Standards and approvals

Standards

In the field of safety engineering, rope pull switches belong to the category of “EMERGENCY-STOP devices with mechanical latching”. The required EMERGENCY-STOP function must be available and functional at all times irrespective of the operating mode. After operation of the actuating element, the EMERGENCY-STOP device must automatically prevent or reduce the hazard in the best possible way.

The following standards are specifically relevant in relation to rope pull switches:

- EN 60204-1 (Safety of machinery - Electrical equipment of machines - Part 1: General requirements)
- EN 60947-5-5 (Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function)
- EN 418 (Design, color and arrangement of EMERGENCY-STOP actuating elements)

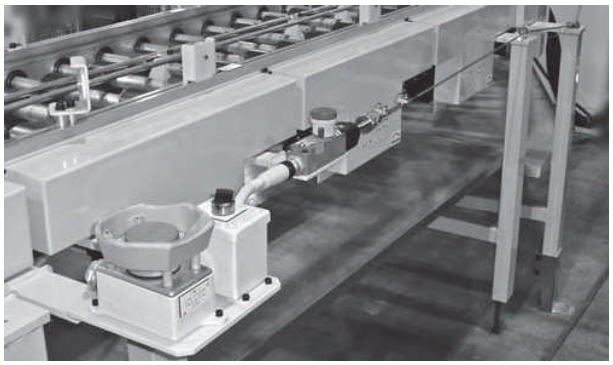
Approvals

To demonstrate conformity, the Machinery Directive also includes the possibility of type examination. Although all relevant standards are taken into account during development, we have all our safety switches subjected to additional type examinations by a notified body.
Many of the safety switches listed in this catalog have been tested by an employers' liability insurance association (BG) and are given in the lists from the BG.
Furthermore, numerous switches are listed by Underwriters Laboratories (UL). These switches can be used in countries in which this listing is required. The approval symbols on the individual pages of the catalog indicate which body tested the switches.
With the aid of the approval symbols listed below you can quickly see which approvals are available for the related switches:

BG-PRÜFZERT	Switches with this symbol are approved by a German employers' liability insurance association (BG)
C SA US	Switches with this symbol are approved by Canadian Standards Association (CSA, Canada and USA)

Task of rope pull switches

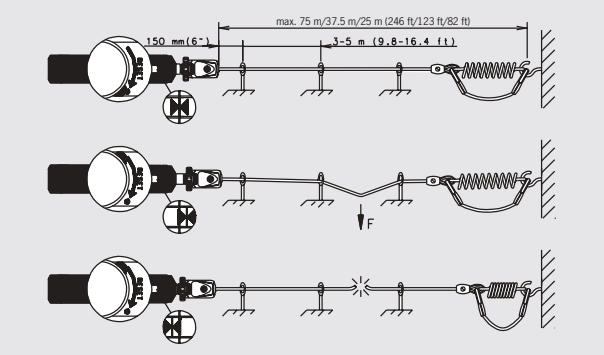
The trip range is much larger than for switches with Emergency-Stop pushbutton, since operation is possible over the whole rope length and is not restricted to the small area within reach of the switch.
Rope pull switches are used whenever it is necessary to protect large danger areas where fitting of a housing or cover is not possible or too complex.



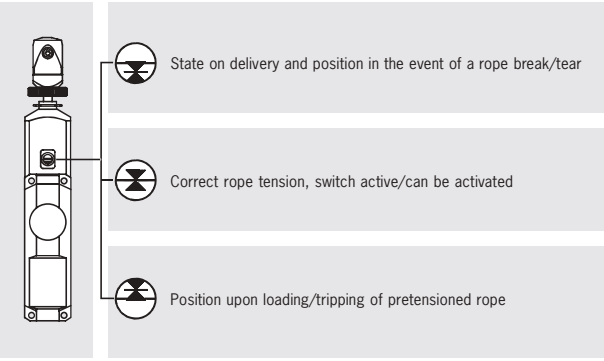
The advantage is that areas of an installation or machine can be shut down immediately from any point in the working area in the event of danger in cases where it would otherwise be necessary to install individual latched Emergency-Stop buttons at short distances apart.

Function and technology used in rope pull switches

The standard EN 60947-5-5 - 6 (Requirements for EMERGENCY-STOP pushbuttons and rope pull switches) specifies certain requirements which must be met by rope pull switches and which therefore also define the mode of operation of such switches.
For example, the latching device (Emergency-Stop switch) must be reset by turning a key, turning the pushbutton in the specified direction or by a pulling movement. Rope pull switches are normally tripped by pulling a plastic-sheathed steel rope (known as the safety rope or pull rope). In addition, EUCHNER rope pull switches feature a latched Emergency-Stop button on the housing which has the same effect.
Upon tripping, the safety contacts are actuated and a stop signal is generated which switches off the machine. The vertical tensile force which acts on the wire or rope to generate the EMERGENCY-STOP signal (contact opening) must be less than 200 N and the vertical deflection of the wire or rope which is necessary for generation of the EMERGENCY-STOP signal must be less than 400 mm. An EMERGENCY-STOP signal must also be generated if the wire or rope breaks or becomes detached. This means that any fault in the safety device is noticed immediately and the safety function is not lost at any time.



In order to achieve this, the rope pull switch has one center position and two switch-off positions. The switch is in center position during machine operation. If the safety rope is pulled or tears, the switch moves from the center position to one of the switch-off positions and the machine is stopped. Rope pull switches from EUCHNER have a sight window which allows the switch position to be seen.



Installation and rope attachment

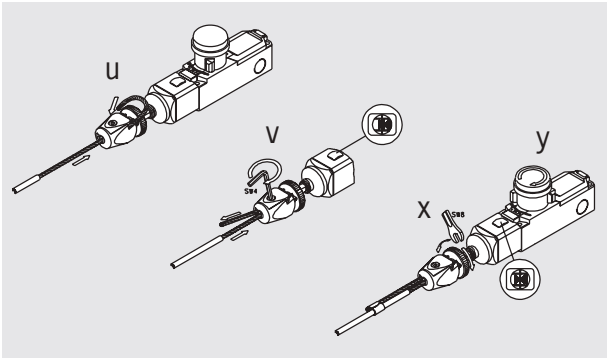
Installation

In accordance with EN 418 - 4.4, EMERGENCY-STOP actuating elements must be installed so that they can be reached easily and operated safely by persons who are at risk. It may be useful to attach marking flags to improve visibility if wires/wire ropes or ropes are used, as is the case with rope pull switches.

Rope attachment

- Versions RPS...SC and RPS...PC

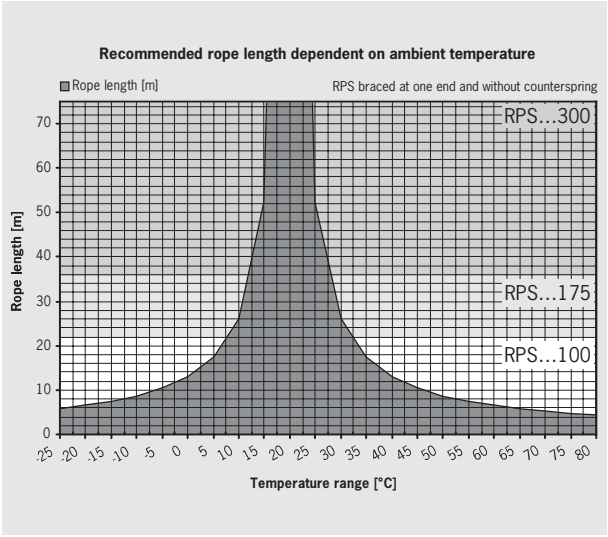
1. Strip the pull rope and insert into the terminal head. In order to prevent pull rope from slipping, there must be no rope coating in the clamping head.
2. Set the pull rope so that the lock marking is in central position and clamp the pull rope firmly with the hexagon socket screw.
3. Actuate the pull rope strongly several times in order to stretch the rope and then reset the rope by way of the clamping head.
4. Set the lock marking in central position by turning the actuation spindle.
5. Activate the rope pull switch by turning the Reset knob in the direction of the arrow (RPS...SC) or by pulling (RPS...PC).



The direction of the safety rope can be changed using rope pulley blocks or eye-bolts. Direction changes of up to max. 90° are possible. Rope pulley blocks have the advantage that the frictional forces between the safety rope and deflection points are kept low.

Temperature dependence

When planning safety installations with rope pull switches, it is necessary to take into account the temperature dependence of the installation and the safety rope so that the switch is not tripped as a result of a change in temperature. To do this, the possible rope lengths must be determined and the trip point must be readjusted regularly. The following graph shows the relationship between rope length and temperature. Installation should take place at a temperature of 20 °C.



Selection table for rope pull switches RPS

EMERGENCY-STOP reset

- **P** Pull-to-reset
- **S** Turn-to-reset

Rope attachment

- **R** Pull lug
- **C** Clamping head

Actuating force

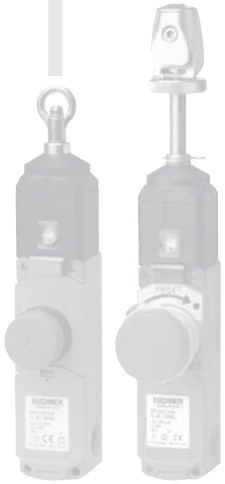
- **100** Actuating force 100 N
- **175** Actuating force 175 N
- **300** Actuating force 300 N

Switching element

- **Four contacts** 3 NC ⊖ + 1 NO or 2 NC ⊖ + 2 NO

Connection

- **M** Thread M20 x 1.5 for cable gland



EMERGENCY-STOP reset		Rope attachment		Actuating force			Switching element	Connection	Page
P	S	R	C	100	175	300	Four contacts	M	
●		●		●			●	●	108
●		●			●		●	●	108
●		●				●	●	●	108
●			●	●			●	●	109
●			●		●		●	●	109
●			●			●	●	●	109
	●		●	●			●	●	109
	●		●		●		●	●	109
	●		●			●	●	●	109

Rope pull switch with pull- or turn-to-reset function for EMERGENCY-STOP device

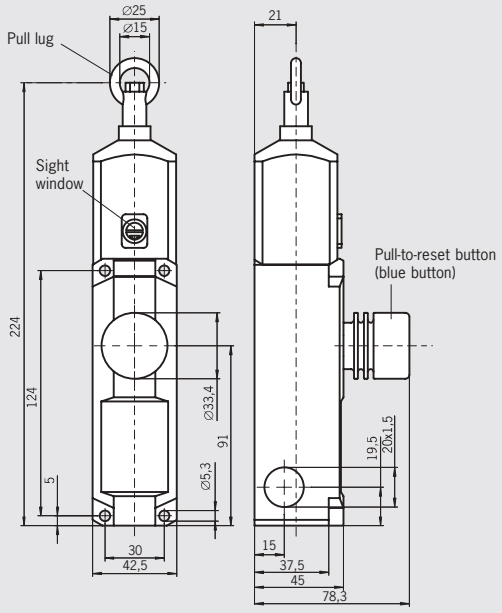
- **EMERGENCY-STOP device with latching in accordance with EN 418 and EN 60204-1**
- **Pull lug or clamping head for pull rope**
- **Indication of correct rope tension**
- **3 cable entries M20 x 1.5**
- **Switching elements with 4 contacts**

Switching elements

- **2131** Slow-action switching element 3 NC ⊖ + 1 NO
- **3131** Slow-action switching element 2 NC ⊖ + 2 NO

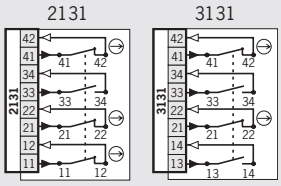
Cable entry M20 x 1.5
Pull-to-reset button for EMERGENCY-STOP, pull lug for tensioning rope

Dimension drawing



For cable glands see page 77

Wiring diagrams Switch not actuated

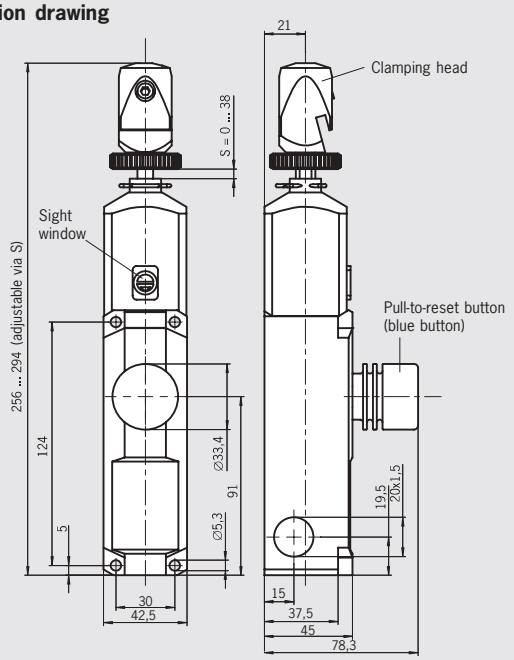


Ordering table

Series	Connection	Rope attachment	EMERGENCY-STOP Reset	Actuating force [N]	Switching element	Order No. / Item
RPS	Cable entry **3 x M20 x 1.5**	**R** Pull lug	**P** Pull-to-reset button	**100**	**2131** 3 NC ⊖ + 1 NO	**094 849** RPS2131PR100M
					3131 2 NC ⊖ + 2 NO	**088 888** RPS3131PR100M
				175	**2131** 3 NC ⊖ + 1 NO	**094 850** RPS2131PR175M
					3131 2 NC ⊖ + 2 NO	**088 889** RPS3131PR175M
				300	**2131** 3 NC ⊖ + 1 NO	**094 851** RPS2131PR300M
					3131 2 NC ⊖ + 2 NO	**088 890** RPS3131PR300M

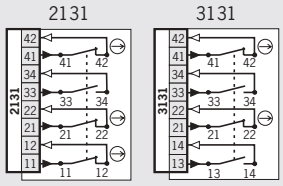
Cable entry M20 x 1.5
Pull-to-reset button for EMERGENCY-STOP, clamping head for tensioning rope

Dimension drawing

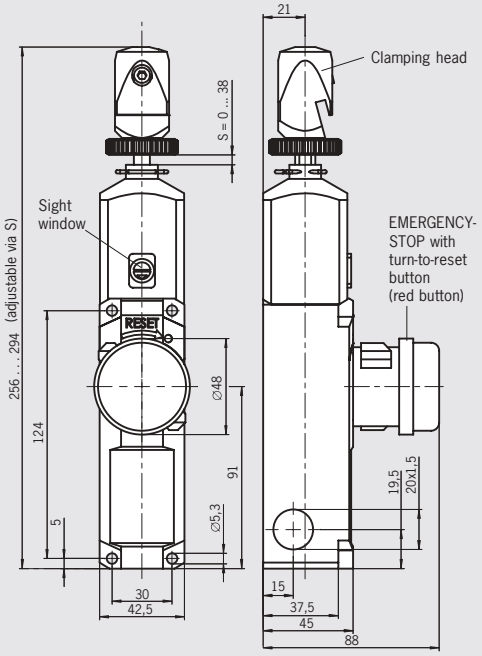


For cable glands see page 77

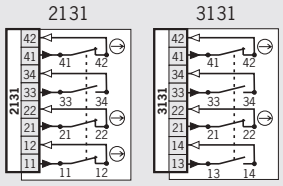
Wiring diagrams Switch not actuated



Cable entry M20 x 1.5
Turn-to-reset button for EMERGENCY-STOP, clamping head for tensioning rope



For cable glands see page 77



Ordering table

Series	Connection	Rope attachment	EMERGENCY-STOP Reset	Actuating force [N]	Switching element	Order No. / Item
RPS	Cable entry **3 x M20 x 1.5**	**C** Clamping head	**P** Pull-to-reset button	**100**	**2131** 3 NC ⊖ + 1 NO	**094 852** RPS2131PC100M
					3131 2 NC ⊖ + 2 NO	**088 885** RPS3131PC100M
				175	**2131** 3 NC ⊖ + 1 NO	**094 853** RPS2131PC175M
					3131 2 NC ⊖ + 2 NO	**088 886** RPS3131PC175M
				300	**2131** 3 NC ⊖ + 1 NO	**094 854** RPS2131PC300M
					3131 2 NC ⊖ + 2 NO	**088 887** RPS3131PC300M
			S Turn-to-reset button	**100**	**2131** 3 NC ⊖ + 1 NO	**094 430** RPS2131SC100M
					3131 2 NC ⊖ + 2 NO	**088 882** RPS3131SC100M
				175	**2131** 3 NC ⊖ + 1 NO	**094 431** RPS2131SC175M
					3131 2 NC ⊖ + 2 NO	**088 883** RPS3131SC175M
				300	**2131** 3 NC ⊖ + 1 NO	**094 432** RPS2131SC300M
					3131 2 NC ⊖ + 2 NO	**088 884** RPS3131SC300M

For safety instructions see page 114
For technical data see page 112

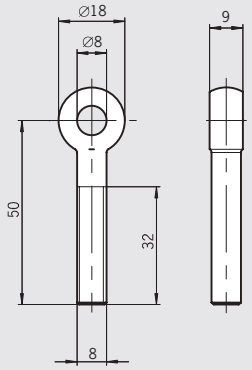
Accessories for rope pull switches

- **Eyebolt**
- **Rope set**
- **Pulley set**
- **Turnbuckle**
- **Tensioner spring**
- **Tensioning rope**
- **Built-in LED**

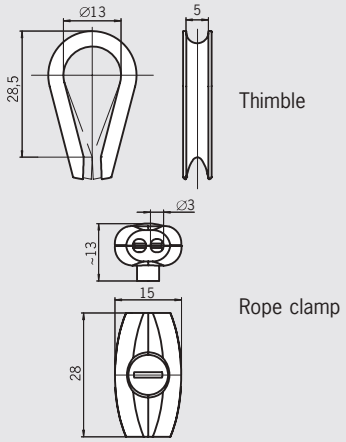
Built-in LED
The built-in LED is suitable for direct installation in one of the M20 x 1.5 threads of the three cable entries in the rope pull switch RPS.
The built-in LED indicates to the operator whether the switch is actuated or not.
The switching element can be wired individually.
Operating voltage DC 24 V +10%, -15%.

Eyebolt
Thread M8

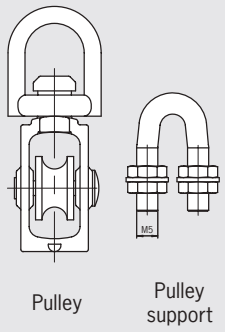
Dimension drawings



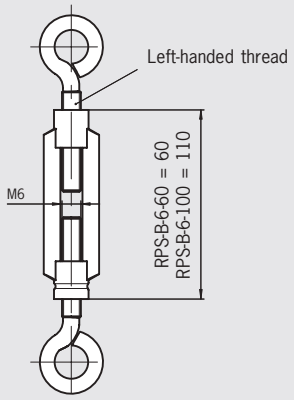
Rope set



Pulley set



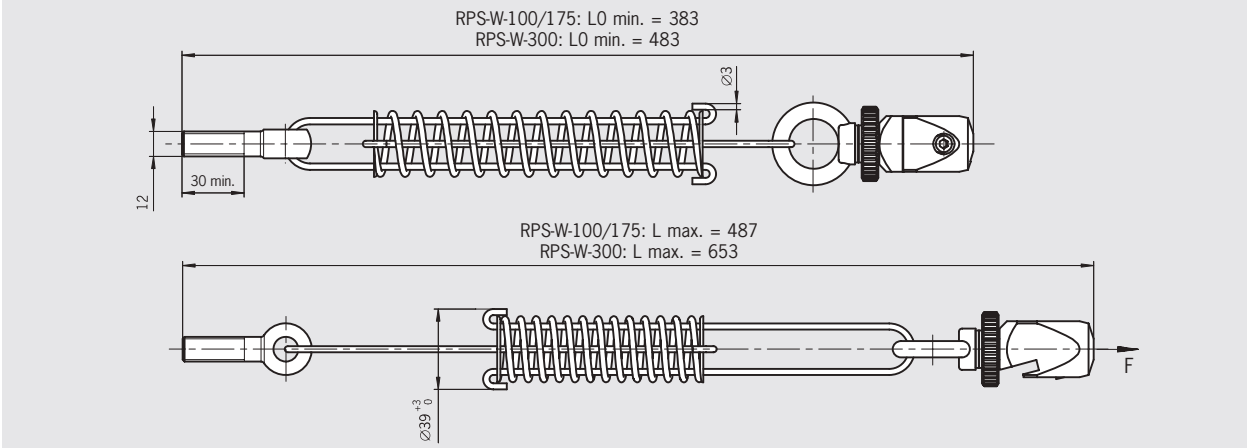
Turnbuckle



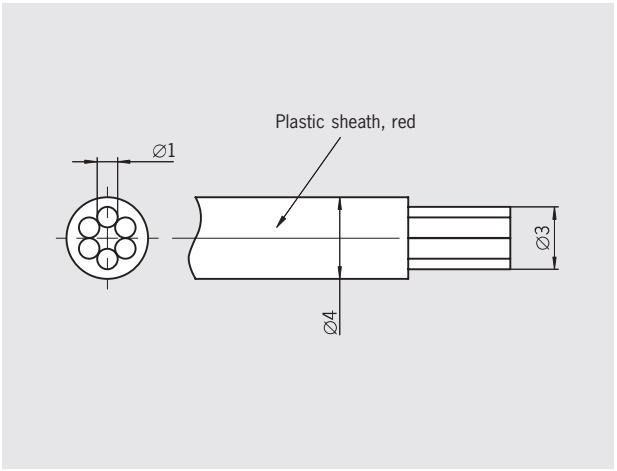
Ordering table

Designation	Version	Packaging unit	Order No.
Eyebolt	Thread M8	5 ea.	**092 495** RPS-O-8-50/V5
Rope set	Consisting of thimble and rope clamp	5 ea.	**092 496** RPS-RS/V5
Pulley set	Consisting of rope pulley block and pulley bracket	5 ea.	**092 501** RPS-PS/V5
Turnbuckle	M6 x 60	5 ea.	**092 498** RPS-B-6-60/V5
	M6 x 100	1 ea.	**092 500** RPS-B-6-110

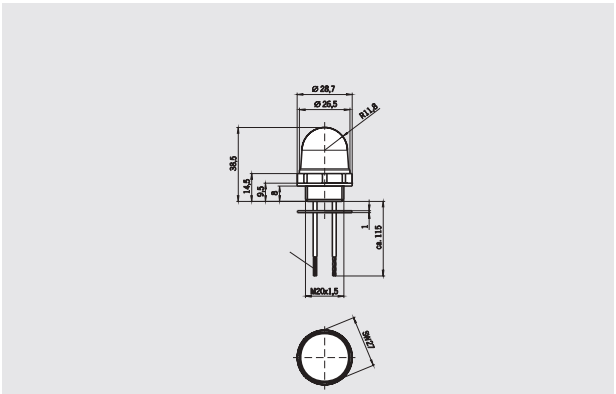
Tensioner spring



Tensioning rope



Built-in LED

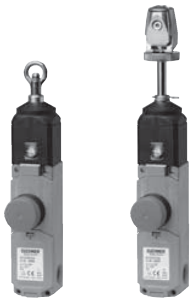


Ordering table

Designation	Version	Packaging unit	Order No.
Tensioner spring	For tensile force 110 N / 175 N	1 ea.	**092 136** RPS-W-100/175
	For tensile force 300 N	1 ea.	**092 138** RPS-W-300
Tensioning rope	Length 50 m	1 ea.	**092 813** RPS-I-3-4/50m
	Length 100 m	1 ea.	**092 814** RPS-I-3-4/100m
Built-in LED	Color red for cable entry M20 x 1.5, with seal light radiation to side	1 ea.	**087 423** LED M20x1.5
	Color red for cable entry M20 x 1.5, with seal light radiation to front	1 ea.	**095 510** LED M20x1.5

For safety instructions see page 114
For technical data see page 113

Rope pull switch RPS



The technical data on switches and switching elements apply to all connection types. Further technical data are given for the connection type selected.

Switch

Parameter		Value			Unit
Housing material		Reinforced thermoplastic			
Actuation material		Die-cast zinc, steel			
Degree of protection according to IEC 60529		IP 67			
Mechanical life		acc. to IEC 60947-5-5			
Ambient temperature		- 25 ... + 70			°C
Weight		approx. 0.48			kg
Latching device		acc. to EN 418			
		RPS...100	**RPS...175**	**RPS...300**	
Actuating force		100	175	300	N
Rope length max.		25	37.5	75	m
Rope diameter		2 ... 5			mm
Rope attachment	RPS...R...	via pull lug			
	RPS...C...	via clamping head			
EMERGENCY-STOP reset	RPS...P...	Pull reset button			
	RPS...S...	Rotary release button			

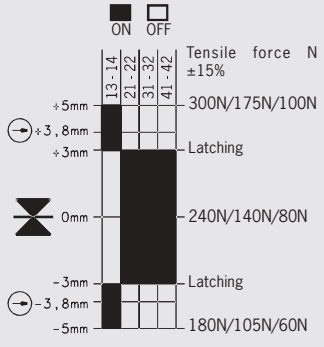
Switching element

Parameter	Value		Unit
Switching principle	Slow-action switching element		
Switching elements With 4 contact elements	**2131** 3 NC ⊖ + 1 NO	**3131** 2 NC ⊖ + 2 NO	
Contact opening gap	> 2 x 2 mm		
Switching current, min., at 24 V DC	10		mA

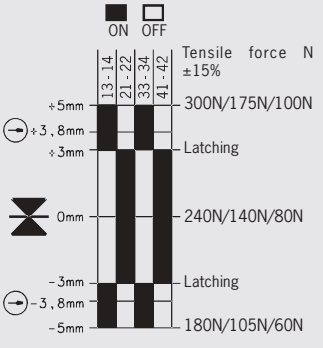
Connection, cable entry M20 x 1.5

Parameter	Value	Unit
Connection	Screw terminal	
Version	M20 x 1.5	
Conductor cross-section	0.34 ... 1.5	mm²
Rated insulation voltage U_i	250	V AC/DC
Conventional thermal current I_{th}	10	A
Short circuit protection according to IEC 60269-1 (control circuit fuse)	10	A gL
Utilization category according to IEC 60947-5-1 AC-15	I_e 4 A U_e 230 V	

Travel diagram RPS2131...



Travel diagram RPS3131...



Accessories for rope pull switches RPS

Rope pull spring

Parameter	Value		Unit
Material of rope clamp	Die-cast zinc/steel		
Material of spring	X12CrNi177 (1.4310)		
Eye-bolt	DIN 444 M12x50-4.6 Zn		
Ambient temperature	-25 ... +70		°C
Rope diameter	2 ... 5		mm
Rope attachment	Quick-action clamping device		
	RPS-W-100/175	**RPS-W-300**	
Spring rate	2.1	1.9	N/mm
Maximum spring force	218	335	N
Weight	approx. 0.5	approx. 0.55	kg

Built-in LED

Parameter	Value	Unit
Material of housing	ABS/PC blend, black	
Material of cap	Transparent polycarbonate	
Degree of protection (fitted in rope pull switch)	IP 65	
Ambient temperature	-20 ... +50	°C
Connection	2 wires	
Mounting	M20 x 1.5	
Operating voltage	24	V DC
Switch-on current	< 0.5	A
Current consumption	45	mA