

## Automation

Emergency pull-wire, Belt-alignment,  
Slack-wire switches



// SYSTEMATIC CONTROL SWITCHGEAR

Catalogue





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# // SAFE SWITCHGEAR FOR DEMANDING AND CRITICAL APPLICATIONS

## Wireless



## Automation



## Extreme



## Meditec



»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, GOST).

### 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



## Emergency pull-wire switches

// Selection table Emergency pull-wire switches

from page 12

// Pre-stress and travel limitation

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One-side actuation

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Two-side actuation

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// Series ZS 75 S

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// Series ZS 91 S

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# 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 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.

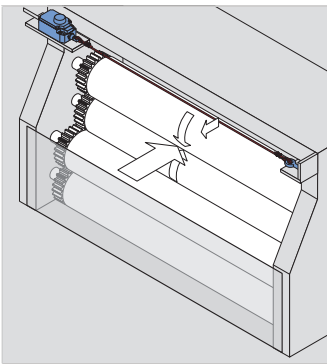
Emergency pull-wire switches without mechanical latching VD or VS do not conform to the EN ISO 13850. It is possible to meet the requirements of this standard by suitable measurement of the circuitry and control technology.

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.

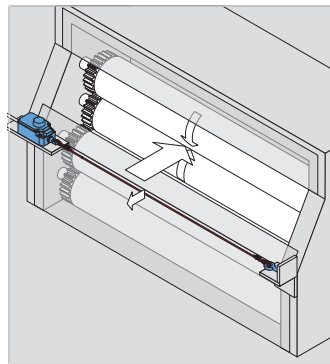
All emergency pull-wire switches bear the CE mark according to the Machinery Directive 2006/42/EC.

## Application

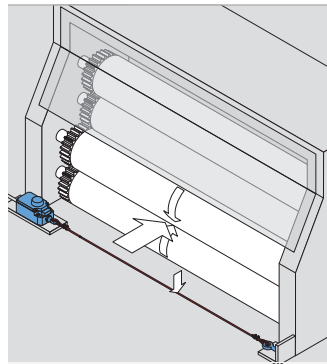
Mounting at head level



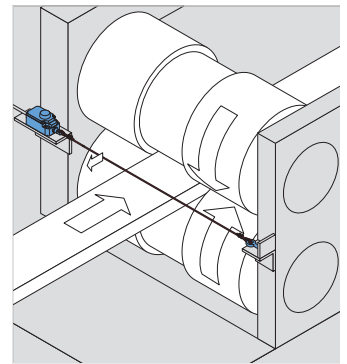
Mounting at hand level



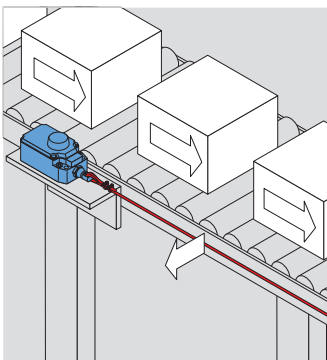
Mounting at foot level



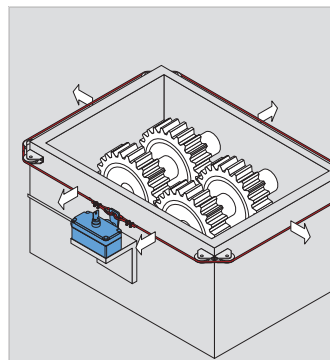
Mounting at hazardous inrunning nips



Mounting at conveyor-belts



Complete fencing





# Emergency pull-wire switches

## // Technical information

### 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. 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  $F = 200\text{ N}$  and of the actuating travel  $s = 400\text{ mm}$  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.

### Maximum pull-wire length

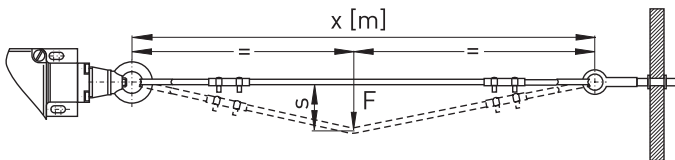
The maximum pull-wire length is mainly limited by two basic conditions. On the one hand by the maximum admissible actuating travel  $s$  of 400 mm and on the other hand by the thermal change in length of the pull-wire with a fluctuating ambient temperature that may not lead to an undesired actuation 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

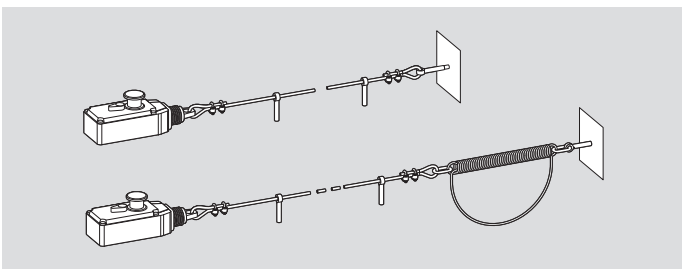
Compensation springs are applied to compensate thermal changes in lengths of the pull-wire and therefore allow for higher pull-wire lengths. In general the following is valid:

- 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  $s = 400\text{ mm}$ . 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

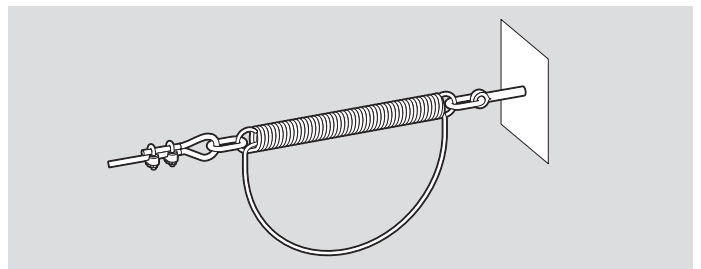
### Interrelation of actuating travel / distance wire support



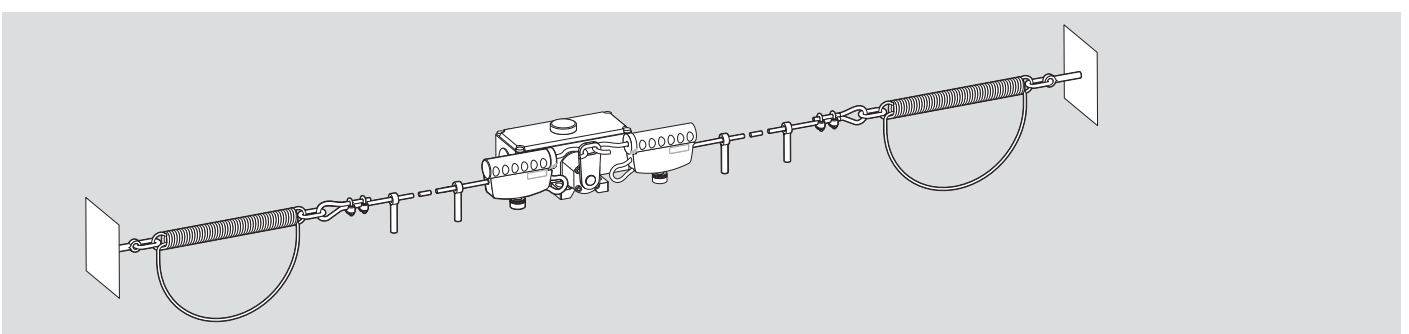
### Mounting of one-side actuation



### Compensation spring with travel limitation



### Mounting of two-side actuation

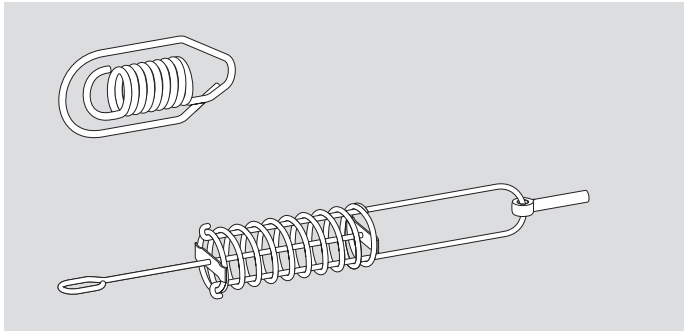




# Emergency pull-wire switches

## // Technical information

### Examples of other compensation springs variants

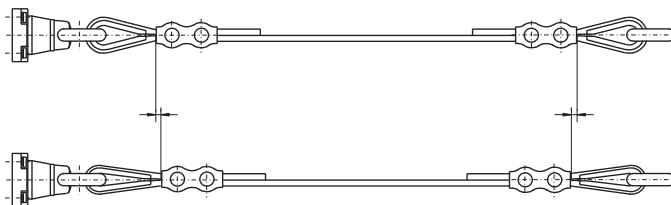


spring rate of the rest spring), the pull-wire length (length and elasticity of the pull-wire) and the maximum actuating travel of  $s = 400$  mm.

- With two-side actuation a travel limitation must be installed, see drawing left page, in order to prevent overstressing of the tension spring
- Before mounting the pull-wire, the red PVC sheath must be removed from 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 behaviour 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



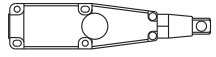
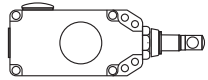
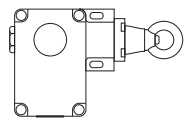
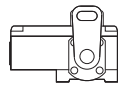
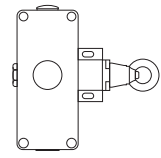
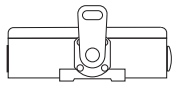
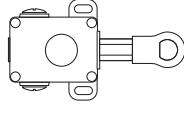
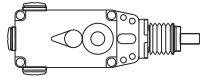
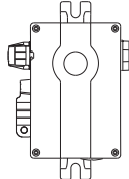
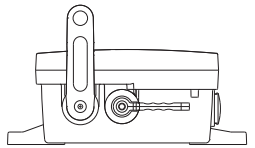
- After fitting the wire, pull strongly on it several times, as the pull-wire and the wire thimble will deform.
- Subsequently, retense the wire using the wire clamp, eye-bolt or tensioner.
- In order to guarantee safe operation, observe the enclosed mounting and wiring instructions.
- According to EN 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 70, on page 14 - Thermoplastic enclosure - One-side actuation - 2 contacts		10 m	-	
ZS 71, on page 16 - Metal enclosure - One-side actuation - 3 contacts		35 m	-	
ZS 73, on page 20 and 34 - Metal enclosure - One-side actuation: ZS 73 - two-side actuation: ZS 73 S - 2 contacts		130 m	2 x 100 m	
ZS 75, on page 24 and 38 - Metal enclosure - One-side actuation: ZS 75 - Two-side actuation: ZS 75 S - 4 contacts		130 m	2 x 100 m	
ZS 441, on page 28 - Metal enclosure - One-side actuation - 2 contacts		60 m	-	
ZS 80, on page 32 - Metal enclosure - One-side actuation - 4 contacts		100 m	-	
ZS 91 S, on page 42 - Thermoplastic enclosure - Two-side actuation - 6 contacts		-	2 x 100 m	

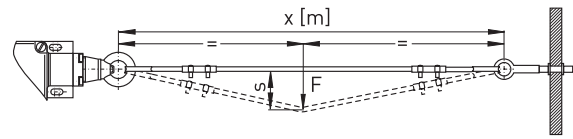
# Emergency pull-wire switches

## // 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 70	2,5	50	7	10	<10	-
ZS 71	3	100	7	12	10	
ZS 73	5	120-180	13	19-25	50-130	/120-180N
ZS 73 S	5	295-390	13	38-60	50-130	/295-390N
	4	-	13	51-85	2 x 30-65	-
ZS 75	5	120-180	13	19-25	50-130	/120-180N
ZS 75 S	5	295-390	13	38-60	50-130	/295-390N
	4	-	13	51-85	2 x 30-65	-
ZS 441	5	150	10	14	5-15	/150N
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 70

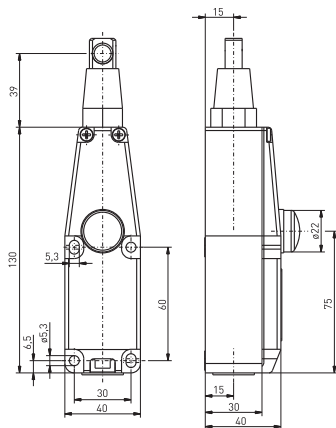
### Features/Options

- Thermoplastic enclosure
- 2 contacts
- Mounting details to EN 50 041
- Small design
- Wire length up to 10 m
- Push button release
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection

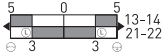

### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid
<b>Cover</b>	glassfibre reinforced, shock-proof thermoplastic, ultramid
<b>Degree of protection</b>	IP 67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	1 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Max. wire length</b>	10 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	

// ZS 70



### Contact variants: switch travel/contacts

	Snap action	Material Number
1 NC/1 NO contact	ZS 70 1Ö/1S VD 	1178365
2 NC contacts	ZS 70 2Ö VD 	1178380

### Ordering details

ZS 70 1Ö/1S VD

VD push button release  
 1 NC/1 NO contact (2Ö)  
 Series  
 Emergency pull-wire switch

At 2.5 m distance intermediate wire supports are required. One wire thimble is provided. Details related to pre-stress and actuating forces are indicated on page 13.

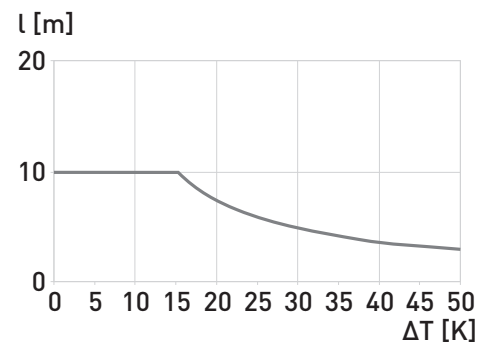
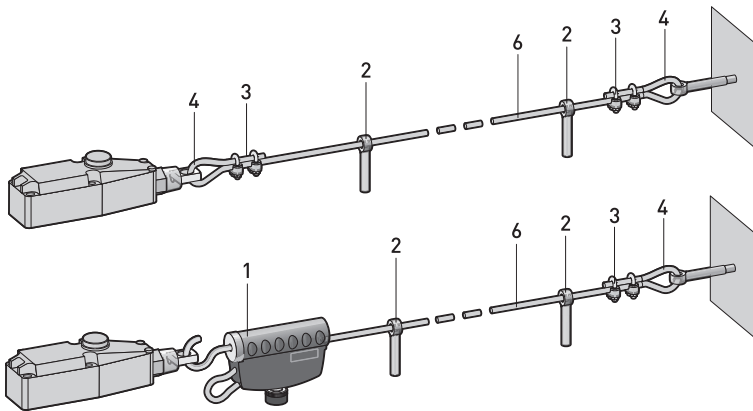
# Emergency pull-wire switches, one-side actuation

## // Series ZS 70, 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
6 Pull-wire per metre	1032984

### // Mounting without compensation spring



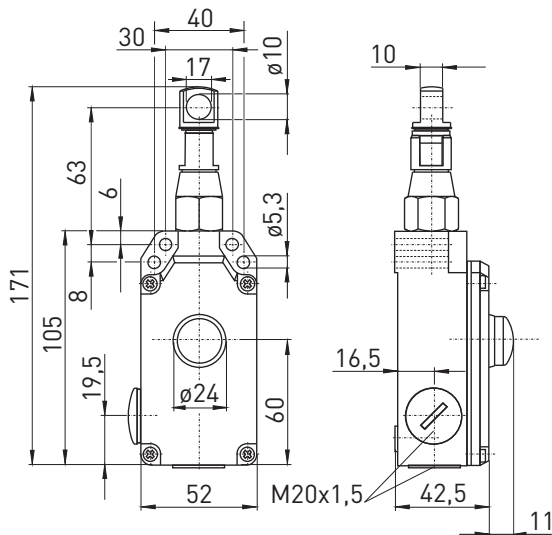
# Emergency pull-wire switches, one-side actuation

## // Series ZS 71

### Features/Options

- Metal enclosure
- 3 contacts
- Small design
- Wire length up to 35 m
- Release by push button or key possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection
- Ex version available
- IP 69K version available, see [www.steute.com](http://www.steute.com) section »Extreme«

## // ZS 71



## Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid
<b>Degree of protection</b>	ZS 71 VD, ZS 71 WVD and ZS 71 NA: IP 67; ZS 71 VS and ZS 71 WVS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	2 NC/1 NO contacts with double break
<b>Switching system</b>	snap action, positive break NC contacts ⊕
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	2 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	2 A/250 VAC
<b>Max. fuse rating</b>	2 A gG/gN-fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	35 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	

### Contact variants: switch travel/contacts

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

### Ordering details

ZS 71 2Ö/1S WVD-A/100 N-G	Indicator lamp (app.)
	100 N pre-stress force
	A position indicator (NA emergency-stop button)
	VD push button release (VS key release on request)
	W watertight collar
	2 NC/1 NO contact
	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 are indicated on page 13.



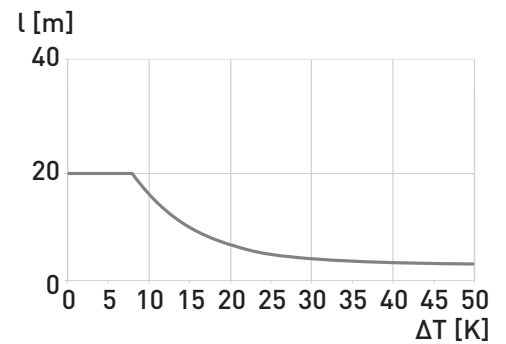
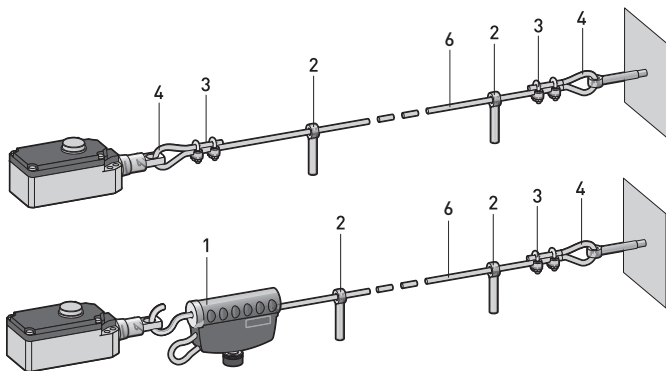
# Emergency pull-wire switches, one-side actuation

## // Series ZS 71, mounting

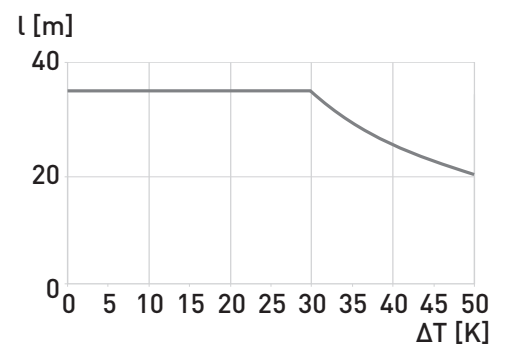
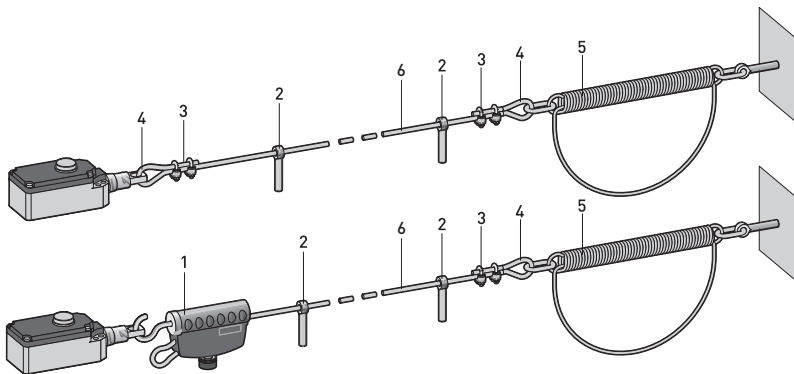
### Legend

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 Compensation spring ZS 71-100N	1187921
6 Pull-wire per metre	1032984

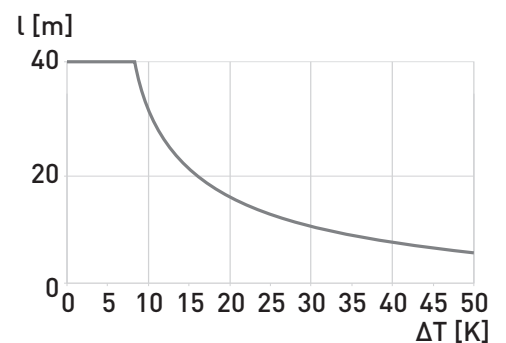
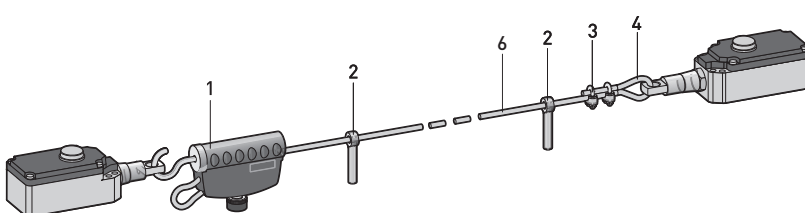
### // Mounting without compensation spring



### // Mounting with compensation spring



### // Mounting with 2 emergency pull-wire switches



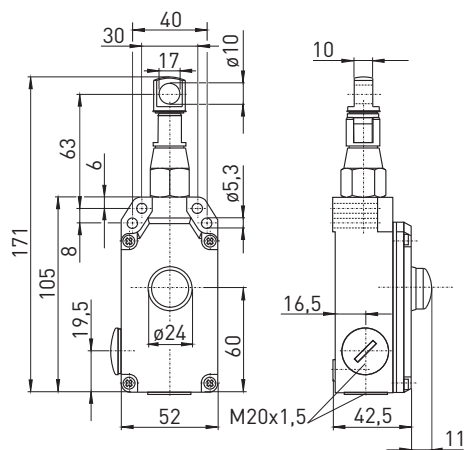
# Emergency pull-wire switches, one-side actuation

## // Series ZS 71, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry

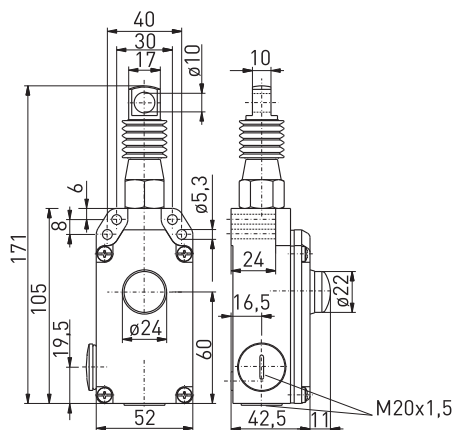
### // Push-button release VD



Push-button release  
ZS 71 20/1S VD/100 N

Material Number  
1185002

### // Watertight collar W



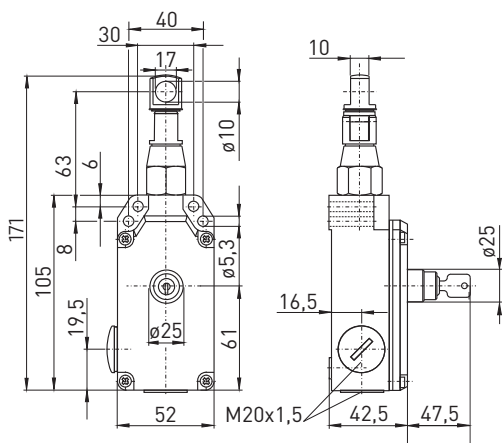
### Features/Options

- Watertight collar for protection against penetration of dirt

Watertight collar/Push-button release  
ZS 71 20/1S WVD/100 N

Material Number  
1185001

### // Key release VS



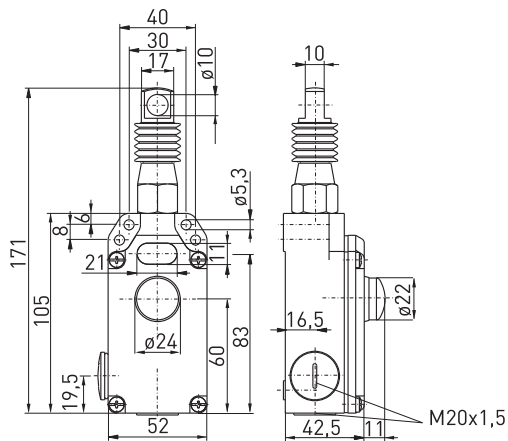
Key release  
ZS 71 20/1S VS/100 N

Material Number  
1188704

Key release/Watertight collar  
ZS 71 20/1S WVS/100 N

Material Number  
1188725

## // Position indicator A



Position indicator/Push-button release  
ZS 71 20/1S VD-A/100 N

Material Number  
1187956

Position indicator/Push-button release/Collar  
ZS 71 20/1S WVD-A/100 N

Material Number  
1182987

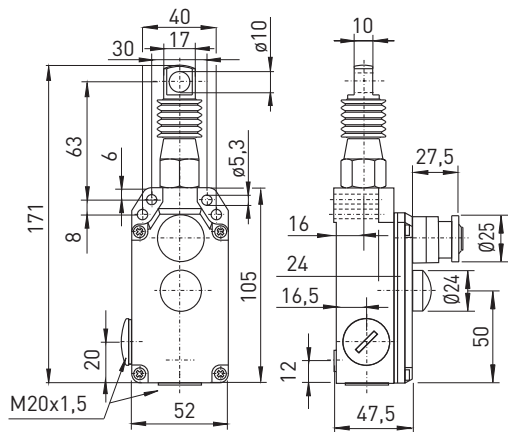
Position indicator/Key release  
ZS 71 20/1S VS-A / 100 N

Material Number  
1188726

Position indicator/Key release/Collar  
ZS 71 20/1S WVS-A/100 N

Material Number  
1188727

## // Emergency-stop push-button NA



### Features/Options

- Position indicator A not available for variant ZS 71 NA
- Version with emergency-stop push button for direct and fast actuation at the switch

Emergency-stop push-button  
ZS 71 20/1S VD-NA/100 N  
ZS 71 20/1S WVD-NA/100 N

Material Number  
1188740  
1188741

# Emergency pull-wire switches, one-side actuation

## // Series ZS 73

### Features/Options

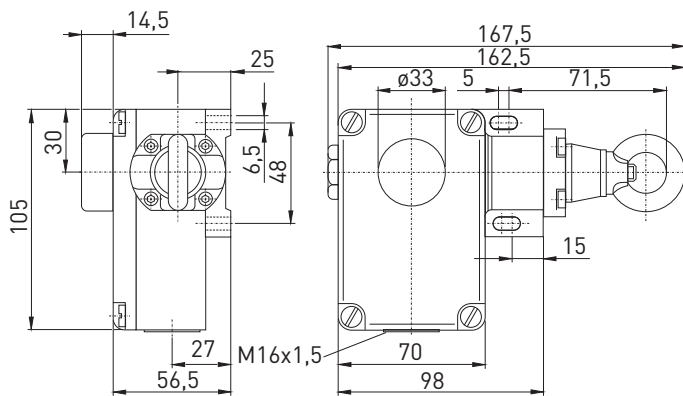
- Metal enclosure
- 2 contacts
- Wire length up to 130 m
- 2 various spring force variants (actuating forces)
- Available without unlocking mechanism (per EN 60947-5-1)
- Release by push button or key possible
- Wire pull and breakage detection
- Ex version available

## // ZS 73



### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish; ZS 73 NIRO: aluminium die-cast, hard-coated and enamelled
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid
<b>Degree of protection</b>	ZS 73 WVD: IP 65; ZS 73 VD, ZS 73 VS and ZS 73 WVS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	1 x M16 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	130 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	



### Contact variants: switch travel/contacts

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

### Ordering details

ZS 73	1Ö/1S	WVD-NIRO	/120-180	N-G	Indicator lamp (app.)
					120-180 N pre-stress force (295-390 N)
					NIRO pull-wire unit
					VD push button release (VS key release)
					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 are indicated on page 13.

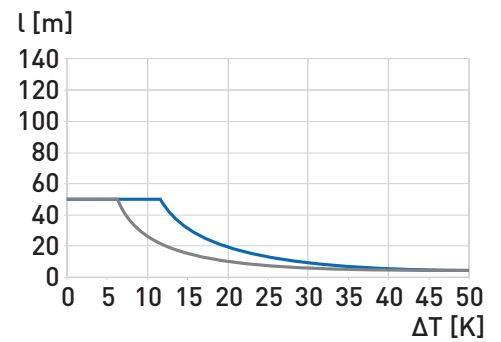
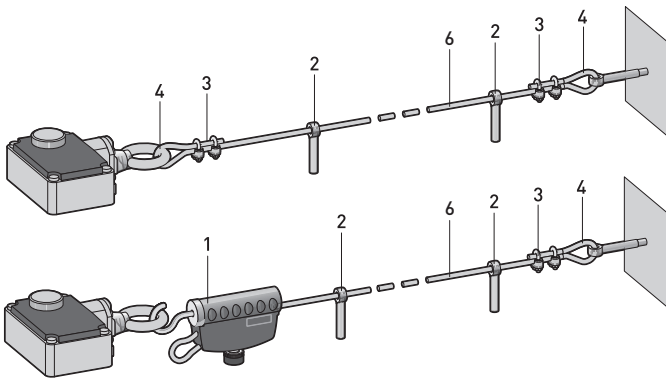
# Emergency pull-wire switches, one-side actuation

## // Series ZS 73, mounting

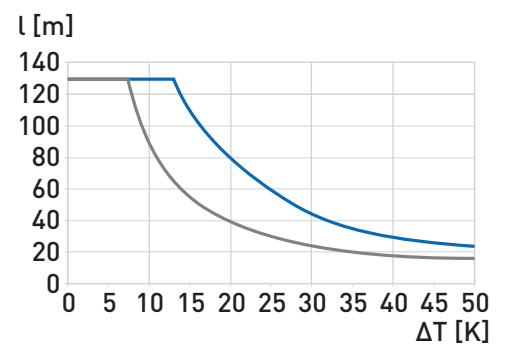
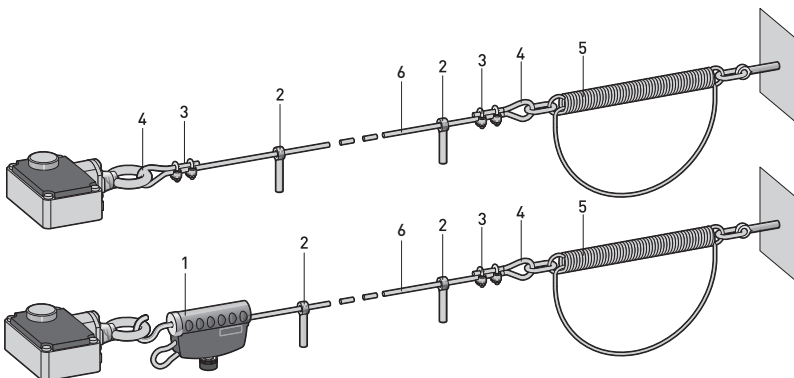
### Legend

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 Compensation spring ZS 73/75-200N for spring force variant 120-180N	1187931
Compensation spring ZS 73/75-400N for spring force variant 295-390N	1187934
6 Pull-wire per metre	1032984

### // Mounting without compensation spring



### // Mounting with compensation spring



Temperature difference/ Wire length

### Legend

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

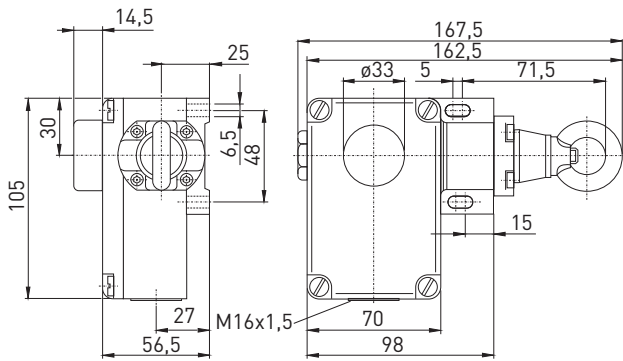
# Emergency pull-wire switches, one-side actuation

## // Series ZS 73, variants

### Features/Options

- Indicator lamp possible on request
- With 2 cable entries available on request

### // Push-button release VD



### Push-button release

ZS 73 10/1S VD/120-180 N  
ZS 73 10/1S VD/295-390 N

### Material Number

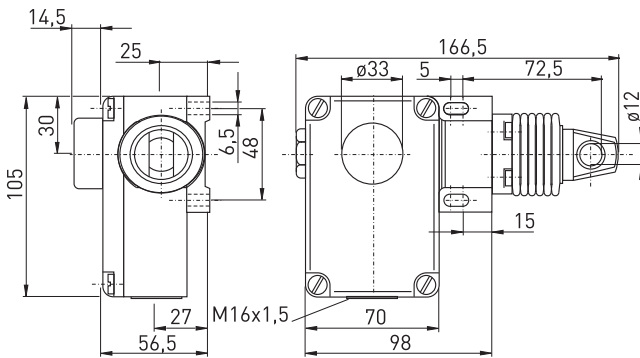
1048218  
1048208

ZS 73 20 VD/120-180 N  
ZS 73 20 VD/295-390 N

1163665  
1048242

22

### // Watertight collar W



### Features/Options

- Watertight collar for protection against penetration of dirt

### Watertight collar/Push-button release

ZS 73 10/1S WVD/120-180 N  
ZS 73 10/1S WVD/295-390 N

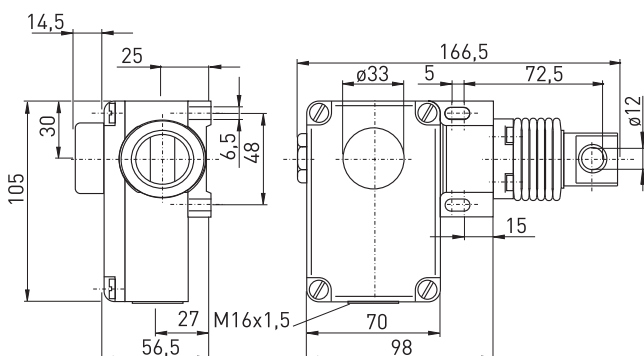
### Material Number

1048233  
1048225

ZS 73 20 WVD/120-180 N  
ZS 73 20 WVD/295-390 N

1048258  
1048249

### // 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

ZS 73 10/1S WVD/120-180 N Niro  
ZS 73 10/1S WVD/295-390 N Niro

### Material Number

1048231  
1048228

ZS 73 20 WVD/295-390 N Niro

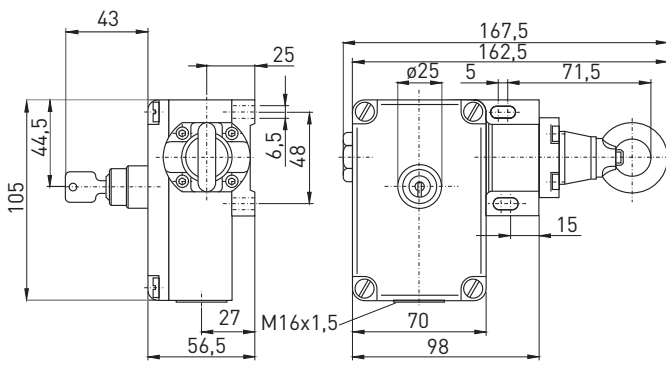
1053932



## // Key release VS

Key release  
ZS 73 10/1S VS/295-390 N  
ZS 73 20 VS/295-390 N

Material Number  
1048209  
1052621



# Emergency pull-wire switches, one-side actuation

## // Series ZS 75

### Features/Options

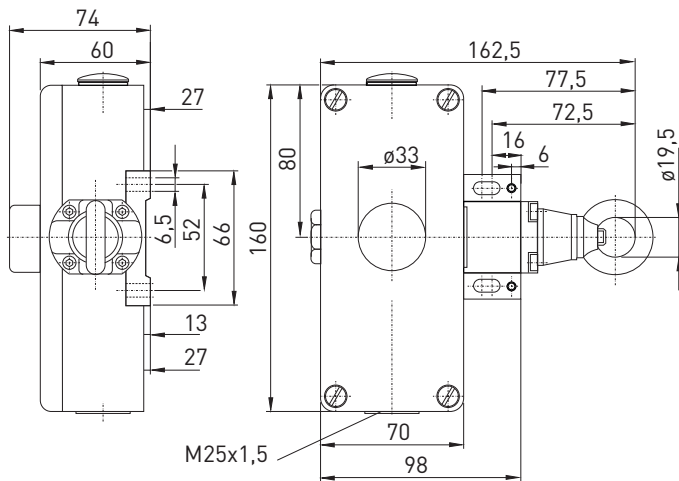
- Metal enclosure
- 2 or 4 contacts
- Wire length up to 130 m
- 2 various spring force variants (actuating forces)
- Release by push button or key possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection
- Version with Dupline or Dupline Safe available on request
- Ex version available

## // ZS 75



### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	aluminium die-cast, enamel finish
<b>Degree of protection</b>	ZS 75 WVD: IP 65; ZS 75 VD, ZS 75 VS and ZS 75 WVS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC/2 NO or 4 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊕
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M25 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	130 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	



### Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	<b>ZS 75 1Ö/1S</b> 
2 NC/2 NO contacts	<b>ZS 75 2Ö/2S</b> 
4 NC contacts	<b>ZS 75 4Ö</b> 

### Ordering details

**ZS 75 1Ö/1S WVD/120-180 N-G-DP**

- Dupline (DPS Dupline Safe)
- Indicator lamp, accessories (app.)
- 120-180 N pre-stress force (295-390 N)
- VD push button release (VS key release)
- 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 are indicated on page 13.

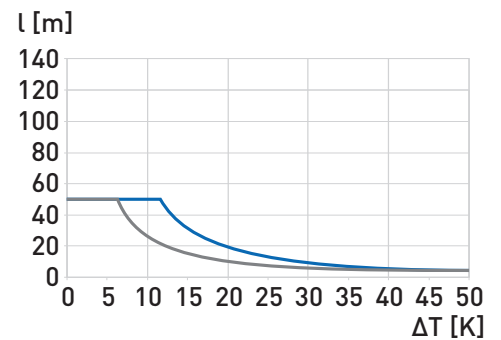
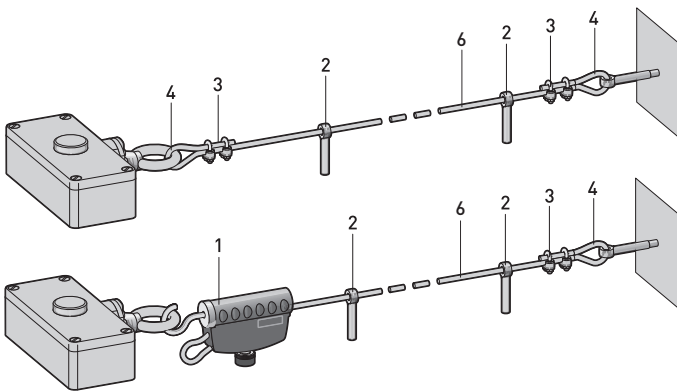
# Emergency pull-wire switches, one-side actuation

## // Series ZS 75, mounting

### Legend

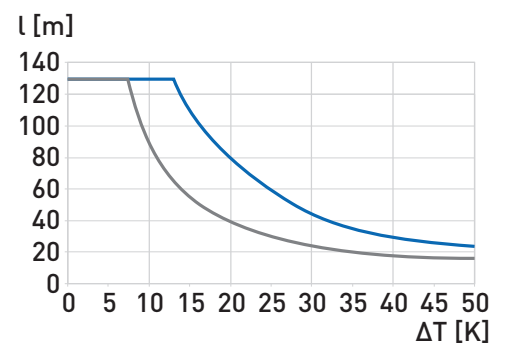
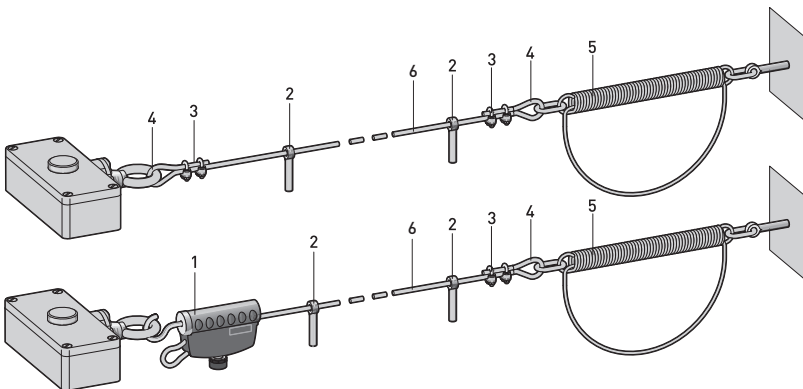
1 Cable tensioner system TS 65	1186621
2 Eye bolt M8 x 70 with nut	1170601
3 Wire clamp	1033247
4 Wire thimble	1033245
5 Compensation spring ZS 73/75-200N for spring force variant 120-180N	1187931
Compensation spring ZS 73/75-400N for spring force variant 295-390N	1187934
6 Pull-wire per metre	1032984

### // Mounting without compensation spring



25

### // Mounting with compensation spring



Temperature difference/ Wire length

### Legend

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

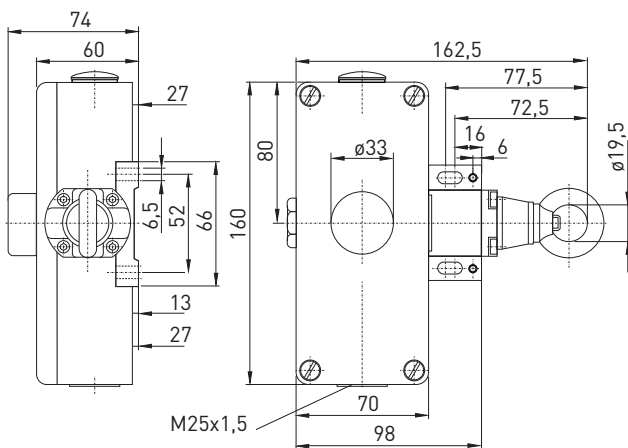
# Emergency pull-wire switches, one-side actuation

## // Series ZS 75, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix

### // Push-button release VD



#### Push-button release

ZS 75 1Ö/1S VD/120-180 N

ZS 75 1Ö/1S VD/295-390 N

ZS 75 2Ö/2S VD/120-180 N

ZS 75 2Ö/2S VD/295-390 N

ZS 75 4Ö VD/120-180 N

ZS 75 4Ö VD/295-390 N

#### Material Number

1048348

1048345

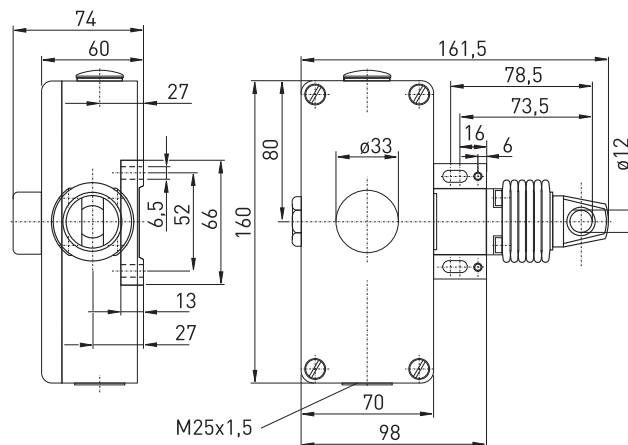
1048416

1048414

1178721

1052558

### // Watertight collar W



#### Features/Options

- Watertight collar for protection against penetration of dirt

#### Watertight collar/Push-button release

ZS 75 1Ö/1SWVD/120-180 N

ZS 75 1Ö/1S WVD/295-390 N

ZS 75 2Ö/2S WVD/120-180 N

ZS 75 2Ö/2S WVD/295-390 N

ZS 75 4Ö WVD/120-180 N

ZS 75 4Ö WVD/295-390 N

#### Material Number

1184425

1048351

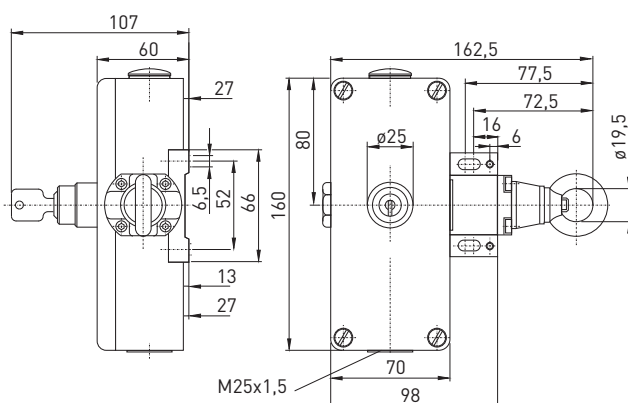
1048431

1048429

1052560

1053134

### // Key release VS



#### Key release

ZS 75 1Ö/1S VS/295-390 N

ZS 75 2Ö/2S VS/120-180 N

ZS 75 2Ö/2S VS/295-390 N

#### Material Number

1048346

1048421

1048419

PRODUCTION PROCESS ASSEMBLY  
MOUNTING OF THE SWITCH INSERTS AT EMERGENCY PULL-WIRE SWITCHES



# Emergency pull-wire switches, one-side actuation

## // Series ZS 441

### Features/Options

- Metal enclosure
- 2 contacts
- Wire length up to 60 m
- 150 N spring force for max. 60 m
- Release by push button or key possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection

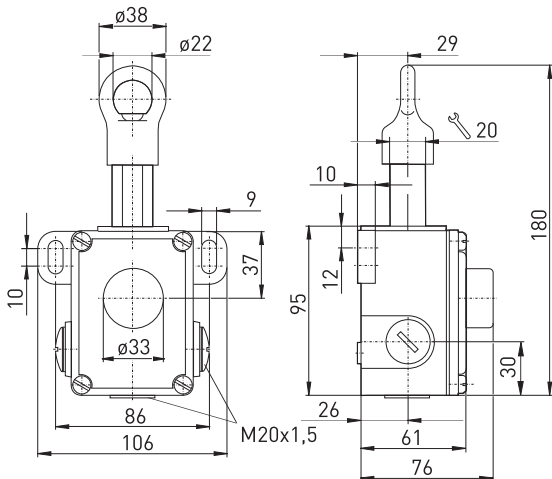
// ZS 441



### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	aluminium die-cast, enamel finish
<b>Degree of protection</b>	ZS 441 VD: IP 65; ZS 441 VS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊕
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	3 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	60 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	

28



### Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	ZS 441 10/1S 
2 NC contacts	ZS 441 20 

### Ordering details

ZS 441	10/1S	VD/150	N-G	
				Indicator lamp, accessories (appendix)
				150 N pre-stress force
				VD push button release (VS key release)
				1 NC/1 NO contact (20)
				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 are indicated on page 13.



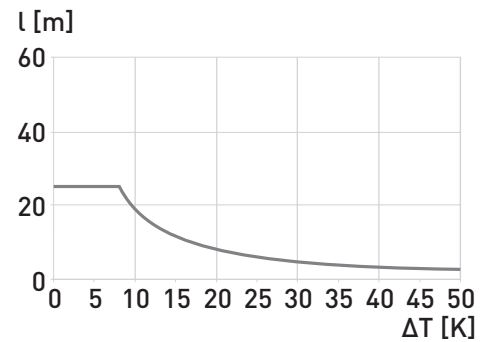
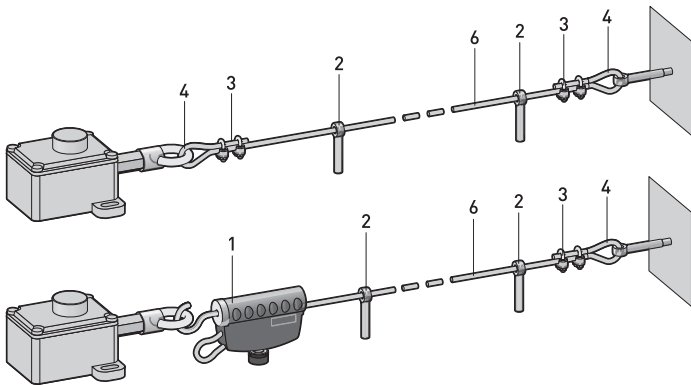
# Emergency pull-wire switches, one-side actuation

## // Series ZS 441, mounting

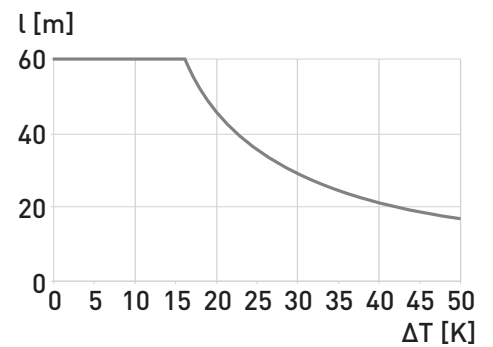
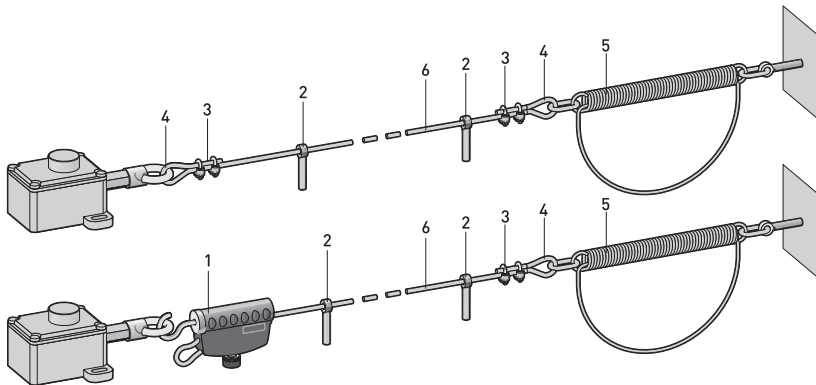
### Legend

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 Compensation spring ZS 73/75-200N	1187931
6 Pull-wire per metre	1032984

### // Mounting without compensation spring



### // Mounting with compensation spring



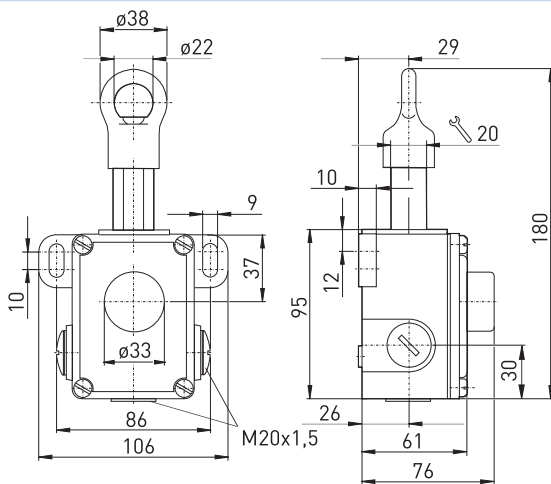
# Emergency pull-wire switches, one-side actuation

## // Series ZS 441, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry, other positions possible on request

### // Push-button release VD



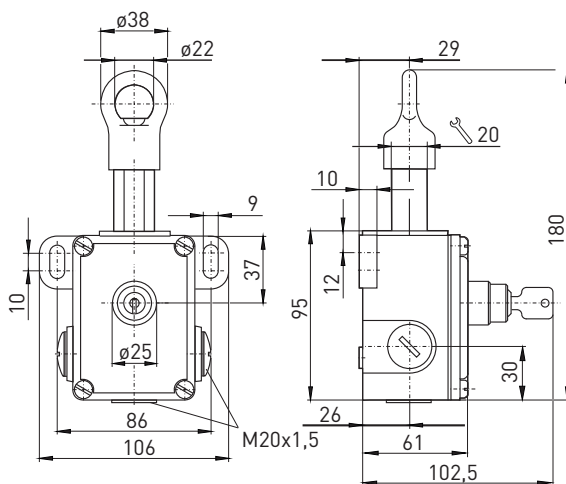
Push-button release  
ZS 441 1Ö/1S VD/150 N

Material Number  
1048284

ZS 441 2Ö VD/150 N

1048301

### // Key release VS



Key release  
ZS 441 1Ö/1S VS/150 N

Material Number  
1048287

ZS 441 2Ö VS/150 N

1183026

PRODUCTION PROCESS ASSEMBLY  
MOUNTING OF THE PULL-WIRE UNIT AT EMERGENCY PULL-WIRE SWITCHES




# Emergency pull-wire switches, one-side actuation

## // Series ZS 80

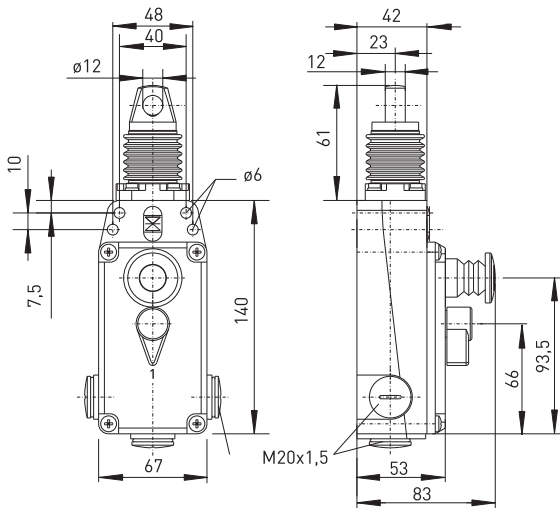
### Features/Options

- Metal enclosure
- 4 contacts
- Position indicator and integrated emergency-stop push-button
- Wire length up to 100 m
- Pretensioning force 100 N
- Lever for release and position indication
- Watertight collar
- Wire pull and breakage detection
- Indicator lamp available for various voltages see chapter accessories in the appendix

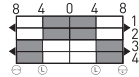
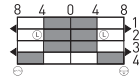
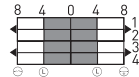
### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid
<b>Degree of protection</b>	IP 67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	2 NC/2 NO, 3 NC/1 NO or 4 NC contacts with double break
<b>Switching system</b>	slow action, positive break NC contacts ⊕
<b>Connection</b>	2 x 4-pole terminal block
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	3 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	2.5 kV
<b>U<sub>i</sub></b>	250 V
<b>I<sub>the</sub></b>	2 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	2 A/250 VAC
<b>Max. fuse rating</b>	2 A gG/gN-fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	100 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	

## // ZS 80




### Contact variants: switch travel/contacts

	Snap action	Material Number
2 NC/2 NO contact	ZS 80 2Ö/2S WVD 	1177916
3 NC/1 NO contacts	ZS 80 3Ö/1S WVD 	1178758
4 NC contacts	ZS 80 4Ö WVD 	1178759

### Ordering details

#### ZS 80 2Ö/2S WVD

  
 VD lever release  
 W watertight collar  
 2 NC/2 NO contacts  
 (3Ö/1S, 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 are indicated on page 13.

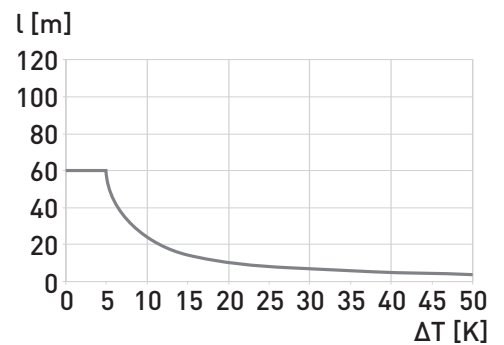
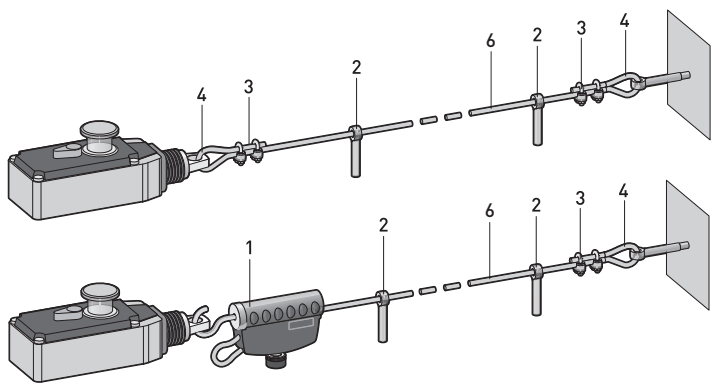
# Emergency pull-wire switches, one-side actuation

## // Series ZS 80, mounting

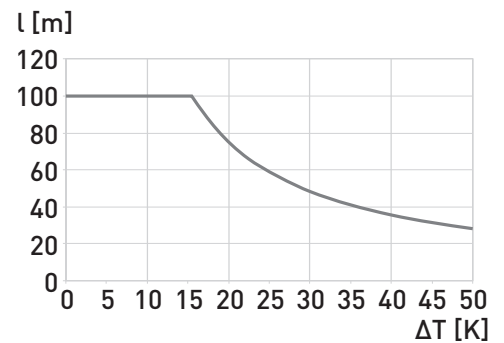
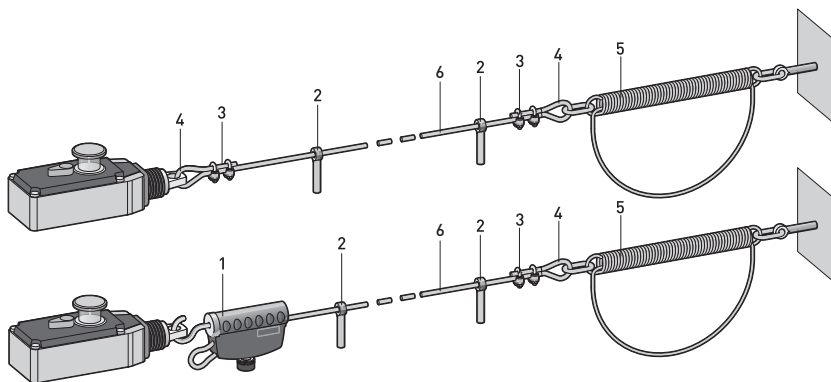
### Legend

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 Compensation spring ZS 80	1187933
6 Pull-wire per metre	1032984

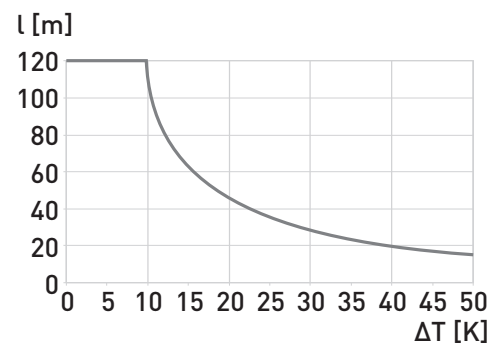
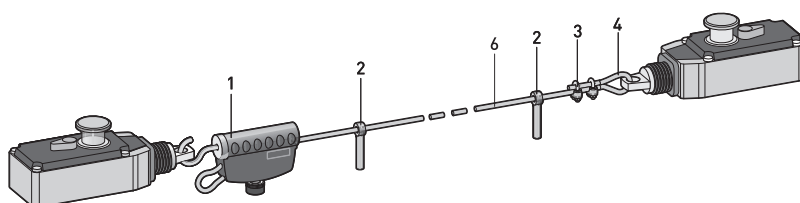
### // Mounting without compensation spring



### // Mounting with compensation spring



### // Mounting with 2 emergency pull-wire switches





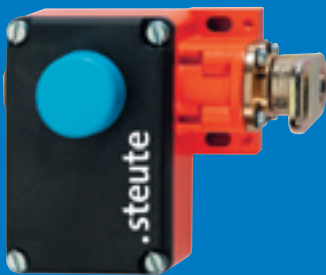
# Emergency pull-wire switches, two-side actuation

## // Series ZS 73 S

### Features/Options

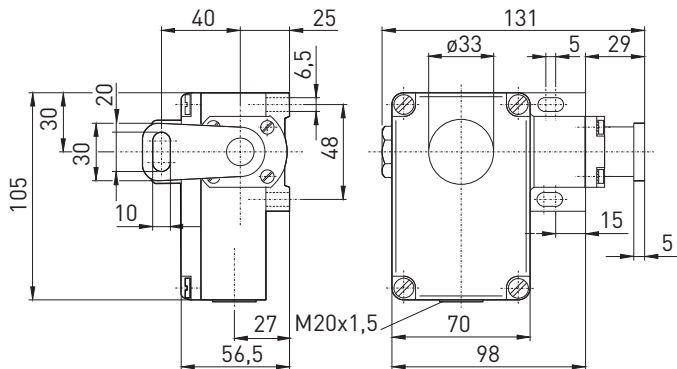
- Metal enclosure
- 2 or 3 contacts
- Wire length up to 2 x 100 m
- Release by push button or key possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection
- Ex version available

## // ZS 73 S



### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish; ZS 73 NIRO: aluminium die-cast, hard-coated and enamelled
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid
<b>Degree of protection</b>	ZS 73 S VD: IP 65; ZS 73 S VS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC or 2 NC/1 NO contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	2 contacts: 6 kV, 3 contacts: 1 kV
<b>U<sub>i</sub></b>	2 contacts: 400 V, 3 contacts: 250 V
<b>I<sub>the</sub></b>	2 contacts: 6 A, 3 contacts: 2 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	2 contacts: 6 A/400 VAC, 3 contacts: 2 A/250 VAC
<b>Max. fuse rating</b>	2 contacts: 6 A gG/gN-fuse, 3 contacts: 2 A gG/gN-fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	2 x 100 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	



### Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	<b>ZS 73 S 10̄/1S</b> 
2 NC contacts	<b>ZS 73 S 20̄</b> 
2 NC/1 NO contacts	<b>ZS 73 S 20̄/1S</b> 

### Ordering details

ZS 73 S 10̄/1S VD-NIRO-G	Indicator lamp, accessories (appendix)
	NIRO pull-wire unit
	VD push button release (VS key release, blank without manual latching))
	1 NC/1 NO contact (20̄, 20̄/1S)
	S two-side actuation
	Series
	Emergency pull-wire switch

At 4 m distance intermediate wire supports are required. Two compensation springs type ZS 73/75 S must be installed see chapter accessories in the appendix.



# Emergency pull-wire switches, two-side actuation

## // Series ZS 73 S, mounting

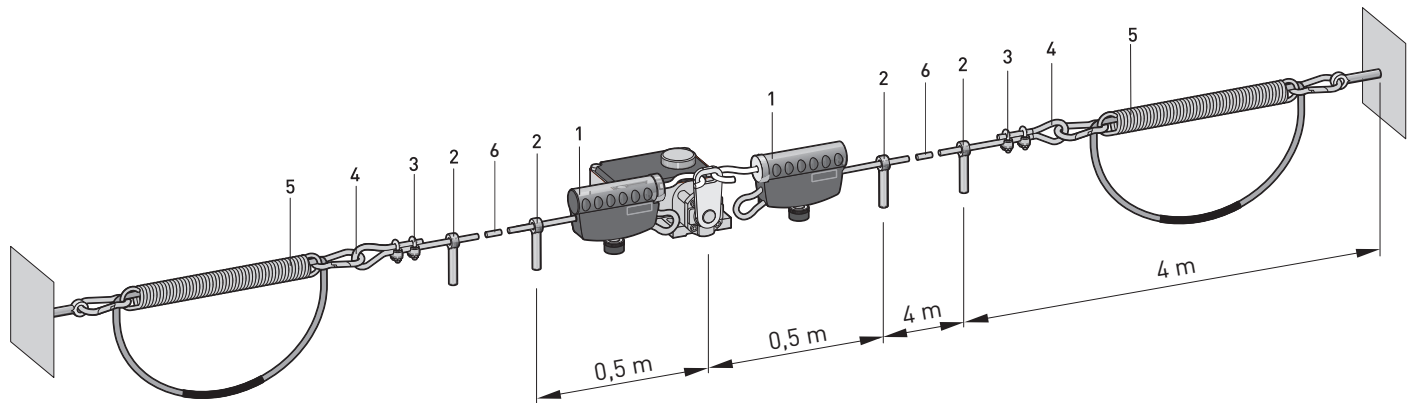
### Legend

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 Compensation spring ZS 73/75 S	1187935
6 Pull-wire per metre	1032984

### Note

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

## // Mounting with compensation spring



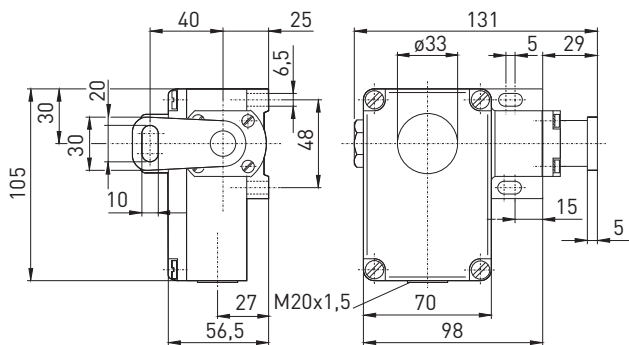
# Emergency pull-wire switches, two-side actuation

## // Series ZS 73 S, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry, other positions possible on request
- With 2 cable entries available on request

### // Push-button release VD



Push-button release  
ZS 73 S 10/1S VD

Material Number  
1053107

ZS 73 S 20 VD

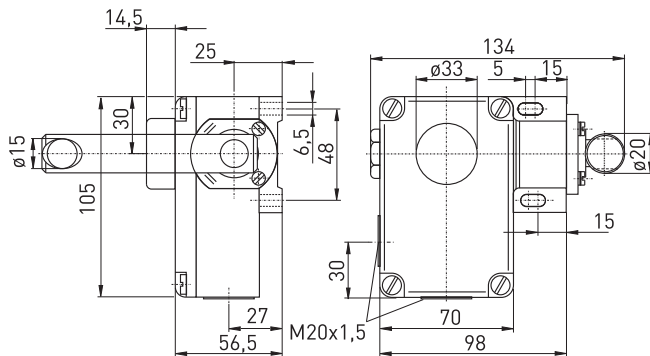
1166652

ZS 73 S 20/1S VD

1184854

36

### // Stainless Steel ZS 73 S NIRO



### Features/Options

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

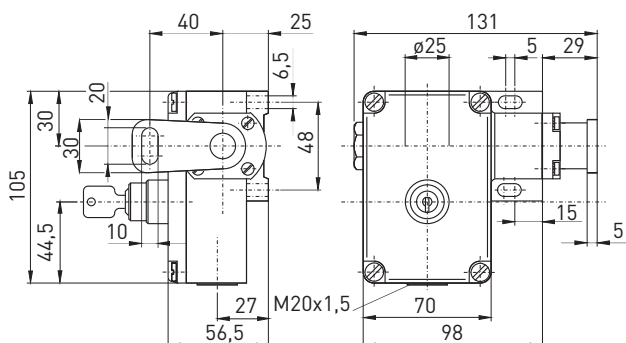
Stainless Steel/Push-button release  
ZS 73 S 10/1S VD NiRO

Material Number  
1048206

ZS 73 S 20/1S VD

1186349

### // Key release VS



Key release  
ZS 73 S 10/1S VS

Material Number  
on request

QUALITY MANAGEMENT  
SHOCK TEST OF AN EMERGENCY PULL-WIRE SWITCH



# Emergency pull-wire switches, two-side actuation

## // Series ZS 75 S

### Features/Options

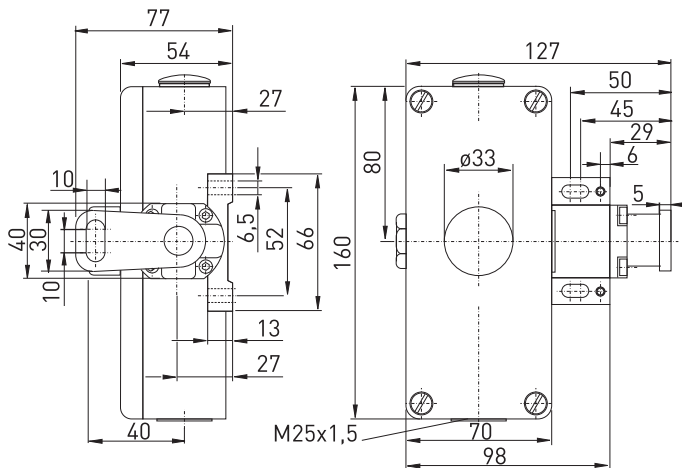
- Metal enclosure
- 2 or 4 contacts
- Wire length up to 2 x 100 m
- Release by push button or key or pull-ring possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection
- Version with Dupline or Dupline Safe available on request
- Ex version available

## // ZS 75 S



## Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	aluminium die-cast, enamel finish
<b>Degree of protection</b>	ZS 75 S VD: IP 65; ZS 75 S VS: IP 54; ZS 75 S VZ: IP 67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NO/2 NC or 4 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M25 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	> 100 000 operations
<b>Indicator lamp</b>	as option
<b>Max. wire length</b>	2 x 100 m
<b>Features</b>	wire pull and breakage detection
<b>Approvals</b>	



### Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	<b>ZS 75 S 10̄/1S</b> 
2 NC/2 NO contacts	<b>ZS 75 S 20̄/2S</b> 
4 NC contacts	<b>ZS 75 S 40̄</b> 

### Ordering details

<b>ZS 75 S 20̄/2S VD-G-DP</b>	
	Dupline (DPS Dupline Safe)
	Indicator lamp, accessories (appendix)
	VD push button release (VS key rel./VZ pull-ring rel.)
	2 NC/2 NO contacts (10̄/1S, 40̄)
	S two-side actuation
	Series
	Emergency pull-wire switch

At 4 m distance intermediate wire supports are required. Two compensation springs type ZS 73/75 S must be installed see chapter accessories in the appendix.

# Emergency pull-wire switches, two-side actuation

## // Series ZS 75 S, mounting

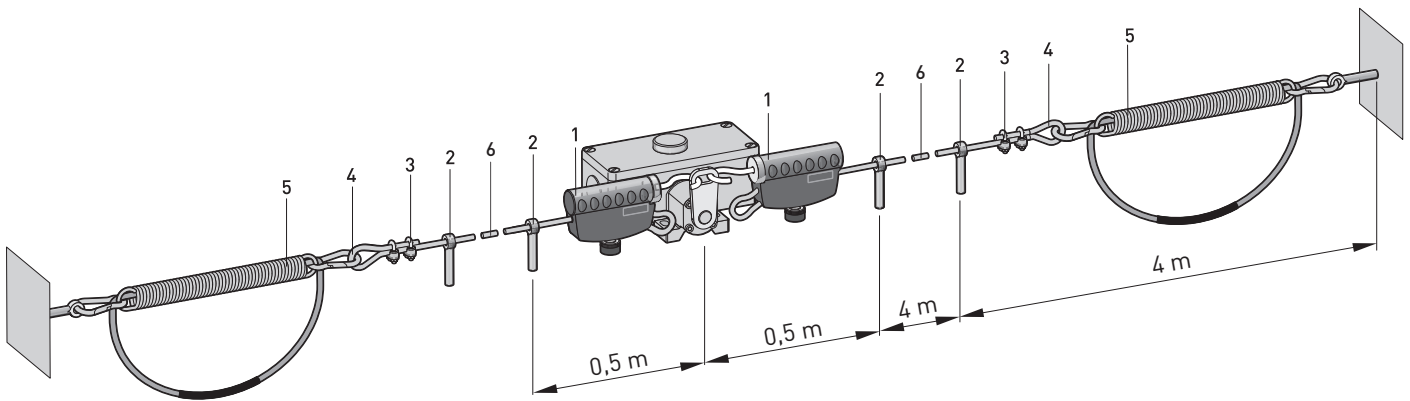
### Legend

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 Compensation spring ZS 73/75 S	1187935
6 Pull-wire per metre	1032984

### Note

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

## // Mounting with compensation spring



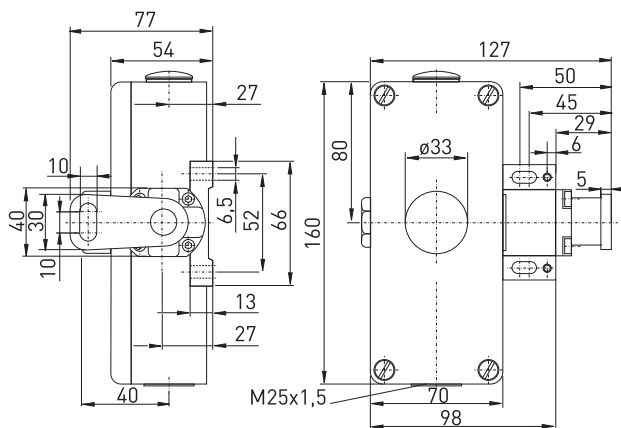
# Emergency pull-wire switches, two-side actuation

## // Series ZS 75 S, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry, other positions possible on request

### // ZS 75 S

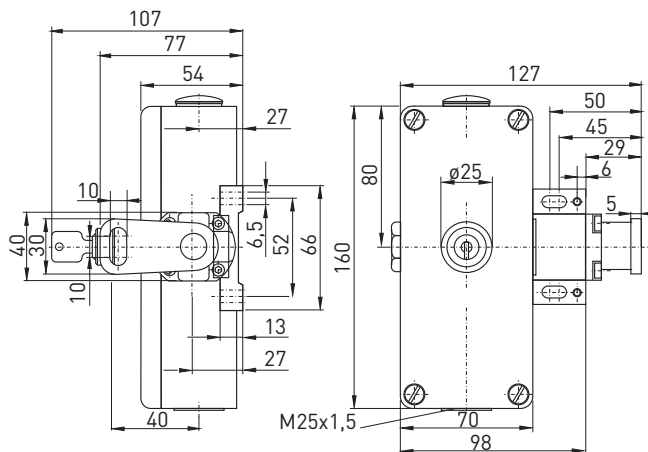


Push-button release  
**ZS 75 S 10/1S VD**  
**ZS 75 S 20/2S VD**  
**ZS 75 S 40 VD**

Material Number  
**1048339**  
**1159425**  
**1048443**

40

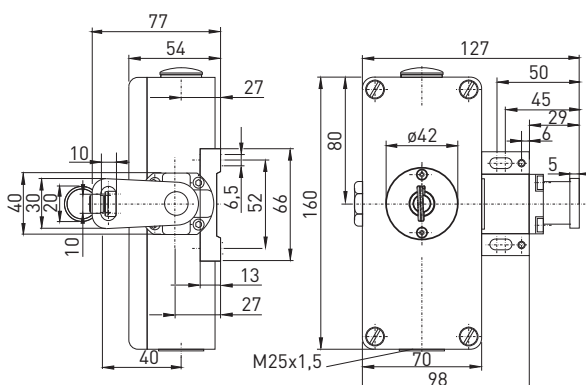
### // Key release VS



Key release  
**ZS 75 S 10/1S VS**  
**ZS 75 S 20/2S VS**

Material Number  
**1048340**  
**1168991**

### // Pull-ring release VZ



Pullring release  
**ZS 75 S 20/2S VZ IP67 Extreme**

Material Number  
**1182287**



QUALITY MANAGEMENT  
LIFE TEST OF UNLOCKING MECHANISM



# Emergency pull-wire switches, two-side actuation

## // Series ZS 91 S

### Features/Options

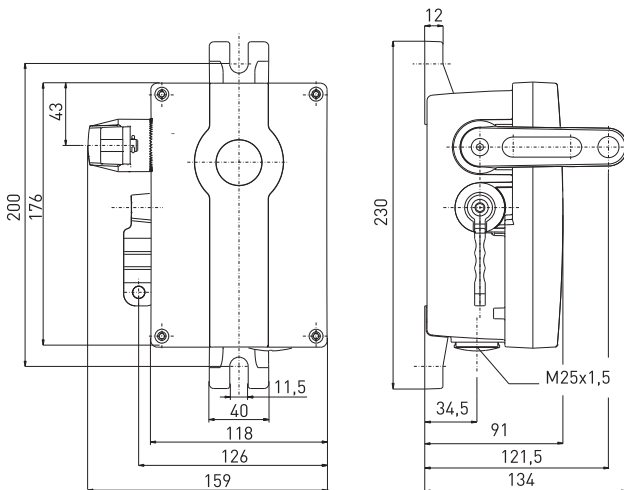
- Thermoplastic enclosure
- 4 or 6 contacts
- Wire length up to 2 x 100 m
- Release by lever possible
- Available without unlocking mechanism (per EN 60947-5-1)
- Wire pull and breakage detection
- Version with Bus or Si-Bus available on request

## // ZS 91 S



### Technical data

<b>Standards</b>	EN 60947-5-1, EN 60947-5-5, EN ISO 13850, EN ISO 13849-1
<b>Enclosure</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
<b>Degree of protection</b>	IP 66/67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	2 NC/2 NO, 3 NC/1 NO, 4 NC, 3 NC/3 NO or 4 NC/2 NO contacts with double break
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M25 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	ZS 91 S VD: > 80 000 operations ZS 91 S: > 2 million operations
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-40 °C ... +85 °C
<b>Mech. life</b>	ZS 91 S VD: > 40 000 operations ZS 91 S: > 1 million operations
<b>Max. wire length</b>	2 x 100 m
<b>Features</b>	wire pull and breakage detection



### Contact variants: switch travel/contacts

	Snap action	Material Number
2 NC/2 NO contacts	<b>ZS 91 S 20/2S</b> 	1189190
3 NC/3 NO contacts	<b>ZS 91 S 30/3S VD</b> 	1241303
4 NC/2 NO contacts	<b>ZS 91 S 40/2S VD</b> 	1189486

### Ordering example

#### ZS 91 S 20/2S VD-BUS

Bus (Si-Bus)  
 VD lever release (blank without manual latching)  
 2 NC/2 NO contacts  
 S two-side actuation  
 Series  
 Emergency pull-wire switch

At 3 m distance intermediate wire supports are required. Two compensation springs type RZ 130K must be installed see chapter accessories in the appendix.

# Emergency pull-wire switches, two-side actuation

## // Series ZS 91 S, mounting

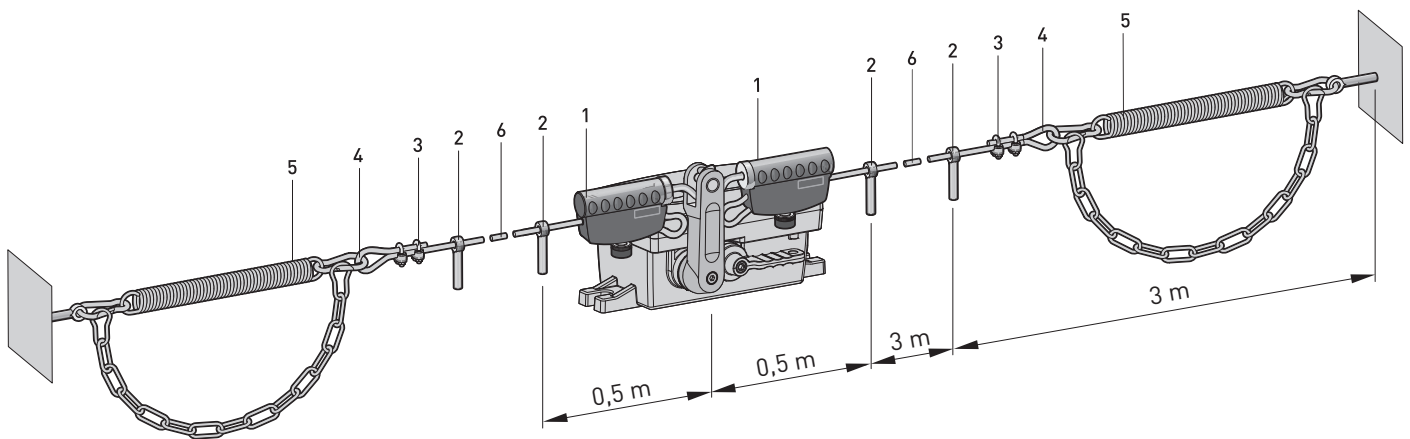
### Legend

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 Compensation spring ZS 90/91 S	1184540
6 Pull-wire per metre	1032984

### Note

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

## // Mounting with compensation spring







## Belt-alignment switches

// Series ES 61 SR  
from page 48

// Series ES 98 SR  
from page 49

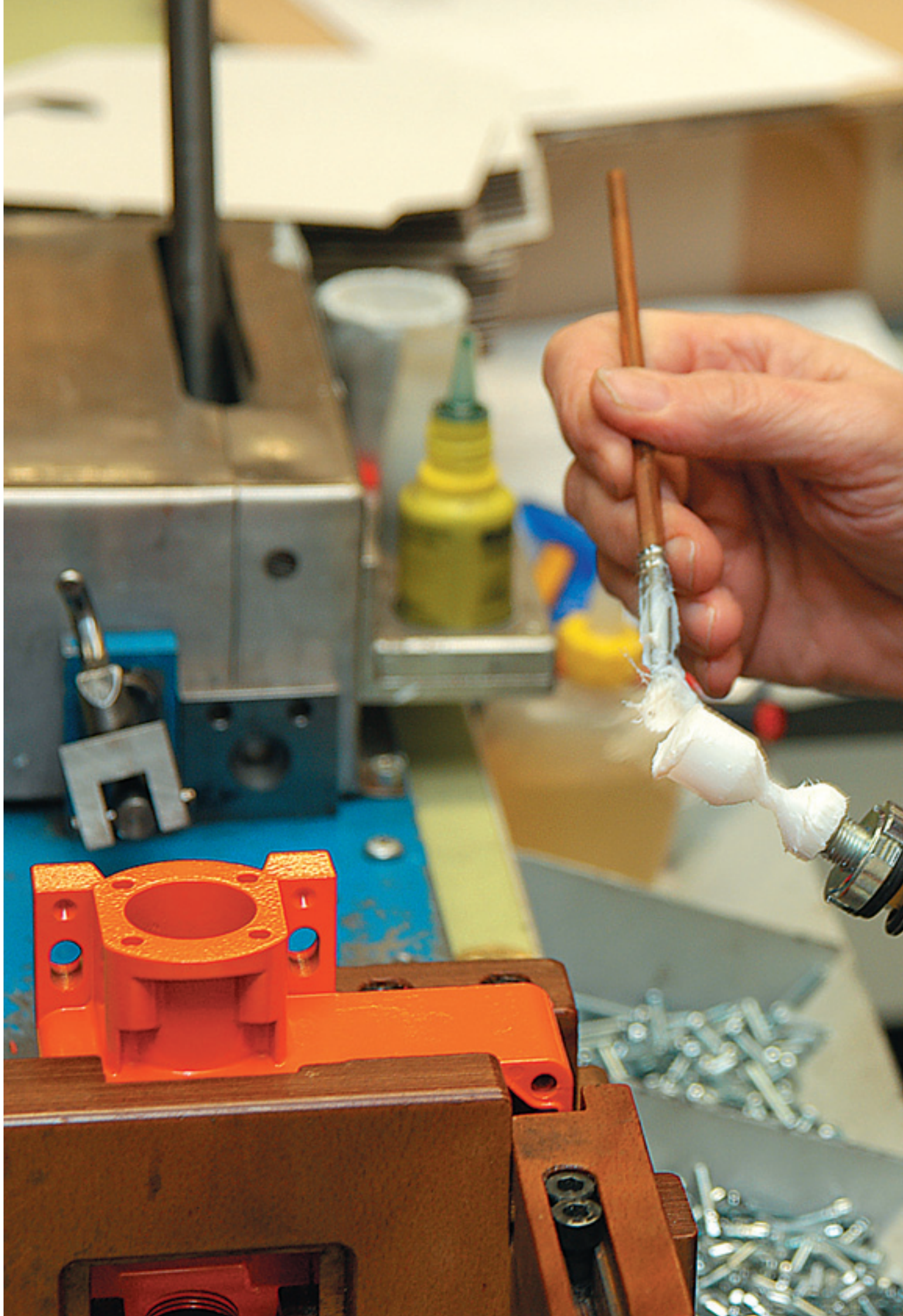
// Series ZS 73 SR  
from page 50

// Series ZS 75 SR  
from page 52

// Series ZS 91 SR  
from page 54

ZS 73 SR







# Belt-alignment switches

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

## Design and mode of operation

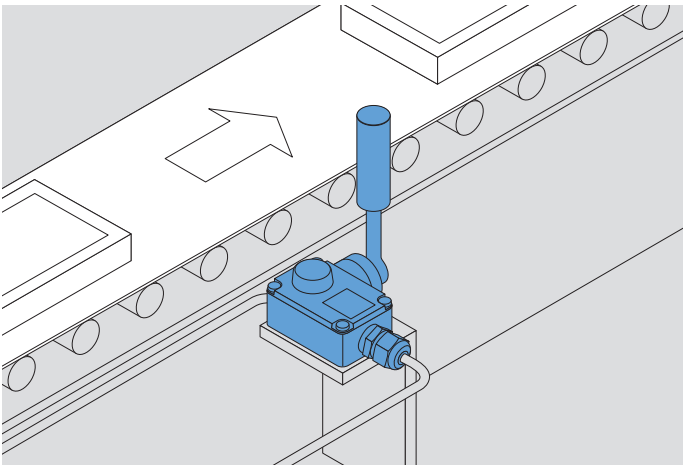
Belt-alignment switches are actuated when the conveyor belt becomes misaligned. Depending on the plant arrangements, this signal can either be used to switch the equipment off or to provide automatic correction of the belt alignment. Thus they should be installed at both sides of the conveyor belt close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

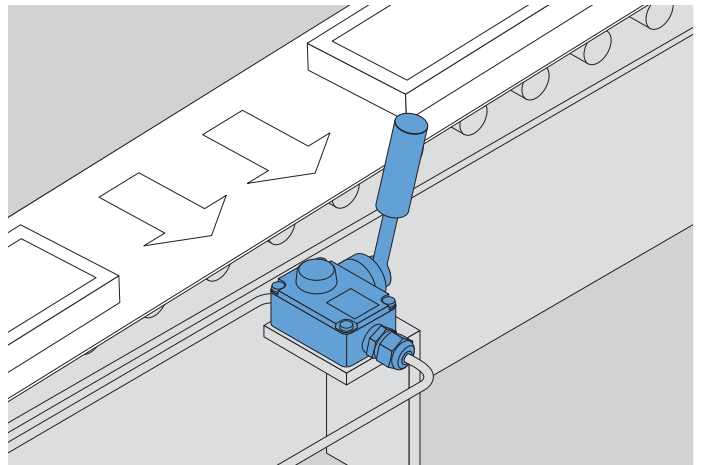
All belt-alignment switches bear the CE mark according to the Machinery Directive 2006/42/EC.

## Application

### Monitoring an conveyor belt



### Belt-alignment switch in actuated state



# Belt-alignment switches

## // Series ES 61 SR

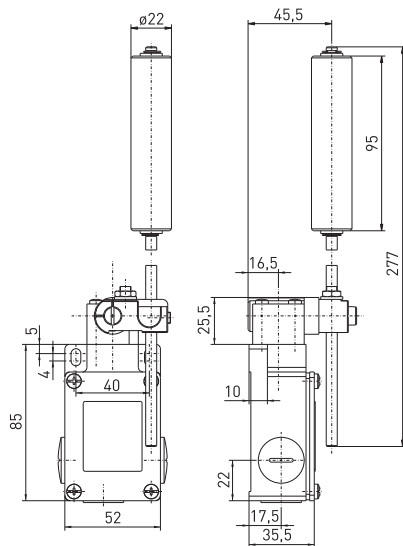
- Features/Options**
- Metal enclosure
  - Slow action: 2 contacts

// ES 61 SR



### Technical data

<b>Standards</b>	EN 60947-5-1, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish
<b>Cover</b>	steel, enamel finish
<b>Degree of protection</b>	IP 65 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break with galvanically separated contact bridges
<b>Switching system</b>	slow action
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	3 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	2 million
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	10 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	16 A/400 VAC
<b>Max. fuse rating</b>	16 A gG/gN fuse
<b>Ambient temperature</b>	-20 °C ... +80 °C
<b>Mech. life</b>	> 1 million operations
<b>Switching frequency</b>	3600/h
<b>Approvals</b>	



### Contact variants: switch travel/contacts

	Slow action	Material Number
1 NC/1 NO contact	<b>ES 61 SR 10/1S</b> 	1181734
1 NC/1 NO contact with overlapping	<b>ES 61 SR UE</b> 	1181735

### Ordering details

**ES 61 SR 10/1S**

- 1 NC/1 NO contact, (UE 1 NC/1 NO contact with contact overlapping)
- SR Belt-alignment lever
- Series
- S Slow action (M snap action)

# Belt-alignment switches

## // Series ES 98 SR

### Features/Options

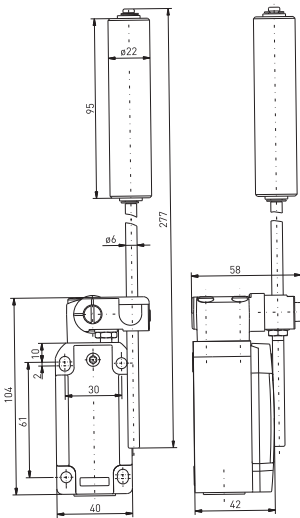
- Metal enclosure
- Slow action: 2 contacts
- Wiring compartment
- Adjustable-length rod lever with nylon roller
- For light- and medium-heavy applications
- Ex version available

## // ES 98 SR



### Technical data

<b>Standards</b>	EN 60947-5-1; EN ISO 13849-1
<b>Enclosure</b>	zinc die-cast, enamel finish
<b>Degree of protection</b>	IP 67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	1 NC/1 NO, 2 NC or 1 NC/1 NO contacts with overlapping with double break, galvanically separated contact bridges
<b>Switching system</b>	slow action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	1 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	2 million
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	4 kV
<b>U<sub>i</sub></b>	250 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15; DC-13
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/250 VAC; 0.25 A/230 VDC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-20 °C ... +60 °C
<b>Mechanical life</b>	> 1 million operations
<b>Frequency of operation</b>	1800/h



### Contact variants: switch travel/contacts

	Slow action	Material Number
1 NC/1 NO contacts	<b>ES 98 SR-11</b> 	1248307
2 NC	<b>ES 98 SR-02</b> 	1249635

### Ordering example

ES 98 SR-11

- 1 NC/1 NO contacts (20)
- SR belt-alignment lever
- Series
- S Slow action (M snap action)

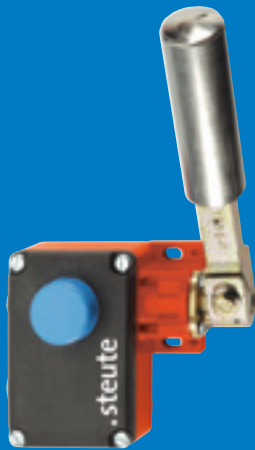
# Belt-alignment switches

## // Series ZS 73 SR

### Features/Options

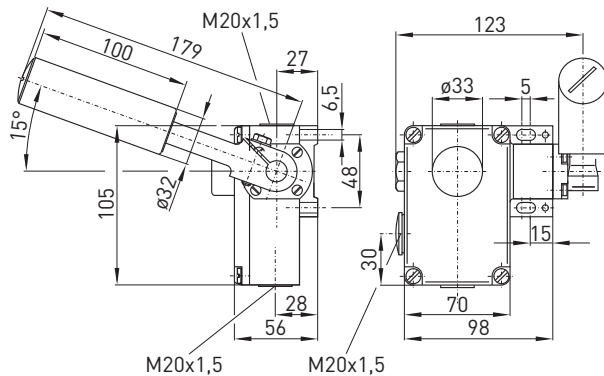
- Metal enclosure
- 2 contacts
- Release by push button or key possible
- Belt-alignment roller made of stainless steel 1.4104
- Ex version available

## // ZS 73 SR



## Technical data

<b>Standards</b>	EN 60947-5-1, EN ISO 13849-1
<b>Enclosure</b>	aluminium die-cast, enamel finish;
<b>Cover</b>	glass-fibre reinforced, shockproof thermoplastic, ultramid
<b>Degree of protection</b>	ZS 73 SR VD: IP 65; ZS 73 SR VS: IP 54 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break or 2 NC contacts
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M20 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	ZS 73 SR: 2 million; ZS 73 SR VD/VS: 200 000
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Ambient temperature</b>	-25 °C ... +70 °C
<b>Mech. life</b>	ZS 73 SR: > 1 million operations ZS 73 SR VD/VS: > 100 000 operations
<b>Indicator lamp</b>	as option
<b>Approvals</b>	



### Contact variants: switch travel/contacts

	Snap action
1 NC/1 NO contact	<b>ZS 73 SR 10̇/1S</b> 
2 NC contacts	<b>ZS 73 SR 20̇</b> 

### Ordering details

<b>ZS 73 SR 10̇/1S VD-G</b>	
	Indicator lamp, see accessories (appendix)
	VD Push button release
	[VS key release, blank without manual latching]
	1 NC/1 NO contact (20̇)
	SR Belt-alignment lever
	Series
	Belt-alignment switch

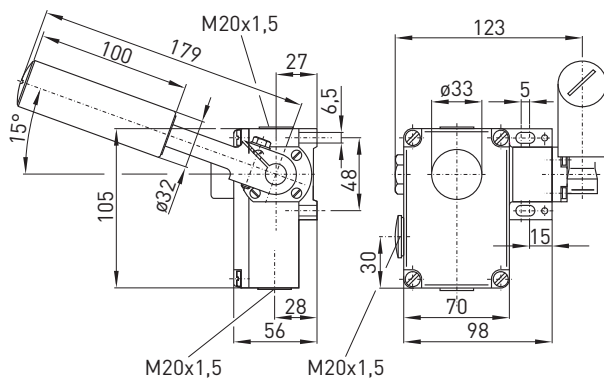
# Belt-alignment switches

## // Series ZS 73 SR, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry, other positions possible on request
- With 2 cable entries available on request

## // Push-button release VD



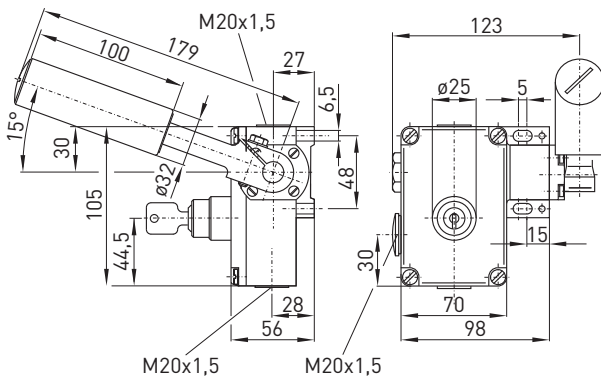
Push-button release  
ZS 73 SR 10/1S VD

Material Number  
1177256

Without release  
ZS 73 SR 10/1S

Material Number  
1185572

## // Key release VS



Key release  
ZS 73 SR 10/1S VS

Material Number  
1188743





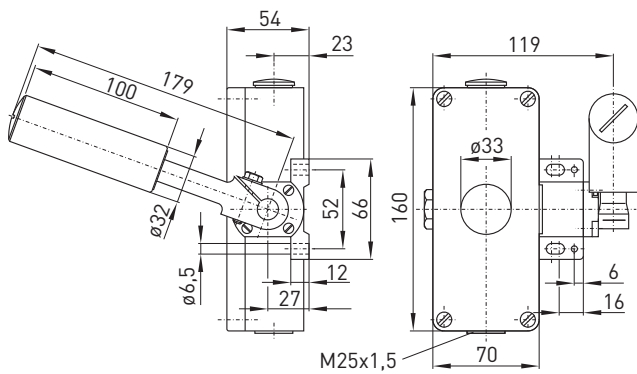
# Belt-alignment switches

## // Series ZS 75 SR, variants

### Features/Options

- Indicator lamps for various voltages are indicated in chapter accessories in the appendix
- Indicator lamp position in the left side cable entry, other positions possible on request

### // Push-button release VD



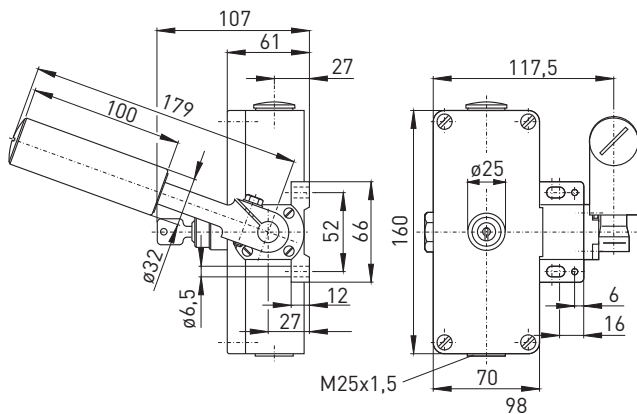
Without release  
 ZS 75 SR 10/1S  
 ZS 75 SR 20/2S

Material Number  
 1048341  
 1169331

Push-button release  
 ZS 75 SR 10/1S VD  
 ZS 75 SR 20/2S VD

Material Number  
 1048342  
 1169350

### // Key release VS



Key release  
 ZS 75 SR 10/1S VS  
 ZS 75 SR 20/2S VS

Material Number  
 1048343  
 1169360

# Belt-alignment switches

## // Series ZS 91 SR

### Features/Options

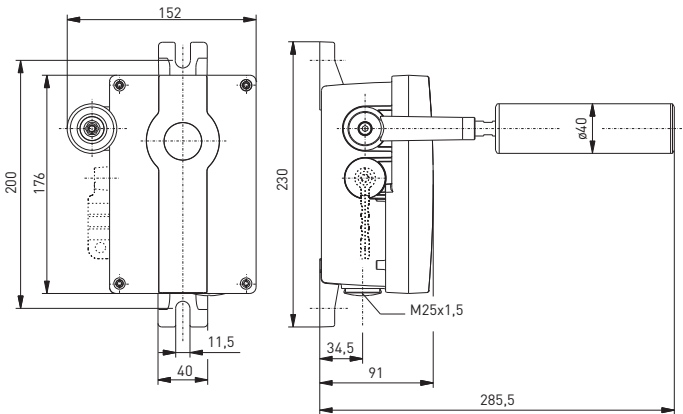
- Thermoplastic enclosure
- 4 or 6 contacts with contact staggering:  
1 NC and 1 NO contact switching at 15°,  
1 NC and 1 NO contact switching at 25°
- Release by lever VD possible
- Belt-alignment lever continuously adjustable
- Version with Bus or Si-Bus available on request

## // ZS 91 SR



### Technical data

<b>Standards</b>	EN 60947-5-1; EN ISO 13849-1
<b>Enclosure</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
<b>Cover</b>	glass-fibre reinforced, shock-proof thermoplastic, ultramid, UV resistant to EN ISO 4892
<b>Degree of protection</b>	IP 66/67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	1 NC/1 NO, 2 NC/2 NO, 3 NC/1 NO, 3 NC/3 NO, 4 NC or 4 NC/2 NO contacts with double break
<b>Switching system</b>	snap action, positive break NC contacts ⊖
<b>Connection</b>	Screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	2 x M25 x 1.5
<b>B<sub>10d</sub> (10 % load)</b>	ZS 91 SR VD: 80 000, ZS 91 SR: 2 million
<b>T<sub>M</sub></b>	max. 20 years
<b>U<sub>imp</sub></b>	6 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Gebrauchskategorie</b>	AC-15
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC
<b>Max. fuse rating</b>	6 A gG/gN-fuse
<b>Ambient temperature</b>	-40 °C ... +85 °C
<b>Mech. life</b>	ZS 91 SR VD: > 40 000 operations, ZS 91 SR: > > 1 million operations

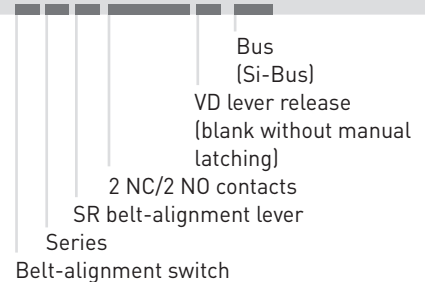


### Contact variants: switch travel/contacts

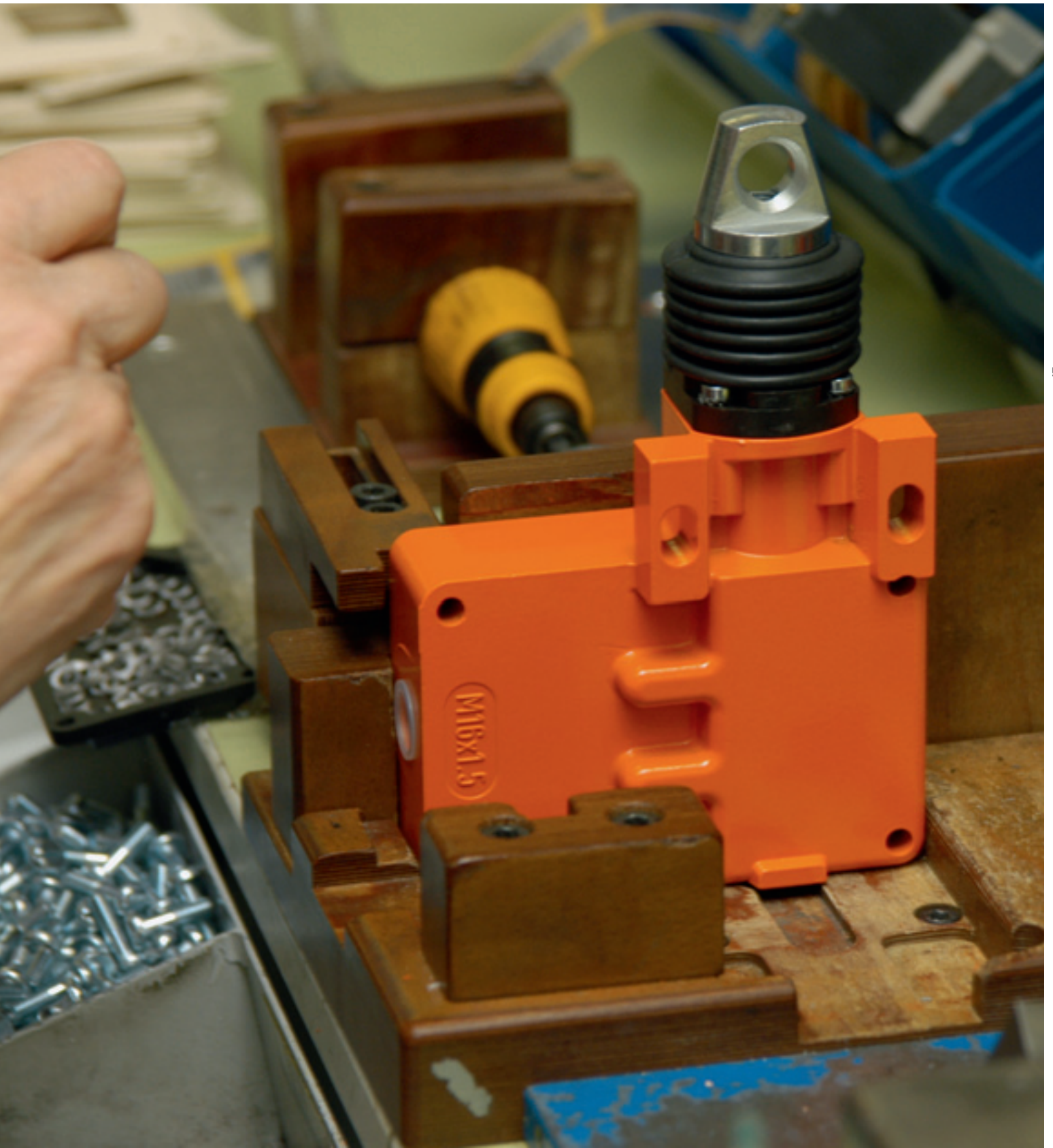
	Snap action	Material Number
2 NC/2 NO contacts	<b>ZS 91 SR 2Ö/2S VD</b> 30° 20° 0° 20° 30° 	1213379
2 NC/2 NO contacts with contact staggering	<b>ZS 91 SR 1ÖS/1ÖS</b> 30° 15° 0° 15° 30° 	1208202

### Ordering example

ZS 91 SR 1ÖS/1ÖS VD-BUS



PRODUCTION PROCESS ASSEMBLY  
MOUNTING OF ACTUATOR









## Pull-wire switches

// Series ES/EM 95 Z

from page 62

// Series ES 51 Z

from page 64

// Series ES/EM 41 Z

from page 66

// Series ES/EM 61 Z

from page 70

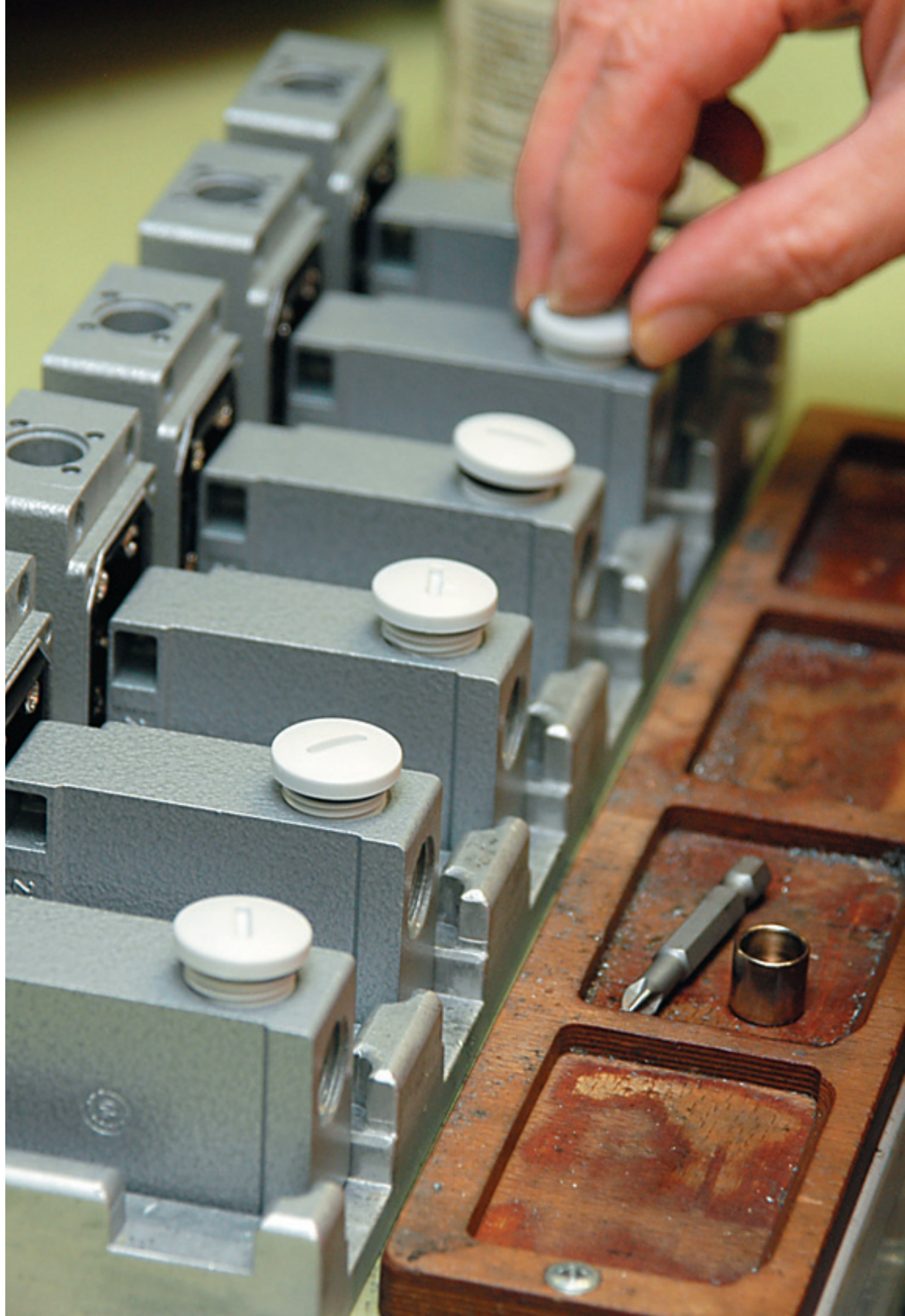
// Series ZS 70

from page 72

// Series ZS 71

from page 73







# Pull-wire switches

## Application

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

## Design and mode of operation

Pull-wire switches are actuated manually by pulling. There are variants with and without latching. The pull-wire switches without latching generate a switching impulse on actuation. With the devices with latching the switching impulse is maintained until repeated actuation.

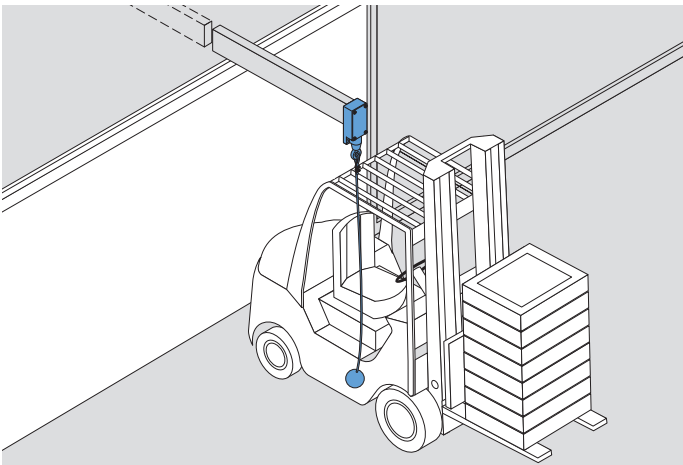
An important feature for the selection of pull-wire switches are the mounting possibilities, wall or ceiling mounting. For your support you find a selection table on the following page.

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

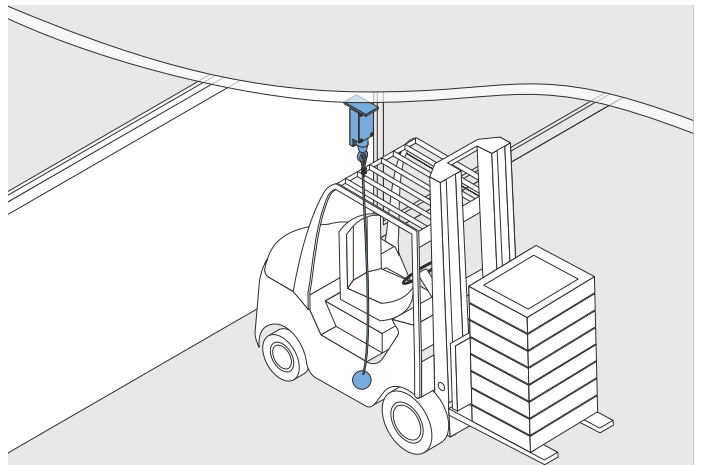
All pull-wire switches presented in this chapter bear the CE mark according to the Low Voltage Directive 06/95/EC.

## Application

Wall mounting as door opener



Ceiling mounting



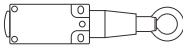
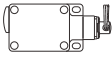
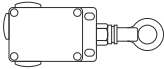
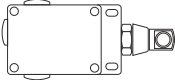
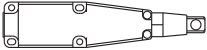
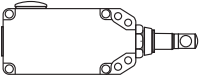


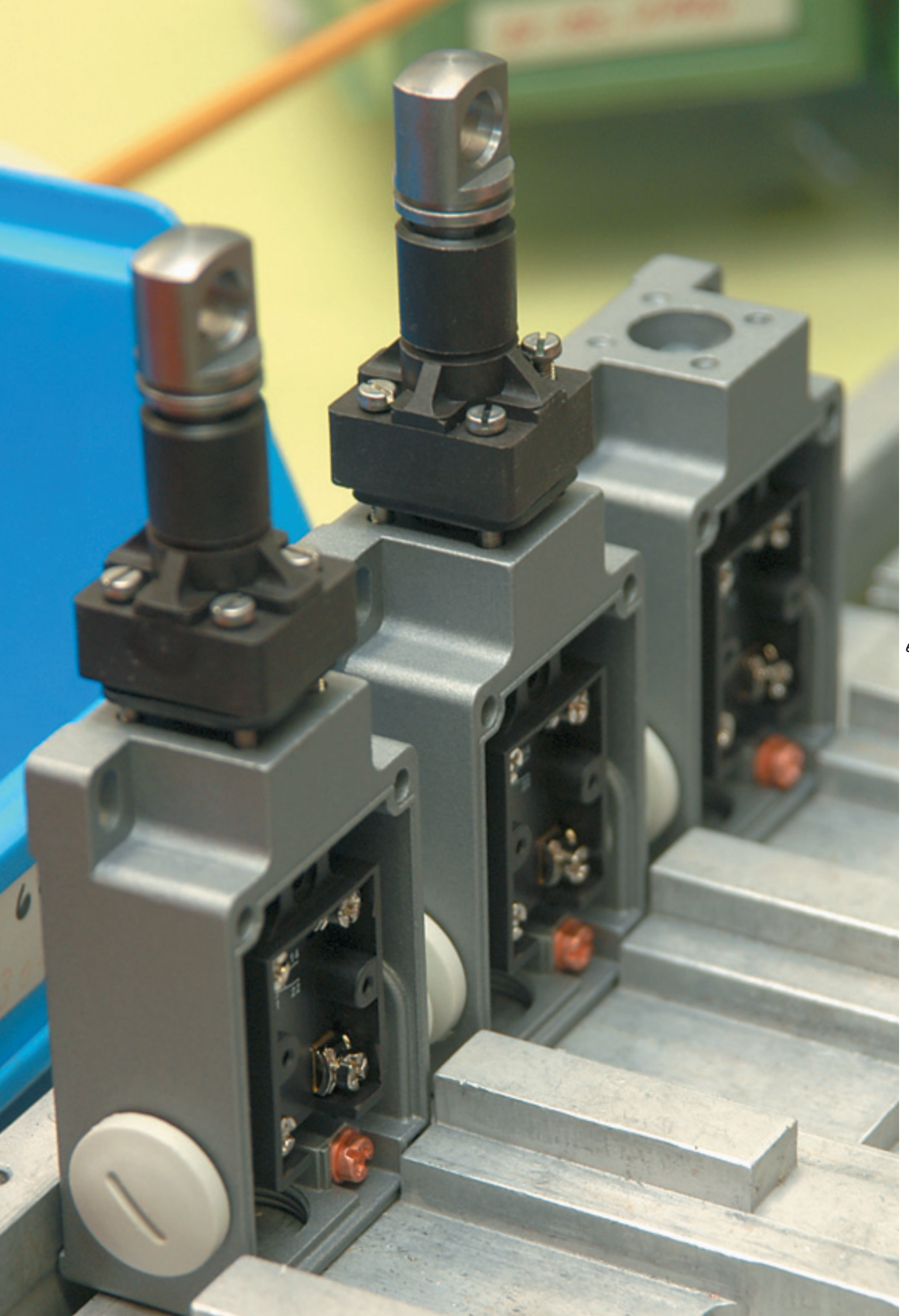
# Selection table

## Pull-wire switches

// Series

// Mounting possibilities

		↓	↓	
				
ES/EM 95 Z, on page 62 - Thermoplastic enclosure - Ceiling or wall mounting		X	X	
ES 51 Z, on page 64 - Metal enclosure - Wall mounting		X	-	
ES/EM 41 Z, on page 66 - Metal enclosure - Ceiling or wall mounting		X	X	
ES/EM 61 Z, on page 70 - Metal enclosure - Ceiling or wall mounting		X	X	
ZS 70, on page 72 - Thermoplastic enclosure - Wall mounting		X	-	
ZS 71, on page 73 - Metal enclosure - Wall mounting		X	-	



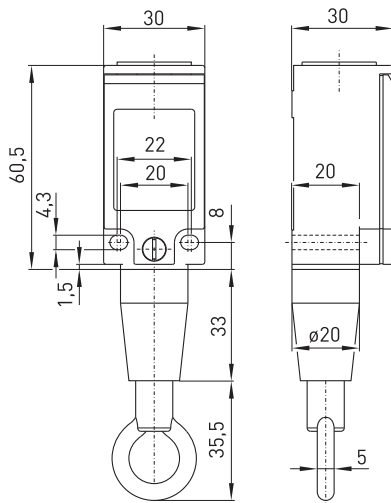
# Pull-wire switches

## // Series ES 95 Z



### Features/Options

- Thermoplastic enclosure
- Wall or ceiling mounting
- Slow action: 2 contacts
- Horizontal slotted mounting holes
- Double insulated

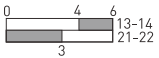
## // ES 95 Z



## Technical data

<b>Standards</b>	EN 60947-5-1
<b>Enclosure</b>	glass-fibre reinforced, shockproof thermoplastic, self-extinguishing UL 94-V0
<b>Degree of protection</b>	IP 67 to IEC/EN 60529
<b>Contact material</b>	silver
<b>Switching elements</b>	change-over contact with double break, galvanically separated contact bridges
<b>Switching system</b>	slow action, positive break NC contacts ⊖
<b>Connection</b>	screw connection terminals
<b>Cable cross section</b>	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
<b>Cable entry</b>	1 x M20 x 1.5
<b>U<sub>imp</sub></b>	4 kV
<b>U<sub>i</sub></b>	400 V
<b>I<sub>the</sub></b>	6 A
<b>Utilisation category</b>	AC-15; DC-13
<b>I<sub>e</sub>/U<sub>e</sub></b>	6 A/400 VAC; 0.25 A/230 VDC
<b>Max. fuse rating</b>	6 A gG/gN fuse
<b>Mech. life</b>	> 1 million operations
<b>Switching frequency</b>	1800/h
<b>Ambient temperature</b>	- 20 °C ... + 80 °C
<b>Contact opening</b>	2 x 3.5 mm
<b>Actuating force</b>	20 N
<b>Features</b>	pull-wire function
<b>Approvals</b>	 

### Contact variants: switch travel/contacts

1 NC/1 NO contact	<b>Slow action</b>
	<b>ES 95 Z 10/1S</b>
	

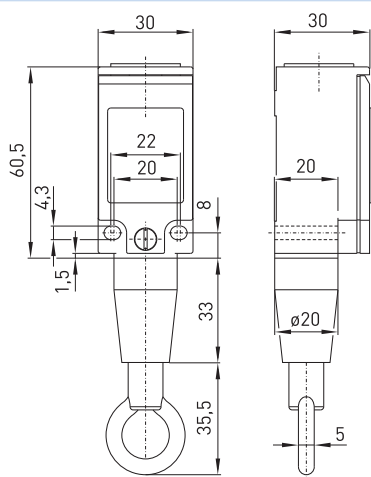
### Ordering details

**ES 95 Z 10/1S**

- 1 NC/1 NO contact
- Z Actuator towing eye
- Series
- S Slow action

Pull-wire switches  
 // Series ES 95 Z, variants

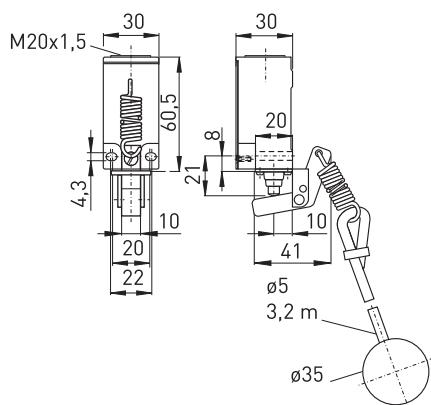
//ES 95 Z



Slow action  
 ES 95 Z 1Ö/1S  
 ES 95 Z 2S

Material Number  
 1179354  
 1188106

// ES 95 WH/90° 1Ö/1S



Features/Options

- Suitable for wall- and ceiling mounting
- Version for door/gate opening ES 95 WH/90° 1Ö/1S:  
 including 3.2 m long nylon pull-wire and rubber ball,  
 slow action 1 NC/1 NO contact

Slow action  
 ES 95 WH/90° 1Ö/1S-3,2m

Material Number  
 1181495

# Pull-wire switches

## // Series ES 51 Z

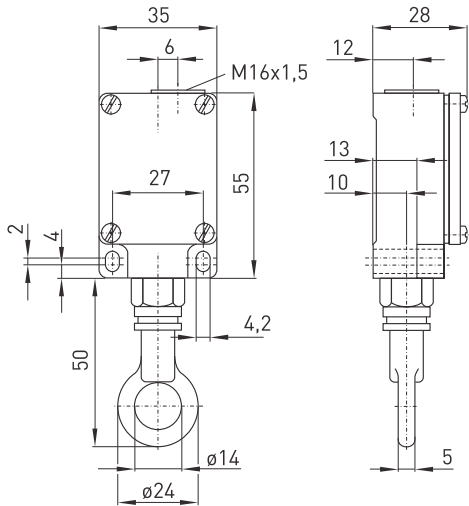
- Features/Options
- Metal enclosure
  - Wall mounting
  - Slow action: 2 contacts
  - Small design
  - Pull-wire function

// ES 51 Z



### Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, enamel finish
Cover	steel, enamel finish
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching elements	change-over contact with double break with galvanically separated contact bridges
Switching system	slow action
Connection	screw connection terminals
Cable cross section	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
Cable entry	1 x M16 x 1.5
U <sub>imp</sub>	4 kV
U <sub>i</sub>	400 V
I <sub>the</sub>	4 A
Utilisation category	AC-15
I <sub>e</sub> /U <sub>e</sub>	4 A/400 VAC
Max. fuse rating	4 A gG/gN-fuse
Ambient temperature	-20 °C ... +80 °C
Mech. life	> 1 million operations
Switching frequency	3600/h
Actuating force	max. 40 N
Features	pull-wire function
Approvals	



### Contact variants: switch travel/contacts

	Slow action
1 NC/1 NO contact	ES 51 Z 10/1S

### Ordering details

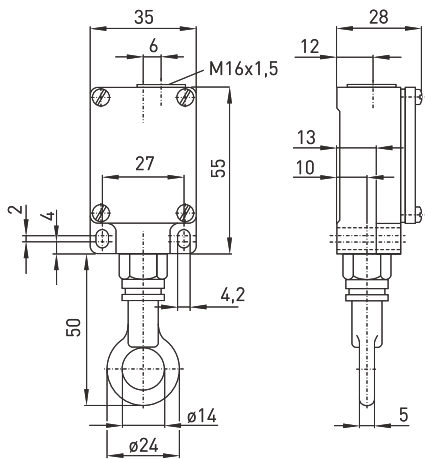
ES 51 W Z 10/1S

- 1 NC/1 NO contact
- Z Actuator towing eye
- W Collar
- Series
- S Slow action



Pull-wire switches  
// Series ES 51 Z, variants

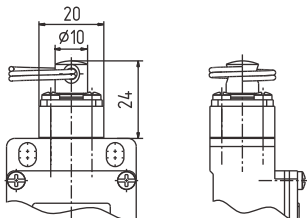
//ES 51 Z



Slow action  
ES 51 Z 10/1S

Material Number  
1047044

// Collar W



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

Collar/Slow action  
ES 51 WZ 10/1S

Material Number  
1047048

# Pull-wire switches

## // Series ES/EM 41 Z

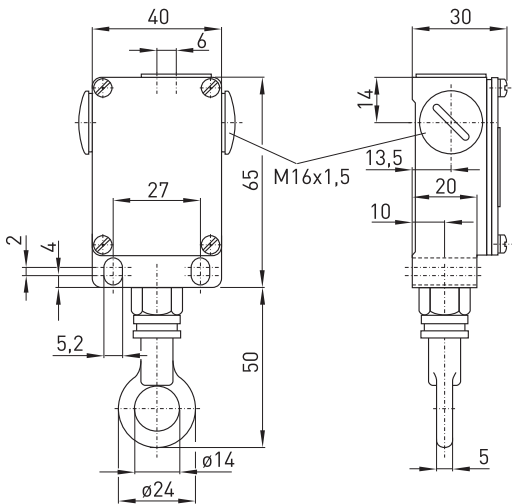
- Features/Options
- Metal enclosure
  - Wall or ceiling mounting
  - Slow or snap action: 2 contacts
  - Pull-wire function

### // ES/EM 41 Z



### Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, enamel finish
Cover	steel, enamel finish
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching elements	change-over or 2 NO contacts with double break
Switching system	slow or snap action
Connection	M3.5 screw connection terminals
Cable cross section	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
Cable entry	3 x M16 x 1.5
U <sub>imp</sub>	4 kV
U <sub>i</sub>	400 V
I <sub>the</sub>	10 A
Utilisation category	AC-15
I <sub>e</sub> /U <sub>e</sub>	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	-20 °C ... +80 °C
Mech. life	> 1 million operations
Switching frequency	3600/h
Actuating force	max. 45 N
Features	pull-wire function
Approvals	



### Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact	<b>EM 41 Z 10/1S</b> 	<b>ES 41 Z 10/1S</b> 
2 NO contacts		<b>ES 41 Z 2S</b> 

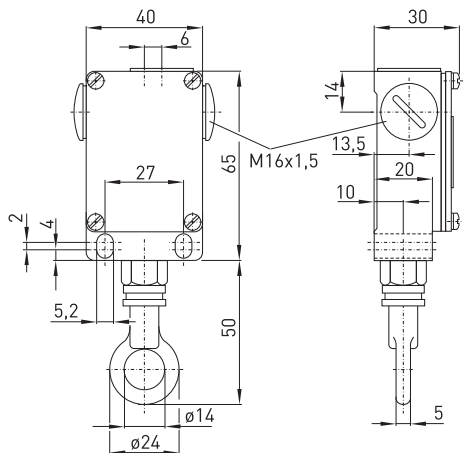
### Ordering details

#### ES 41 W Z 10/1S DM

- DM Ceiling mounting, including ceiling mounting plate
- 1 NC/1 NO contact, (2S 2 NO contacts)
- Z Actuator towing eye
- W Collar
- Series
- S Slow action (M snap action)

Pull-wire switches  
 // Series ES/EM 41 Z, variants

// ES/EM 41 Z



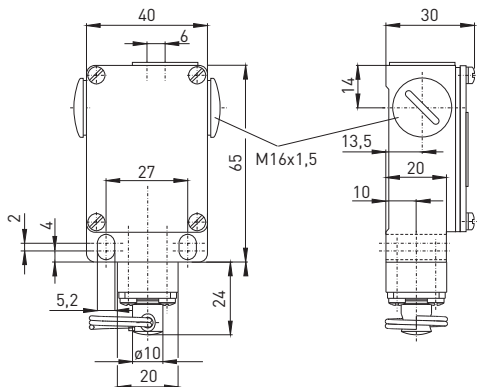
Slow action  
 ES 41 Z 10/1S  
 ES 41 Z 2S

Material Number  
 1046348  
 1046548

Snap action  
 EM 41 Z 10/1S

Material Number  
 1046487

// Collar W



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

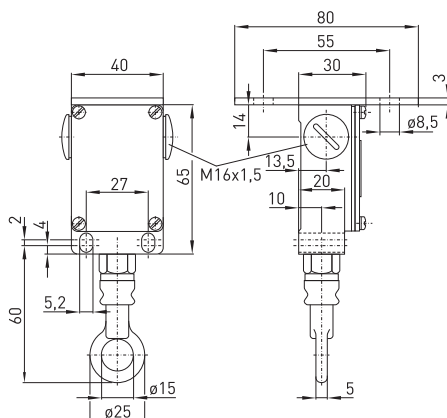
Collar/Slow action  
 ES 41 WZ 10/1S  
 ES 41 WZ 2S

Material Number  
 1046362  
 1046549

Collar/Snap action  
 EM 41 WZ 10/1S

Material Number  
 1046491

// Ceiling mounting DM



Features/Options  
 - Version for ceiling mounting with mounting plate

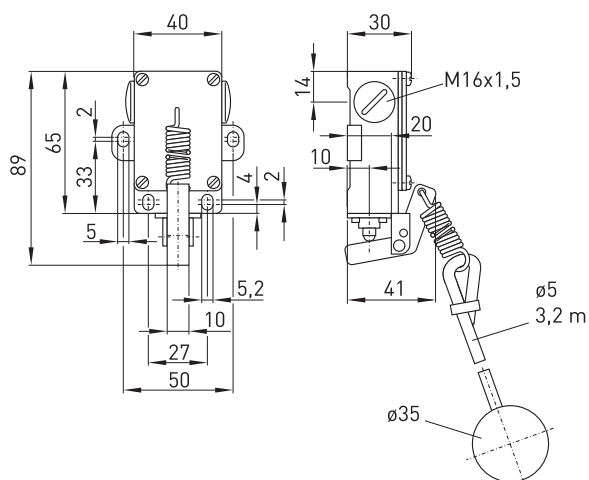
Ceiling mounting/Slow action  
 ES 41 Z 10/1S ceiling mounting DM

Material Number  
 1166638

# Pull-wire switches

## // Series ES/EM 41 Z, variants

### // ES 41 WH/90° 1Ö/1S



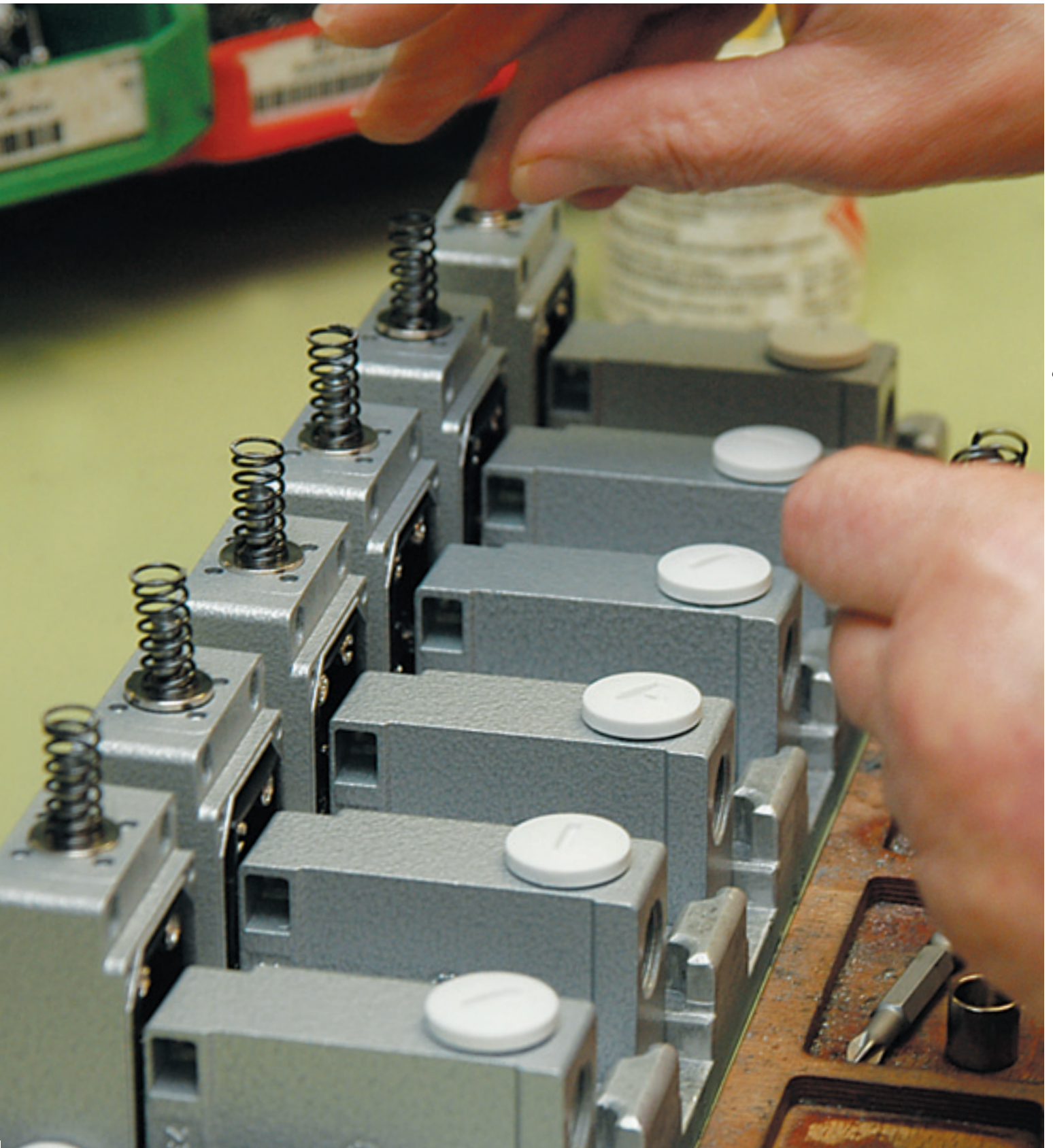
#### Features/Options

- Version for ceiling and wall mounting ES 41 WH/90° 1Ö/1S
- Version for door/gate opening ES 41 WH/90° 1Ö/1S:  
including 3.2 m long nylon pull-wire with rubber ball,  
including mounting screws and rawlplugs, metal enclosure with  
thermoplastic cover, slow action 1 NC/1 NO contact

Slow action  
ES 41 WH/90° 1Ö/1S-3,2

Material Number  
1177335

PRODUCTION PROCESS ASSEMBLY  
MOUNTING OF PULL-WIRE SWITCHES



# Pull-wire switches

## // Series ES/EM 61 Z

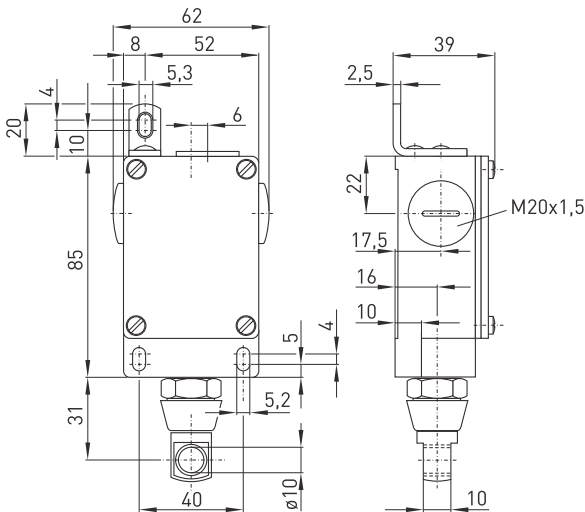
- Features/Options
- Metal enclosure
  - Wall or ceiling mounting
  - Slow or snap action: 2 contacts
  - Pull-wire function
  - Ex version available

// ES/EM 61 Z



### Technical data

Standards	EN 60947-5-1
Enclosure	aluminium die-cast, enamel finish
Cover	steel, enamel finish
Degree of protection	IP 65 to IEC/EN 60529
Contact material	silver
Switching elements	change-over or 2 NO contacts with double break and galvanically separated contact bridges
Switching system	slow or snap action
Connection	screw connection terminals
Cable cross section	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
Cable entry	3 x M20 x 1.5
U <sub>imp</sub>	6 kV
U <sub>i</sub>	400 V
I <sub>the</sub>	10 A
Utilisation category	AC-15
I <sub>e</sub> /U <sub>e</sub>	ES 61: 16 A/400 VAC, EM 61: 6 A/400 VAC
Max. fuse rating	ES 61: 16 A gG/gN fuse EM 61: 6 A gG/gN fuse
Ambient temperature	-20 °C ... +80 °C
Mech. life	> 1 million operations
Indicator lamp	as option
Switching frequency	3600/h
Actuating force	max. 50 N
Features	pull-wire function
Approvals	



### Contact variants: switch travel/contacts

	Snap action	Slow action
1 NC/1 NO contact	<b>EM 61 Z 10/1S</b> 	<b>ES 61 Z 10/1S</b> 
2 NO contacts		<b>ES 61 Z 2S</b> 

### Ordering details

ES 61 W Z 10/1S DM-G

- Indicator lamp (app)
- DM Ceiling mounting with mounting plate
- 1 NC/1 NO contact, (2S 2 NO contacts)
- Z Actuator towing eye
- W Collar
- Series
- S Slow action (M snap action)



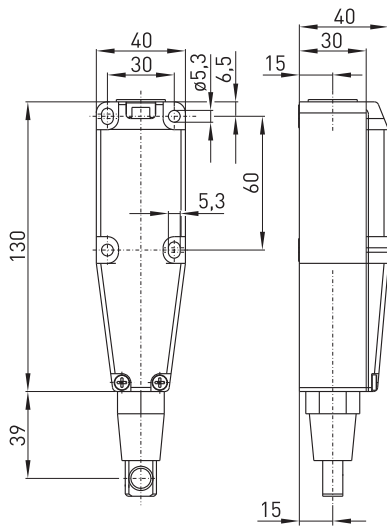


# Pull-wire switches





## // Series ZS 70 Z

- Features/Options
- Thermoplastic enclosure
  - Wall mounting
  - Snap action: 2 contacts
  - Pull-wire function

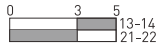
// ZS 70 Z



### Technical data

Standards	EN 60947-5-1
Design	mounting details to EN 50041
Enclosure	glass-fibre reinforced, shockproof thermoplastic, ultramid
Cover	glass-fibre reinforced, shockproof thermoplastic, ultramid
Degree of protection	IP 67 to IEC/EN 60529
Contact material	silver
Switching elements	change-over contact with double break with galvanically separated contact bridges
Switching system	snap action, positive break NC contacts ⊖
Connection	screw connection terminals
Cable cross section	max. 2.5 mm <sup>2</sup> (incl. conductor ferrules)
Cable entry	1 x M20 x 1.5
U <sub>imp</sub>	6 kV
U <sub>i</sub>	400 V
I <sub>the</sub>	6 A
Utilisation category	AC-15
I <sub>e</sub> /U <sub>e</sub>	6 A/400 VAC
Max. fuse rating	6 A gG/gN fuse
Ambient temperature	-10 °C ... +70 °C
Mech. life	> 1 million operations
Switching frequency	1800/h
Actuating force	max. 85 N
Features	pull-wire function
Approvals	   

### Contact variants: switch travel/contacts

	Snap action	Order No.
1 NC/1 NO contact	ZS 70 Z 10/1S 	1182884

### Ordering details

ZS 70 Z 10/1S

1 NC/1 NO contact  
 Z Actuator towing eye  
 Series  
 Pull-wire switch







## Slack-wire switches

// Series ES 41 DB  
from page 78







# Slack-wire switches

## Application

Slack-wire switches are suitable for applications with handling equipment. There they are for example mounted at a wire in order to monitor the wire tension.

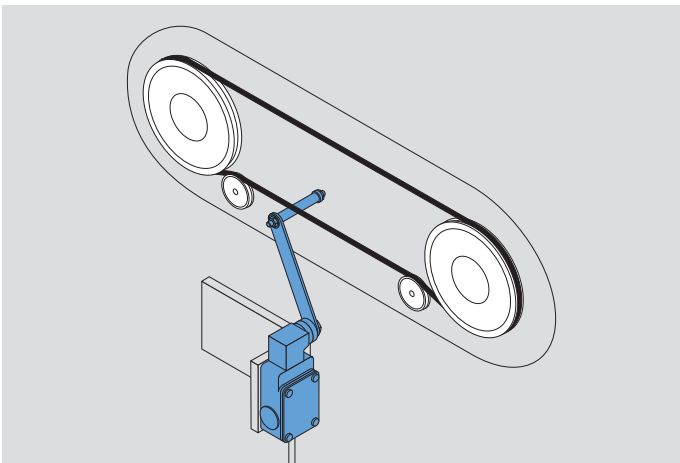
## Design and mode of operation

Slack-wire switches monitor the pull-wire tension. With correct tension present, the switch is actuated. In case of wire breakage or stretching of the wire the switch is released and thus switches the system off. In addition, this signal can depending on the construction of the system generate an optical or acoustic indicating or warning signal.

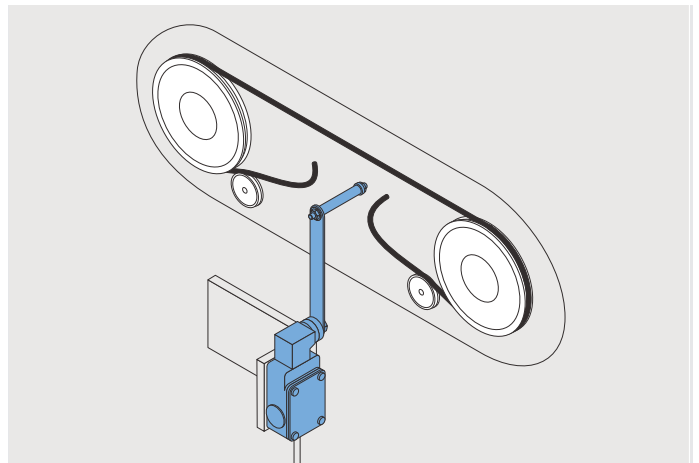
All slack-wire switches presented in this chapter bear the CE mark according to the Low Voltage Directive 06/95/EC.

## Application

### Monitoring of wire tension



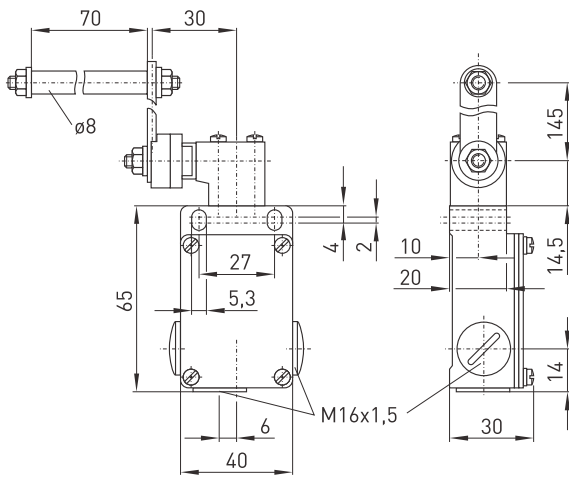
### Slack-wire switches in released state after wire breakage





Slack-wire switches  
// Series ES 41 DB

// ES 41 DB



Slow action  
ES 41 DB/90° 1Ö/1S  
ES 41 DB/90° 2Ö  
ES 41 DB/90° UE

Material Number  
1046330  
1186577  
1188101

Snap action  
EM 41 DB/90° 1Ö/1S

Material Number  
1186424

# Appendix

## // Accessories Emergency pull-wire and pull-wire switches

### // Accessories

### // Order number

<p><b>Indicator lamp glow lamp</b></p> <ul style="list-style-type: none"> <li>- Lamp cap red</li> <li>- M20 x 1.5</li> <li>- 24 VDC</li> <li>- Ordering unit: 1 piece</li> </ul>		Indicator lamp glow lamp 24 VDC	1164937
<p><b>Indicator lamp Multi-LED red</b></p> <ul style="list-style-type: none"> <li>- Lamp cap red</li> <li>- M20 x 1.5</li> <li>- 24 VDC, 115 VAC or 230 VAC</li> <li>- Ordering unit: 1 piece</li> </ul>		<p>Indicator lamp Multi-LED RD 24 VDC Indicator lamp Multi-LED RD 115 VAC Indicator lamp Multi-LED RD 230 VAC</p>	<p>1169219 1169221 1178917</p>
<p><b>Indicator lamp Multi-LED white</b></p> <ul style="list-style-type: none"> <li>- Lamp cap white</li> <li>- M20 x 1.5</li> <li>- 24 VDC, 115 VAC or 230 VAC</li> <li>- Ordering unit: 1 piece</li> </ul>		<p>Indicator lamp Multi-LED WH 24 VDC Indicator lamp Multi-LED WH 115 VAC Indicator lamp Multi-LED WH 230 VAC</p>	<p>1169220 1169222 1178916</p>
<p><b>Pulley</b></p> <ul style="list-style-type: none"> <li>- To guide the pull-wire where the path is not a straight line</li> <li>- For pull-wire with red PVC sheath Ø 5 mm (steel core Ø 3 mm)</li> <li>- Ordering unit: 1 piece</li> </ul>		Pulley	1041765
<p><b>Pull-wire</b></p> <ul style="list-style-type: none"> <li>- Steel core Ø 3 mm with red PVC sheath</li> <li>- Total diameter 5 mm</li> <li>- Ordering unit: per metre</li> <li>- Available with stainless steel core</li> </ul>		<p>Pull-wire Ø 5 mm per metre Pull-wire stainless steel Ø 5 mm per metre</p>	<p>1032984 1033297</p>
<p><b>Complete Pull-wire set</b></p> <ul style="list-style-type: none"> <li>- 5 m pull-wire Ø 3 mm with 2 mm PVC sheath, 2 wire clamps DIN 741, 1 wire thimble DIN 6899, 1 eye bolt DIN 444 and 1 Duplex wire clamp</li> </ul>		<p>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</p>	<p>1041628 1041633 1041634 1041645 1041635 1041642</p>
<p><b>Pull-wire for emergency pull-wire sw.</b></p> <ul style="list-style-type: none"> <li>- Pull-wire yellow (polypropylene)</li> <li>- 1, 2, 3 or 4 m long</li> <li>- With rubber ball and mounting clamp</li> </ul>		<p>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</p>	<p>1041764 1167653 1167654 1160281</p>
<p><b>Pull-wire for pull-wire switches</b></p> <ul style="list-style-type: none"> <li>- Pull-wire yellow (polypropylene)</li> <li>- 1, 2, 3 or 4 m long</li> <li>- With rubber ball and Duplex wire clamp</li> <li>- Ordering unit: 1 piece</li> </ul>		<p>Pull-wire with ball pull-wire switches 1 m Pull-wire with ball pull-wire switches 2 m Pull-wire with ball pull-wire switches 3 m Pull-wire with ball pull-wire switches 4 m</p>	<p>1177973 1177974 1177975 1177976</p>
<p><b>Wire clamp</b></p> <ul style="list-style-type: none"> <li>- For pull-wire with steel core Ø 3 mm</li> <li>- Ordering unit: 1 piece</li> <li>- Wire clamp made of stainless steel available</li> </ul>		<p>Wire clamp 3 mm Wire clamp 3 mm stainless steel</p>	<p>1033247 1033299</p>



## // Accessories

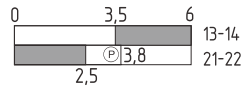
## // Order number



<p><b>Duplex wire clamp</b>          - For pull-wire with steel core <math>\varnothing</math> 3 mm          - Ordering unit: 1 piece</p>		<p>Duplex wire clamp 1033248</p>
<p><b>Egg-shaped wire clamp</b>          - For pull-wire with steel core <math>\varnothing</math> 3 mm          - Ordering unit: 1 piece</p>		<p>Egg-shaped wire clamp 3 mm 1181896</p>
<p><b>Wire thimble</b>          - Per DIN 6899          - For pull-wire with steel core <math>\varnothing</math> 3 mm          - Wire clamp made of stainless steel available</p>		<p>Wire thimble 3 mm 1033245          Wire thimble 3 mm stainless steel 1172707</p>
<p><b>Eye bolt incl. nut</b>          - Per DIN 444          - Available made of stainless steel          - Ordering unit: 1 piece</p>		<p>Eye bolt M8x70 with nut 1170601          Eye bolt M8 x 70 stainless steel with nut 1189687          Eye bolt BM10 x 40 with nut 1032610          Eye bolt M10 x 55 open with 2 nuts 1279170</p>
<p><b>Compensation spring/travel limitation</b>          - Adaption of length expansions caused by changes in temperature          - Stainless steel 1.4310          - Ordering unit: 1 piece</p>		<p>Compensation spring ZS 71-100N 1187921          Compensation spring ZS 73/75-200N 1187931          Compensation spring ZS 73/75-400N 1187934          Compensation spring ZS 73/75 S 1187935          Compensation spring ZS 80 1187933</p>
<p><b>Compensation spring ZS 91 S</b>          - Adaption of length expansions caused by changes in temperature          - Stainless steel 1.4310          - Ordering unit: 1 piece</p>		<p>Compensation spring ZS 91 S 1184540</p>
<p><b>Tensioner M6</b>          - For precise adjustment of pull-wire pre-stress          - Per DIN 1480          - Adjustable von 145 mm bis 225 mm</p>		<p>Tensioner M6 1033254</p>
<p><b>Tensioner M8</b>          - For precise adjustment of pull-wire pre-stress          - Made of stainless steel, adjustable from 160 mm to 255 mm</p>		<p>Tensioner M8 Niro 1033300</p>
<p><b>Cable tensioner system TS 65</b>          - For pull-wire with steel core <math>\varnothing</math> 4 - 6 mm incl. sheath          - Adjustment range max. 65 mm          - Diameter of eyebolt min. 8 mm          - Pull-wire length max. 75 m</p>		<p>Cable tensioner system TS 65 1186621</p>

# Explanation of symbols

-  positive break NC contacts
-  positive break travel/angle
-  latching point
-  wire breakage detection
-  wire pull detection
-  spanner size across flats
-  CSA/UL approval, Canada
-  CCC approval, China
-  Gost approval, Russia
-  Inmetro approval, Brazil
-  TÜV prototype-tested
-  BG prototype-tested
-  conformity to standards, see declaration of conformity
- $I_e$  thermal test current
- $I_{the}$  Thermal test current
- $U_e$  rated operating voltage
- $U_i$  rated insulation voltage
- $U_{imp}$  rated impulse withstand voltage

## Explanation of travel diagrams



 Contact open  
 Contact closed

X1-X2 NC contact  
 X3-X4 NO contact  
 X5-X6 contact overlapping

Image sources:  
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