the system, are the main features when selecting an emergency pull-wire switch.

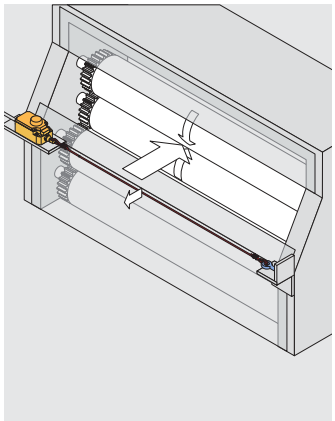
All emergency pull-wire switches bear the CE mark according to the Machinery Directive 2006/42/EC.

Application

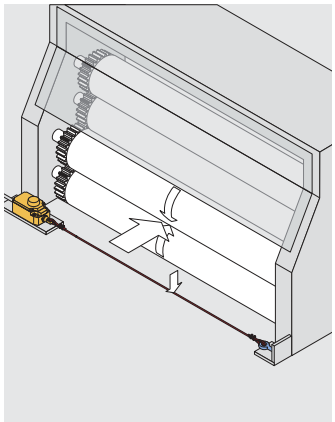
Mounting at head level



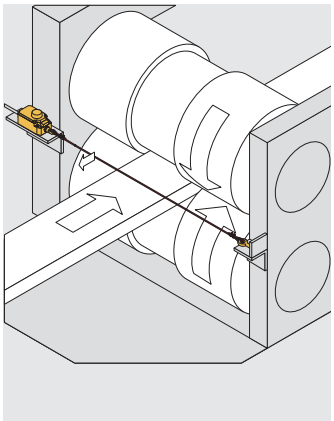
Mounting at hand level



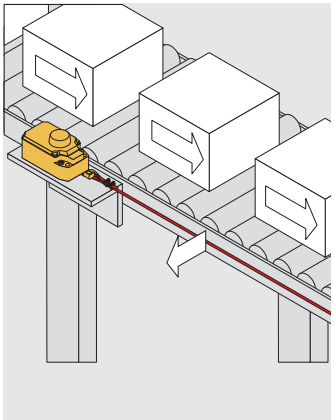
Mounting at foot level



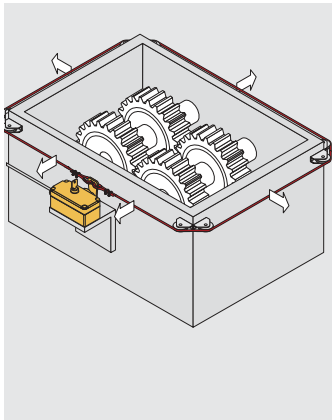
Mounting at hazardous inrunning nips



Mountinge at conveyor-belts



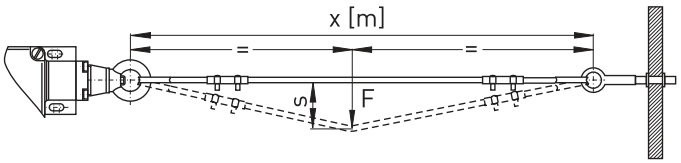
Complete fencing



Function principle

All emergency pull-wire switches from steute are provided with a wire-break detection so that the wire must with be mounted with a defined pre-tension force. This value of the pre-tension force vaies depending on the different devices. The appropriate value can be found on the data sheet of the emergency pull-wire switch. With an incorrect mounting cannot be taken in operation, i. e. an unlocking is not possible. By vertically pulling the pull-wire the switching function is carried out. The actuating force is exclusively depending on the spring rate of the reset spring. There are emergency pull-wire switches with one-side and two-side actuatiuon, see drawings below. Ex emergency pull-wire switches with two-side actuation must always be mounted with two compensation springs. According to EN 60947-5-5 the maximum values of the actuating force F = 200 N and of the actuating travel s = 400 mm must not be exceeded on vertical actuation of the emergency pull-wire switch. In addition, the pull-wire must withstand the 10 times higher vertical pulling force that is required in order to generate the emergency-stop signal.

Interrelation of actuating travel / distance wire support



Maximum pull-wire length

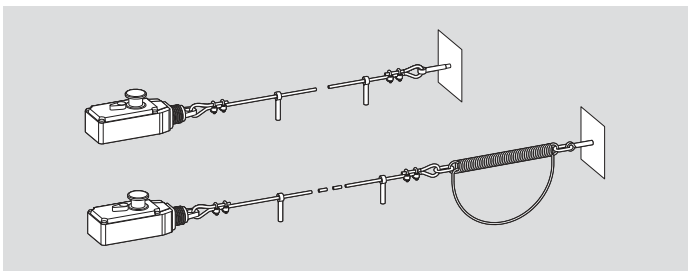
The maximum pull-wire length is mainly limited by two basic conditions. On the one hand by the maximum admissible actuating travel s of 400 mm and on the other hand by the thermal change in length of the pull-wire with a fluctuating ambient temperature that may not lead to an undesired actuation of the switch. Because the first basic condition requires a preferably low and the second requires a preferably high elasticity of the system it is necessary to optimise such systems in respect to both basic conditions depending on the operational conditions. In addition, it must be checked if the actuating force F of 200 N is adhered.

Application of compensation springs / Travel limitation

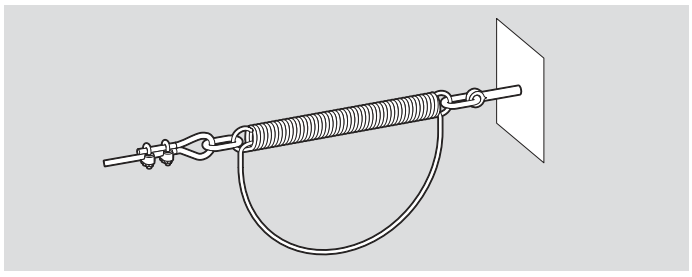
Compensation springs are applied to compensate thermal changes in lengths of the pull-wire and therefore allow for higher pull-wire lengths. In general the following is valid:

- Soft compensation spring with a low spring rate can compensate higher thermal changes in length.
- Though on pull-wire actuation soft compensation springs have a high expansion behaviour and therefore earlier reach the limit of the maximum actuating travel s = 400 mm. Thus the expansion behaviour limitates the maximum pull-wire length at a constant temperature range or the temperature range at a constant pull-wire length.
- The dimensioning of the compensation spring is determined by the reset spring of the switches (Value of the pre-tension force and

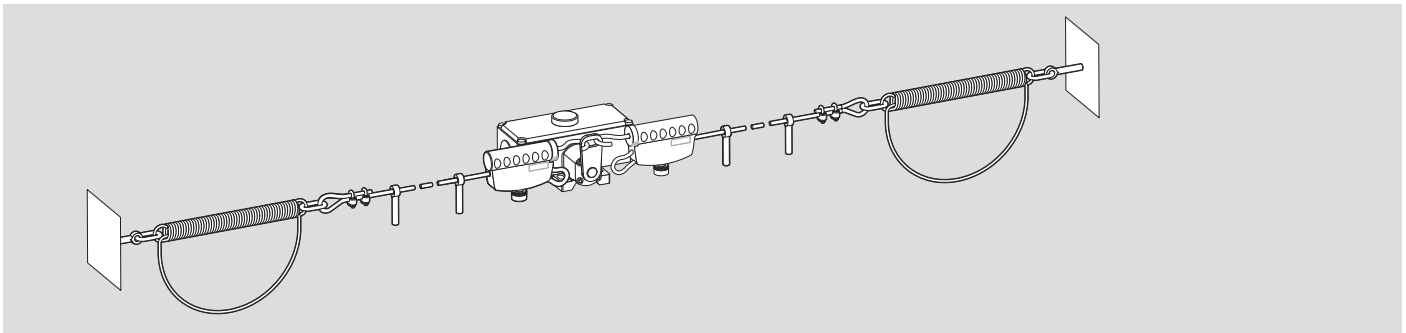
Mounting of one-side actuation



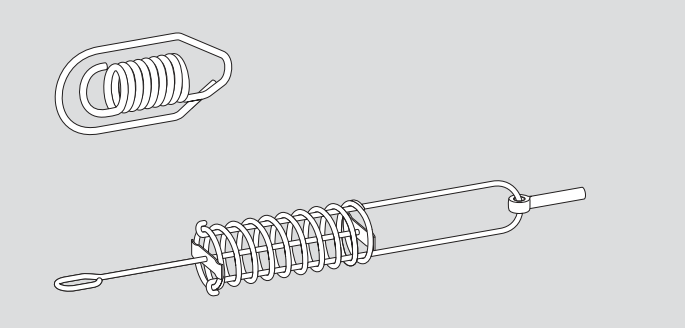
Compensation spring with travel limitation



Mounting of two-side actuation



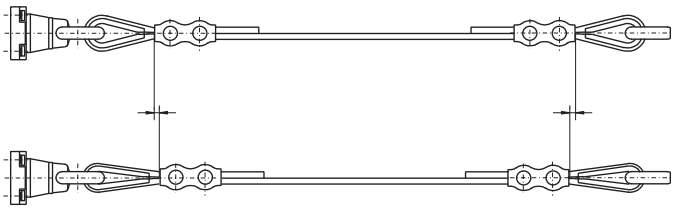
Examples of other compensation springs variants



spring rate of the rest spring), the pull-wire length (length and elasticitiy of the pull-wire) and the maximum actuatimng travel of s = 400 mm.
- With two-side actuation a travel limitation must be installed, see drawing left page, in order to prevent overstretching of the tension spring
- Before mounting the pull-wire, the red PVC sheath must be removed from the the pull-wire in the clamping range of the pull-wire!

An overstress of the compensation spring is in general prevented by a travel limitation. In practice either additional travel limitations are applied or self-protecting compensation springs are used. Additional travel limitations made of catch-ropes are critical when the function relevant length of the travel limitation is set but have a clear advantage in cost in comparison to compensation springs.

Wire thimble deformation



Distance of wire support

The actuating travel required to vertically actuate the switch results from the sum of the spring travels of the switch, pull-wire and where required compensation spring as well as the distance of the wire supports x [m]. This means a larger actuating travel is required with a larger distance of the wire supports when actuating the pull-wire in order to achieve the same actuating distance. Securing a safe switching at a constant pull-wire length the distance of the wire supports must be reduced in order to aim for a wider temperature range.

Type of pull-wire

The expansion behaviouer of the pull-wire is determined by the type of wire. Besides elastic elongation permanent elongations can occur when actuating the pull-wire. Under certain conditions higher pre-tension forces can lead to relaxation processes (temporal pre-tension loss). Statistical spread of the manufacturing process also have an effect on the expansion behaviour.

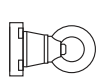
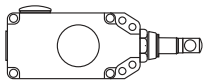
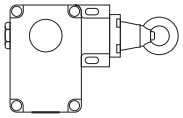
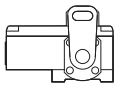
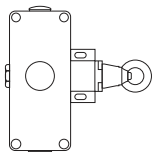
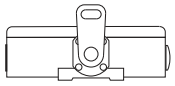
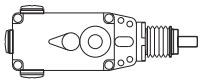
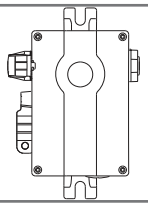
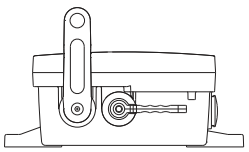
Therefore it is urgently recommended at least for longer pull-wire lengths to apply pull-wires from steute. These are much tougher and thus optimised for such applications.

Pull-wires from other manufacturers often lengthen gradually because of the creep characteristics of the plastic core (relaxation). If so, it is necessary to regularly check the pull-wire tension and if required to retension the pull-wire. The appropriate security note in the mounting and wiring instructions and the standard application of a tensioner are the prerequisite for a safe function.

Mounting notes

- After fitting the wire, pull strongly on it several times, as the pull-wire and the wire thimble will deform.
- Subsequently, retense the wire using the wire clamp, eye-bolt or tensioner.
- In order to guarantee safe operation, observe the enclosed mounting and wiring instructions.
- According to EN ISO 13850, pulleys may only be mounted such that the complete length of the pull-wire can be observed.

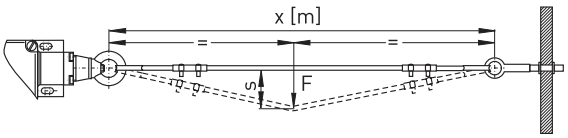
Selection table
Emergency pull-wire switches

// Series		// Maximum pull-wire length		
		→	←→	
				
ZS 71, on page 82 - Metal or thermoplastic enclosure - One-side actuation - 3 contacts		35 m	–	
ZS 73, on page 86 and 96 - Metal enclosure - One-side actuation: ZS 73 - two-side actuation: ZS 73 S - 2 or 3 contacts		130 m	2 x 100 m	
ZS 75, on page 90 and 98 - Metal enclosure - One-side actuation: ZS 75 - Two-side actuation: ZS 75 S - 4 contacts		130 m	2 x 100 m	
ZS 80, on page 94 - Thermoplastic enclosure - One-side actuation - 4 contacts		100 m	–	
ZS 91 S, on page 100 - Thermoplastic enclosure - Two-side actuation - 4 or 6 contacts		–	2 x 100 m	

Emergency pull-wire switches
// Pre-stress and actuating forces

Notes
- The values are indicated for an ambient temperature of 20 °C at the stated wire length.
- The linear expansion of the wire due to strain and deformation of the wire thimble is not considered.
- The actuating forces are only approximate values, due to the spring forces being subject to tolerances.

Actuating forces and travel between supports

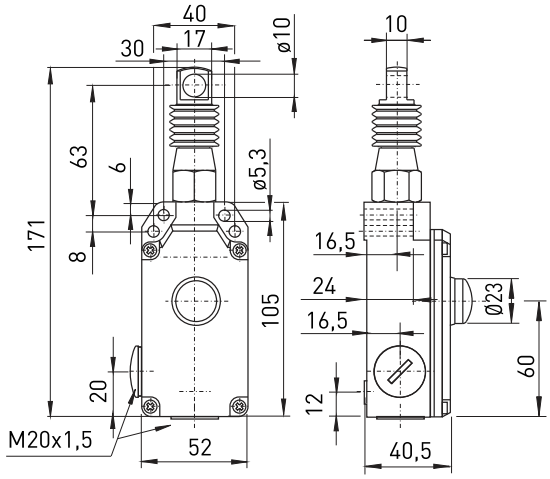


Emergency pull-wire switch	Wire length betw. supports x [m]	Pre-stress force [N]	Actuating travel s [cm]	Actuating force F [N]	Wire length [m]	Ordering index
ZS 71	3	100	7	12	10	
ZS 73 ZS 73 S	5 5 4	120-180 295-390 –	13 13 13	19-25 38-60 51-85	50-130 50-130 2 x 30-65	/120-180N /295-390N –
ZS 75 ZS 75 S	5 5 4	120-180 295-390 –	13 13 13	19-25 38-60 51-85	50-130 50-130 2 x 30-65	/120-180N /295-390N –
ZS 80	5	100	22	32	75	–
ZS 91 S	3	–	<40	<80	2 x 100	–

Emergency pull-wire switches, one-side actuation
// Series ZS 71 -40 °C Extreme

Features/Options
- Metal enclosure
- Cold-resistant down to -40 °C
- High degree of protection IP 67
- 3 contacts
- Small design
- Wire length up to 35 m
- Release by push-button
- Watertight collar W for protection against penetration of dirt
- Wire pull and breakage detection

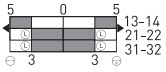
// ZS 71 -40°C EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, powder-coated; pull-wire unit and screws made of stainless steel 1.4305
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	2 NC/1 NO contact, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M20 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	2 A
Utilisation category	AC-15
I_e/U_e	2 A/250 VAC
Max. fuse rating	2 A gG/gN fuse
Ambient temperature	–40 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	35 m
Features	wire pull and breakage detection
Approvals	cULus EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/1 NO contact	ZS 71 2Ö/1S 

Type code ZS 71 2Ö/1S WVD 100 N IP 67 -40°C Extreme

- cold-resistant down to -40 °C
- high degree of protectionIP 67
- 100 N Pre-stress force
- VD Push-button release (blank without latching)
- W Watertight collar
- 2 NC/1 NO contact (2Ö)
- Series
- Emergency pull-wire switch

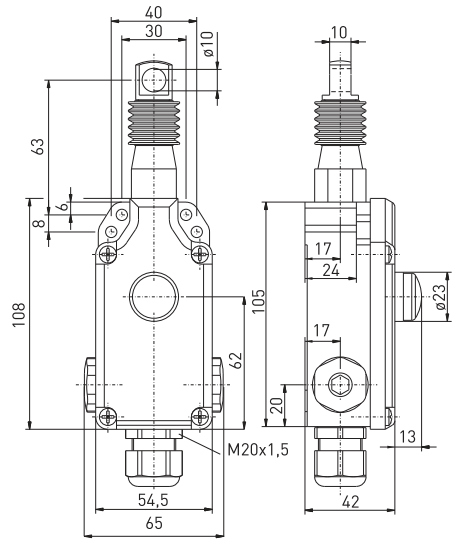
At 3 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces see table on page 81.

✓ in stock

Emergency pull-wire switches, one-side actuation
// Series ZS 71 KST IP69 Extreme

Features/Options
- Thermoplastic or metal enclosure
- 3 contacts
- Version with higher degree of protection IP 69: suitable for cleaning with 80 °C hot water at 100 bar pressure at a distance of 100 mm from different directions
- Small design
- Wire length up to 35 m
- Release by push-button
- Available without unlocking mechanism (per DIN EN 60947-5-1)
- Wire pull and breakage detection

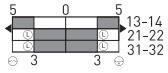
// ZS 71 KST IP69 EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish or glass-fibre reinforced, shock-proof thermoplastic, ultramid; pull-wire unit and screws made of stainless steel 1.4305
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	2 NC/1 NO contacts, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	3 x M20 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	2 A
Utilisation category	AC-15
I_e/U_e	2 A/250 VAC
Max. fuse rating	2 A gG/gN fuse
Ambient temperature	–25 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	35 m
Features	wire pull and breakage detection
Approvals	EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/1 NO contact	ZS 71 2Ö/1S KST 

Type code ZS 71 2Ö/1S WVD 100 N KST IP69 Niro Extr.

- high degree of protection IP 69 (IP 66, IP 67)
- Thermoplastic enclosure
- 100 N Pre-stress force
- VD Push-button release (blank without latching)
- W Watertight collar
- 2 NC/1 NO contact (2Ö)
- Series Emergency pull-wire switch

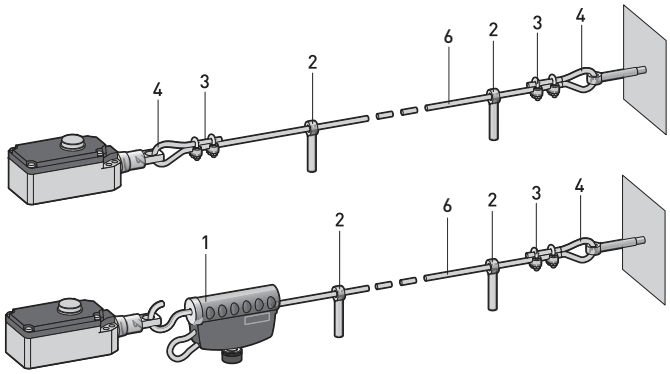
At 3 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces see table on page 81.

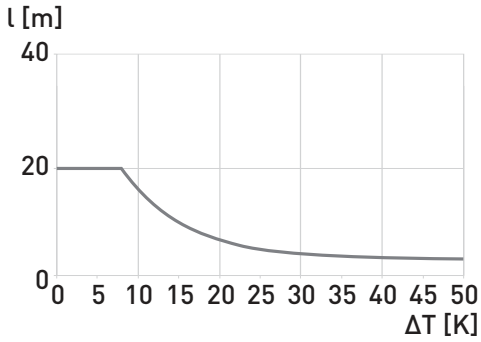
Emergency pull-wire switches, one-side actuation
// Series ZS 71 Extreme, mounting

Legend

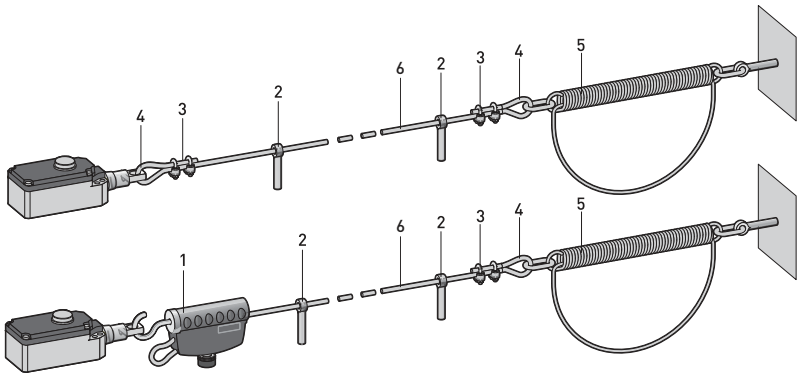
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 71-100N	1187921
6 Pull-wire per metre	1032984

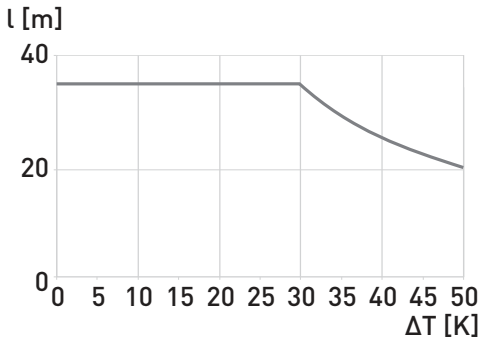
// Mounting without tension spring



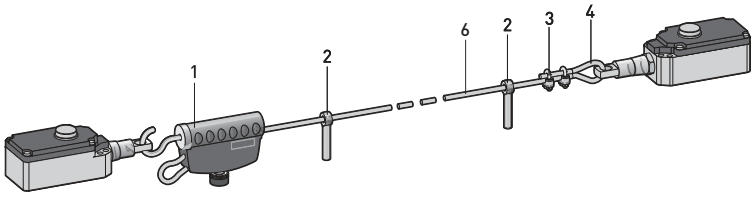


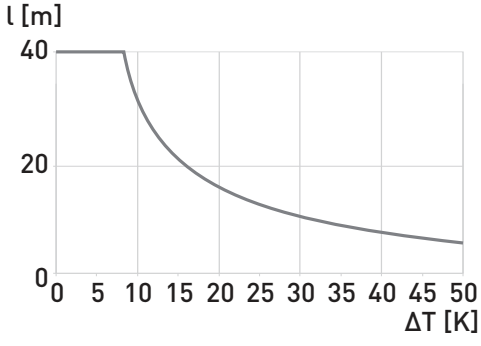
// Mounting with tension spring





// Mounting with 2 emergency pull-wire switches

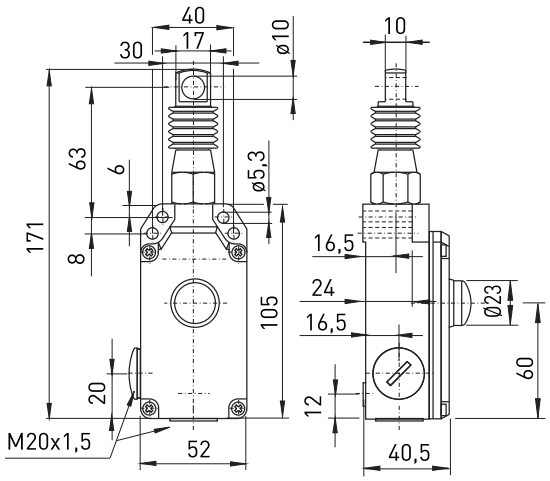




Emergency pull-wire switches, one-side actuation
// Series ZS 71 Extreme, variants

Features/Options
- Indicator lamps are indicated at the end of this chapter
- Indicator lamp position in the left side cable entry
- Emergency pull-wire switches are also available without mechanical latching

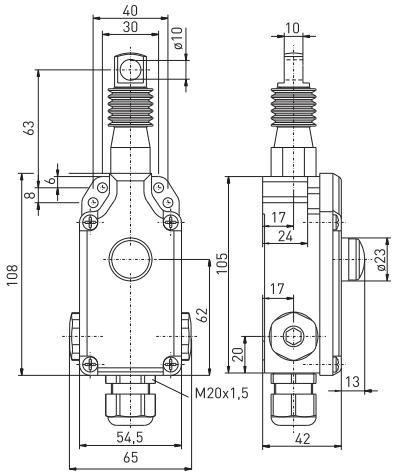
// Version with metal enclosure



Features/Options
- Version with IP 67 degree of protection without cable gland
- Version with IP 69 degree of protection equipped with cable gland

Push-button release	Material Number
ZS 71 2Ö/1S WVD/100N IP67 -40°C Extreme	on request
ZS 71 2Ö/1S WVD/100N IP69 NIRO Extreme	✓ 1189534

// Version with thermoplastic enclosure



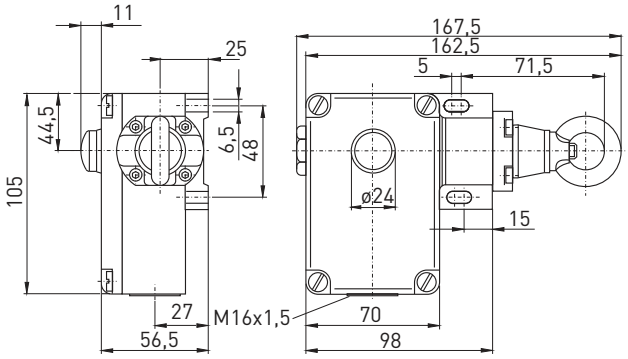
Features/Options
- Verion with IP 67 degree of protection without cable gland
- Version with IP 69 degree of protection equipped with cable gland

Push-button release	Material Number
ZS 71 2Ö/1S WVD/100N KST IP67 -40°C Extreme	✓ 1189532
ZS 71 2Ö/1S WVD/100N KST IP67 -40°C Niro Extreme	1189533
ZS 71 2Ö/1S WVD/100N KST IP69 NIRO Extreme	✓ 1189534

Emergency pull-wire switches, one-side actuation
// Series ZS 73 Extreme

Features/Options
- Cold-resistant down to -40 °C
- Metal enclosure
- Stainless steel version: Pull-wire unit and screws made of stainless steel 1.4305, hard-coated enclosure with enamel finish
- 2 contacts
- Wire length up to 130 m
- 2 various spring force variants (actuating forces)
- Release by push-button
- Wire pull and breakage detection

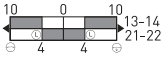
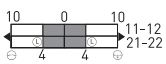
// ZS 73 EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish; ZS 73 NIRO: aluminium die-cast, hard-coated and enamel finish
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	ZS 73 WVD: IP 65; ZS 73 VD: IP 54 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	1 NC/1 NO or 2 NC contacts, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	1 x M16 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +70 °C; -25 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	130 m
Features	wire pull and breakage detection
Approvals	c SP us EAC

Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	ZS 73 1Ö/1S 
2 NC contacts	ZS 73 2Ö 

✓ in stock

Type code ZS 73 1Ö/1S WVD -40°C/120-180 N NIRO Extr.

- Stainless steel variant
- 120-180 N Pre-stress force (295-390 N)
- Cold-resistant down to -40 °C
- VD Push-button release (blank without mechanical latching)
- W Watertight collar
- 1 NC/1 NO contact (2Ö)
- Series
- Emergency pull-wire switch

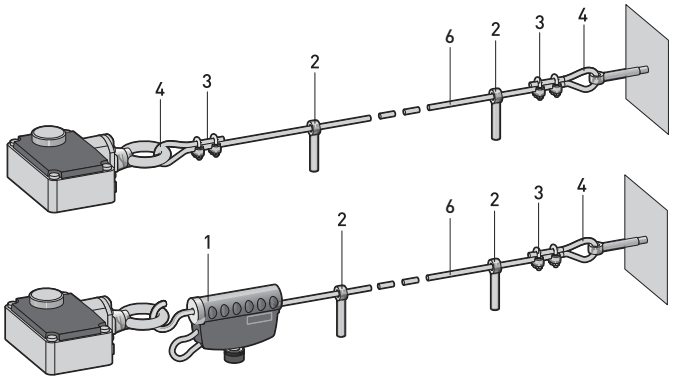
At 5 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces see table on page 81.

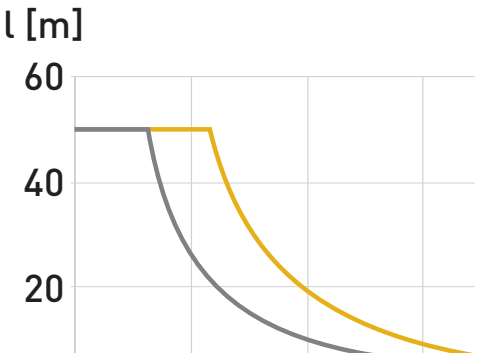
Emergency pull-wire switches, one-side actuation
// Series ZS 73 Extreme, mounting

Legend

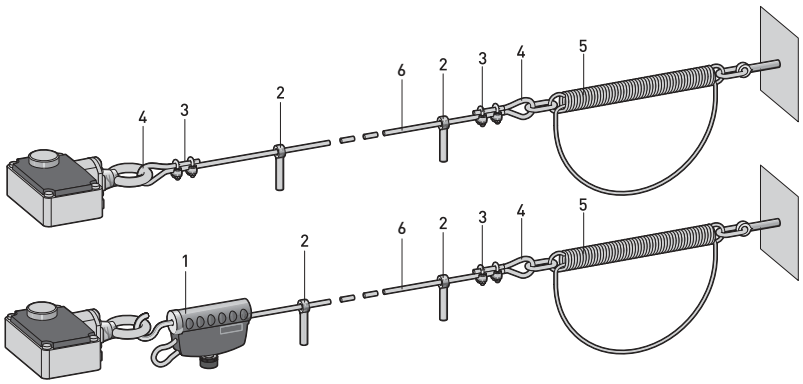
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 73/75-200N for spring force variant 120-180N	1187931
Tension spring ZS 73/75-400N for spring force variant 295-390N	1187934
6 Pull-wire per metre	1032984

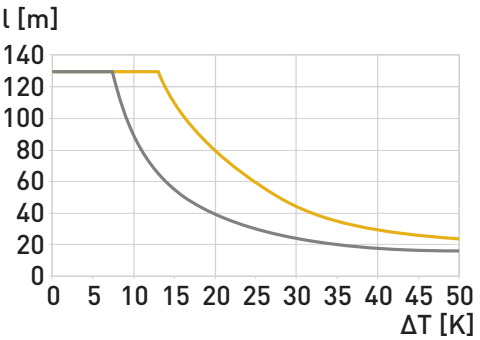
// Mounting without tension spring





// Mounting with tension spring





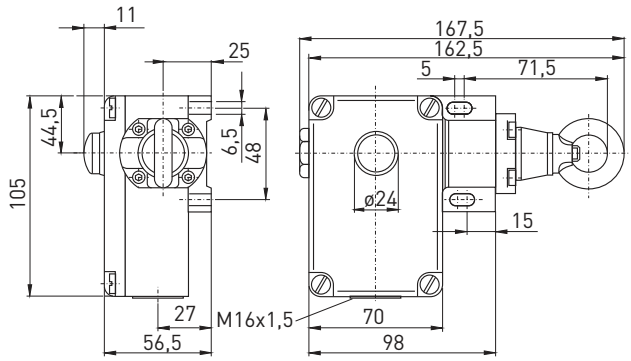
Temperature difference/ Wire length

Legend
- 120-180 N standard version
- 295-390 N for long pull-wire lengths and strong vibrations

Emergency pull-wire switches, one-side actuation
// Series ZS 73 Extreme, variants

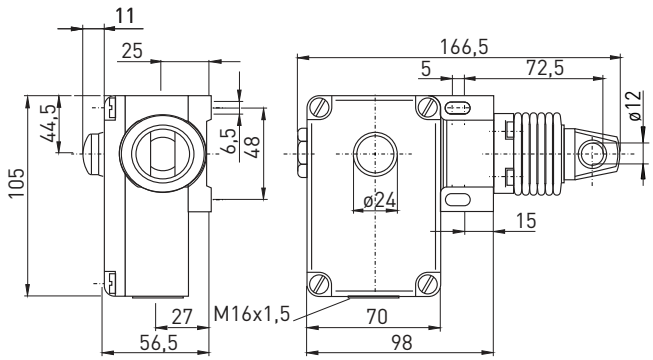
Features/Options
- Indicator lamps are indicated at the end of this chapter
- Indicator lamp position in the left side cable entry, other positions possible on request
- Emergency pull-wire switches are also available without mechanical latching

// Push-button release ZS 73 VD -40°C



Push-button release	Material Number
ZS 73 1Ö/1S VD/120-180 N -40°C Extreme	1188408
ZS 73 1Ö/1S VD/295-390 N -40°C Extreme	1190416

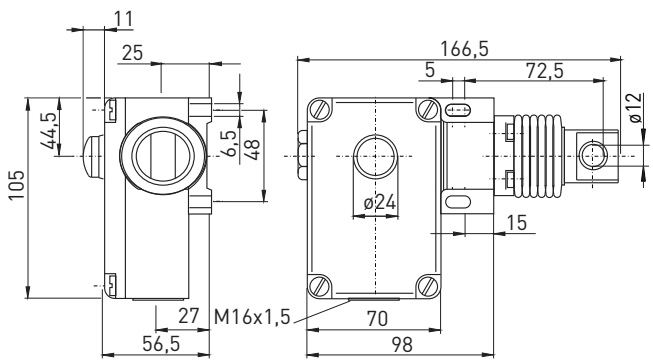
// Push-button release, watertight collar ZS 73 WVD -40°C



Features/Options
- Watertight collar for protection against penetration of dirt

Watertight collar/Push-button release	Material Number
ZS 73 1Ö/1S WVD/120-180 N -40°C Extreme	1188083
ZS 73 1Ö/1S WVD/295-390 N -40°C Extreme	on request

// Stainless steel ZS 73 NIRO



Features/Options
- ZS 73 NIRO: pull-wire unit and screws made of stainless steel 1.4305, hard-coated enclosure with enamel finish

Stainless Steel/Push-button release	Material Number
ZS 73 1Ö/1S WVD/120-180 N Niro hartcoatiert	1048231
ZS 73 1Ö/1S WVD/295-390 N Niro hartcoatiert	1048228
ZS 73 2Ö WVD/120-180 N Niro hartcoatiert	on request
ZS 73 2Ö WVD/295-390 N Niro hartcoatiert	1053932

✓ in stock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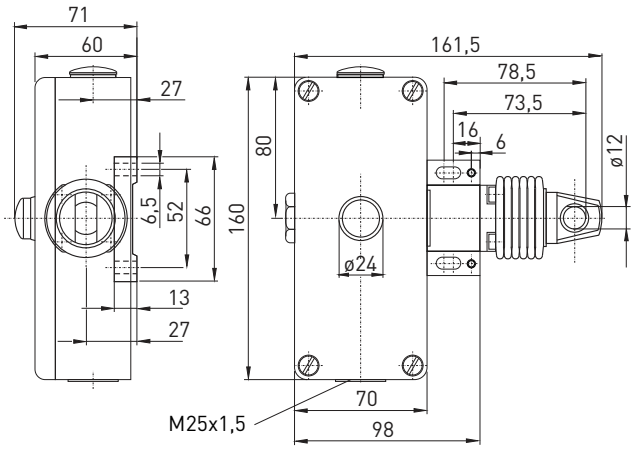
Emergency pull-wire switches, one-side actuation
// Series ZS 75 Extreme

Features/Options
- Cold-resistant down to -40 °C
- Metal enclosure
- 4 contacts
- Wire length up to 130 m
- 2 various spring force variants (actuating forces)
- Release by push-button
- Watertight collar W for protection against penetration of dirt
- Wire pull and breakage detection

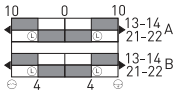
// ZS 75 EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish
Cover	aluminium die-cast, enamel finish
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	1 NO/1 NC or 2 NO/2 NC or 4 NC contacts, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M25 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	130 m
Features	wire pull and breakage detection
Approvals	cSPus EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/2 NO contact	ZS 75 2Ö/2S 

Type code ZS 75 1Ö/1S WVD/120-180 N -40°C Extreme

- Cold-resistant down to -40 °C
- 120-180 N Pre-stress force (295-390 N)
- VD Push-button release (blank without mechanical latching)
- W Watertight collar
- 1 NC/1 NO contact (2Ö/2S, 4Ö)
- Series

Emergency pull-wire switch

At 5 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces see table on page 81.

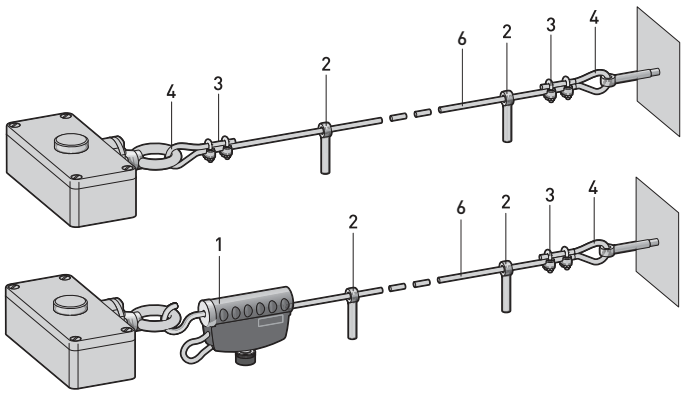
✓ in stock

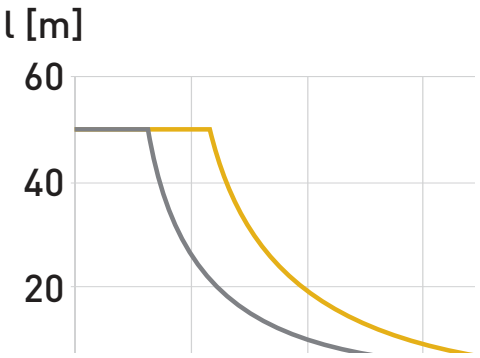
Emergency pull-wire switches, one-side actuation
// Series ZS 75 Extreme, mounting

Legend

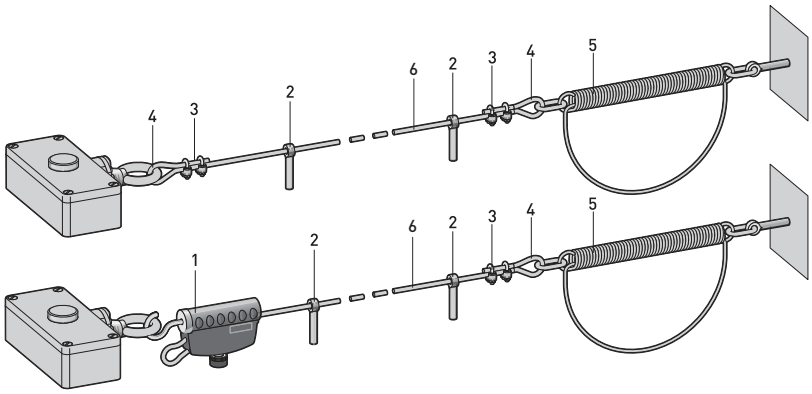
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 73/75-200N for spring force variant 120-180N	1187931
Tension spring ZS 73/75-400N for spring force variant 295-390N	1187934
6 Pull-wire per metre	1032984

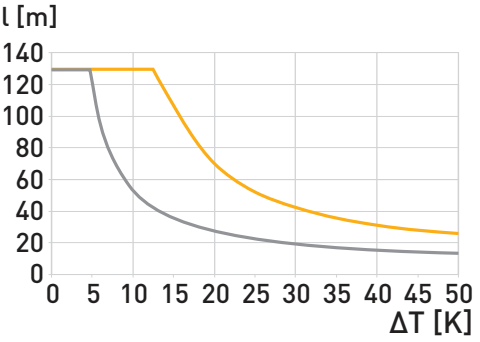
// Mounting without tension spring





// Mounting with tension spring





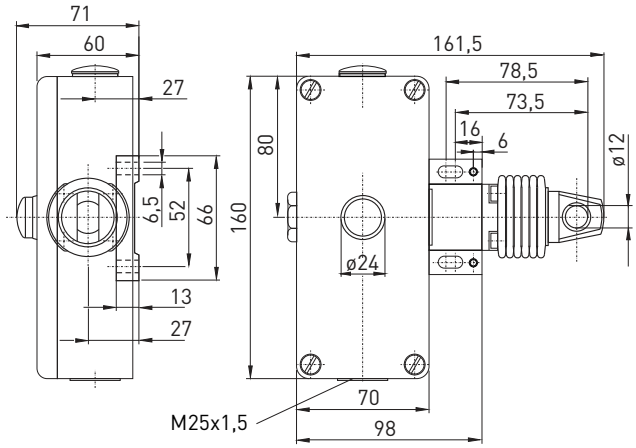
Temperature difference/ Wire length

Legend
- 120-180 N standard version
- 295-390 N for long pull-wire lengths and strong vibrations

Emergency pull-wire switches, one-side actuation
// Series ZS 75 Extreme, variants

Features/Options
- Indicator lamps are indicated at the end of this chapter
- Indicator lamp position on the left side, other positions possible on request
- Emergency pull-wire switches are also available without mechanical latching

// Watertight collar W



Features/Options
- Watertight collar for protection against penetration of dirt

Watertight collar/Push-button release	Material Number
ZS 75 2Ö/2S WVD/120-180 N -40°C Extreme	1189292
ZS 75 2Ö/2S WVD/295-390 N -40°C Extreme	on request

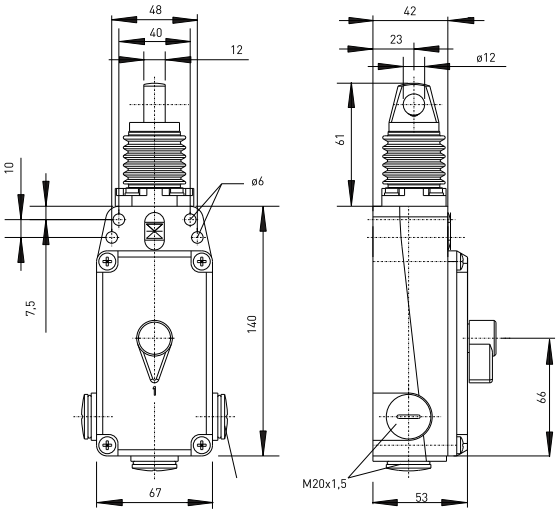
✓ in stock

QUALITY FEATURE
CORROSION-RESISTAT

Emergency pull-wire switches, one-side actuation
// Series ZS 80 KST Extreme

Features/Options
- Thermoplastic enclosure, pull-wire unit and screws made of stainless steel 1.4305 (NIRO)
- High degree of protection IP 67
- 4 contacts
- Position indicator
- Wire length up to 100 m
- Pretensioning force 100 N
- Lever for release and position indication
- Watertight collar
- Wire pull and breakage detection

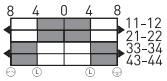
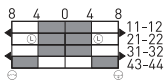
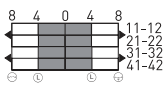
// ZS 80 KST EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contacts ⊖
Switching elements	2 NC/2 NO, 3 NC/1 NO or 4 NC contacts, type Zb
Connection	2 x 4-pole terminal block
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	3 x M20 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	2.5 kV
U_i	250 V
I_{the}	2 A
Utilisation category	AC-15
I_e/U_e	2 A/250 VAC
Max. fuse rating	2 A gG/gN fuse
Ambient temperature	–25 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	100 m
Features	wire pull and breakage detection
Approvals	

Contact variants: switch travel/contacts

	Slow action	Material Number
2 NC/2 NO contact	**ZS 80 2Ö/2S WVD** 	**1189264**
3 NC/1 NO contact	**ZS 80 3Ö/1S WVD** 	**1189698**
4 NC contacts	**ZS 80 4Ö WVD** 	**1189701**

✓ in stock

Type code ZS 80 2Ö/2S WVD KST IP67 Niro Extreme

- Stainless steel variant
- High degree of protection IP 67
- Thermoplastic enclosure
- VD Lever release
- W Watertight collar
- 2 NC/2 NO contact (4Ö, 3Ö/1S)
- Series
- Emergency pull-wire switch

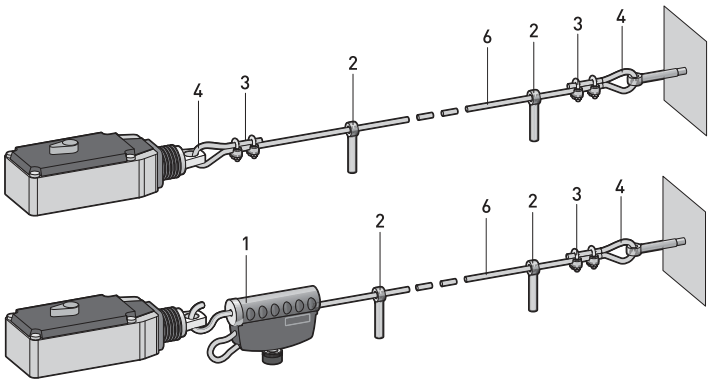
At 5 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces see table on page 81.

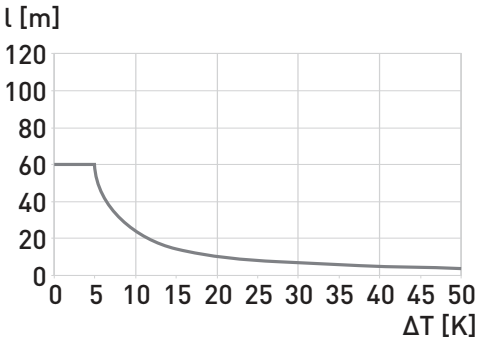
Emergency pull-wire switches, one-side actuation
// Series ZS 80 KST Extreme, mounting

Legend

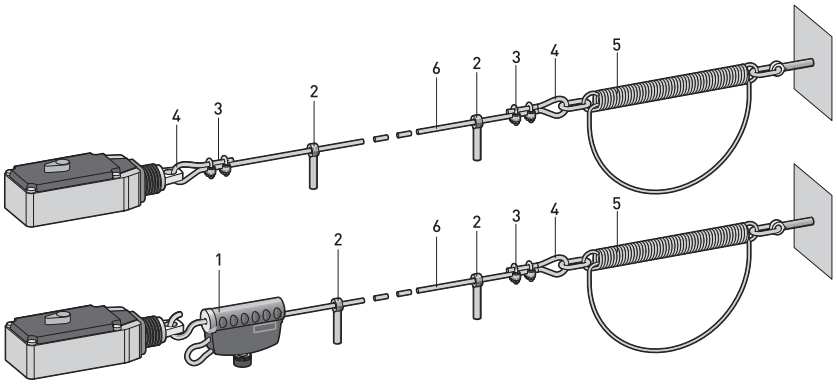
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 80	1187933
6 Pull-wire per metre	1032984

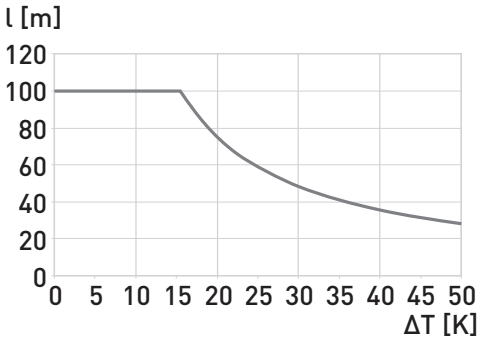
// Mounting without tension spring



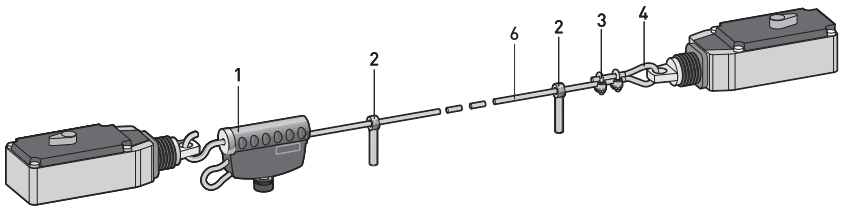


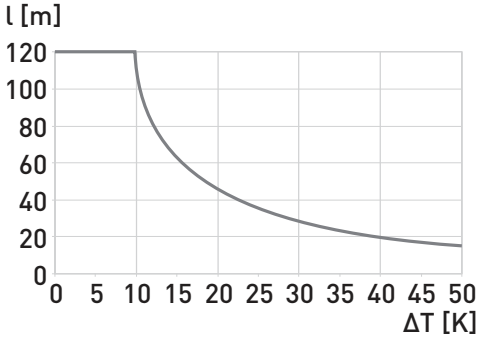
// Mounting with tension spring





// Mounting with 2 emergency pull-wire switches

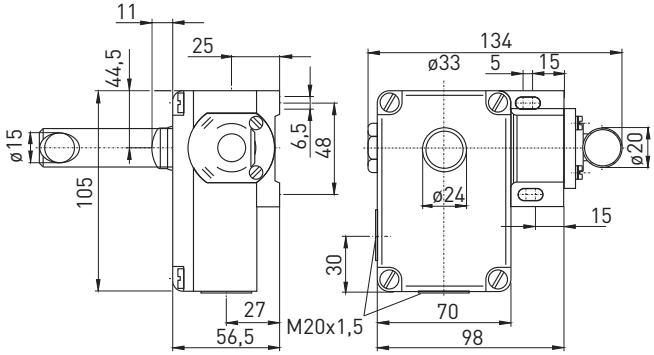




Emergency pull-wire switches, two-side actuation
// Series ZS 73 S Extreme

Features/Options
- Pull-wire unit and screws made of stainless steel 1.4305, hard-coated metal enclosure with enamel finish
- 2 or 3 contacts
- Wire length up to 2 x 100 m
- Release by push-button
- Wire pull and breakage detection

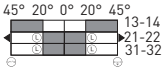
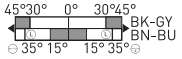
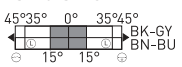
// ZS 73 S EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish; ZS 73 NIRO: aluminium die-cast, hard-coated and enamel finish
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	1 NC/1 NO, 2 NC or 2 NC/1 NO contacts, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M20 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	2 contacts: 6 kV, 3 contacts: 1 kV
U_i	2 contacts: 400 V, 3 contacts: 250 V
I_{the}	2 contacts: 6 A, 3 contacts: 2 A
Utilisation category	AC-15
I_e/U_e	2 contacts: 6 A/400 VAC, 3 contacts: 2 A/250 VAC
Max. fuse rating	2 contacts: 6 A gG/gN fuse, 3 contacts: 2 A gG/gN fuse
Ambient temperature	–25 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	2 x 100 m
Features	wire pull and breakage detection
Approvals	cSPus EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/1 NO contact	**ZS 73 S 2Ö/1S** 
1 NC/1 NO contact	**ZS 73 S 1Ö/1S** 
2 NC contacts	**ZS 73 S 2Ö** 

✓ in stock

Type code ZS 73 S 1Ö/1S VD NIRO hard-coated Extreme

- hard-coated enclosure
- Stainless steel pull-wire unit
- VD Push-button release (blank without mechanical latching)
- 1 NC/1 NO contact (2Ö, 2Ö/1S)
- S Two-side actuation
- Series
- Emergency pull-wire switch

At 4 m distance intermediate wire supports are required. Details related to pre-stress and actuating forces are indicated at the end of this chapter. Two tension springs type ZS 73/75 S must be installed. See chapter accessories at the end of this chapter.

Emergency pull-wire switches, two-side actuation
// Series ZS 73 S Extreme, mounting/variants

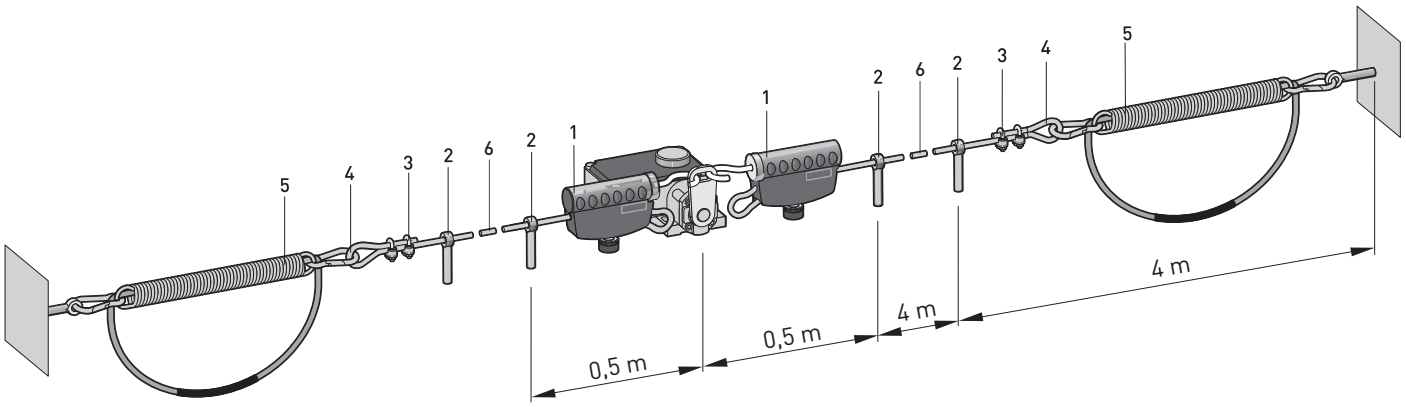
Legend

1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 73/75 S	1187935
6 Pull-wire per metre	1032984

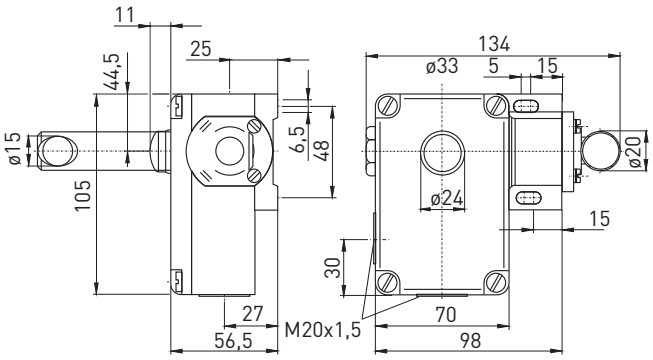
Features/Options
- Indicator lamps are indicated at the end of this chapter
- Indicator lamp position in the left side cable entry, other positions possible on request

Note
- Always mount emergency pull-wire switch in middle position.

// Mounting with tension spring



// Stainless Steel ZS 73 S NIRO



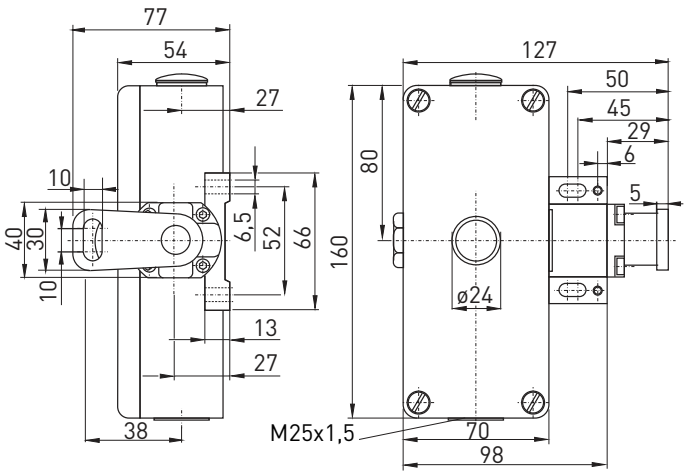
Features/Options
- Pull-wire lever and screws made of stainless steel 1.4305, hard-coated enclosure with enamel finish

Stainless Steel/Push-button release	Material Number
ZS 73 S 2Ö/1S VD Niro hard-coated Extreme	1186349
ZS 73 S 1Ö/1S VD Niro hard-coated Extreme	1048206
ZS 73 S 2Ö VD Niro hard-coated Extreme	on request

Emergency pull-wire switches, two-side actuation
// Series ZS 75 S Extreme

Features/Options
- Cold-resistant down to -40 °C
- Metal enclosure
- High degree of protection IP 67
- 4 contacts
- Wire length up to 2 x 100 m
- Release by push-button
- Available without unlocking mechanism (per DIN EN 60947-5-1)
- Wire pull and breakage detection

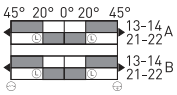
// ZS 75 S EXTREME



Technical data

Standards	EN 60947-5-1, -5; EN ISO 13850; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish
Cover	aluminium die-cast, enamel finish
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	2 NO/2 NC contacts, type Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M25 x 1.5
B_{10d} (10 % load)	200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +70 °C
Mechanical life	> 100 000 operations
Max. wire length	2 x 100 m
Features	wire pull and breakage detection
Approvals	c SP us, EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/2 NO contact	**ZS 75 S 2Ö/2S** 

Type code	**ZS 75 S 2Ö/2S VD Extreme**

- VD Push-button release (blank without mechanical latching)
- 2 NC/2 NO contacts (1Ö/1S, 4Ö)
- S Two-side actuation
- Series
- Emergency pull-wire switch

At 4 m distance intermediate wire supports are required. Details related to pre-stress and actuating forces are indicated at the end of this chapter.Two tension springs type ZS 73/75 S must be installed. See chapter accessories at the end of this chapter.

✓ in stock

Emergency pull-wire switches, two-side actuation
// Series ZS 75 S Extreme, mounting

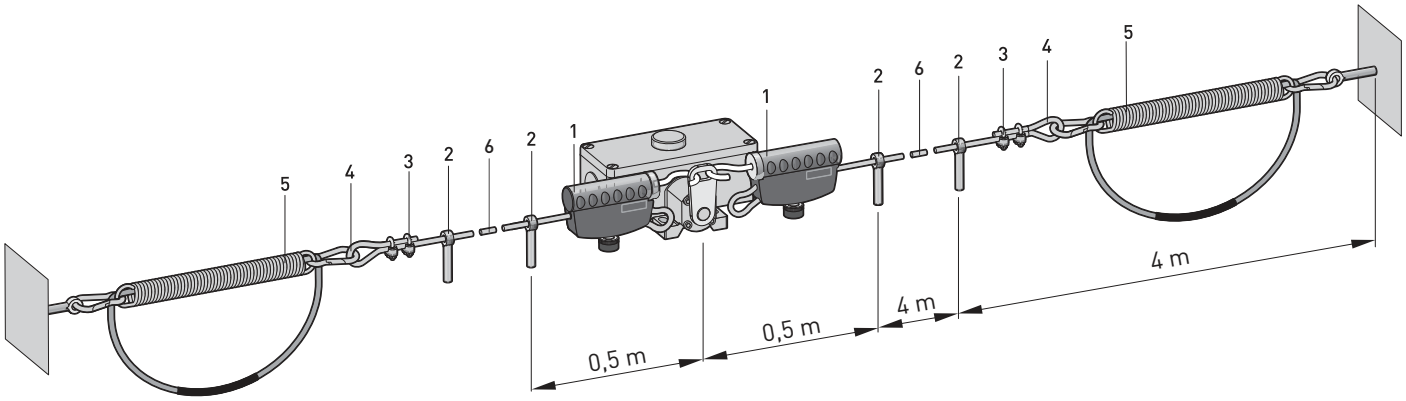
Legend

1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble 3 mm	1033245
5 Tension spring ZS 73/75 S	1187935
6 Pull-wire per metre	1032984

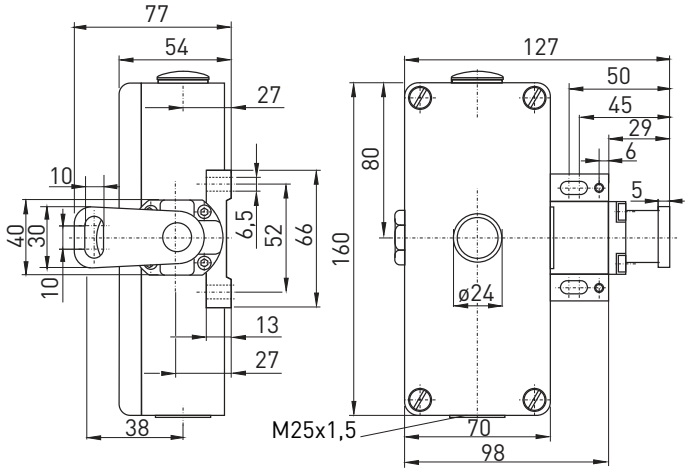
Features/Options
- Indicator lamps are indicated at the end of this chapter
- Indicator lamp position on the left side, other positions possible on request

Note
- Always mount emergency pull-wire switch in middle position.

// Mounting with tension spring



// Push-button release VD



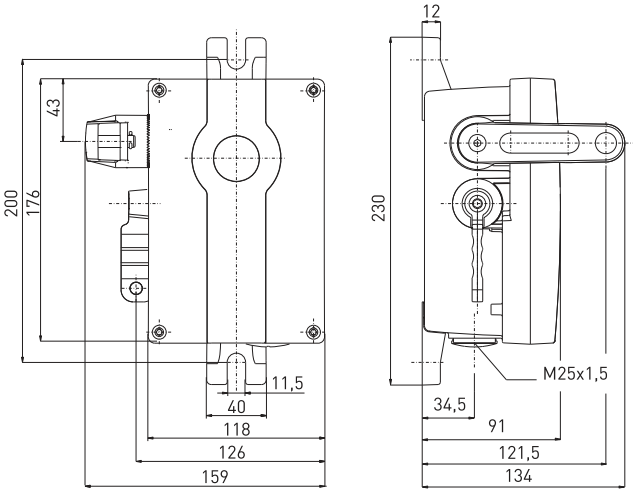
Push-button release	Material Number
ZS 75 S 2Ö/2S VD IP67 -40°C Extreme	1183405

Emergency pull-wire switches, two-side actuation
// Series ZS 91 S Extreme

Features/Options
- Temperature resistant from -40 °C to +85 °C
- High degree of protection IP 66 / IP 67
- Thermoplastic enclosure
- 4 or 6 contacts
- Wire length up to 2 x 100 m
- Release by lever possible
- Wire pull and breakage detection
- Version with Bus or Si-Bus available on request

// ZS 91 S EXTREME

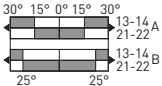
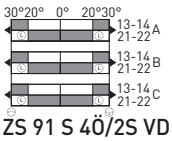
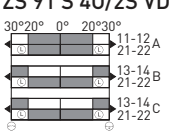
100



Technical data

Standards	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
Enclosure	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
Degree of protection	IP 66/67 to IEC/EN 60529
Contact material	silver
Switching elements	2 NC/2 NO, 3 NC/1 NO, 3 NC/3 NO, 4 NC/2 NO, 4 NC or 2 NC contacts, type Zb
Switching system	snap action, positive break NC contacts ⊖
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M25 x 1.5
B_{10d} (10% Nennlast)	> 80 000 operations
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +85 °C
Mech. life	> 40 000 operations
Max. wire length	2 x 100 m
Features	wire pull and breakage detection
Approvals	

Contact variants: switch travel/contacts

	Snap action
2 NC/2 NO contacts	**ZS 91 S 2Ö/2S** 
3 NC/3 NO contacts	**ZS 91 S 3Ö/3S VD** 
4 NC/2 NO contacts	**ZS 91 S 4Ö/2S VD** 

✓ in stock

Type code ZS 91 S 2Ö/2S VD -40°C...+85°C IP66/67-BUS

- Bus (Si-Bus)
- High degree of protection IP 66 / IP 67
- Temperature resistant from -40 °C to +85 °C
- VD lever release (blank without manual latching)
- 2 NC/2 NO contacts (3Ö/3S, 4Ö/2S, 3Ö/1S, 4Ö, 2S)
- S two-side actuation
- Series
- Emergency pull-wire switch

Emergency pull-wire switches, two-side actuation
// Series ZS 91 S Extreme, mounting

Legend

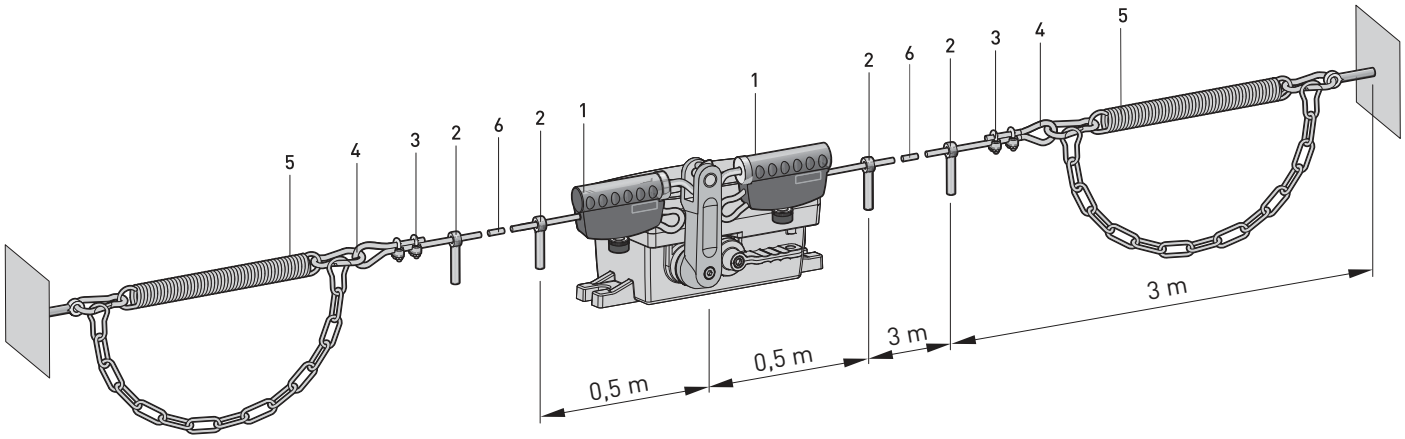
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble	1033245
5 Tension spring ZS 90/91 S	1184540
6 Pull-wire per metre	1032984

- At 3 m distance intermediate wire supports are required. Two tension springs ZS 90/91 S must be installed see chapter accessories in the appendix.

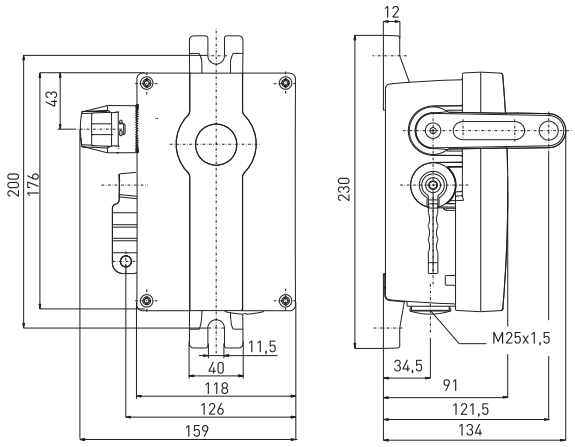
Note

- Always mount emergency pull-wire switch in middle position.

// Mounting with tension spring



// Lever release VD

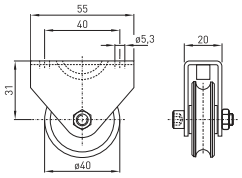


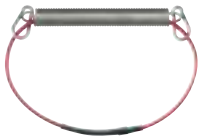
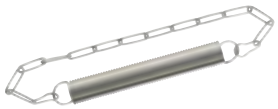
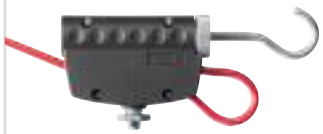
Lever release	Material Number
ZS 91 S 3Ö/3S VD -40°C ... +85°C IP66/67 Extreme	1241303
ZS 91 S 4Ö/2S VD -40°C ... +85°C IP66/67 Extreme	1189486
ZS 91 S 2Ö/2S VD -40°C ... +85°C IP66/67 Extreme	✓ 1189190
ZS 91 S 3Ö/1S VD -40°C ... +85°C IP66/67 Extreme	1227145
ZS 91 S 4Ö VD -40°C ... +85°C IP66/67 Extreme	1241516
ZS 91 S 2Ö VD Si-Bus Extreme	1298657

// Safety input module A

Safety input module	Material Number
GS 7510 2192	1341952
GS 7510 2192-1	1341951

Emergency pull-wire switches
// Accessories

// Accessories		// Order number	
Pulley - To guide the pull-wire where the path is not a straight line - For pull-wire with red PVC sheath Ø 5 mm (steel core Ø 3 mm) - Ordering unit: 1 piece		Pulley	1041765
Pull-wire - Steel core Ø 3 mm with red PVC sheath - Total diameter 5 mm - Ordering unit: per metre - Available with stainless steel core		Pull-wire Ø 5 mm per metre Pull-wire stainless steel Ø 5 mm per metre	1032984 1033297
Complete Pull-wire set - 5 m pull-wire Ø 3 mm with 2 mm PVC sheath, 2 wire clamps DIN 741, 1 wire thimble DIN 65457, 1 eye bolt DIN 444 and 1 Duplex wire clamp		Complete pull-wire set, 5 m Complete pull-wire set, 10 m Complete pull-wire set, 15 m Complete pull-wire set, 20 m Complete pull-wire set, 25 m Complete pull-wire set, 50 m	1041628 1041633 1041634 1041645 1041635 1041642
Pull-wire for emergency pull-wire sw. - Pull-wire yellow (polypropylene) - 1, 2, 3 or 4 m long - With rubber ball and mounting clamp		Pull-wire with ball emergency pull-wire sw. 1 m Pull-wire with ball emergency pull-wire sw. 2 m Pull-wire with ball emergency pull-wire sw. 3 m Pull-wire with ball emergency pull-wire sw. 4 m	1041764 1167653 1167654 1160281
Wire clamp - For pull-wire with steel core Ø 3 mm - Ordering unit: 1 piece - Wire clamp made of stainless steel available		Wire clamp 3 mm Wire clamp 3 mm stainless steel	1033247 1033299
Duplex wire clamp - For pull-wire with steel core Ø 3 mm - Ordering unit: 1 piece		Duplex wire clamp	1033248
Egg-shaped wire clamp - For pull-wire with steel core Ø 3 mm - Ordering unit: 1 piece		Egg-shaped wire clamp 3 mm	1181896
Wire thimble - Per DIN 65457 - For pull-wire with steel core Ø 3 mm - Wire clamp made of stainless steel available		Wire thimble 3 mm Wire thimble 3 mm Niro	1033245 1172707
Eye bolt incl. nut - Per DIN 444 - Available made of stainless steel - Ordering unit: 1 piece		Eye bolt M8x70 with nut Eye bolt M8 x 70 stainless steel with nut Eye bolt BM10 x 40 with nut Exe bolt M10 x 55 open with 2 nuts	1170601 1189687 1032610 1279170

// Accessories		// Order number	
Compensation spring/travel limitation - Adaption of length expansions caused by changes in temperature - Stainless steel 1.4310 - Ordering unit: 1 piece		Compensation spring ZS 71-100N Compensation spring ZS 73/75-200N Compensation spring ZS 73/75-400N Compensation spring ZS 73/75 S Compensation spring ZS 80	1187921 1187931 1187934 1187935 1187933
Comp. spring ZS 90/91 S for ZS 91 S - Adaption of length expansions caused by changes in temperature - Stainless steel 1.4310 - Ordering unit: 1 piece		Compensation spring ZS 90/91 S	1184540
Tensioner M6 - For precise adjustment of pull-wire pre-stress - Per DIN 1480 - Adjustable von 145 mm bis 225 mm		Tensioner M6	1033254
Tensioner M8 - For precise adjustment of pull-wire pre-stress - Made of stainless steel, adjustable from 160 mm to 255 mm		Tensioner M8 Niro	1033300
Cable tensioner system TS 65 - For pull-wire with steel core Ø 4 - 6 mm incl. sheath - Adjustment range max. 65 mm - Diameter of eyebolt min. 8 mm - Pull-wire length max. 75 m		Cable tensioner system TS 65	1186621
Indicator lamp ML RD 24 VAC/DC - LED - Ambient temperature -40 +80 °C - Degree of protection IP 66/67 - M20 x 1.5		Indicator lamp ML RD 24 VAC/DC M20x1,5	1344170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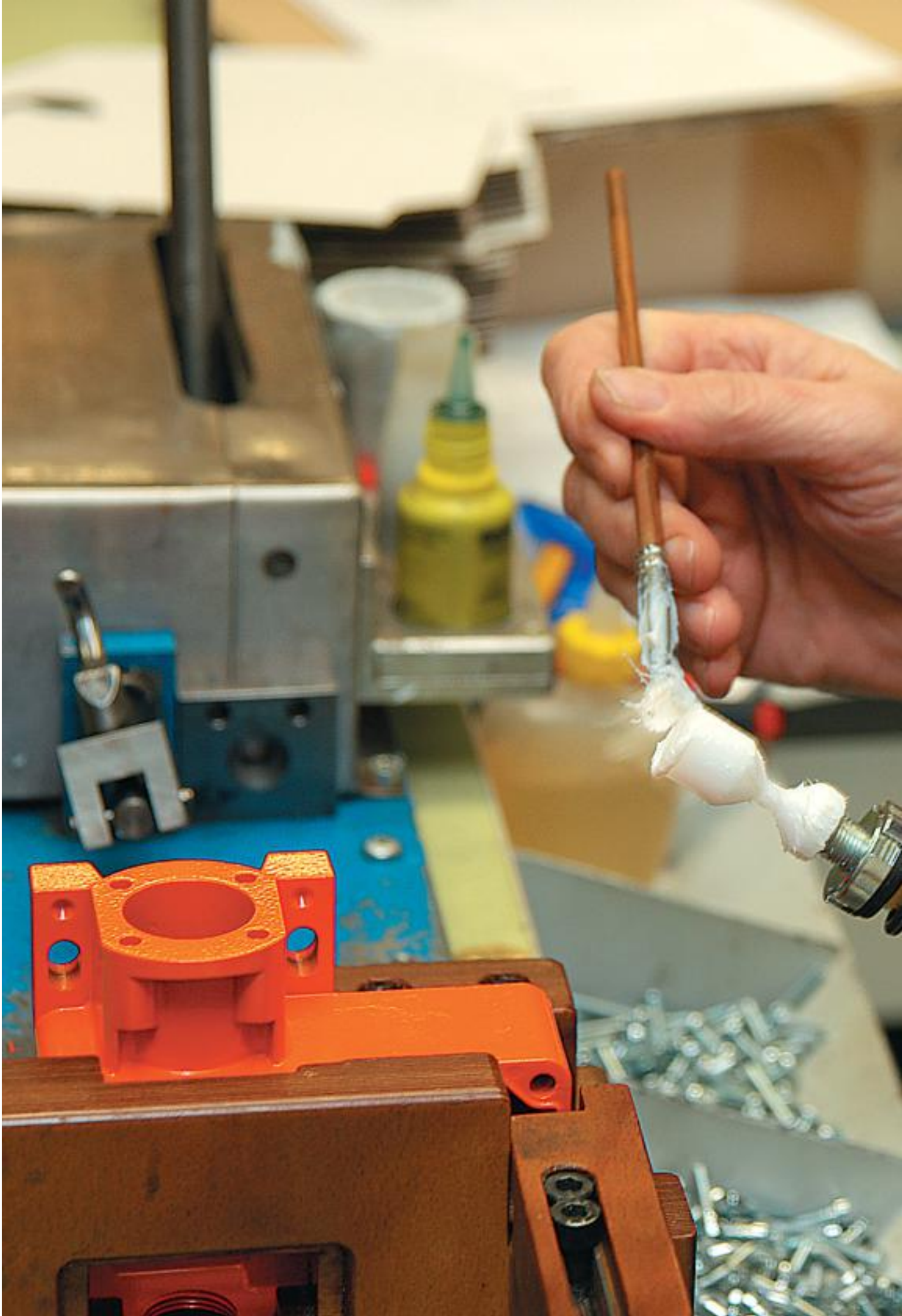
Belt-alignment switches

ZS 73 SR Extreme



Belt-alignment switches

Range of application

Belt-alignment switches are suitable for applications with handling equipment. Here they are installed e.g. at both sides of a conveyor belt in order to monitor the misalignment of the belt.

Belt misalignment, evoked by, for example, goods not in the middle of conveyor belt positioned or pollution of track idlers and deflection pulleys, can without any monitoring measurements lead to damage, destruction, material covering and dropping.

Design and operating principle

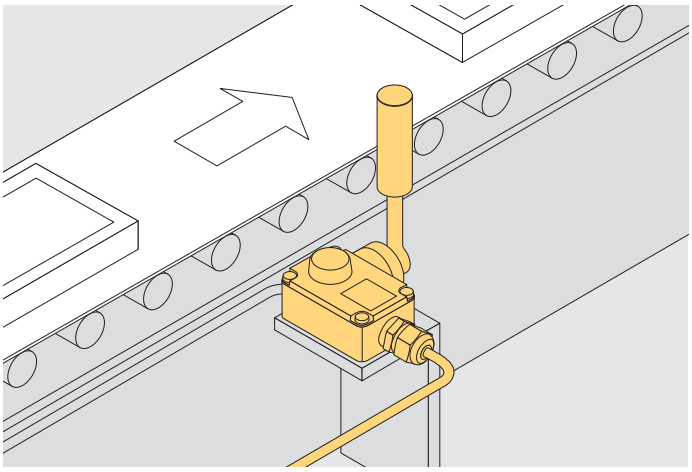
Belt-alignment switches are actuated when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can either be used to switch the equipment off or to provide automatic correction of the belt alignment. Thus they should be installed at both sides of the conveyor belt close to the deflection and drive pulleys. In the case of very long conveyor systems, further belt-alignment switches must be installed.

These are actuated with the misalignment of the conveyor belt. This signal can either switch the system off or start an automatic belt position correction, as well as at the same time generate an optical or acoustic indicating or warning signal. All belt-alignment switches have positive break NC contacts and those of series ZS also have a mechanical latching. At actuation the NC contacts are opened and latched mechanically. The release can be carried out by push button or lever. Thus an unintentional, automatic restart of the conveyor belt is prevented.

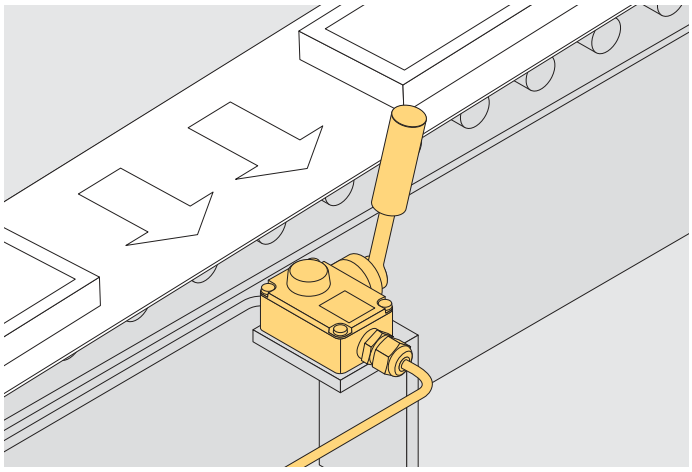
All belt-alignment switches bear the CE mark according to the Low Voltage Directive 06/95/EC.

Application

Monitoring a conveyor belt



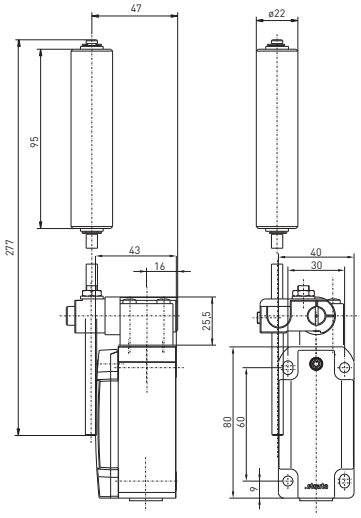
Belt-alignment switch in actuated state



Belt-alignment switches
// Series ES 98 SR Extreme

Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +90 °C
- High degree of protection IP 66 or IP 69
- Metal enclosure
- 2 contacts

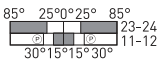
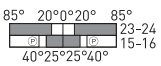
// ES 98 SR EXTREME



Technical data

Standards	EN ISO 13849-1; EN 60947-5-1
Design	EN 50041
Enclosure	corrosion-resistant aluminium, powder-coated, similar to RAL 7016
Cover	stainless steel 1.4401, powder-coated, similar to RAL 1003
Degree of protection	IP 66, 67 or 69 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contacts
Switching elements	1 NC/1 NO or 1 NC/1 NO contact with contact overlapping Zb, galvanically separated contact bridges
Connection	screw connection terminals
Cable cross-section	max. 1.5 mm² (incl. conductor ferrules)
U_{imp}	4 kV
U_i	250 V
I_{the}	6 A
I_e/U_e	6 A/250 VAC; 0.25 A/230 VDC
Utilisation category	AC-15; DC-13
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +60 °C; -20 °C ... +90 °C
Mechanical life	> 1 million operations
Operation cycles	1800/h
Repeat accuracy of switching points	± 0.1 mm
Approvals	EAC

Contact variants: switch travel/contacts

	Slow action	Material Number
1 NC/1 NO contact	**ES 98 SR-11 -40°C...**	**1190325** ✓
	ES 98 SR-11 +90°C...	**1190327** ✓
		
1 NC/1 NO contact with overlapping	**ES 98 SR-11U -40°C...**	**1190326**
	ES 98 SR-11U +90°C...	**1190328**
		

Ordering details **ES 98 SR-11 -40°C IP66 Extreme**

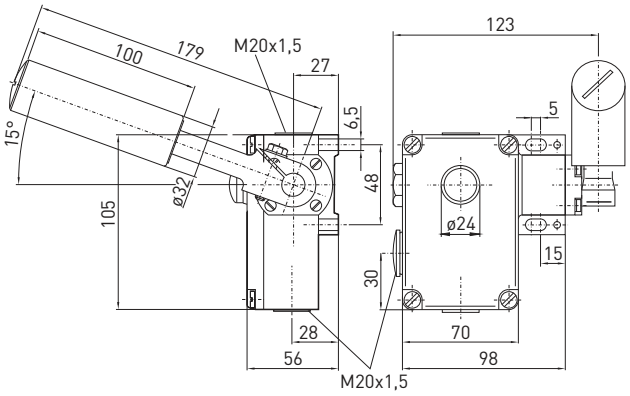
- high degree of protection IP 66 (IP 69, IP 67)
- cold-resistant down to -40 °C (heat-resistant +90 °C)
- 1 NC/1 NO contact, (-11U)
- SR Belt-alignment lever
- Series
- S Slow action

QUALITY TEST
JET-WATER

Belt-alignment switches
// Series ZS 73 SR Extreme

Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +100 °C
- High degree of protection IP 67
- Metal enclosure
- 2 contacts
- Release by push-button
- Belt-alignment roller made of stainless steel 1.4104

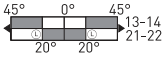
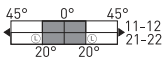
// ZS 73 SR EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 65/67 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	1 NC/1 NO contact or 2 NC contacts Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M20 x 1.5
B_{10d} (10 % load)	ZS 73 SR: 2 million ZS 73 SR VD: 200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +100 °C
Mechanical life	ZS 73 SR VD: > 100 000 operations; ZS 73 SR: > 1 million operations
Approvals	cSPus EAC

Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	ZS 73 SR 1Ö/1S 
2 NC contacts	ZS 73 SR 2Ö 

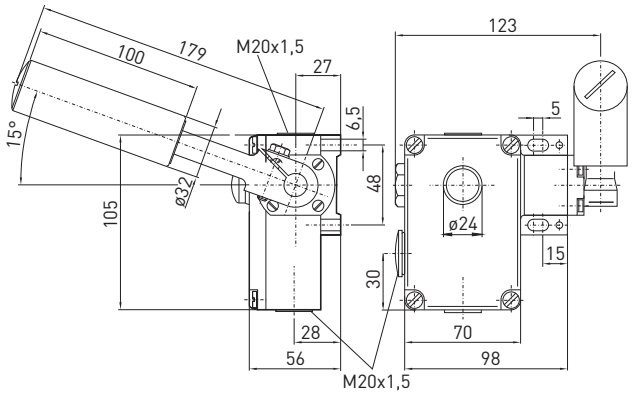
Type code ZS 73 SR 1Ö/1S VD IP67 -40°C Extreme

- Series
- SR Belt-alignment lever
- 1 NC/1 NO contact (2Ö)
- VD Push-button release (blank without mechanical latching)
- high degree of protection IP 67
- cold-resistant down to -40 °C (heat-resistant up to +100 °C)

Belt-alignment switches
// Series ZS 73 SR Extreme, variants

Features/Options
- Indicator lamp position on the left side, other positions possible on request

// Push-button release VD



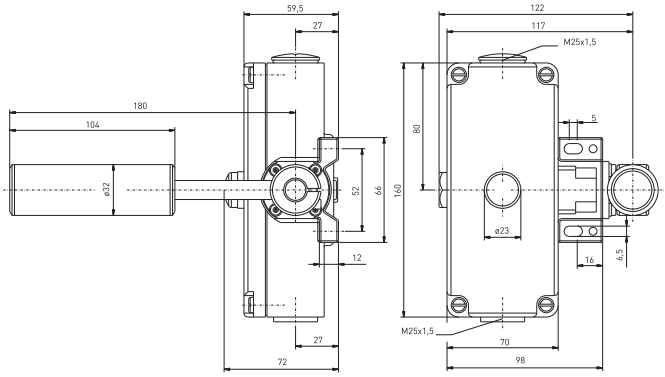
Push-button release	Material Number
ZS 73 SR 1Ö/1S VD IP67 -40°C Extreme	1190418

Without latching	Material Number
ZS 73 SR 1Ö/1S +100°C Extreme	1182290
ZS 73 SR 2Ö IP67 +100°C Extreme	1182421

Belt-alignment switches
// Series ZS 75 SR Extreme

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 67
- Metal enclosure
- 4 contacts
- Release by push button
- Available without unlocking mechanism (per EN 60947-5-1)
- Belt-alignment roller made of stainless steel 1.4104

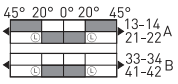
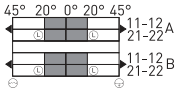
// ZS 75 SR EXTREME



Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	aluminium die-cast, enamel finish
Cover	aluminium die-cast, enamel finish
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	snap action, positive break NC contacts ⊖
Switching elements	2 NO/2 NC or 4 NC contacts Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
B_{10d} (10 % load)	ZS 75 SR: 2 million ZS 75 SR VD: 200 000
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +70 °C
Mechanical life	ZS 75 SR: > 1 million operations; ZS 75 SR VD: > 100 000 operations;
Approvals	cSPus EAC

Contact variants: switch travel/contacts

	Snap action
2 NC/2 NO contact	**ZS 75 SR 2Ö/2S** 
4 NC contacts	**ZS 75 SR 4Ö** 

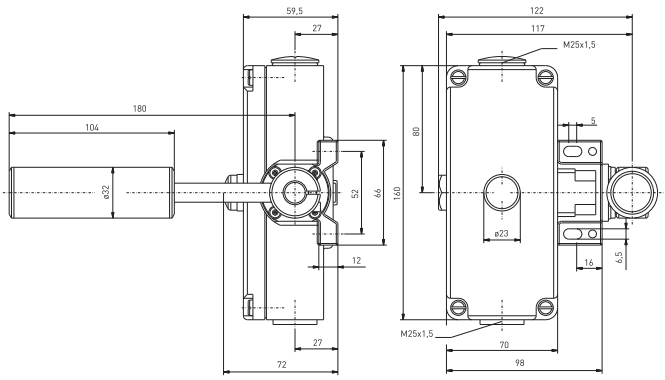
Type code ZS 75 SR 2Ö/2S VD -40°C IP67 Extreme

- high degree of protection IP 67
- cold-resistant down to -40 °C
- VD Push-button release (blank without mechanical latching)
- 2 NC/2 NO contact (4Ö)
- SR Belt-alignment lever
- Series

Belt-alignment switches
// Series ZS 75 SR Extreme, variants

Features/Options
- Indicator lamp position on the left side, other positions possible on request

// Push-button release VD

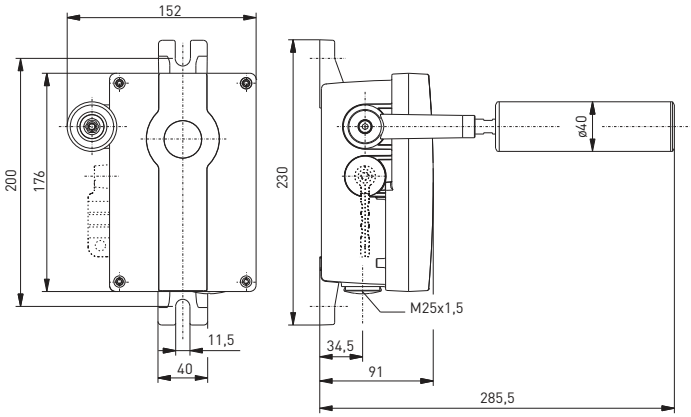


Push-button release	Material Number
ZS 75 SR 2Ö/2S VD -40°C IP67 Extreme	1188861

Belt-alignment switches
// Series ZS 91 SR Extreme

Features/Options
- Temperature resistant from -40 °C to +85 °C
- High degree of protection IP 66 / IP 67
- Thermoplastic enclosure
- 4 or 6 contacts
- 4 contacts available with contact staggering:
  1 NC and 1 NO contact switching at 15°,
  1 NC and 1 NO contact switching at 25°
- Release by lever possible
- Belt-alignment lever can be repositioned in 6° steps clockwise or counter-clockwise
- Version with Bus available on request

// ZS 91 SR EXTREME

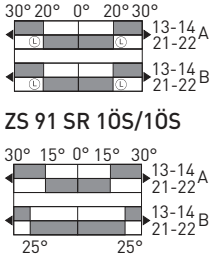


Technical data

Standards	EN 60947-5-1; EN ISO 13849-1
Enclosure	glass-fibre reinforced, shock-proof thermo-plastic, UV resistant to EN ISO 4892
Cover	glass-fibre reinforced, shock-proof thermo-plastic, UV resistant to EN ISO 4892
Degree of protection	IP 66/67 to IEC/EN 60529
Contact material	silver
Switching elements	3 NC/3 NO, 4 NC/2 NO, 2 NC/2 NO, 3 NC/1 NO or 4 NC contacts Zb
Switching system	snap action, positive break NC contacts ⊖
Connection	Screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	2 x M25 x 1.5
B_{10d} (10 % load)	ZS 91 SR VD: 80 000, ZS 91 SR: 2 million
T_M	max. 20 years
U_{imp}	6 kV
U_i	400 V
I_{the}	6 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	–40 °C ... +85 °C
Mech. life	ZS 91 SR VD: > 40 000 operations, ZS 91 SR: > > 1 million operations
Approvals	

Contact variants: switch travel/contacts

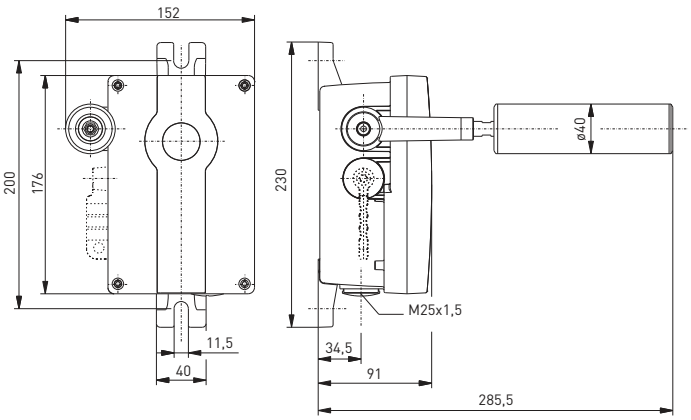
	Snap action
2 NC/2 NO contacts	**ZS 91 SR 2Ö/2S VD**
2 NC/2 NO contacts with contact staggering	**ZS 91 SR 1ÖS/1ÖS**



Type code ZS 91 SR 1ÖS/1ÖS VD-40°C... IP66/67-BUS

- Bus (Si-Bus)
- high degree of protection IP 67
- cold-resistant down to -40 °C, heat-resistant up to +100 °C
- VD lever release (blank without manual latching)
- 2 NC/2 NO contacts
- SR belt-alignment lever
- Series

// Lever release VD



Lever release	Material Number
ZS 91 SR 3Ö/3S VD -40°C ... +85°C IP66/67 Extreme	1242033
ZS 91 SR 4Ö/2S VD -40°C ... +85°C IP66/67 Extreme	1242228
ZS 91 SR 2Ö/2S VD -40°C ... +85°C IP66/67 Extreme	✓ 1213379
ZS 91 SR 3Ö/1S VD -40°C ... +85°C IP66/67 Extreme	1241836
ZS 91 SR 4Ö VD -40°C ... +85°C IP66/67 Extreme	1242226

Without latching	Material Number
ZS 91 SR 2Ö/2S -40°C ... +85°C IP66/67 Extreme	1358181

Without latching/with contact staggering	Material Number
ZS 91 SR 1ÖS/1ÖS -40°C ... +85°C IP66/67 Extreme	✓ 1208202


steute

Pull-wire switches

ES 61 WZ Extreme

Pull-wire switches

Range of application

Pull-wire switches are suitable as transducers for starting machines or to open and close electrically-powered doors, gates and barriers.

Design and operating principle

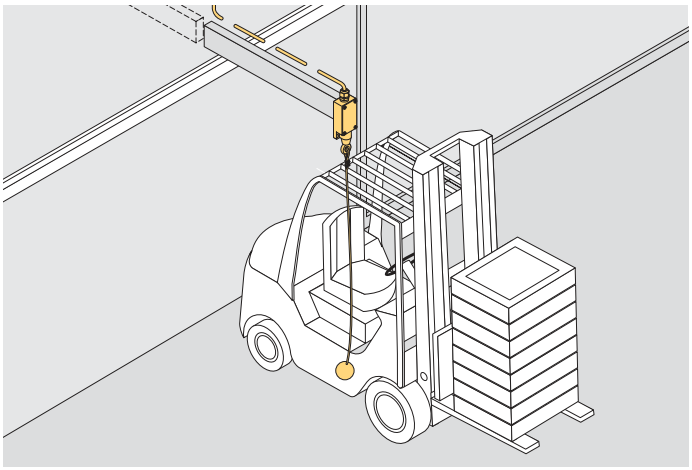
Pull-wire switches are actuated manually by pulling. The pull-wire switches generate a switching impulse on actuation.

In the appendix the mounting accessories for pull-wire switches can be selected.

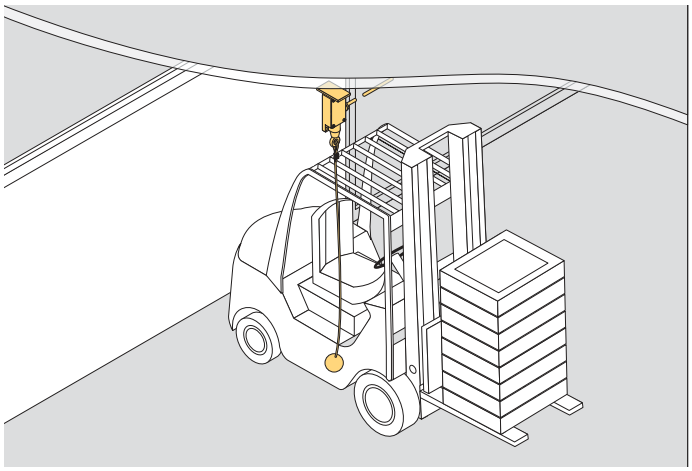
All pull-wire switches presented in this chapter bear the CE mark according to the Low Voltage Directive 06/95/EC.

Application

Wall mounting as door opener



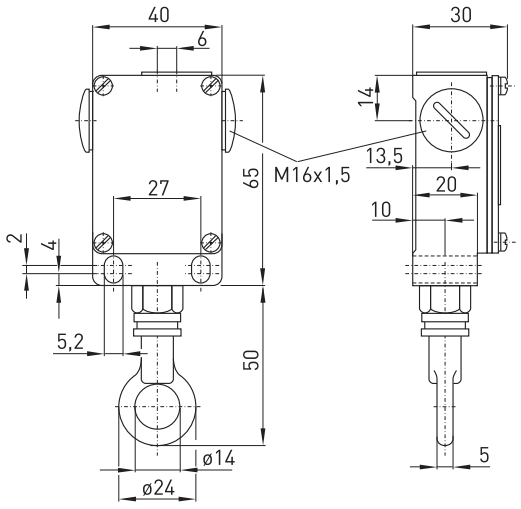
Ceiling mounting



Pull-wire switches
// Series ES/EM 41 Z Extreme

Features/Options
- Cold-resistant down to -40 °C
- Metal enclosure
- Wall mounting
- Slow or snap action: 2 contacts
- Pull-wire function

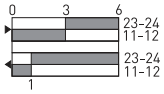
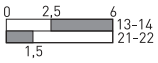
// ES/EM 41 Z EXTREME



Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, powder-coated
Cover	steel, enamel finish
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching system	slow or snap action
Switching elements	1 NC/1 NO or 2 NO contacts Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	3 x M16 x 1.5
U_{imp}	4 kV
U_i	400 V
I_{the}	10 A
Utilisation category	AC-15
I_e/U_e	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Mechanical life	> 1 million operations
Operation cycles	3600/h
Ambient temperature	–40 °C ... +80 °C
Actuating force	max. 45 N
Features	pull-wire function
Approvals	EAC

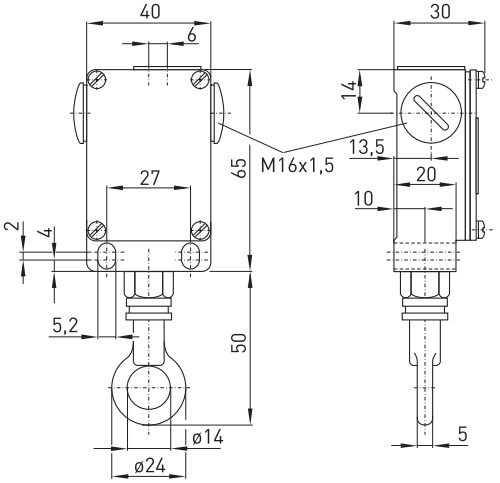
Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact	**EM 41 Z 1Ö/1S** 	**ES 41 Z 1Ö/1S** 

Type code ES 41 Z 1Ö/1S -40°C Extreme

- Cold-resistant down to -40 °C
- 1 NC/1 NO contact
- Z Actuator towing eye
- Series
- S Slow action (M snap action)

// ES/EM 41 Z Extreme

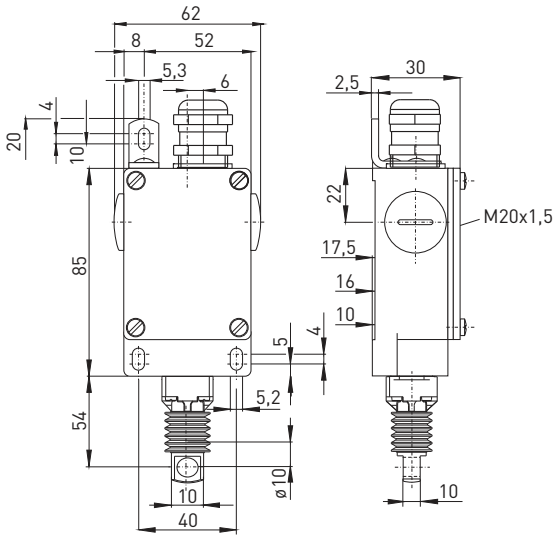


Snap action	**Material Number**
EM 41 Z 1Ö/1S -40°C Extreme	1183202
Slow action	**Material Number**
ES 41 Z 1Ö/1S -40°C Extreme	✓ 1188168

Pull-wire switches
// Series ES 61 WZ Extreme

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 67
- Metal enclosure
- With watertight collar
- Wall mounting
- Slow action: 2 contacts
- Pull-wire function

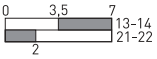
// ES 61 WZ EXTREME



Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, enamel finish
Cover	steel, enamel finish
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	slow action, positive break NC contact ⊖
Switching elements	1 NC/1 NO contact Zb
Connection	screw connection terminals
Cable cross-section	max. 2.5 mm² (incl. conductor ferrules)
Cable entry	3 x M20 x 1.5
U_{imp}	6 kV
U_i	400 V
I_{the}	10 A
I_e/U_e	16 A/400 VAC
Utilisation category	AC-15
Max. fuse rating	16 A gG/gN fuse
Ambient temperature	–40 °C ... +80 °C
Mechanical life	> 1 million operations
Operation cycles	3600/h
Actuating force	max. 50 N
Features	pull-wire function
Approvals	EAC

Contact variants: switch travel/contacts

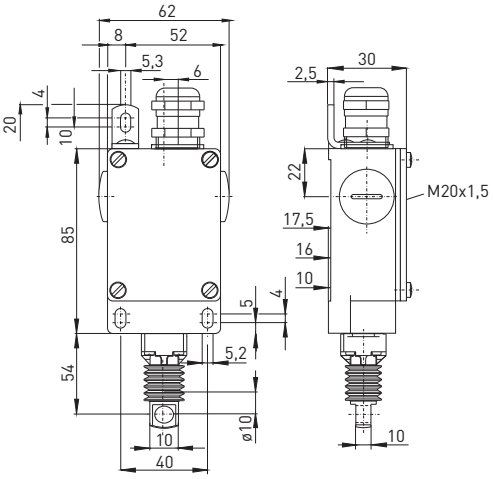
	Slow action
1 NC/1 NO contact	**ES 61 WZ 1Ö/1S** 

Type code ES 61 WZ 1Ö/1S -40°C IP67 Extreme

- high degree of protection IP 67
- Cold-resistant down to -40 °C
- 1 NC/1 NO contact
- Z Actuator towing eye
- W Watertight collar
- Series
- S Slow action

Features/Options
- Watertight collar W for protection against penetration of dirt

// Watertight collar W

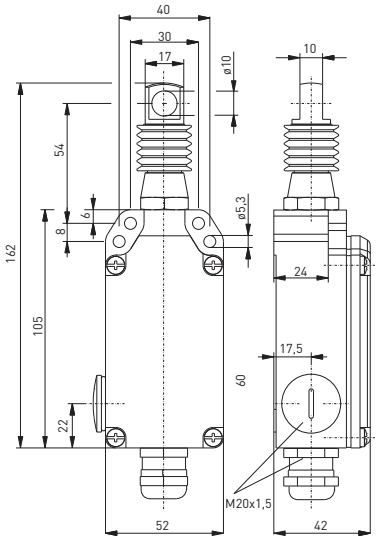


Slow action	Material Number
ES 61 WZ 1Ö/1S -40°C IP67 Extreme	1188177

Pull-wire switches
// Series ZS 71 WZ Extreme

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 67
- Metal enclosure
- With watertight collar
- Wall mounting
- Snap action: 2 contacts
- Pull-wire function with latching

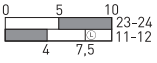
// ZS 71 WZ EXTREME



Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, powder-coated
Cover	glass-fibre reinforced, shock-proof thermoplastic, ultramid
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching system	snap action
Switching elements	1 NC/1 NO contact Zb
Connection	screw connection terminals
Cable cross-section	max. 1.5 mm² (incl. conductor ferrules)
Cable entry	2 x M20 x 1.5
U_{imp}	4 kV
U_i	400 V
I_{the}	4 A
I_e/U_e	4 A/400 VAC
Utilisation category	AC-15
Max. fuse rating	4 A gG/gN fuse
Ambient temperature	–40 °C ... +80 °C
Mechanical life	> 1 million operations
Operation cycles	3600/h
Actuating force	max. 50 N
Features	pull-wire function
Approvals	EAC

Contact variants: switch travel/contacts

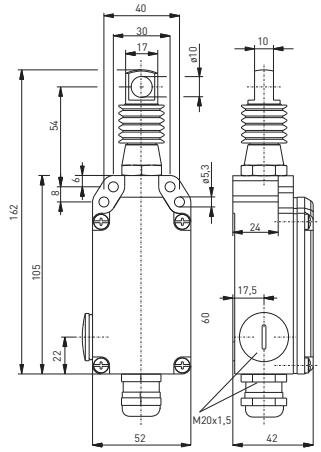
	Snap action
1 NC/1 NO contact	**ZS 71 WZ 1Ö/1S RE** 

Type code **ZS 71 WZ 1Ö/1S RE -40°C IP67 Extreme**

- Series
- W Watertight collar
- Z Actuator towing eye
- 1 NC/1 NO contact
- with latching
- Cold-resistant down to -40 °C
- high degree of protection IP 67

Features/Options
- Watertight collar W for protection against penetration of dirt

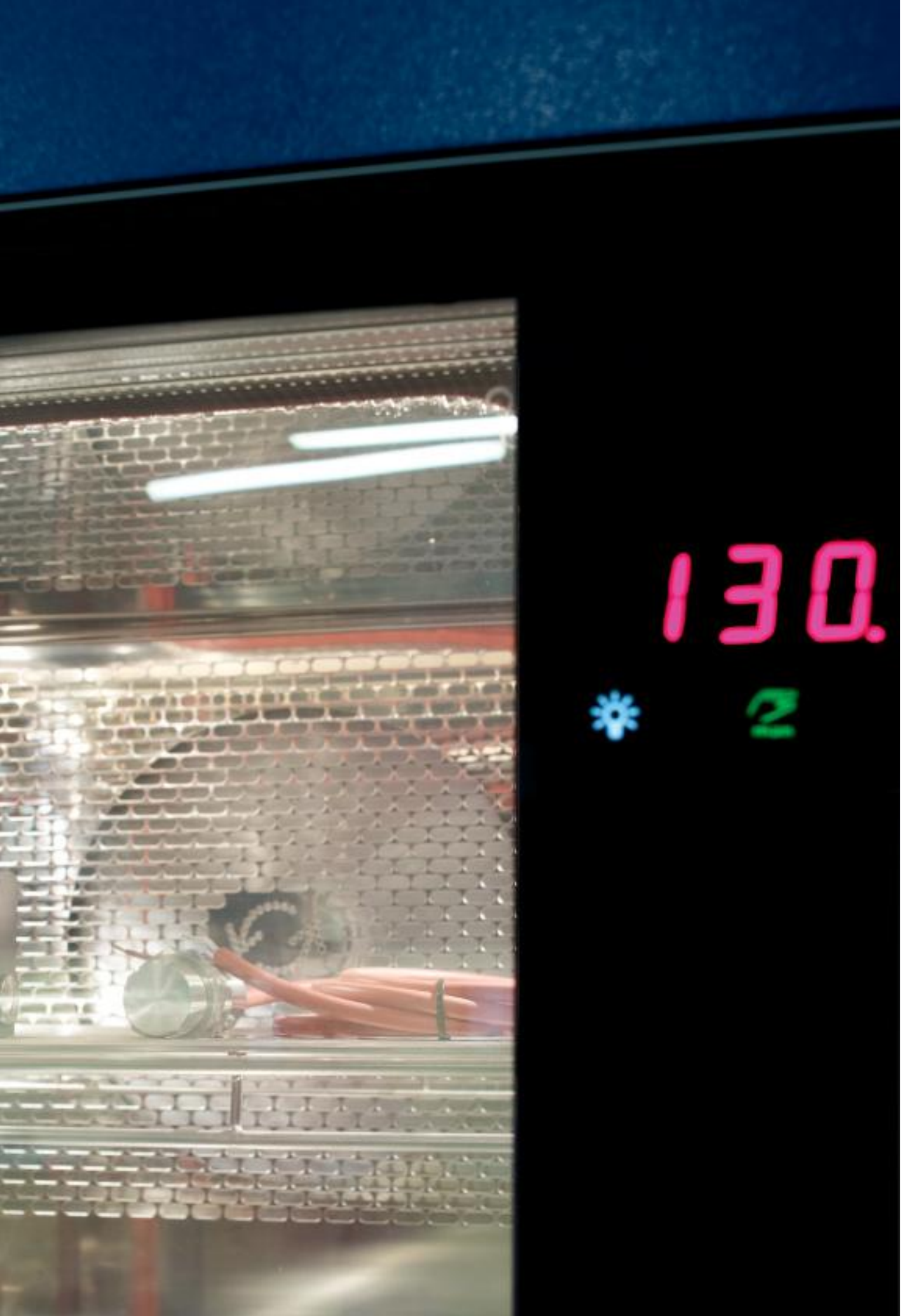
// Watertight collar W



Snap action
ZS 71 WZ 1Ö/1S RE-40°C IP67 Extreme

Material Number
1188175

// Accessories		// Order number	
Pull-wire for pull-wire switches - Pull-wire yellow (polypropylene) - 1, 2, 3 or 4 m long - With rubber ball and Duplex wire clamp - Ordering unit: 1 piece		Pull-wire with ball for pull-wire switches 1 m Pull-wire with ball for pull-wire switches 2 m Pull-wire with ball for pull-wire switches 3 m Pull-wire with ball for pull-wire switches 4 m	1177973 1177974 1177975 1177976


130.
2

Magnetic sensors

Range of application

Magnetic sensors are preferable where extreme dirt occurs or strict hygienic requirements must be met. This is because they are easy to clean. The high degree of protection allows for outside applications.

Even in the presence of aggressive materials, e.g. in galvanisation technology, safe switching is ensured through encapsulation of the contacts. A further advantage is the possibility of concealed mounting behind non-magnetic materials. Workplace surfaces can be designed without dirt-catching edges, functional spacings or covers.

For applications where a precise approach of the magnet to the sensor is not possible and highly fluctuating actuating distances occur magnetic sensors are also suitable.

Design and operating principle

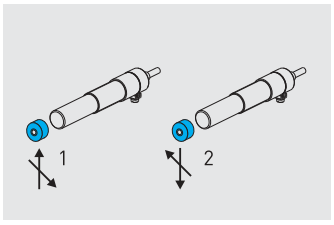
The magnetic sensors are actuated by an M series permanent magnet, described at the end of this chapter, without any mechanical contact. The devices can be selected with NO, change-over or bistable contacts. All magnetic sensors described in this chapter are supplied with pre-wired cables.

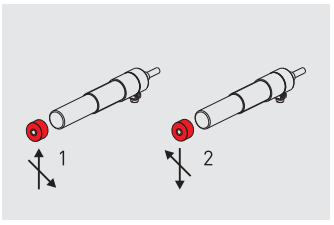
The mounting site for magnetic sensors must be free of magnetic fields.

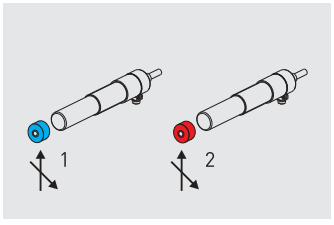
The magnetic sensors described in this chapter bear the CE mark according to the Low Voltage Directive 06/95/EC.

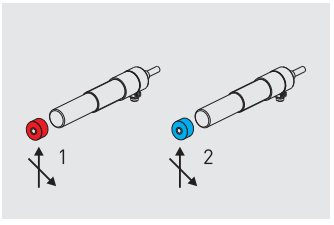
Operating principle

Magnetic sensors bistable contact, actuation from front

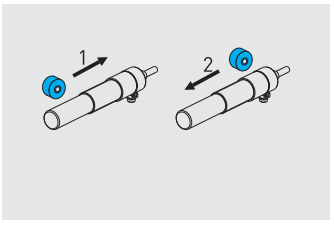


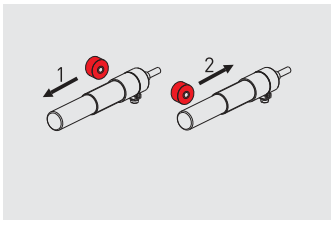


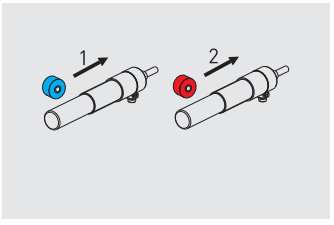


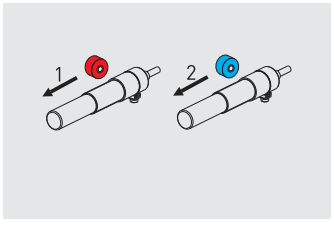


Magnetic sensors bistable contact, actuation from side

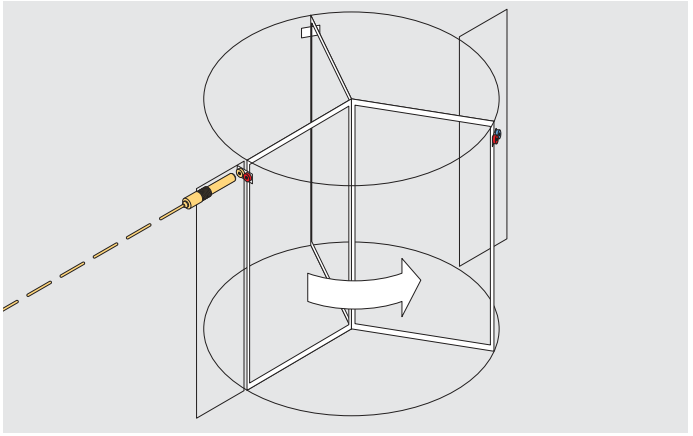


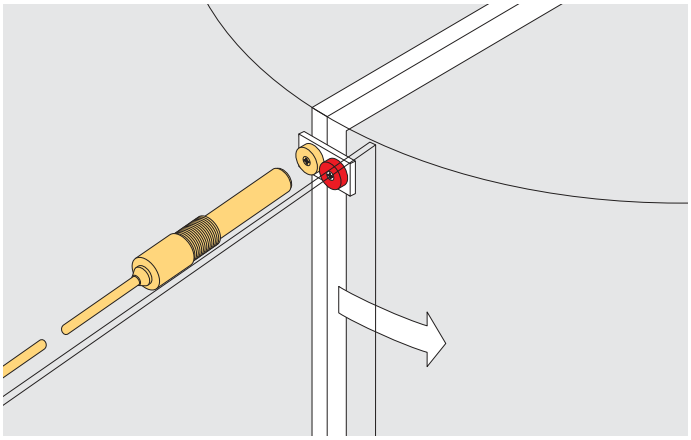






Magnetic sensors on a revolving door

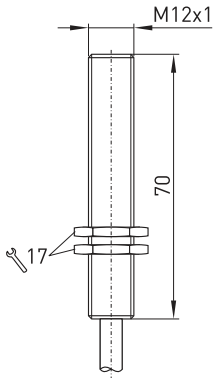




Magnetic sensors, cylindrical design
// Series RC 23 Extreme

Features/Options
- Temperature resistant from -60 °C to +100 °C
- High degree of protection IP 69
- Metal enclosure
- M12 x 1 thread
- Long life
- 1 Reed contact
- Actuation from front and from side
- Switching distance up to 30 mm depending on the actuating magnet
- With pre-wired cable

// RC 23 EXTREME



Technical data

Standards	EN 60947-5-1
Enclosure	brass, nickeled
Actuator	series M permanent magnet
Degree of protection	IP 66, 67 or 69 to EN 60529
Contact material	Rhodium
Switching system	reed contacts
Switching elements	NO contact or change-over contact
Connection	cable, Silicone SIHF, length 2 or 10 m
Cable cross-section	1S: 2 x 0.75 mm², 1W: 3 x 0.75 mm²
Switching voltage	max. 90 VAC/125 VDC
Switching current	max. 1 A
Switching capacity	max. 30 W
Switching frequency	max. 100 Hz
Ambient temperature	–60 °C ... +100 °C
Mechanical life	10⁷ operations
Electrical life	10⁷ operations
Repeatability	± 0.02 mm
Vibration resistance	20 g
Approvals	c SP us GL on request

Contact variants: switch travel/contacts

	bidirectional actuation	Material number
1 NO contact	RC 23 1S-2m -60°C ...	1188642 ✓
	RC 23 1S-10m -60°C ...	1318264
		
1 change-over	RC 23 1W-2m -60°C ...	1253800 ✓
		

Type code RC 23 1W-2m -60°C...+100°C IP69 Extreme

- RC 23 – Series Magnetic sensor
- 1W – 1 change-over (1S)
- 2m – Cable length 2 m (10 m)
- -60°C...+100°C – Temperature-resistant from -60 °C to +100 °C
- IP69 – high degree of protection IP 69 (IP 66, IP 67)
- Extreme

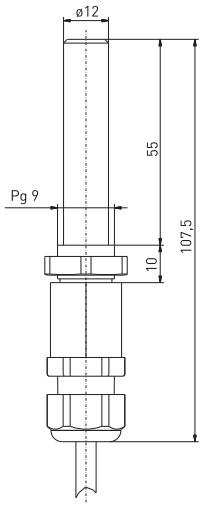
2 mounting nuts are provided.

✓ in stock

Magnetic sensors, cylindrical design
// Series RC 60 Extreme

Features/Options
- Temperature resistant from -40 °C up to +130 °C
- Thermoplastic enclosure
- Long life
- 1 Reed contact
- Actuation from front and from side
- Switching distance up to 33 mm depending on the actuating magnet
- With pre-wired cable

// RC 60 EXTREME



Technical data

Standards	EN 60947-5-1
Enclosure	Thermoplastic, Ultramid A3X2G5
Actuator	series M permanent magnet
Degree of protection	IP 67 to IEC/EN 60529
Contact material	Rhodium
Switching system	reed contacts
Switching elements	change-over contact
Connection	cable, Silicone SIHF, length 2 m
Cable cross-section	3 x 0.75 mm²
Switching voltage	max. 250 VAC/DC
Switching current	0.5 A
Switching capacity	max. 15 W
Switching frequency	max. 200 Hz
Ambient temperature	-40 °C ... +130 °C
Mechanical life	10⁷ operations
Electrical life	10⁷ operations
Repeatability	± 0.02 mm
Vibration resistance	10 g
Approvals	GL on request

Contact variants: switch travel/contacts

	bidirectional actuation	Material number
1 change-over	**RC 60 1W-2m -40°C...** 1 — 2 GY BN 4 BK	1187005 ✓

Type code **RC 60 1W-2m -40°C ... +130°C Extreme**

- Temperature-resistant from -40 °C to +130 °C
- Cable length 2 m
- 1 change-over
- Series
- Magnetic sensor

1 mounting nut is provided

Magnetic sensors
// Actuating magnets

Features/Options

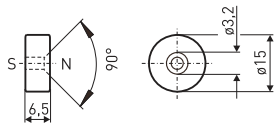
M 50 N U, M 100 N U, M 200 N U
- Not encapsulated
- Barium ferrite
- Ambient temperature: –40 °C ... +150 °C

M 100 S, M 100 N, M 200 S
- Thermoplastic enclosure polyamide 6.6, blue S or red N
- Barium ferrite
- Ambient temperature: –40 °C ... +80 °C

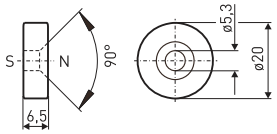
Not encapsulated	Material Number
M 50 N U	1033965
M 100 N U	1033966
M 200 N U	1033967

Encapsulated	Material Number
M 100 S	1042615
M 100 N	1042609
M 200 S	1042616

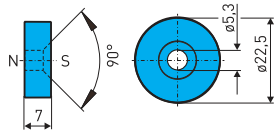
// Actuator M 50 N U



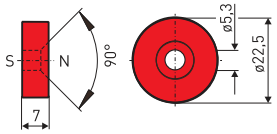
// Actuator M 100 N U



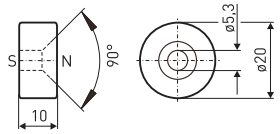
// Actuator M 100 S



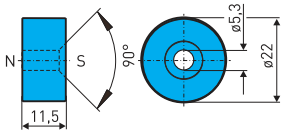
// Actuator M 100 N



// Actuator M 200 N U



// Actuator M 200 S



✓ in stock

Features/Options

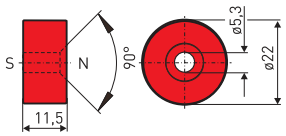
M 300 N U, M 400 N U
- Not encapsulated
- M 300 U: North pole with colour marking (red dot)
- Barium ferrite
- Ambient temperature: –40 °C ... +150 °C

M 200 N, M 300 S, M 300 N
- Thermoplastic enclosure polyamide 6.6, blue S or red N
- Barium ferrite
- Ambient temperature: –40 °C ... +80 °C

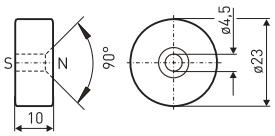
Not encapsulated	Material Number
M 300 N U	1033968
M 400 N U	1033970

Encapsulated	Material Number
M 200 N	1042610
M 300 N	1042617
M 300 S	1042618

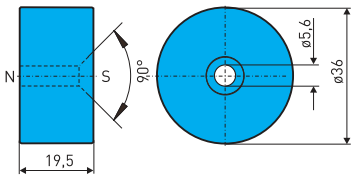
// Actuator M 200 N



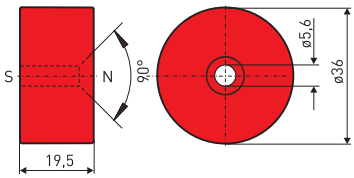
// Actuator M 300 N U



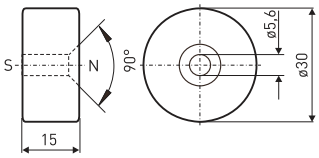
// Actuator M 300 S



// Actuator M 300 N



// Actuator M 400 N U



Magnetic sensors
// Actuating magnets

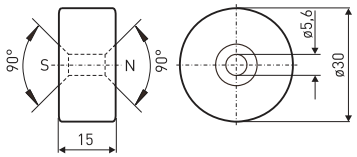
Features/Options
M 400 U B
- Not encapsulated
- Barium ferrite
- Ambient temperature: –40 °C ... +150 °C

M 700 N
- Thermoplastic enclosure polyamide 6.6, red N
- Barium ferrite
- Ambient temperature: –40 °C ... +80 °C

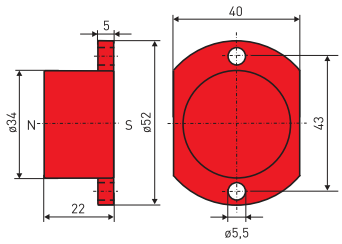
Features/Options
M 30 Niro
- Neodym-Magnet
- Stainless steel 1.4571
- Ambient temperature: -60°C ... +80 °C

Magnet	Material Number
M 400 U B	1033982
M 700 N	1042612
M 30 Niro	1189024

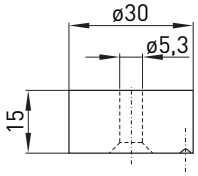
// Actuating magnet M 400 U B



// Actuator M 700 N



// Actuator M 30 Niro



✓ in stock

IP TEST: WATER JET

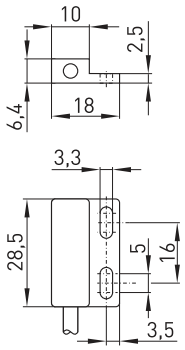
Magnetic sensors, rectangular design
// Series RC 4 Extreme

Features/Options
- Heat-resistant up to +130 °C
- Thermoplastic enclosure
- Long life
- 1 Reed contact
- Actuation from front and from side
- Switching distance up to 48 mm depending on the actuating magnet
- With pre-wired cable

// RC 4 EXTREME

Technical data

Standards	EN 60947-5-1
Enclosure	Thermoplastic
Actuator	series M permanent magnet
Degree of protection	IP 67 to IEC/EN 60529
Contact material	Rhodium
Switching system	reed contacts
Switching elements	1 NO contact
Connection	cable, Wigaflex SiHSi, length 5 or 10 m
Cable cross-section	2 x 0.34 mm²
Switching voltage	max. 230 VDC / 125 VAC
Switching current	max. 0.5 A
Switching capacity	max. 15 W
Switching frequency	max. 200 Hz
Ambient temperature	–10 °C ... +130 °C
Mechanical life	10⁷ operations
Electrical life	10⁷ operations
Repeatability	± 0.02 mm
Vibration resistance	20 g



Contact variants: switch travel/contacts

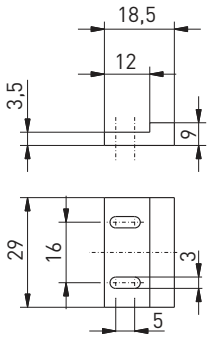
	bidirectional actuation	Material number
1 NO contact	RC 4 1S-5m +130°C ...	1323510 ✓
	RC 4 1S-10m +130°C ...	1356400

Type code RC 4 1S-5m +130°C Extreme

- Heat-resistant up to +130 °C
- Cable length 5 m (10 m)
- 1 NO contact
- Series
- Magnetic sensor

✓ in stock

// Actuating magnet M 40



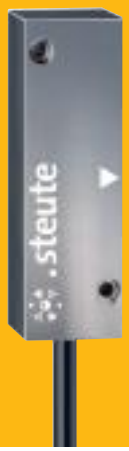
Features/Options
- Neodymium magnet
- Thermoplastic enclosure
- Temperature resistant from -20 °C up to +150 °C

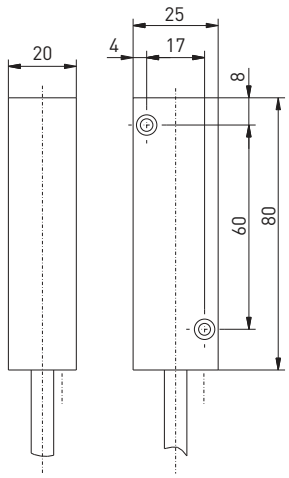
Magnet	Material Number
M 40	1033980

Magnetic sensors, rectangular design
// Series RC 2580 Extreme

Features/Options
- Cold-resistant down to -40 °C
- High degree of protection IP 68
- Stainless steel enclosure
- 1 Reed contact
- Actuation from side
- Switching distance up to 30 mm
- With pre-wired cable
- RC 2580-B: Variant with mounting thread M16 x 1.5 for cable protection system

// RC 2580 EXTREME





Technical data

Standards	EN 60947-5-1
Enclosure	stainless steel 1.4571
Actuator	Magnet M 2580, stainless steel 1.4571
Degree of protection	IP 68 to IEC/EN 60529
Contact material	Rhodium
Switching system	reed contacts
Switching elements	change-over contact
Connection	cable, 3 x AWG 20, length 2, 5, or 10 m
Cable cross-section	3 x 0.56 mm²
Switching voltage	250 VAC
Switching current	1 A
Switching capacity	max. 50 W
Utilisation category	AC-15, DC-13
Bounce duration	0.3 ... 0.6 ms
Ambient temperature	–40 °C ... +70 °C
Mechanical life	> 1 million operations
Electrical life	10^6 ... 10^9 operations
Vibration resistance	10 ... 50 g
Approvals	GL on request

Contact variants: switch travel/contacts

	actuation from side
1 change-over	RC 2580 1W 1 — 2 RD BN — 4 BK

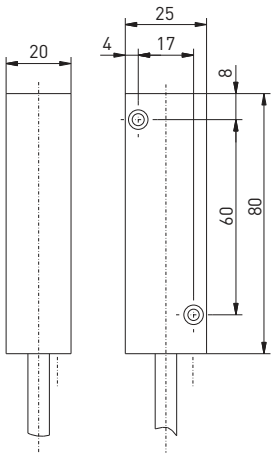
Type code

RC 2580 1W-B-2m -40°C IP68 Niro Extreme

- RC 2580 Series Magnetic sensor
- 1W 1 change-over contact
- B Tapped bushing M16 x 1.5
- 2m Cable length 2 m (5 m)
- -40°C Cold-resistant down to -40 °C
- IP68 High degree of protection IP 68
- Niro Extreme Stainless steel enclosure

✓ in stock

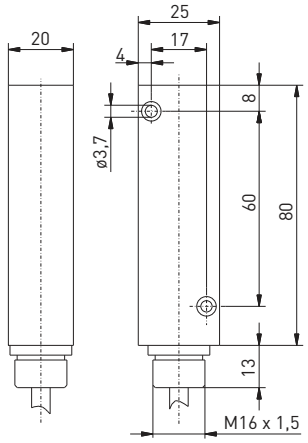
// RC 2580-Niro Extreme



Features/Options
- Actuator M 2580 must be ordered separately, not provided in delivery of sensor

Magnet	Material Number
RC 2580 1W-2m -40°C IP68 Niro Extreme	1190115
RC 2580 1W-5m -40°C IP68 Niro Extreme	✓ 1190116
RC 2580 1W-10m -40°C IP68 Niro Extreme	on request

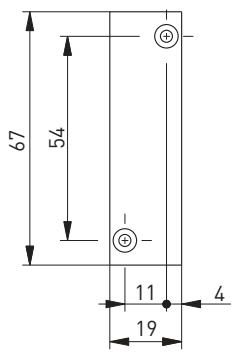
// RC 2580-B-Niro Extreme



Features/Options
- RC 2580-B, variant with tapped bushing M16 x 1.5
- Actuator M 2580 must be ordered separately, not provided in delivery of sensor

Magnet	Material Number
RC 2580 1W-B-2m -40°C IP68 Niro Extreme	1190145
RC 2580 1W-B-5m -40°C IP68 Niro Extreme	✓ 1190146
RC 2580 1W-B-10m -40°C IP68 Niro Extreme	on request

// Actuating magnet M 2580-Niro Extreme



Features/Options
- Actuator M 2580 must be ordered separately, not provided in delivery of sensor

Magnet	Material Number
M 2580-Niro Extreme	1189177

Inductive sensors

Range of application

Inductive sensors are suitable for the positioning and controlling of machines and systems in many areas of industrial applications.

They are generally used as an alternative to mechanically operated limit switches in cases where unfavourable operating conditions, such as high or low actuating speeds, large switching frequencies, extreme dirt or dust production, high humidity, chemical atmospheres, highly fluctuating actuating distances, etc., occur. Even in the pre-sence of aggressive materials, safe switching is ensured through encapsulation of the contacts.

Design and mode of operation

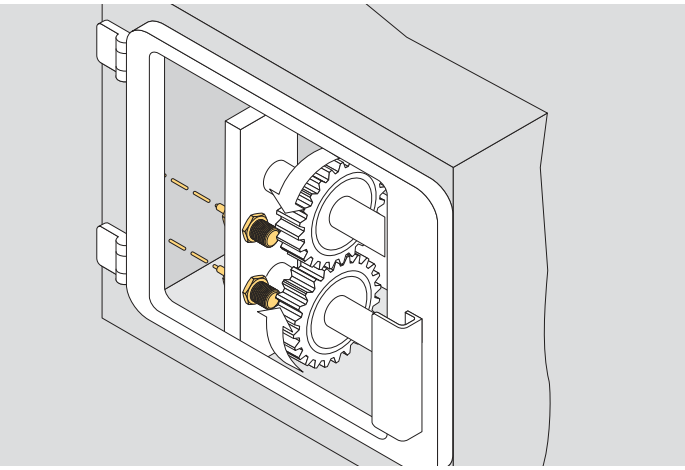
The inductive sensors change their current consumption or their internal resistance with the approach of metal to the sensor surface.

The degree of protection IP 68 even permits safe application under rough ambient conditions.

All inductive sensors shown in this chapter bear the CE mark according to the EMC Directive 2004/108/EC.

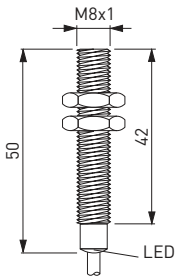
Application

Inductive sensors for standstill monitoring



Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +120 °C
- High degree of protection IP 68
- Stainless steel enclosure
- Flush mounting
- Long life, no mechanical wear
- Suitable for the food processing industry
- Insensitive to soiling
- With LED
- Enclosure diameter M8 x 1

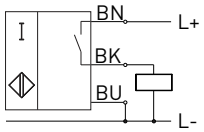
// IS M8 EXTREME



Technical data

Standards	EN 60947-5-2
Enclosure	Stainless steel A1, 1.4305
Front cap	Hostaform C13021
Back cap	Epoxy resin
Connection	cable, PUR (Ø max. 3.25 mm), length 2 m
Cable cross-section	3 x 0.14 mm²
Degree of protection	IP 68 to IEC/EN 60529
Switching elements	1 NO contact, PNP, 3-wire
Switching distance s_n	2 mm
Correction factors	steel (Fe 360): 1, stainless steel: approx. 0.7, brass: approx. 0.5, copper: approx. 0.4, aluminium: approx. 0.4
Rated operating voltage range U_B	6 ... 30 VDC
Residual ripple	≤ 10 %
Switching current	200 mA
Voltage drop	< 1.8 V
Current absorption at 24 VDC	< 12 mA
Hysteresis	< 10 %
Switching frequency	2000 Hz
Repeatability	≤ 3 %
Protection circuit	Inductive interference protection, protection against polarity reversal, short-circuit and overload proof
Ambient temperature	-40 °C ... +50 °C; 0°C ... +120°C

Contact variants: switch travel/contacts

	3-wire
1 NO contact	**Ex IS M8 b ...** 

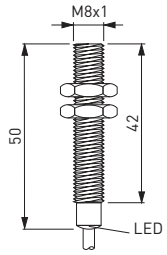
Type code

IS M8 b 2 B B B C B PNP NO 2m Extreme

- Cable length 2 m
- NO function
- PNP output
- PUR cable (A PVC cable)
- 3 wire DC (A 2 wire)
- stainless steel enclosure (A brass, nickeled)
- degree of protection IP68 (A IP 67, C IP 69K)
- ambient temperature -40 ... +50 °C (C 0 ... +120 °C)
- 2 mm switching distance
- b flush
- Enclosure diameter M8
- Inductive sensor

✓ in stock

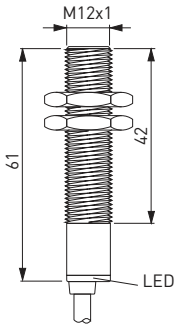
// IS M8 B EXTREME



Inductive sensor	Material Number
IS M8b 2BBBCB PNP NO 2m Extreme	✓ 1202087
IS M8b 2CBBCB PNP NO 2m Extreme	✓ 1202090

Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +120 °C
- High degree of protection IP 68
- Stainless steel enclosure
- Flush mounting
- Long life, no mechanical wear
- Suitable for the food processing industry
- Insensitive to soiling
- With LED
- Enclosure diameter M12 x 1

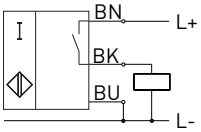
// IS M12 EXTREME



Technical data

Standards	EN 60947-5-2
Enclosure	Stainless steel A1, 1.4305
Front cap	Kepital F25 POM
Back cap	Lexan 923/A
Connection	cable, PUR (Ø max. 4.1 mm), length 2 m
Cable cross-section	3 x 0.25 mm²
Degree of protection	IP 68 to IEC/EN 60529
Switching elements	1 NO contact, PNP, 3-wire
Switching distance s_n	2 or 4 mm
Correction factors	steel (Fe 360): 1, stainless steel: approx. 0.7, brass: approx. 0.5, copper: approx. 0.4, aluminium: approx. 0.4
Rated operating voltage range U_B	10 ... 30 VDC
Residual ripple	≤ 10 %
Switching current	200 mA
Voltage drop	< 1.8 V
Current absorption at 24 VDC	< 15 mA
Hysteresis	< 10 %
Switching frequency	1000 Hz
Repeatability	≤ 3 %
Protection circuit	Inductive interference protection, protection against polarity reversal, short-circuit and overload proof
Ambient temperature	-40 °C ... +50 °C; 0°C ... +120°C

Contact variants: switch travel/contacts

	3-wire
1 NO contact	**Ex IS M12 b ...** 

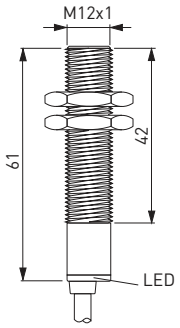
Type code

IS M12 b 2 B B B C B PNP NO 2m Extreme

- Cable length 2 m
- NO function
- PNP output
- PUR cable (A PVC cable)
- 3 wire DC (A 2 wire)
- stainless steel enclosure (A brass, nickeled)
- degree of protection IP68 (A IP 67, C IP 69K)
- ambient temperature -40 ... +50 °C (C 0 ... +120 °C)
- 2 mm switching distance
- b flush
- Enclosure diameter M12
- Inductive sensor

✓ in stock

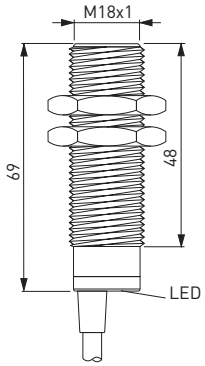
// IS M12 B EXTREME



Inductive sensor	Material Number
IS M12b 2BBBCB PNP NO 2m Extreme	✓ 1202138
IS M12b 2CBBCB PNP NO 2m Extreme	✓ 1202142
IS M12b 4BBBCB PNP NO 2m Extreme	✓ 1202147
IS M12b 4CBBCB PNP NO 2m Extreme	✓ 1202157

Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +120 °C
- High degree of protection IP 68
- Stainless steel enclosure
- Flush mounting
- Long life, no mechanical wear
- Suitable for the food processing industry
- Insensitive to soiling
- With LED
- Enclosure diameter M18 x 1

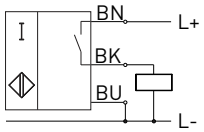
// IS M18 EXTREME



Technical data

Standards	EN 60947-5-2
Enclosure	Stainless steel A1, 1.4305
Front cap	Kepital F25 POM
Back cap	Lexan 923/A
Connection	cable, PUR (Ø max. 4.1 mm), length 2 m
Cable cross-section	3 x 0.25 mm²
Degree of protection	IP 68 to IEC/EN 60529
Switching elements	1 NO contact, PNP, 3-wire
Switching distance s_n	5 or 8 mm
Correction factors	steel (Fe 360): 1, stainless steel: approx. 0.7, brass: approx. 0.5, copper: approx. 0.4, aluminium: approx. 0.4
Rated operating voltage range U_B	10 ... 30 VDC
Residual ripple	≤ 10 %
Switching current	200 mA
Voltage drop	< 1.8 V
Current absorption at 24 VDC	< 15 mA
Hysteresis	< 10 %
Switching frequency	1000 Hz or 400 Hz
Repeatability	≤ 3 %
Protection circuit	Inductive interference protection, protection against polarity reversal, short-circuit and overload proof
Ambient temperature	-40 °C ... +50 °C; 0°C ... +120°C

Contact variants: switch travel/contacts

	3-wire
1 NO contact	**Ex IS M18 b ...** 

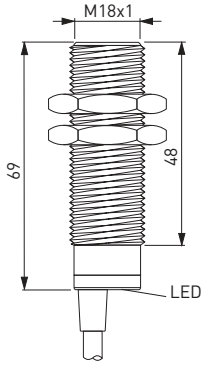
Type code

	IS	M18	b	5	B	B	B	C	B	PNP	NO	2m	Extreme

- Extreme
- 2m: Cable length 2 m
- NO: NO function
- PNP: PNP output
- B: PUR cable (A PVC cable)
- B: 3 wire DC (A 2 wire)
- B: stainless steel enclosure (A brass, nickeled)
- B: degree of protection IP68 (A IP 67, C IP 69K)
- C: ambient temperature -40 ... +50 °C (C 0 ... +120 °C)
- 5: 5 mm switching distance
- b: b flush
- M18: Enclosure diameter M12
- IS: Inductive sensor

✓ in stock

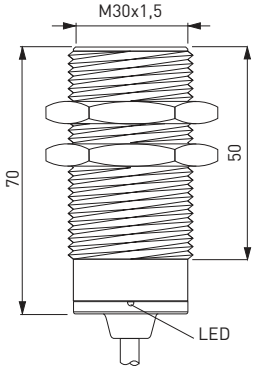
// IS M18 B EXTREME



Inductive sensor	Material Number
IS M18b 5BBBCB PNP NO 2m Extreme	✓ 1202185
IS M18b 5CBBCB PNP NO 2m Extreme	✓ 1202187
IS M18b 8BBBCB PNP NO 2m Extreme	✓ 1202189
IS M18b 8CBBCB PNP NO 2m Extreme	✓ 1202191

Features/Options
- Cold-resistant down to -40 °C or heat-resistant up to +120 °C
- High degree of protection IP 68
- Stainless steel enclosure
- Flush mounting
- Long life, no mechanical wear
- Suitable for the food processing industry
- Insensitive to soiling
- With LED
- Enclosure diameter M30 x 1.5

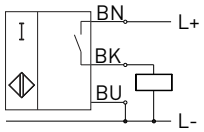
// IS M30 EXTREME



Technical data

Standards	EN 60947-5-2
Enclosure	Stainless steel A1, 1.4305
Front cap	Lexan 923/A
Back cap	Lexan 923/A
Connection	cable, PUR (Ø max. 4,6 mm), length 2 m
Cable cross-section	3 x 0.35 mm²
Degree of protection	IP 68 to IEC/EN 60529
Switching elements	1 NO contact, PNP, 3-wire
Switching distance s_n	10 mm
Correction factors	steel (Fe 360): 1, stainless steel: approx. 0.7, brass: approx. 0.5, copper: approx. 0.4, aluminium: approx. 0.4
Rated operating voltage range U_B	10 ... 30 VDC
Residual ripple	≤ 10 %
Switching current	200 mA
Voltage drop	< 1.8 V
Current absorption at 24 VDC	< 15 mA
Hysteresis	< 10 %
Switching frequency	300 Hz
Repeatability	≤ 3 %
Protection circuit	Inductive interference protection, protection against polarity reversal, short-circuit and overload proof
Ambient temperature	-40 °C ... +50 °C; 0°C ... +120°C

Contact variants: switch travel/contacts

	3-wire
1 NO contact	**Ex IS M30 b ...** 

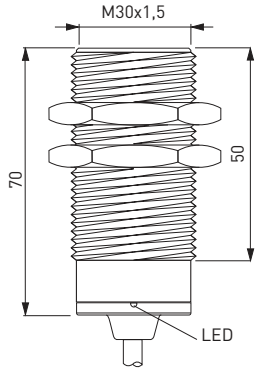
Type code

IS M30 b 10 B B B C B PNP NO 2m Extreme

- Cable length 2 m
- NO function
- PNP output
- PUR cable (A PVC cable)
- 3 wire DC (A 2 wire)
- stainless steel enclosure (A brass, nickeled)
- degree of protection IP68 (A IP 67, C IP 69K)
- ambient temperature -40 ... +50 °C (C 0 ... +120 °C)
- 10 mm switching distance
- b flush
- Enclosure diameter M12
- Inductive sensor

✓ in stock

// IS M30 B EXTREME

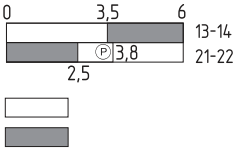


Inductive sensor	Material Number
IS M30b 10BBBCB PNP NO 2m Extreme	✓ 1202198
IS M30b 10CBBCB PNP NO 2m Extreme	✓ 1202200

PRODUCTION PROCESS
MOULDING OF SENSORS

LEGEND

	A/F
	Double insulated
	Positive break NC contact
	Positive break travel/angle
	Latching point
	Wire breakage detection
	Wire pull detection
	Actuated
	Not actuated
	Type examination-tested
	Approval for Russia
	CSA/UL approval, Canada
	Directive-compliance, see Declaration of Conformity
I_e	Rated operating current
I_{the}	Thermal test current
U_e	Rated operating voltage
U_i	Rated insulation voltage
U_{imp}	Rated impulse withstand voltage
s_{ao}	Assured operation distance
s_{ar}	Assured release distance
s_n	Nominal distance



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Fotostudio Udo Kowalski, Wuppertal
www.fotodesignkowalski.com
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