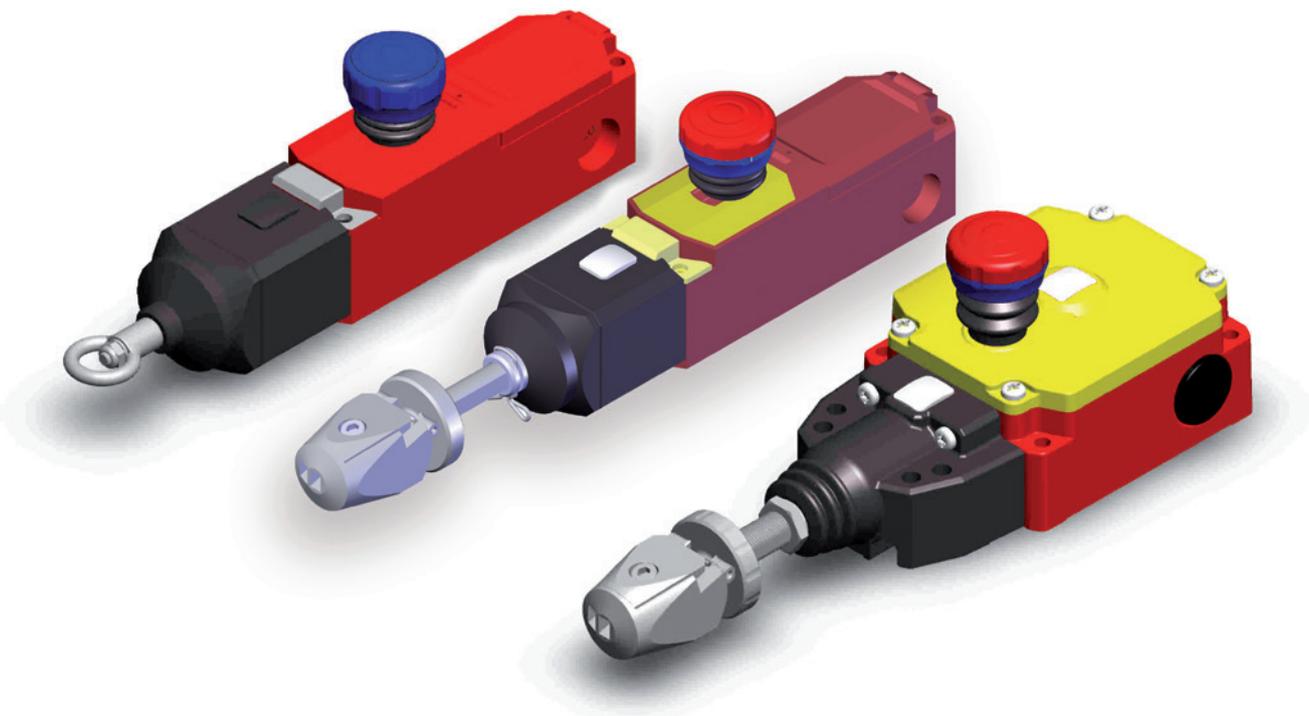


# EUCHNER

## Operating Instructions



Rope Pull Switches  
RPS...

EN

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## 1. About this document

### 1.1. Scope

These operating instructions are valid for all Rope Pull Switches RPS.... These operating instructions, the document *Safety information* and any available data sheet form the complete user information for your device.

### 1.2. Target group

Design engineers and installation planners for safety devices on machines, as well as setup and servicing staff possessing special expertise in handling safety components.

### 1.3. Key to symbols

Symbol/depiction	Meaning
	Printed document
	Document is available for download at <a href="http://www.euchner.com">www.euchner.com</a>
	This section is applicable only if the memory card is used
 <b>DANGER</b> <b>WARNING</b> <b>CAUTION</b>	Safety precautions <b>Danger</b> of death or severe injuries <b>Warning</b> about possible injuries <b>Caution</b> slight injuries possible
 <b>NOTICE</b> <b>Important!</b>	<b>Notice</b> about possible device damage <b>Important</b> information
<b>Tip</b>	Useful information

### 1.4. Supplementary documents

The overall documentation for this device consists of the following documents:

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	
Operating instructions (2090276)	(this document)	
Declaration of conformity	Declaration of conformity	
Possibly available data sheet	Item-specific information about deviations or additions	 
	<b>Important!</b> Always read all documents to gain a complete overview of safe installation, setup and use of the device. The documents can be downloaded from <a href="http://www.euchner.com">www.euchner.com</a> . For this purpose enter the doc. no. in the search box.	

## 2. Correct use

According to EN 60947-5-5 and EN ISO 13850, rope pull switches can be used to initiate an emergency stop function in order to avoid existing or impending hazard situations.

The following applicable standards must be taken into account for this purpose:

- EN ISO 13849-1
- EN ISO 12100
- EN ISO 13850

The purpose of these regulations is to prevent any danger for persons or damage to machines.

The safety rope pull switches of the series RPS have been designed and tested in accordance with the standards EN 60947-5-5 and EN ISO 13850. They must be used only in control circuits.

Safety rope pull switches are used on the accessible sides of conveyor systems or machines. In contrast to emergency stop switches (e.g. mushroom-head pushbuttons) located at certain intervals that allow the emergency stop signal to be generated only at the devices themselves, rope pull switches allow signal generation at any point along the rope length.

The safety rope pull switches of the type RPS are suitable for use only in closed rooms.

The safety rope pull switches of the type RPS-M are suitable for use in closed rooms and outdoors.

## 3. Design

The safety rope pull switches of the type RPS consist of a polyamide housing, those of the type RPS-M of a die-cast aluminum housing. They achieve the specified degree of protection IP67 if the cover is properly closed and if a cable gland is used that offers at least equivalent protection. The RPS has three cable entries M20x1.5.

The switches comply with the international requirements according to EN 60947-5-5 and EN ISO 13850, i.e. after actuation or a rope tear, the emergency stop switch latches automatically and the switch can then be reset to its initial position only by means of the resetting device on the switch.

Depending on the switch version, it is possible to achieve a rope length of up to 75 m. It must be taken into account here that the friction in the overall system can become so high due to the rope guides that this makes it difficult or impossible to reset the system (see "Mounting" section).

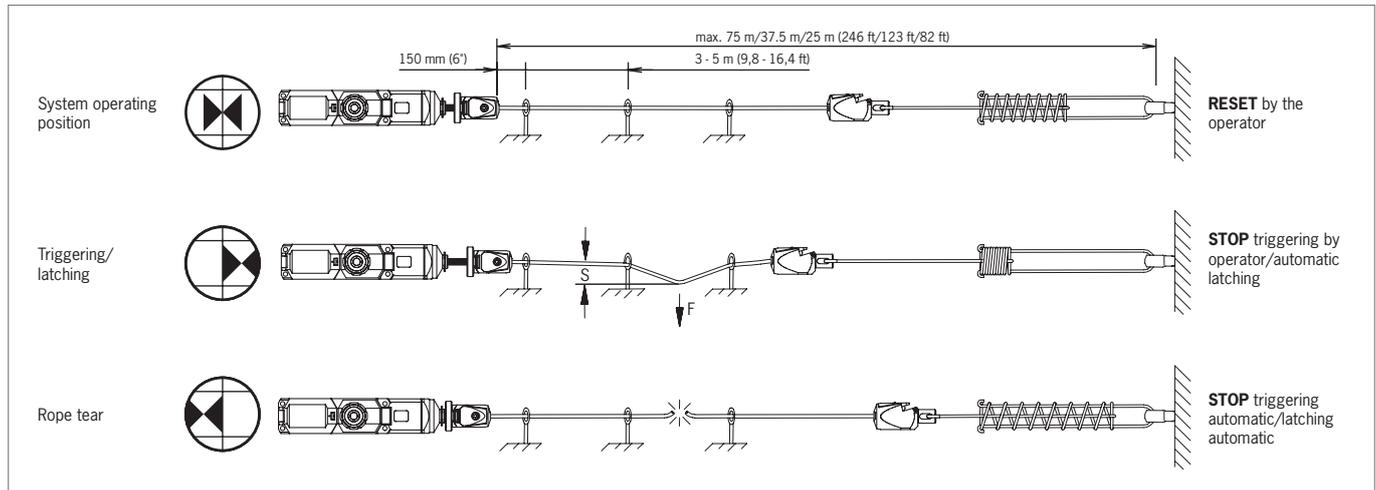
This can be avoided by choosing different system components.

The user is responsible for ensuring that the system functions properly.

## 4. Function

The system consists of the switching device, a red pull rope, support points and a counterspring.

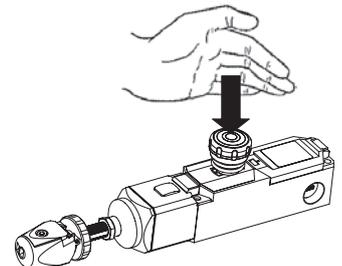
The pull device of the rope pull switch is connected with a pull rope. The emergency stop function can be tripped by pulling this rope. Since the rope pull system is pretensioned by an integrated spring, switch latching and the emergency stop function are tripped immediately if the rope tears. The safety contacts remain latched after activation. After the hazardous situation has been remedied and after examination of the entire rope pull section, the system may be manually reset to readiness for operation again.



### 4.1. RPS...S

The RPS...S... types have an integrated red emergency stop slam button that can be actuated by pressing it if a hazardous situation occurs. Analogously to operation of the pull rope, the safety contacts are then opened and the switch is latched. After rectification of the hazardous situation, the system can be reset manually to readiness for operation by pulling.

Please also refer to item 3 in chapter 10. *Installation sequence*.



### 4.2. RPS...P

After the hazard situation has been remedied, and with the rope system tensioned, the rope pull switch can be unlocked and so made operational again by pulling the reset knob.

### 4.3. Pre-failure monitoring (optional)

The safety rope pull switches of the type RPS-M-E... have a remote display for monitoring the rope tension. It uses an integrated sensor unit to monitor the permissible rope tension for being exceeded and impending activation of the safety rope pull switch.

Required maintenance/adjustment is signaled via an electronic output in good time before unintentional machine standstills occur. Optionally available signal lamps can also be connected to this output (refer to chapter 19. *Accessories*). This meets the requirements for *preventive maintenance*.

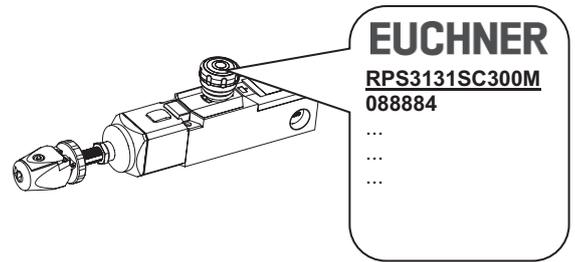
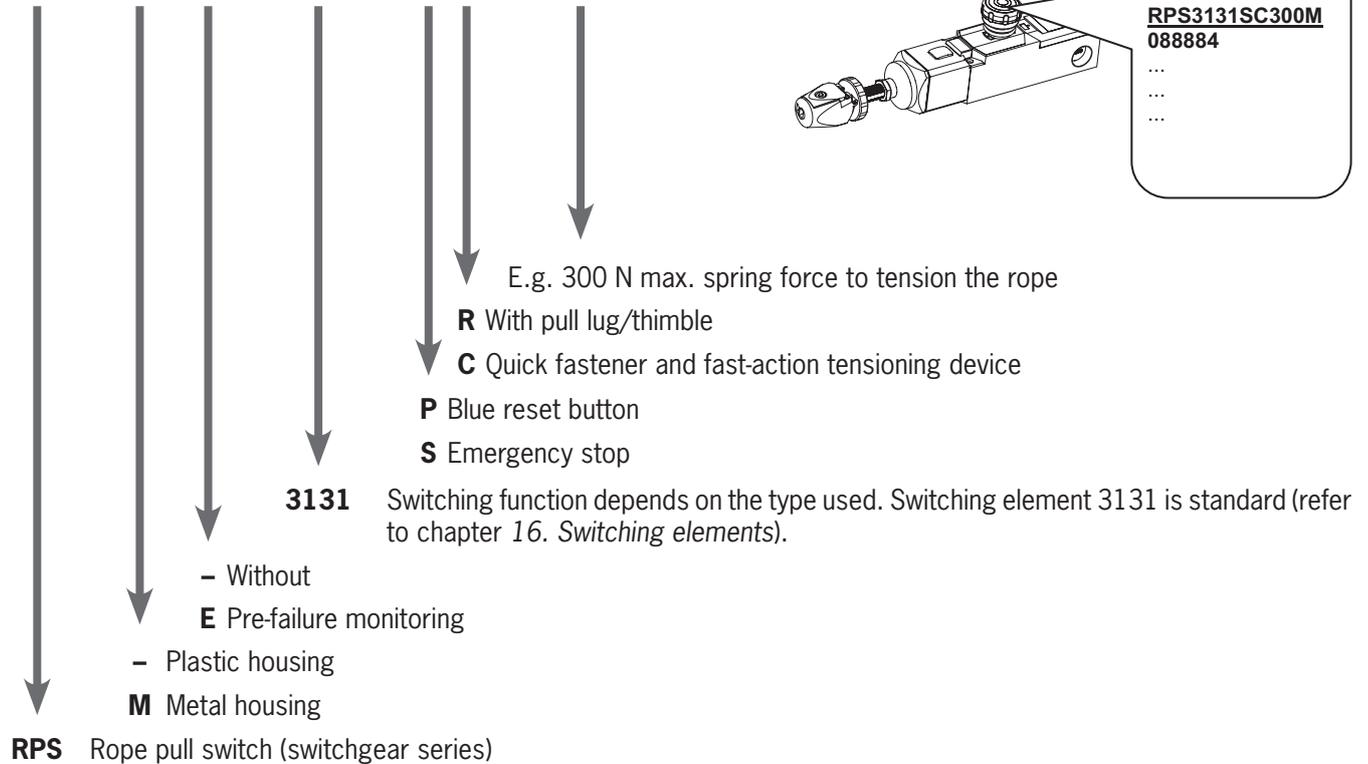
### 5. Safety precautions

- › All system components must be mounted on surfaces that can safely withstand all the forces that may occur.
- › Routing the rope as straight as possible results in low frictional forces in the system. From a system length of 25 m, only rope pulley blocks may be used as rope supports. Rope pulley blocks and other accessories are optionally available.
- › Positioning the support points at irregular intervals prevents rope oscillations that might cause false tripping.
- › The red pull rope must have sufficient space between the support points to ensure that secure gripping and activation are possible. To improve visibility, marking flags can be attached to the pull rope along its length; however, these must not interfere with activation of the emergency stop function!
- › When a rope pull section is being set up and planned, it is necessary to take into account and comply with the applicable regulations, as well as the maximum permitted actuating travel of  $S = 400 \text{ mm}$  and maximum tripping force of  $F = 200 \text{ N}$  applied perpendicularly to the rope.
- › Suitable guide rollers (roller diameter  $\geq 50 \text{ mm}$ ) must be used for rope routing at angles. The rope pull section must be angled by no more than  $180^\circ$  (e.g.  $2 \times 90^\circ$ ).
- › Improper installation of or tampering with the rope pull switch will lead to loss of the personnel protection function and can cause serious or fatal injuries.
- › Rope pull switches must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.
- › Mounting, electrical connection and setup only by authorized personnel.
- › If damage or wear is found, the complete switch must be replaced. Replacement of individual parts or assemblies is not permitted!
- › The user is responsible for safe integration of the device into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-2.
- › If the simplified method according to section 6.3 of EN ISO 13849 1:2015 is used for validation, the Performance Level (PL) might be reduced if several devices are connected in series.
- › If a data sheet is available, the information on the data sheet applies in case of discrepancies with the operating instructions.

## 6. Identification of the rope pull switch

### 6.1. Identification by designation

#### RPS-M-E-3131-SC-300M...

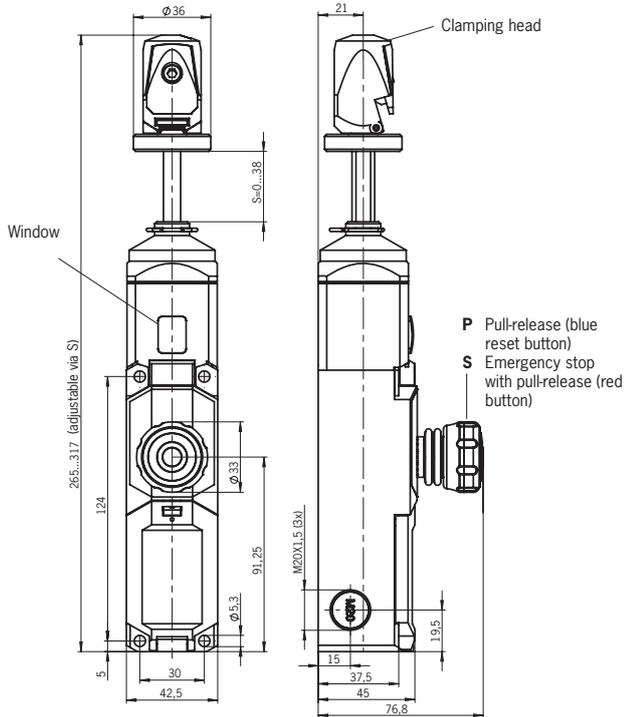


### 6.2. Identification by item number

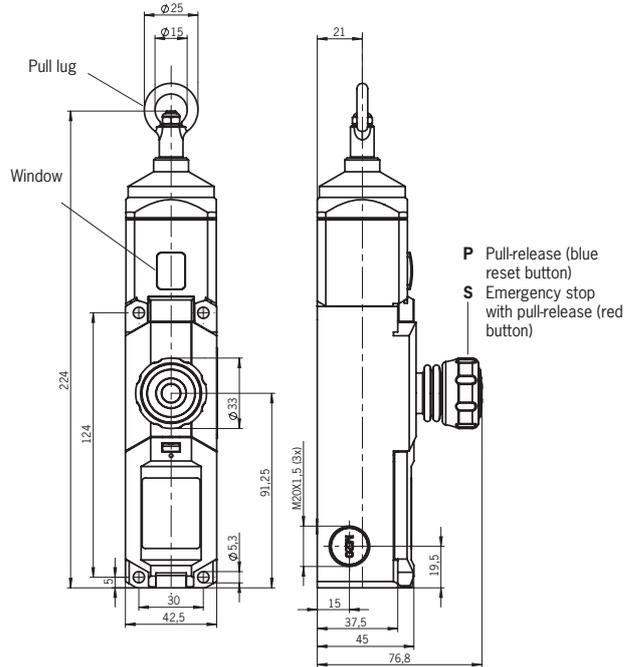
The item number of the switch is located beneath the switch designation on the switch label. Please state this number in correspondence and orders to EUCHNER GmbH + Co. KG.

## 7. Dimensions

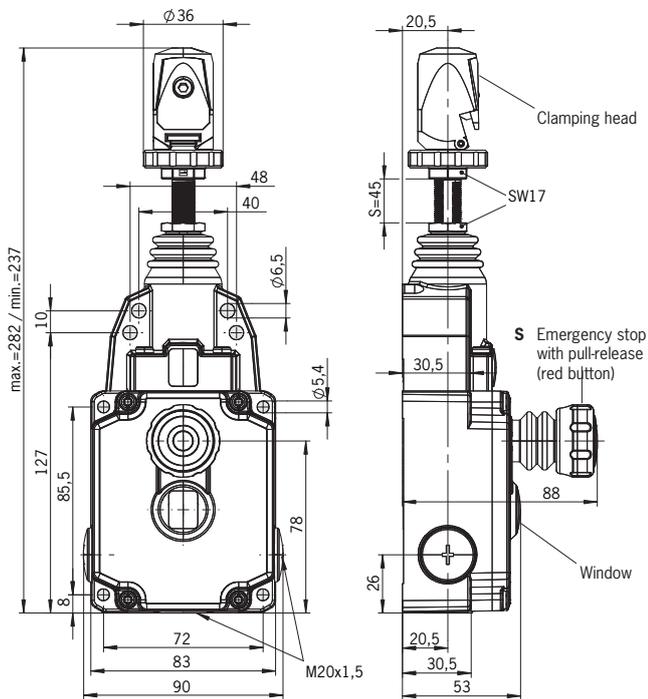
RPS...SC... / RPS...PC...



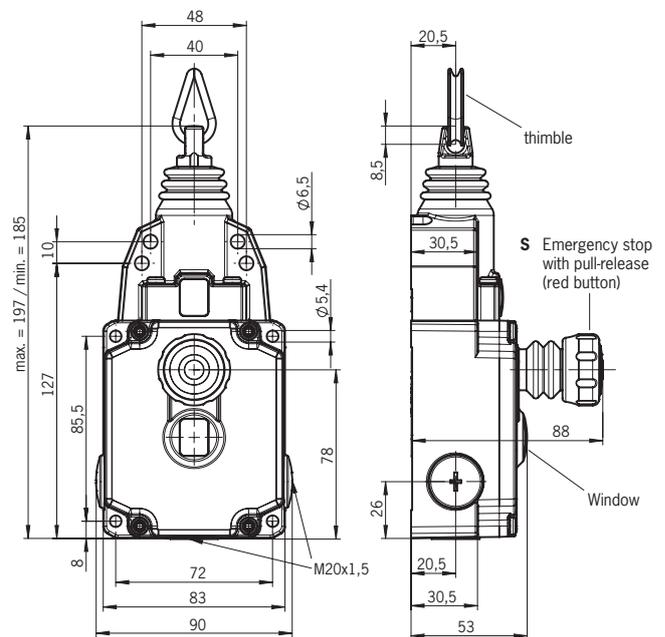
RPS...PR... / RPS...SR...



RPS-M...SC...



RPS-M...SR...



All dimensions in millimeters

## 8. Mounting



### NOTICE

- › Under ideal installation conditions, it is possible to achieve a maximum rope length of 75 m.
- › Depending on the actual situation, there may be increased friction in the system. This friction may be so high that automatic resetting is no longer possible as described above. However, activation in the event of a rope tear must be guaranteed in all cases.
- › The amount of friction depends on:
  - Number of eyebolts used
  - Number of contact angles and deflections
  - Number and size of guide rollers
  - Alignment of rollers and eyebolts with respect to each other.
- › The friction can be reduced by using guide rollers with a larger diameter. The system should be divided up if there is too much friction. The user is responsible for component selection and correct functioning of the system.
- › It is recommended to remove the sheath in the undefined operating area of the support points.

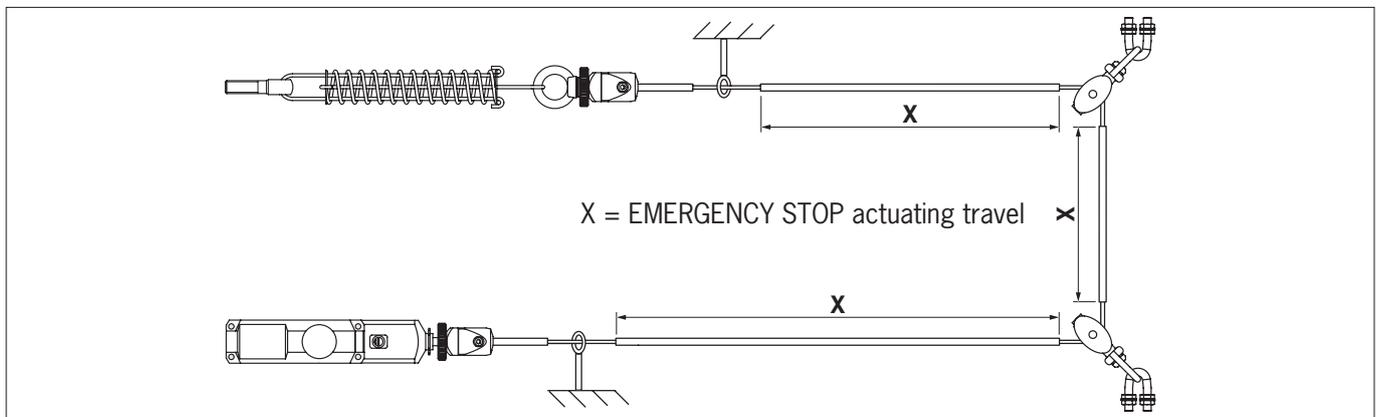


Fig. 1: Example of proper installation

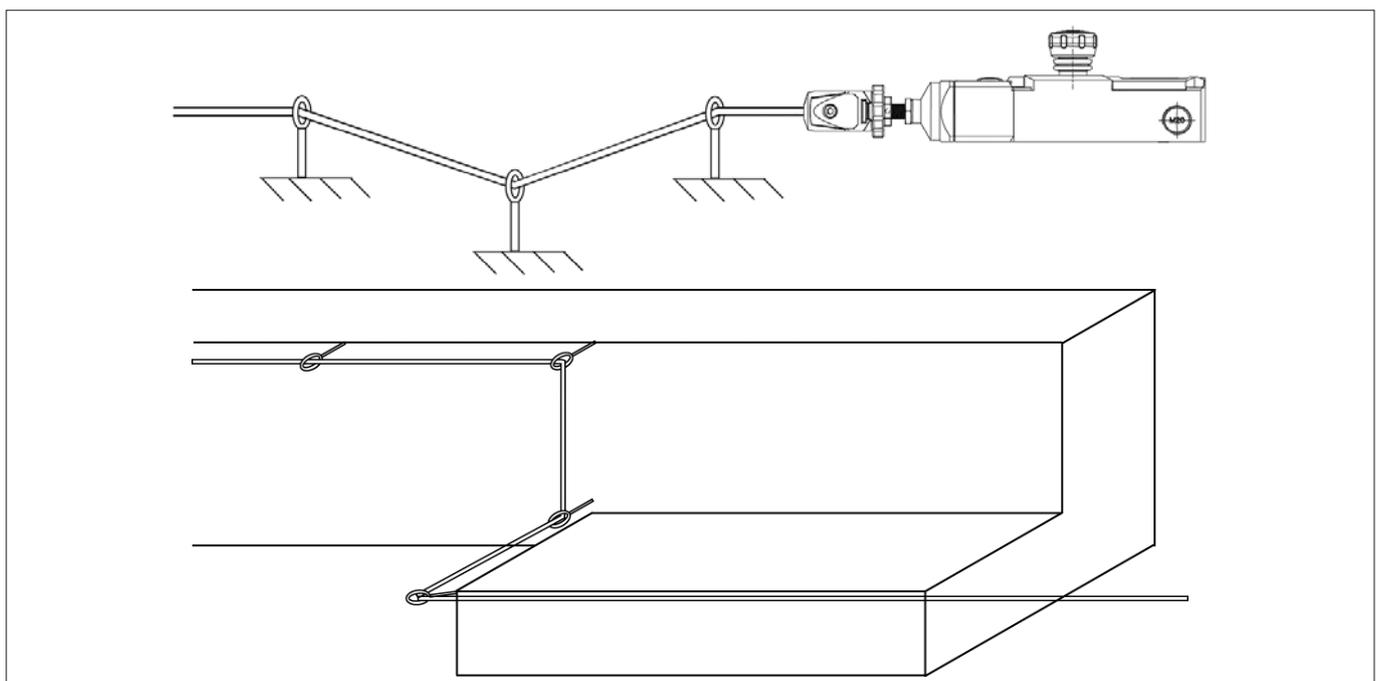


Fig. 2: Examples of improper installation

### 9. Selection of system components

A tensioner spring must be installed on the counter bearing in order to ensure proper and safety-compliant implementation of the rope pull system. This is a precondition for direction-independent activation at any point along the rope length. In order to achieve fast and simple compliance with this requirement, we recommend the use of EUCHNER tensioner springs with integrated overstretch protection (see *Table 1*). Additional fixing and installation materials as well as ropes are also optionally available. A detailed overview is provided in the “Accessories” chapter.

#### 9.1. Tensioner spring

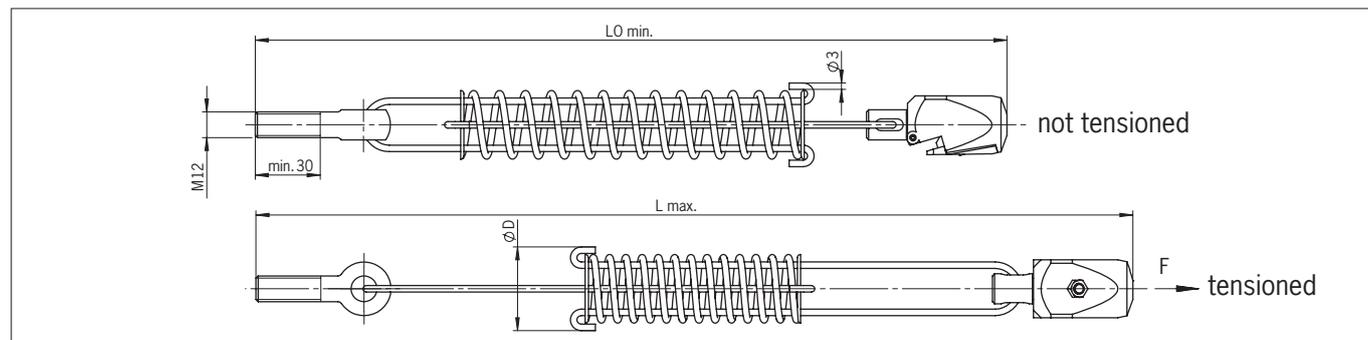


Table 1: Tensioner springs

RPS type	RPS...100/175	RPS...300
Item number	092136	092138
LO min. [mm]	383	483
L max. [mm]	487	653
Ø D [mm]	39	48

Tensioner springs are supplied with quick fastener and an eyebolt according to DIN 444 - M12 x 50.

When installing and adjusting the rope pull switch, it is necessary to take into account the physical changes in the rope length as a result of variations in temperature.

*Table 2* shows the permitted rope lengths as a function of the expected temperature difference.

The diagram also shows the maximum permitted rope length for the different spring forces of the respective switch types. It also permits selection of the appropriate switch corresponding to the expected temperature variations.

Table 2: Permissible rope lengths

		Rope length $L_{max}$ in meters [m]																																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	55	60	65
Max. temperature fluctuation [K]	± 80 K																																						
	± 70 K																																						
	± 60 K																																						
	± 50 K																																						
	± 40 K																																						
	± 30 K																																						
	± 20 K																																						
	± 10 K																																						
± 7 K																																							
<b>RPS...100</b>	Rope length max. 25 m																																						
<b>RPS...175</b>	Rope length max. 37.5 m																																						
<b>RPS...300</b>	Rope length max. 75 m																																						

		Rope length $L_{max}$ in meters [m]																																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	55	60	65
Max. temperature fluctuation [K]	± 110 K																																						
	± 100 K																																						
	± 90 K																																						
	± 70 K																																						
	± 50 K																																						
	± 40 K																																						
	± 26 K																																						
	± 14 K																																						
± 9 K																																							
<b>RPS-M...175</b>	Rope length max. 37.5 m																																						
<b>RPS-M...300</b>	Rope length max. 75 m																																						

Rope supports must be provided at intervals of 2 – 5 m when planning and installing the system. Refer also to the “Safety precautions” chapter.

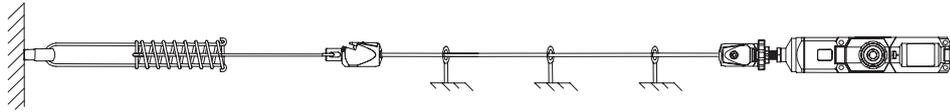
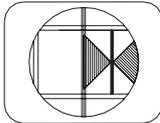
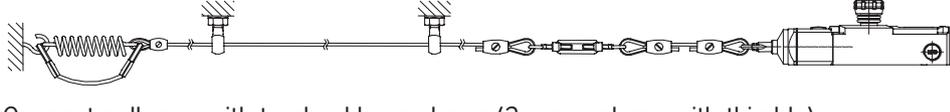
### 10. Installation sequence

Installation must be performed only by authorized personnel.

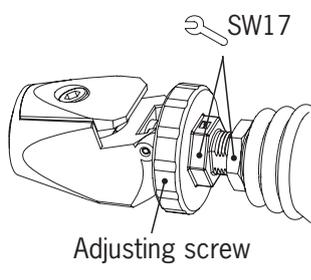
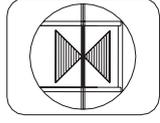
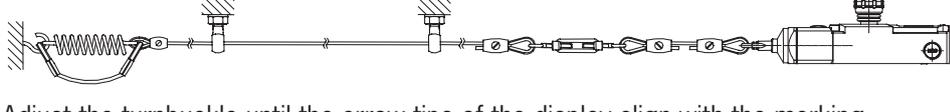
1 A	1.1 A	1.2 A	1.3 A
<p>Attach bearing element with tensioner spring; fit pull rope: sheathing <u>must</u> be removed in the clamping range; insert rope into the fast-action clamping head as shown and secure.</p>			
B	1.1B	1.2B	
<p>Attach bearing element with counterspring; fit pull rope: secure rope as shown with thimble and rope clamp, attach rope bridge to limit travel of counterspring with thimbles and rope clamps.</p>			

2 A			
B			
<p>Observe distance to the 1st support points. The 1st rope support toward the switch must be installed after <math>L_a = 150</math> mm. On the counterspring side, observe the distance <math>L_g = 200</math> mm for sufficient tripping travel of the switch. Install supports at intervals of 2 – 5 m.</p>			

3	<p>Fasten the RPS switch with 4 M5 screws (also M6 for RPS-M).</p> <p>Maximum tightening torque <math>M = 2</math> Nm</p>		
		<p>The emergency stop switches must be positioned so that the rope or emergency stop slam button can be reached without obstacles in hazardous situations.</p>	

<p><b>4 A</b></p>  <p>Connect pull rope with fast-action clamping head (see Item 1). Pre-tension pull rope.</p>	<p>Display</p> 
<p><b>B</b></p>  <p>Connect pull rope with turnbuckle as shown (3x rope clamp with thimble)</p>	

**5** Basic setting should take place at a temperature corresponding to the prevailing operating conditions. The length of the pull rope changes if there is a large change in the ambient temperature. Under these conditions, long rope lengths mean a frequent change in the basic setting. This can be remedied by re-adjustment (Item 5) or shortening the rope length (Table 3).

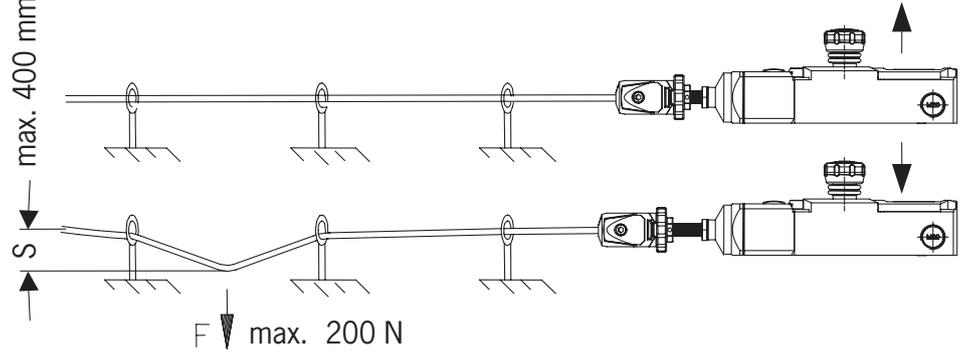
<p><b>A</b></p>  <p>SW17</p> <p>Adjusting screw</p>	<p>Remove any leg spring. If necessary, manually adjust the rope length with the adjusting screw or a flat wrench (a/f 17) by turning the screw in until the arrow tips of the rope tension display align with the marking.</p> <p>Hold the fast-action clamping head when doing this to prevent the pull rope from twisting.</p> <p>Subsequently insert a leg spring or secure the adjusting screw against loosening by locking with the hexagon nut.</p>	<p>Display</p> 
<p><b>B</b></p>  <p>Adjust the turnbuckle until the arrow tips of the display align with the marking.</p>		

## 11. Mechanical function test

**6** Pull button up:  
 ▶ safety contacts closed.

Actuate pull rope or press button:  
 ▶ safety contacts open.

For each test procedure:  
 ▶ actuate button or  
 ▶ pull rope.



max. 400 mm

S

F max. 200 N

Forcefully actuate the pull rope several times to settle the rope pull section.  
 If necessary, correct the adjustment with the adjusting screw/turnbuckle.

### 12. Electrical connection



#### WARNING

- › Electrical connection must be performed only by authorized personnel.
- › Strip the insulation from the ends of the individual wires over a length of  $6 \pm 1$  mm to ensure a safe contact.

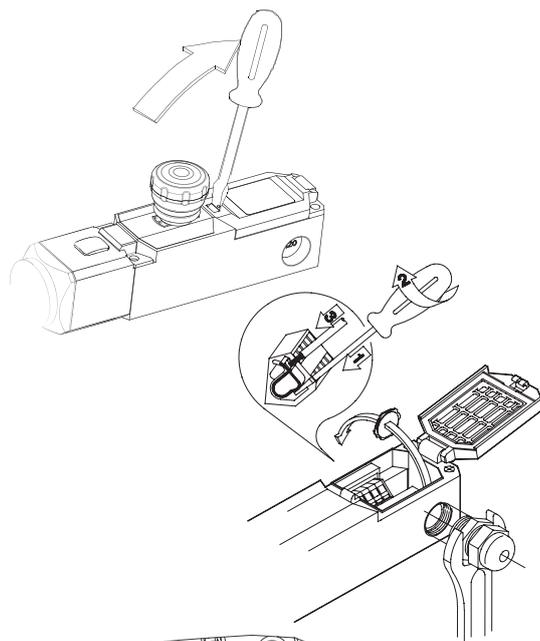


#### NOTICE

- › At least one contact  must be used.

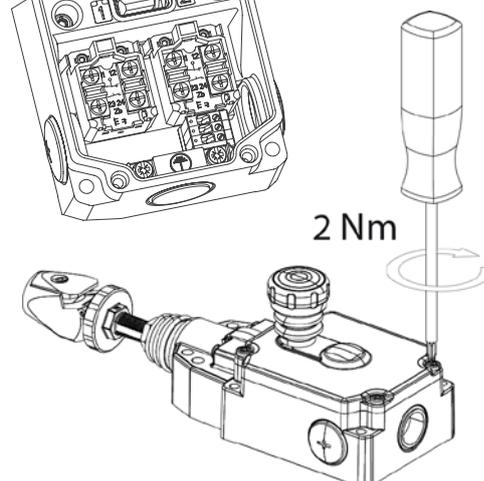
#### 12.1. Connection of RPS...

1. Release cover using a screwdriver.
2. Open break-out wall by screwing in the cable gland; remove the plastic part.
3. Tighten the cable gland.
4. Connect to cage pull spring.
5. Insert screwdriver (2.5 mm blade width) into the bottom opening **(1)**.
6. Turn screwdriver by 45° **(2)**.
7. Insert flexible cable with a cross-section of  $0.5 \dots 1.5 \text{ mm}^2$  into the upper opening **(3)**. The cable end must be fitted with a cable end sleeve.
8. Remove screwdriver.
9. Press on cover.



#### 12.2. Connection of RPS-M...

1. Remove cover: To do this, unscrew the cover screws with a screwdriver and remove the cover.
2. Electrical connection: The electrical contacts of the switching contacts have M3.5 screw terminals. For terminal assignment, see chapter 16. *Switching elements*. The connection must be made as a flexible wire with cable end sleeve or as a single wire with the conductor cross-sections  $0.5 \dots 1.5 \text{ mm}^2$ .
3. Close cover: Place the cover on the housing as shown and tighten the cover screws with a torque of 2 Nm.



## 13. Connection example

The following connection example shows a possible circuit structure with redundant design at the cable level as well.

The signals of the emergency stop chain are evaluated by a safety relay (ESM from EUCHNER).

The overall control concept into which the rope pull switch RPS is integrated must be evaluated by the end consumer/machine designer in accordance with EN ISO 13849-2.

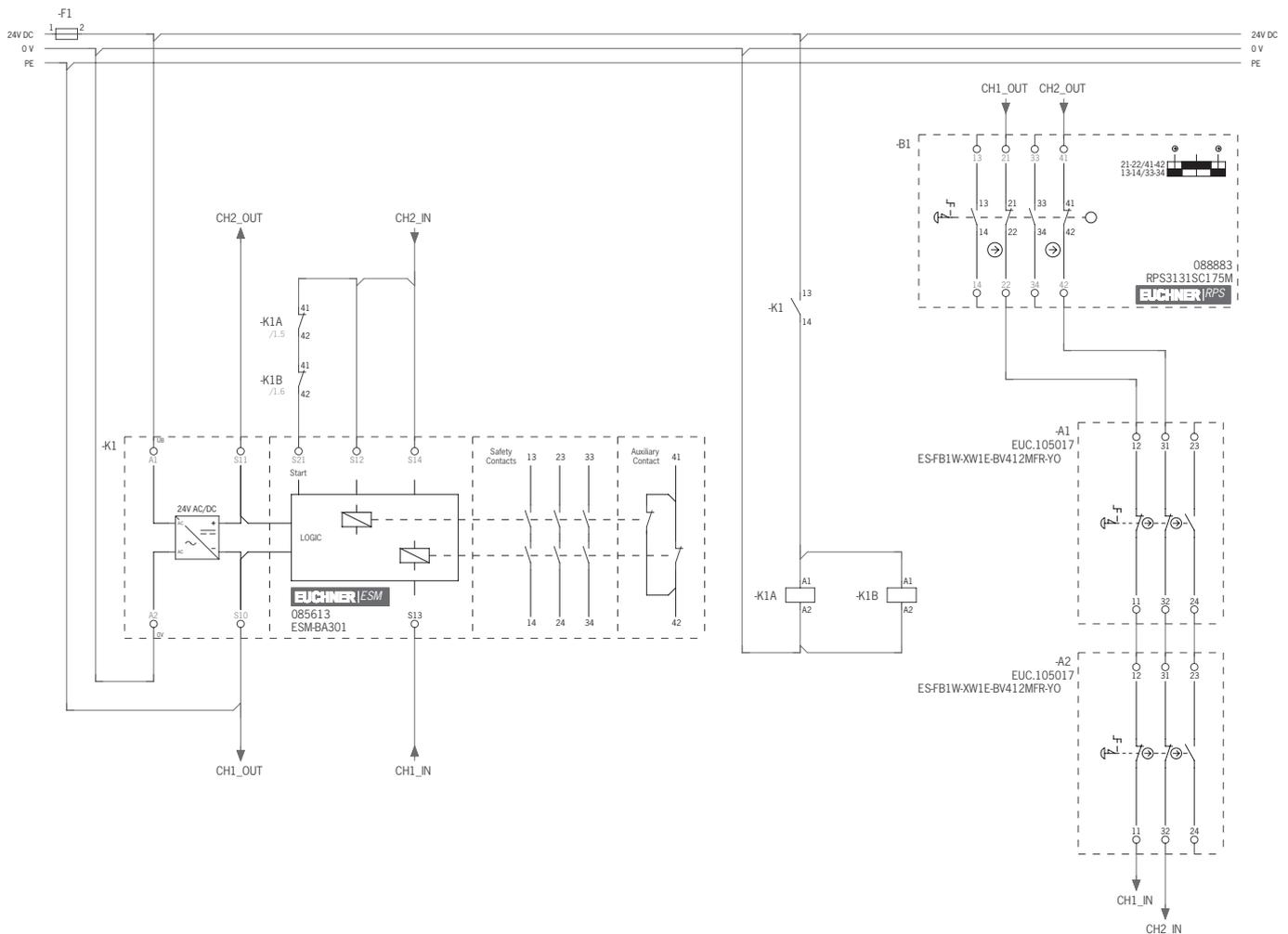


Fig. 3: Connection example

## 14. Setup

### 14.1. Mechanical function test

It must be possible to actuate the pull rope easily at every point of the rope pull system. As a check, actuate the pull rope several times.

### 14.2. Electrical function test

1. Activate the rope pull safety system by means of the RESET actuating cylinder.
2. Start the installation/machine.
3. Actuate the pull rope/emergency stop button ➔ This results in the safety contacts ⊖ opening immediately.
4. Pull the RESET actuating cylinder to close the safety contacts ⊕.

### 15. Technical data

Version	RPS...	RPS-M...
<b>Electrical data</b> (refers to the switch without plug connector)		
Rated insulation voltage	$U_i$	250 V
Rated operating voltage	$U_e$	240 V
Rated impulse withstand voltage	$U_{imp}$	2.5 kV
Conditional short-circuit current		100 A
Continuous thermal current	$I_{the}$	10 A
Utilization category	AC 15; 240 V / 3 A	AC 15; 240 V / 3 A, 120 V / 6 A DC 13; 250 V / 0.27 A, 125 V / 0.55 A
Short circuit protection	6 A gG acc. to IEC 60269-1	
Safety class	II	I
Positively driven NC contacts	⊖ IEC/ EN 60947-5-1, Appendix K	
<b>Pre-failure monitoring RPS-M-E...</b>		
Rated operating voltage	$U_e$	10-30 V/DC
Rated operating current	$I_e$	50 mA
Utilization category		DC 13
Short circuit protection		Yes
Reverse polarity protection		Yes
Connection		Screw terminal, 3-pin = 1.5 mm <sup>2</sup>
<b>Mechanical data</b>		
Housing/cover	PA 6 GV (UL94-V0)	Die-cast aluminum
Emergency stop	PA, fiber glass reinforced	
Actuation	Die-cast zinc/steel	
Ambient temperature	-25°C to +70°C	-30°C to +80°C
Mechanical life	Acc. to IEC 60947-5-5: 0.1 x 10 <sup>6</sup> operating cycles	
Switching frequency	≤ 20/min.	
Latching device	Acc. to EN 60947-5-5, ISO 13850 (DIN EN 418)	
Emergency stop reset	Button pull acc. to EN 60947-5-5	
Rope length	Depending on type $L_{max} \leq 75 \text{ m}/37.5 \text{ m}/25 \text{ m}$ (observe Table 2)	
Rope Ø	D = Ø 2 - 5 mm	
Rope attachment	RPS...SC / PC... fast-action clamping device; PR... / SR... by means of pull lug/thimble	
Connection	8 x cage pull spring 0.5 ... 1.5 mm <sup>2</sup> flex.	8 screw terminals (Ø3.5) 0.5 ... 1.5 mm <sup>2</sup> flex.
Cable entry	3 x M20x1.5	
Mounting	4 x M5	4 x M5 or 4 x M6
Weight	Approx. 0.65 kg	Approx. 1.0 kg
Degree of protection	IP67	
<b>Characteristics acc. to EN ISO 13849-1</b>		
$B_{10D}$ at DC-13 100 mA/24 V		
- RPS		1 x 10 <sup>5</sup>
- RPS-M		2 x 10 <sup>5</sup>

#### Regulations

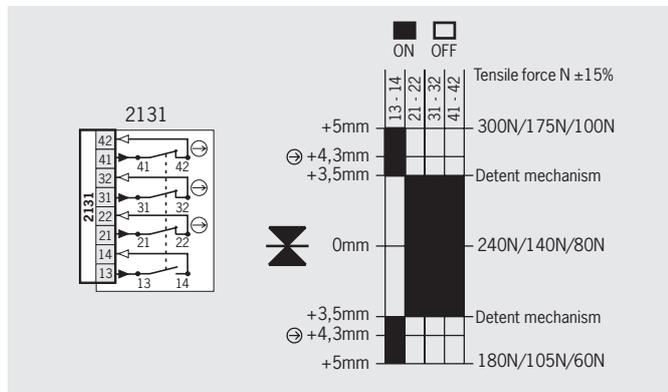
EN 60947-1, EN 60947-5-1, EN 60947-5-5, EN ISO 13850

## 16. Switching elements

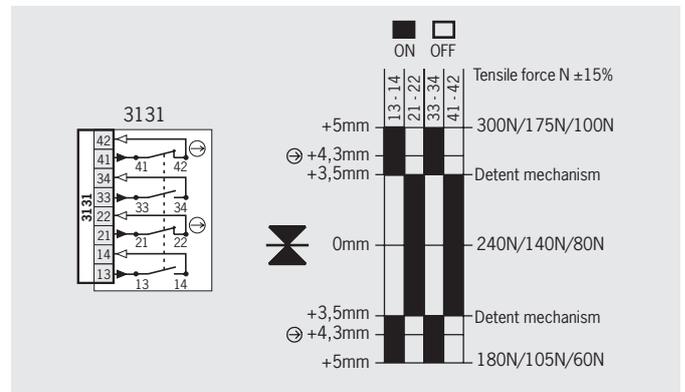
The values for the tensile force depend on the switch type used (RPS...100/RPS...175/RPS...300).

Tolerance: tensile force  $\pm 15\%$

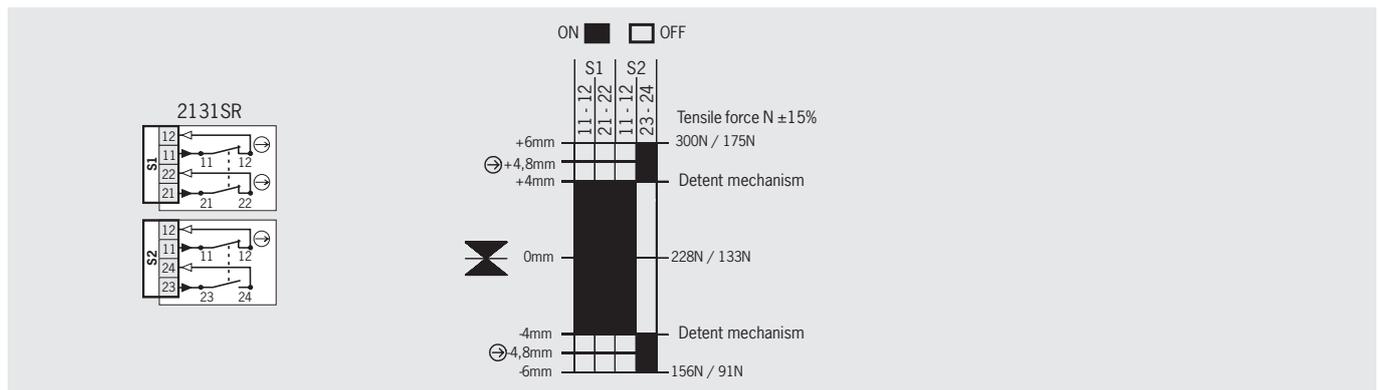
### Travel diagram RPS2131...



### Travel diagram RPS3131...

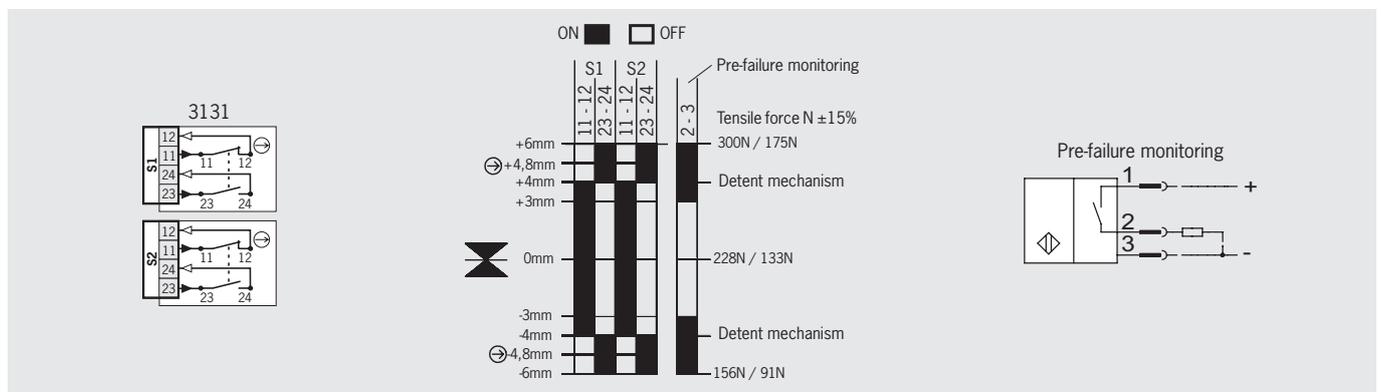


### Travel diagram RPS-M-2131SR... with metal housing



### Travel diagram RPS-M-3131... with metal housing

### Travel diagram RPS-M-E-3131... with metal housing and pre-failure monitoring



### 17. Maintenance/service

In order to ensure trouble-free, long-term operation, it is necessary to perform regular, documented inspection of the following:

- smooth actuation
- correct switching function
- correct rope tension
- secure mounting of components
- dirt and wear
- sealing of cable entry
- loose cable connections or plug connectors.

After servicing or repair, correct functioning of the system should be checked by actuating the pull rope several times. It must be ensured that the switch latches properly after actuation.

In the event of a fault in the switching system or latching device, the switch must be replaced and can be sent to EUCHNER GmbH + Co. KG for inspection.

### 18. Exclusion of liability

If the instructions (correct use, safety regulations, mounting and connection by trained personnel, check for safe function) are violated, this renders the manufacturer's liability null and void.

### 19. Accessories

Designation	Description/version	Packaging unit	Order no./item
<b>Eyebolt</b>	Thread M8	5 pcs.	<b>092495</b> RPS-O-8-50/V5
<b>Rope set</b>	Consisting of thimble and rope clamp	5 pcs.	<b>092496</b> RPS-RS/V5
<b>Pulley set RPS-PS/V5</b>	Rope pulley block with swiveling lug (roller Ø 6 mm) and fastening clamp	5 pcs.	<b>092501</b> RPS-PS/V5
<b>Rope pulley block RPS-P/V1</b>	Rope pulley block (roller Ø 14 mm)	1 pcs.	<b>096251</b> RPS-P/V1
<b>Tensioning rope</b>	Length 50 m	1 pcs.	<b>092813</b> RPS-I-3-4/50M
	Length 100 m	1 pcs.	<b>092814</b> RPS-I-3-4/100M
<b>Built-in LED</b>	Light radiation to side	1 pcs.	<b>087423</b> LED M20x1.5
	Light radiation to front	1 pcs.	<b>095510</b> LED M20x1.5
<b>Turnbuckle</b>	M6 x 60	5 pcs.	<b>092498</b> RPS-B-6-60/V5
	M6 x 110	1 pcs.	<b>092500</b> RPS-B-6-110
<b>Tensioner spring</b>	For RPS 100, 175	1 pcs.	<b>092136</b> RPS-W-100-175
	For RPS 300	1 pcs.	<b>092138</b> RPS-W-300

### 20. Declaration of conformity

The EU declaration of conformity can be found at [www.euchner.com](http://www.euchner.com). Enter the order number of your device in the search box. The document is available under *Downloads*.

EUCHNER GmbH + Co. KG  
Kohlhammerstraße 16  
70771 Leinfelden-Echterdingen  
Germany  
info@euchner.de  
www.euchner.com

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