

i110RP

Rope pull switch



Contents

1 Scope..... 4

2 On safety..... 5

2.1 Qualified safety personnel..... 5

2.2 Applications of the rope pull switches..... 5

2.3 Correct use..... 6

2.4 General safety notes and protective measures..... 6

3 Mounting..... 7

3.1 Protection against surroundings..... 8

4 Electrical installation..... 9

4.1 Variants with M20 cable entry..... 9

4.2 Variants with M12 plug connector..... 10

5 Commissioning..... 11

5.1 Tests before the initial commissioning..... 11

5.2 Periodic technical inspections..... 11

5.3 Disposal..... 11

6 Technical data..... 13

6.1 General system data..... 13

6.2 Dimensional drawings..... 14

7 Conformities and certificates..... 15

7.1 EU declaration of conformity..... 15

7.2 UK declaration of conformity..... 15

Described product

i110RP

Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

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Original document

This document is an original document of SICK AG.



1 Scope

These operating instructions are applicable to the i110RP rope pull switch.

These operating instructions are original operating instructions.

2 On safety

This chapter deals with your own safety and the safety of the machine operators.

- Please read this chapter carefully before working with the i110RP or with the machine protected by the i110RP.

The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the rope-operated switch, in particular

- the Machinery Directive,
- the Low Voltage Directive,
- the Work Equipment Directive,
- the safety regulations as well as
- the work safety regulations/safety rules.

Manufacturers and operators of the machine on which the rope-operated switches are used are responsible for obtaining and observing all applicable safety regulations and rules.

2.1 Qualified safety personnel

The i110RP rope-operated switch must be mounted, installed and commissioned only by qualified safety personnel. Qualified safety personnel are defined as persons who

- have undergone the appropriate technical training

and

- have been instructed by the responsible machine owner in the operation of the machine and the current valid safety guidelines

and

- who have access to these operating instructions.

2.2 Applications of the rope pull switches

Rope pull switches of the i110RP series are electromechanical emergency stop devices that are actuated using a rope. They are not intended as a substitute for safety guards.

The switched off state is retained until the blue reset lever is actuated, i.e. it is set to "1" position.

For the control this means that

- the dangerous state of the machine must stop as soon as the switch is actuated,
- switch on commands that cause dangerous conditions are only allowed to become effective when the blue reset lever on the rope-operated switch has been actuated („1" position).

Prior to the use of rope-operated switches, a risk assessment must be performed on the machine.

Important:

The user is responsible for the safe integration of the rope pull switch in 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 procedure in accordance with section 6.3 EN ISO 13849-1 is used for validation, the Performance Level (PL) may be reduced if several devices are connected one after the other.

To determine the necessary reliability (Performance Level PL, SIL) for the safety function the related standards should be used:

- EN ISO 13849, Safety of machinery — Safety-related parts of control systems
- EN 62061, Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems

2.3 Correct use

The i110RP rope pull switch must be used only as defined in section [Applications of the rope pull switches](#). The rope pull switch must be used only on the machine where it has been mounted, installed and initialized by qualified safety personnel in accordance with these operating instructions.

The product may be used in safety functions.

All warranty claims against SICK AG are forfeited in the case of any other use, or alterations being made to the rope-operated switch, even as part of its mounting or installation.

Correct use includes the regular inspection of the rope pull switch by qualified safety personnel, [see "Applications of the rope pull switches", page 5](#).

2.4 General safety notes and protective measures

Rope pull switches provide a protection function for persons. Incorrect installation or manipulation can result in serious injuries.

3 Mounting



WARNING

Mounting is only allowed to be performed by qualified safety personnel.

Observe EN ISO 14119 for using interlocking devices associated with physical guards.

- ▶ Fit the rope pull switch such that
 - the machine is reliably shut down on actuation of the rope in all directions and the blue reset lever engages in the OFF position "0",
 - the rope extends along the entire operating area and can be accessed easily and safely,
 - the entire length of the rope can be seen on the actuation of the blue reset lever.



WARNING

On long sections or if the rope changes direction around a corner, it is recommended to install 1 switch at each end of the rope.

The use of a rope pull switch in combination with a tensioning spring or two rope pull switches is only permitted up to a certain cable length (see figure 2). Whether a tensioning spring can be used depends on the risk assessment. The risk assessment must take into consideration the possibility of an unplanned jamming of the tensioned rope over its entire length!

- ▶ Mount the rope-operated switch using 4 M5 screws.

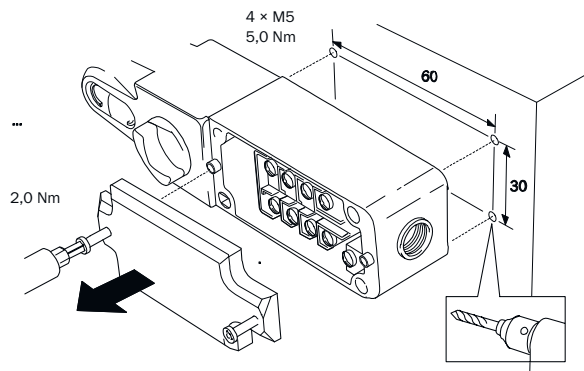


Figure 1: Installing the switch

- ▶ Tighten screws to 5.0 Nm.
- ▶ Install actuation rope.
Max. rope length: 10 ... 30 m



WARNING

For rope lengths of 10 m to 30 m, a rope pull switch must be used at both ends of the rope.



NOTE

For rope lengths up to 10 m the SICK tensioning spring (part no. 5311290) can be used instead of the second rope switch.

- The first and last eye bolt must both be fastened 125 mm from the rope switch or from the tensioning spring. All further eye bolts are placed 2 to 3 m apart.
- The tensioning roller is fitted in the middle of the rope.

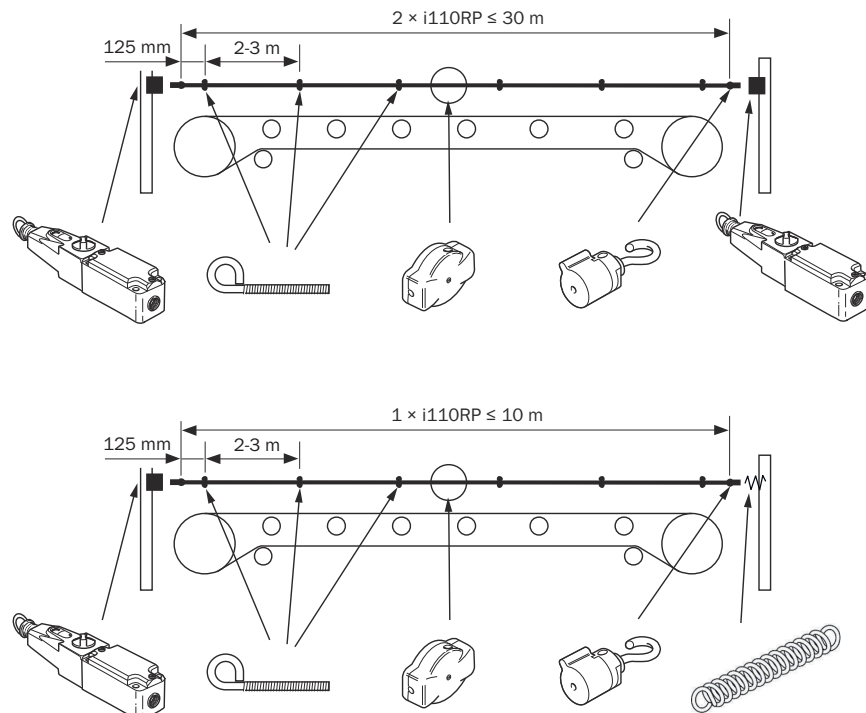


Figure 2: Installing the actuating rope

- If the rope goes round a corner, mount a pulley wheel on either side of the corner.

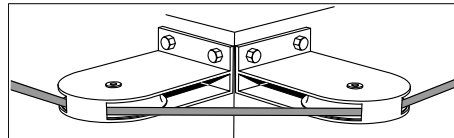


Figure 3: Changing the direction of the rope

- Using the spring and the rope status indicator, tension rope to required amount.

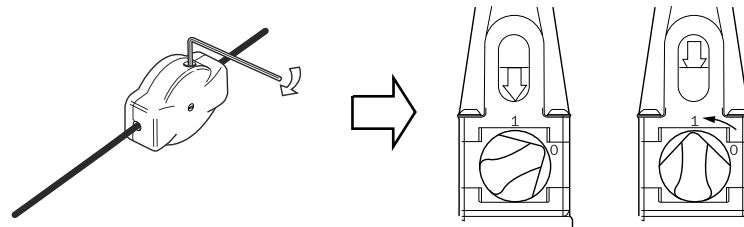


Figure 4: Adjusting the rope tension

3.1 Protection against surroundings

A precondition for a durable and perfect safety function is the protection of the switch against penetration by foreign matter such as shavings, sand, abrasive materials etc.

Mask the type label before applying paint.

4 Electrical installation



WARNING

The electrical connection is only allowed to be made by qualified safety personnel.

4.1 Variants with M20 cable entry

- Fit cable gland M20 with the corresponding enclosure rating.
- Contact assignments [see figure 5, page 9](#).
- Operate all contact pairs in the same voltage range.
- Connect all live parts to one side of the contact block.
- The PE connection must be made using a cable lug.

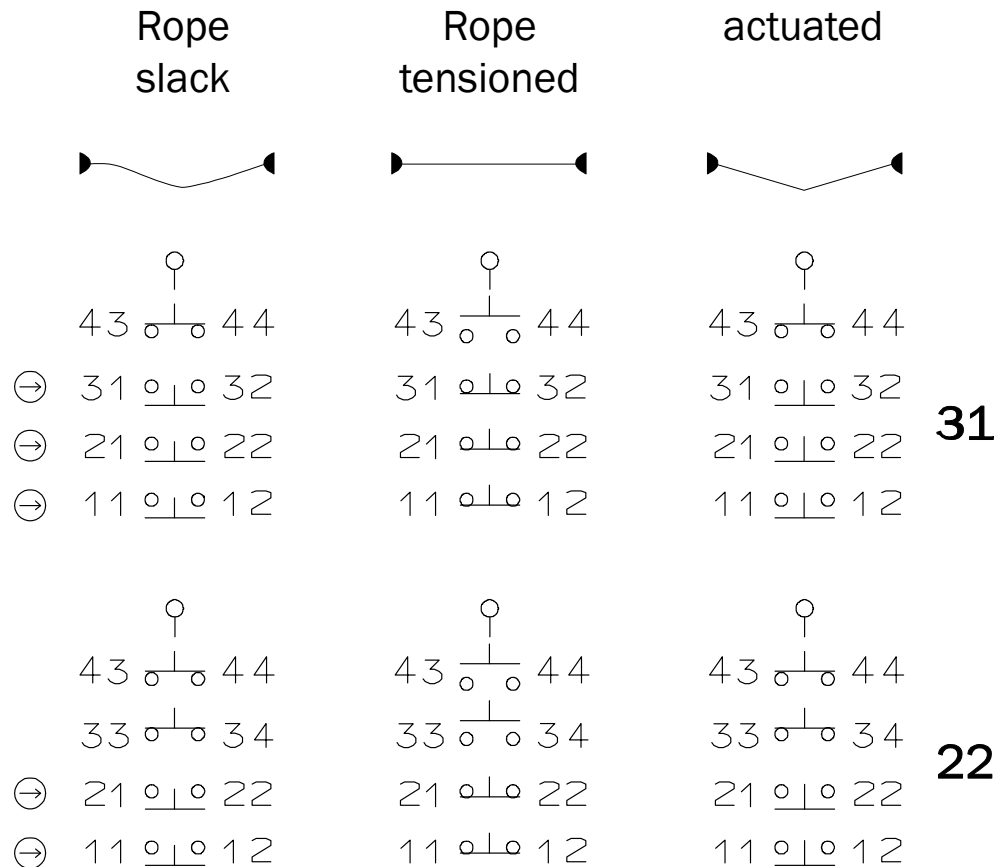
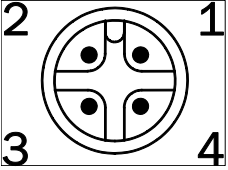


Figure 5: Switching elements and switching functions

- Tighten the clamping bolts to 1.0 Nm.
- Ensure the cable entry is leak-proof.
- Close and screw switch cover in place.
- Tighten screws to 2.0 Nm.

4.2 Variants with M12 plug connector

	Pin	Assignment
	1/2	Positively guided NC contacts 11/12
	3/4	Positively guided NC contacts 21/22

5 Commissioning

5.1 Tests before the initial commissioning

mechanical functional check

- ▶ Check whether the switch is correctly actuated and remains in the OFF position by pulling the rope at all positions and in all directions.
- ▶ Check that the rope is unimpeded.

electrical functional check

- ▶ Set blue reset lever to “1” position.
- ▶ Start the machine.
- ▶ Check whether the machine stops when the rope is pulled.
- ▶ Switch off the machine.
- ▶ Actuate the rope pull switch.
- ▶ The machine is not allowed to start if the rope pull switch has been actuated.

5.2 Periodic technical inspections

To ensure correct function over the long term, regular checks are necessary.



WARNING

Prior to resetting the machine after each time the rope pull switch is actuated, the reason for triggering the switch must be checked along the entire length of the rope.

Daily or prior to the start of the shift the operator must check for:

- ▶ correct function
- ▶ Machine stops when pulling on the rope.
- ▶ no visible evidence of tampering

Regularly according to the machine maintenance schedule by the competent personnel

- ▶ correct switching function
- ▶ safe assembly of the modules
- ▶ deposits and wear and tear
- ▶ correct sealing of the cable entry or plug connection
- ▶ loose cable connections or plug connectors



WARNING

The entire switch must be replaced in the case of damage or wear and tear. It is not permitted to exchange individual components or modules.

Rope pull switches must be completely replaced after 1 million switching operations.

5.3 Disposal

Procedure

- ▶ Always dispose of unusable devices in accordance with national waste disposal regulations.



Complementary information

SICK will be glad to help you dispose of these devices on request.

6 Technical data

6.1 General system data

	i110-RP223 i110-RP313	i110-RP224
Housing material	Light-alloy diecast, varnished	
Eye nut	Stainless steel	
Enclosure rating (IEC 60529)	IP66	
Mechanical life	1 × 10 ⁶ switching operations	
B _{10D} (EN ISO 13849-1)	2 × 10 ⁶ with low load	
Type	Type 1 (EN ISO 14119)	
Actuator coding level	Uncoded (EN ISO 14119)	
T _M (mission time)	20 years	
Operating temperature	-25 °C ... +80 °C	
Mounting orientation	any	
Type of connection	Cable entry 1 × M20	Plug connection 1 × M12 (4-pin)
Actuation force (EN 60947-5-5)	< 125 N (300 mm deflection)	
Tensile force for operating position (normal value)	103 N	
Tensile force for inhibit (normal value)	188 N	
Rope length max.	30 m	
Actuation frequency max.	1 cycle/second	
Contact elements positively guided NC contacts/NO contacts	i110-RP223: 2/2 i110-RP313: 3/1	2/0
Rated impulse withstand voltage U _{imp} contacts referred to housing	2500 V	1500 V
Rated insulation voltage U _i	250 V	30 V
Usage category (EN 60947-5-1)	AC-15: 240 V/3 A DC-13: 24 V/2 A	DC-13: 24 V/2 A
Switching voltage min.	5 V DC	
Switching current min. at 5 V DC	5 mA	
Connection cross-section	1 × 1,5 mm ²	–
Short-circuit protection	T6	2 A
Torque requirements for screws		
Mounting screws housing	5,0 Nm	
Cover screws	2,0 Nm	
Jam screws contacts	1,0 Nm	

6.2 Dimensional drawings

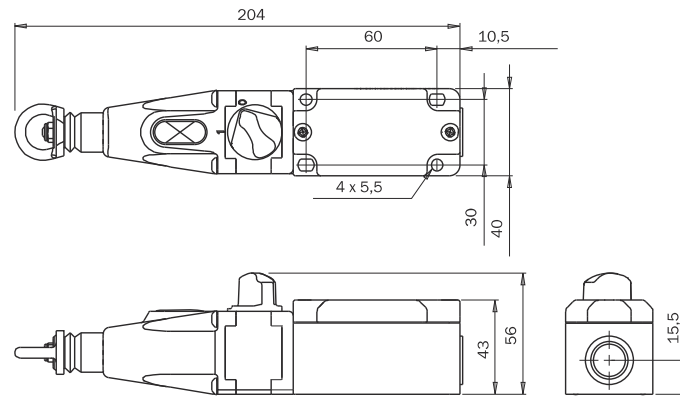


Figure 6: Dimensional drawing rope pull switches i110-RP223 and i110-RP313

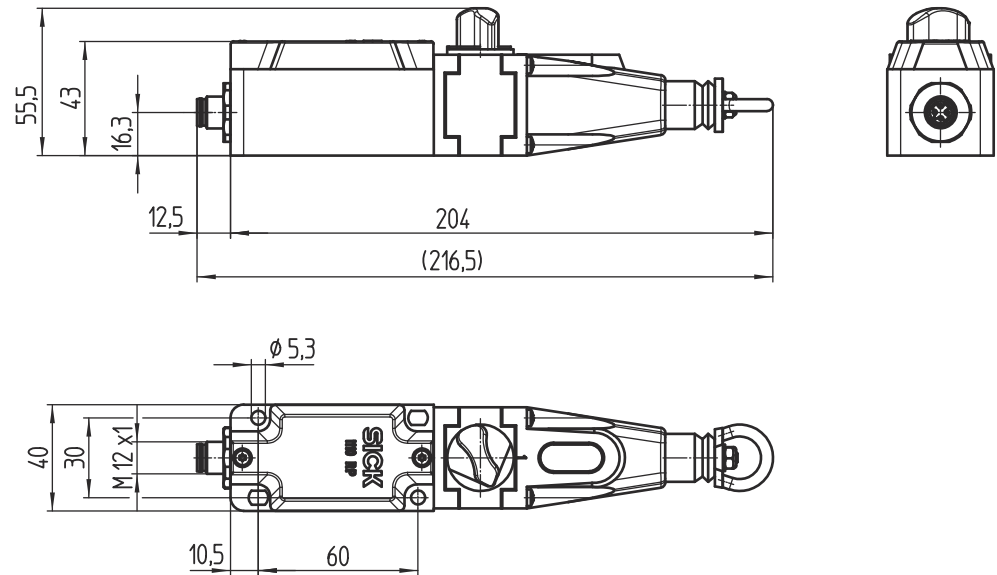


Figure 7: Dimensional drawing rope pull switch i110-RP224

7 Conformities and certificates

You can obtain declarations of conformity, certificates and the current documentation for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

7.1 EU declaration of conformity

Excerpt

The undersigned, representing the manufacturer, herewith declares that the product is in conformity with the provisions of the following EU directive(s) (including all applicable amendments), and that the standards and/or technical specifications stated in the EU declaration of conformity have been used as a basis for this.

- ROHS DIRECTIVE 2011/65/EU
- MACHINERY DIRECTIVE 2006/42/EC

7.2 UK declaration of conformity

Excerpt

The undersigned, representing the following manufacturer herewith declares that this declaration of conformity is issued under the sole responsibility of the manufacturer. The product of this declaration is in conformity with the provisions of the following relevant UK Statutory Instruments (including all applicable amendments), and the respective standards and/or technical specifications have been used as a basis.

- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- Supply of Machinery (Safety) Regulations 2008

Australia

Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria

Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg

Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

Brazil

Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

Canada

Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic

Phone +420 234 719 500
E-Mail sick@sick.cz

Chile

Phone +56 (2) 2274 7430
E-Mail chile@sick.com

China

Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland

Phone +358-9-25 15 800
E-Mail sick@sick.fi

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany

Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece

Phone +30 210 6825100
E-Mail office@sick.com.gr

Hong Kong

Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary

Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

India

Phone +91-22-6119 8900
E-Mail info@sick-india.com

Israel

Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy

Phone +39 02 27 43 41
E-Mail info@sick.it

Japan

Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia

Phone +603-8080 7425
E-Mail enquiry.my@sick.com

Mexico

Phone +52 (472) 748 9451
E-Mail mexico@sick.com

Netherlands

Phone +31 (0) 30 204 40 00
E-Mail info@sick.nl

New Zealand

Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway

Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland

Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania

Phone +40 356-17 11 20
E-Mail office@sick.ro

Singapore

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia

Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia

Phone +386 591 78849
E-Mail office@sick.si

South Africa

Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea

Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

Spain

Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden

Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan

Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

Thailand

Phone +66 2 645 0009
E-Mail marcom.th@sick.com

Turkey

Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates

Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom

Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA

Phone +1 800.325.7425
E-Mail info@sick.com

Vietnam

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at www.sick.com

