

# RE1, RE2

Safety switches

**SICK**  
Sensor Intelligence.



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**Described product**

RE1, RE2

**Manufacturer**

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

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**Original document**

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## Contents

<b>1</b>	<b>About this document.....</b>	<b>4</b>
<b>2</b>	<b>On safety.....</b>	<b>5</b>
2.1	Qualified safety personnel.....	5
2.2	Application.....	5
2.3	Correct use.....	5
2.4	General safety notes and protective measures.....	6
<b>3</b>	<b>Function description.....</b>	<b>7</b>
3.1	Evaluating the switching signals.....	7
<b>4</b>	<b>Mounting.....</b>	<b>10</b>
<b>5</b>	<b>Electrical installation.....</b>	<b>12</b>
<b>6</b>	<b>Commissioning.....</b>	<b>13</b>
6.1	Tests before the initial commissioning.....	13
6.2	Periodic technical checks.....	13
6.2.1	Regular examinations.....	13
6.2.2	Inspection by qualified safety personnel.....	14
<b>7</b>	<b>Maintenance.....</b>	<b>15</b>
<b>8</b>	<b>Disposal.....</b>	<b>16</b>
<b>9</b>	<b>Technical data.....</b>	<b>17</b>
9.1	Data sheet.....	17
9.2	Dimensional drawings.....	18
9.3	Typical response range.....	20
<b>10</b>	<b>Conformities and certificates.....</b>	<b>21</b>
10.1	EU declaration of conformity.....	21
10.2	UK declaration of conformity.....	21

## 1 About this document

These operating instructions are original operating instructions.

These operating instructions only apply to the RE11, RE13, RE15, RE21, RE23, RE27 safety switches with the following information on the product packaging: Operating Instructions 8022549.

These operating instructions are included with SICK part number 8022549 (all available languages of this document)

## 2 On safety

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

- ▶ Please read this chapter carefully before working with the safety switch or with the machine protected by the safety switch.

The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the safety switch, in particular the work safety regulations and safety rules.

### 2.1 Qualified safety personnel

The 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

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

and

- who have access to the operating instructions.

### 2.2 Application

The safety switches of the product families RE1, RE2 (these are: RE11, RE13, RE15, RE21, RE23, RE27) are magnetically operated, non-contact safety switches. In combination with a suitable safety-related evaluation unit, they protect movable guards in the following way:

- The dangerous state of the machine can only be switched on when the guard is closed.
- If the guard is opened while the machine is running, a stop command is triggered.

For the control this means:

- Activation commands that result in dangerous states are only allowed to become effective if the guard is in the protective position.
- Dangerous states must have been terminated before the protective position is left.

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

### 2.3 Correct use

The safety switch must be used only as defined in section ["Application", page 5](#). The safety 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 safety switch, even as part of its mounting or installation.

Correct use includes also regular inspection of the guard by qualified safety personnel in accordance with [section 6.2](#).

### 2.4 General safety notes and protective measures

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

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#### **DANGER**

Safety switches are not allowed to be bypassed, turned away or made ineffective in any other manner.

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### 3 Function description

The safety switch is magnetically coded. Its contacts are operated by the related actuator (RExx-SK). The safety switches are equipped with contacts:

- REx1: 2 complementary switching contacts in normally open-normally closed combination (NO/NC)
- REx3: 2 normally open contacts (NO/NO)
- RE15: 2 complementary switching contacts in normally open-normally closed combination (NO/NC) and 1 normally open contact (NO) as signalling contact
- RE27:
  - 2 normally open contacts (NO/NO)
  - 1 normally open contact (NO) with LED integrated into the sensor for indication of the output state

The switching signals are sampled by a suitable safety-related evaluation unit, e.g. a safe programmable logic controller.

#### 3.1 Evaluating the switching signals

On integrating magnetic safety switches into suitable safe evaluation units, the following must be taken into account:

- It is imperative all contact signals are evaluated separately.
- On the detection of a fault related to the safety switch, the safe evaluation unit must shut down and adopt a locked state.
- Both contacts must change output state, before it can be reset. Compliance with this sequence must be monitored by the safe evaluation unit (figure 2 figure 5 figure 9).
- On the connection of the safety switch to a safe evaluation unit, the input module should be configured such that the discrepancy time set has no effect on the shutdown time for the evaluation (typical configuration “provide 0”). If this is not possible, the calculation must take into account the response time.

##### RE11, RE21

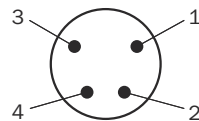


Figure 1: Pin assignment RE11, RE21

With male connector	With connecting cable	Function	Unactivated
1/2	Brown/white	Normally open (NO)	Open
3/4	Blue/black	Normally closed (NC)	Closed

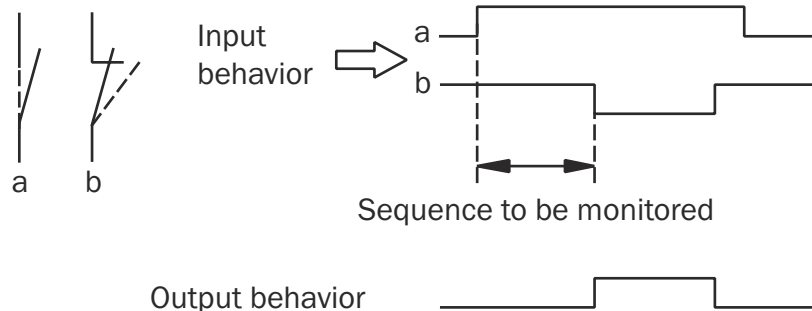


Figure 2: Switching behavior RE11, RE21 (unactivated)

**RE13, RE23**

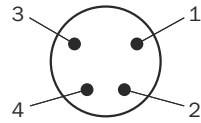


Figure 3: Pin assignment RE13

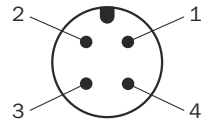


Figure 4: Pin assignment RE23

With male connector	With connecting cable	Function	Unactivated
1/2	Brown/white	Normally open (NO)	Open
3/4	Blue/black	Normally open (NO)	Open

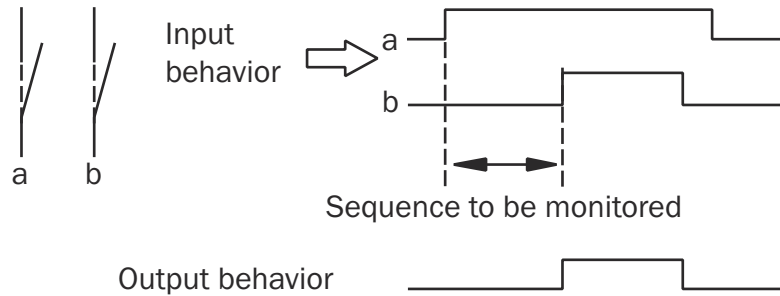


Figure 5: Switching behavior RE13, RE23 (unactivated)

**RE15**

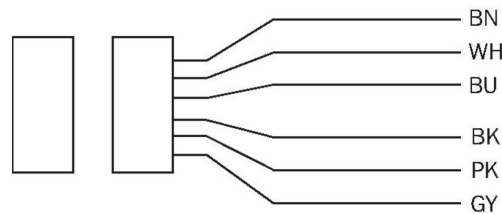


Figure 6: Aderbelegung RE15

With connecting cable	Function	Unactivated
Brown/white	Normally open (NO)	Open
Blue/black	Normally closed (NC)	Closed
Pink/grey	Normally open (NO) AUX	Open

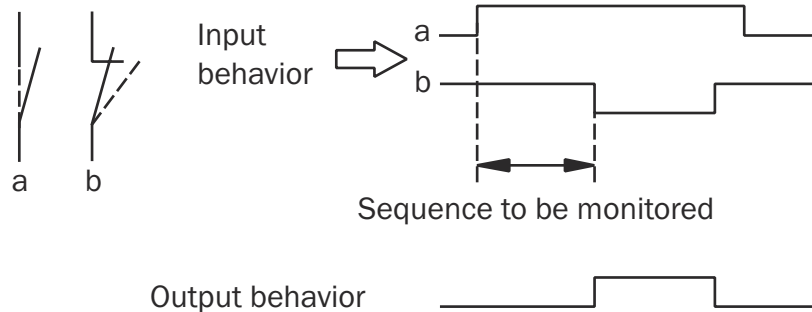


Figure 7: Switching behavior RE15 (unactivated)



RE27

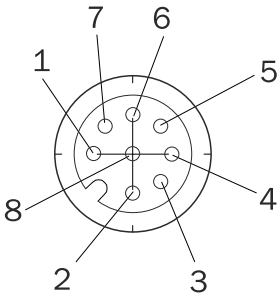


Figure 8: Pin assignment RE27

RE27SA...L			
With male connector	With connecting cable	Function	Unactivated
7/1	Brown/white	Normally open contact (NO)	Open
4/6	Blue/black	Normally open contact (NO)	Open
5/8	Pink/grey	Normally open contact (NO) AUX with LED	Open(LED off)

RE27SA68LS04			
With male connector	With connecting cable	Function	Unactivated
3/4	Brown/white	Normally open contact (NO)	Offen
7/8	Blue/black	Normally open contact (NO)	Offen
1/6	Pink/grey	Normally open contact (NO) AUX with LED	Offen (LED aus)

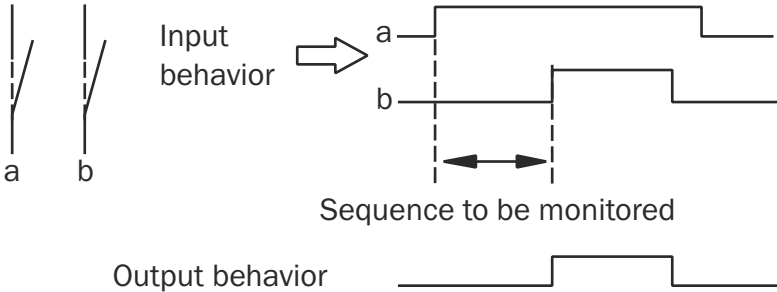


Figure 9: Switching behavior RE27 (unactivated)

## 4 Mounting



**WARNING**

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



**NOTICE**

Discoloration of the housing due to UV radiation. Avoid mounting locations with direct sunlight.

- ▶ Pay attention to EN ISO 14119 on mounting the safety switch and the actuator.
- ▶ Pay attention to EN ISO 14119 on reducing possible ways of bypassing an interlocking device.

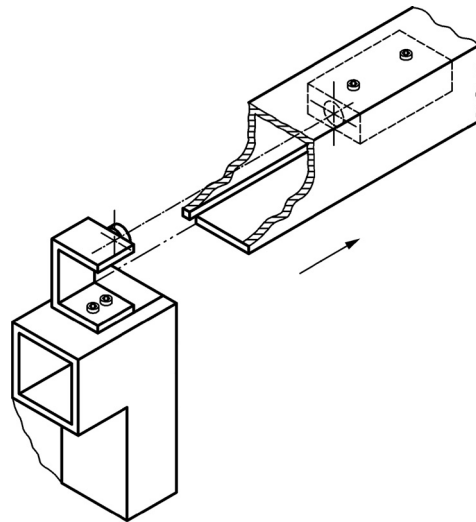


Figure 10: Protection example for bypassing a magnetic safety switch in compliance with EN ISO 14119

- ▶ Do not mount safety switches in an environment with interfering magnetic fields.
- ▶ Note the possible operating positions.

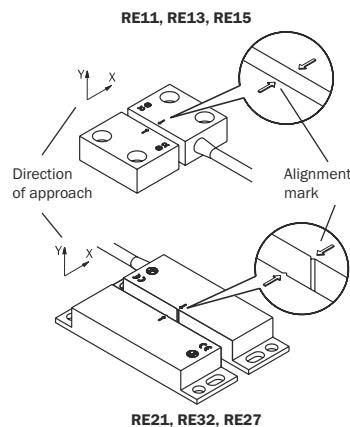


Figure 11: Alignment of sensor and actuator

- ▶ Fit safety switch and actuating element such that they do not touch each other: minimum distance between the front faces with the guard closed 1 mm.

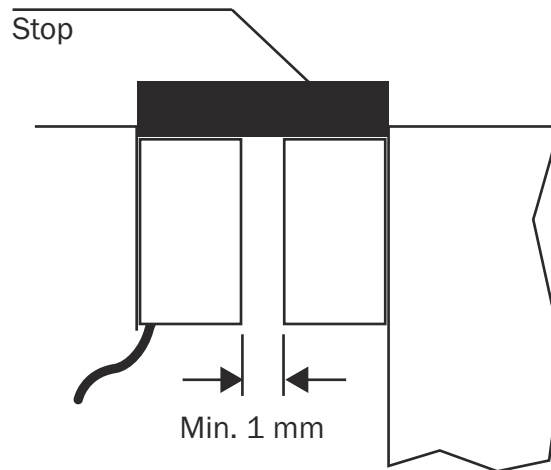


Figure 12: Mounting example for safety switch and actuator

- ▶ Fit an additional stop and guide for the moving part of the protective device (figure 12).
- ▶ Mount the actuator on guard so that it cannot be detached (e.g. using safety screws).
- ▶ Mount safety switch and actuator on non-ferrous materials to prevent any effect on the switching distance. If necessary, use spacers.
- ▶ Tighten self-locking screws to 1.0 Nm.
- ▶ Do not use anaerobic adhesive (e.g. Loctite) to lock the screws, as this will attack the plastic housing.
- ▶ Minimum distance between two adjacent magnetic safety switches: 40 mm. On swivelling doors the actuator is to be fitted to the closing edge.

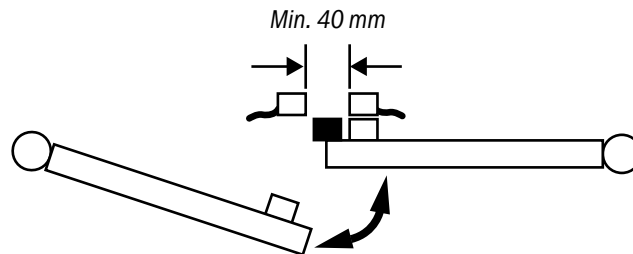


Figure 13: Mounting example on swivelling doors

### 5 Electrical installation

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#### **WARNING**

**An incorrect connection may result in the loss of the safety function!**

On the usage of extension cables, the colors of the cores may vary from that shown in this document.

An incorrect connection may cause the device to malfunction or become damaged.

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

The safe evaluation unit's inputs and outputs connected to the safety switch must meet the requirements of EN 61131.

It must be ensured the possible current through the contacts on the switch does not exceed the specified maximum value.

- 
- ▶ Only use copper wires. In case of use in high ambient temperatures, the temperature data for the field cable must not be lower than the ambient temperature.
  - ▶ The connecting cables must be protected when laid in order to prevent the risk of cross-circuits.

## 6 Commissioning

### 6.1 Tests before the initial commissioning

- Mechanical functional check:
  - Safety switch and actuating element must not touch when the guard is closed.
  - Minimum distance with guard closed 1 mm
- Electrical functional check:
  - ▶ Close the guard.
  - ▶ Start machine.
  - ▶ Open the guard.



#### **DANGER**

Check whether the machine stops when the guard is opened.

- 
- ▶ Switch off machine.
  - ▶ Open the guard.
  - ▶ Start machine.



#### **DANGER**

The machine must not start with a guard open!

---

### 6.2 Periodic technical checks

To ensure correct function over the long term, regular checks are necessary. Check that the protective device functions reliably, particularly ...

- after every commissioning process
- every time a component is replaced
- after a prolonged period of downtime
- after any kind of error

Aside from these checks, the reliable functioning of the protective device should be checked at appropriate intervals as part of the maintenance program. For information on possible intervals refer to EN ISO 14 119.

#### 6.2.1 Regular examinations

Check the safety switch for the following points:

- correct function
- visible signs of tampering

At appropriate intervals, it is also necessary to check:

- the safe mounting of actuators and safety switches
- the sealing of the cable glands on the safety switches
- the placement of the cable connections on the evaluation unit
- the shutdown distances



#### **DANGER**

Damaged or worn system components must be replaced.

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### 6.2.2 Inspection by qualified safety personnel

The inspection by qualified safety personnel must be performed regularly as per the applicable national and international regulations within the intervals defined. This procedure ensures that any changes on the machine or manipulations of the guard after commissioning are detected.

## 7 Maintenance

- ▶ Remove iron filings from the safety switch and actuator at regular intervals.
- ▶ Only use solvent-free cleaning agents to clean the safety switches and actuators.

## 8 Disposal



Always dispose of serviceability devices in compliance with local/ national rules and regulations with respect to waste disposal.



## 9 Technical data

### 9.1 Data sheet

Table 1: Data sheet

Safety-related parameters	
B <sub>10d</sub>	20 × 10 <sup>6</sup> with low load (EN ISO 13849-1)
PFH <sub>D</sub> <sup>1)</sup>	2.5 × 10 <sup>-8</sup>
Type	Type 4 (EN ISO 14119)
Actuator coding level	Low coding level (EN ISO 14119)
Safe state in the event of a fault	The switch has no internal fault detection and is unable to assume a safe state in the event of a fault. Fault detection is performed by the connected safety-related logic unit.
T <sub>M</sub> (mission time)	20 years (EN ISO 13849)
General data	
Housing material	Vistal®
Enclosure rating	IP 67 (IEC 60529)
Function	Magnetic
Storage and operating temperature	-30 °C ... +60 °C
Switching voltage U <sub>max</sub> (UL Class2)	30 V DC
Max. switching current <sup>2)</sup>	
RE11, RE21	400 mA
RE13, RE23, RE15, RE27	100 mA
Max. switching frequency	30/minute
Output state indication with LED	
Switching voltage	24 V DC
Max. switching current	Min. 5 mA ... max. 20 mA
Shock resistance	30 g/11 ms
Vibration resistance	10 ... 55 Hz, ampl. 1 mm
Mechanical life	1 × 10 <sup>8</sup> switching operations (-20 °C ... +60 °C) 1 × 10 <sup>5</sup> switching operations (-30 °C ... +60 °C)
Mounting orientation	Any, note alignment to actuator (mark)
Switching distances	<a href="#">see "Typical response range", page 20</a>
Type of connection	
RExx-SAC	4-pin M8 plug connector (without cable)
RExx-SA64	Cable 0.2 m with 4-pin M12 male connector
RExx-SA68	Cable 0.2 m with 8-pin M12 male connector
RExx-SA84	Cable 0.2 m with 4-pin M8 male connector
RExx-SA03 ... RExx-SA20	Cable with flying leads (3 m ... 20 m)
Cable material	PVC
Wire material	Copper
Coupling nut material	Zinc die cast, nickel plated
Cable diameter	5.8 mm
Wire cross-section	0.25 mm <sup>2</sup>
Bend radius (for fixed installation)	> 12 × cable diameter

Bend radius (for flexible use)	> 15 × cable diameter
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- At low load with a switching frequency of 1 operation/minute, 24 hours/day, 365 days/year, there are 525,600 switching operations per year.
- For UL Class 2 applications the maximum switching capacity is limited to 5 W.

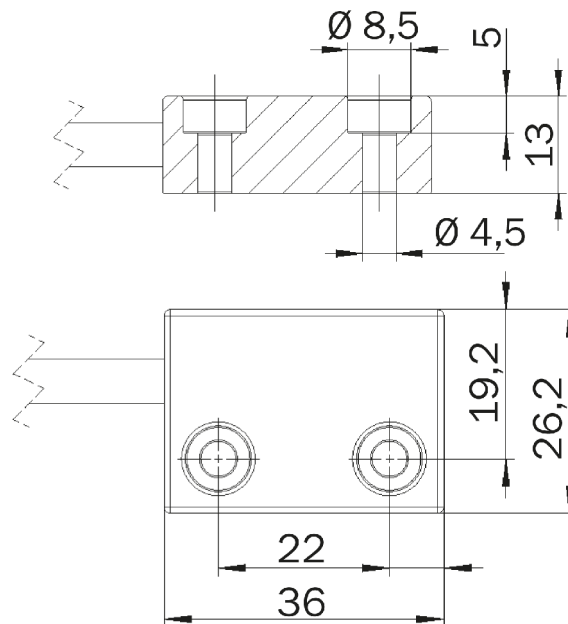
Table 2: Response range

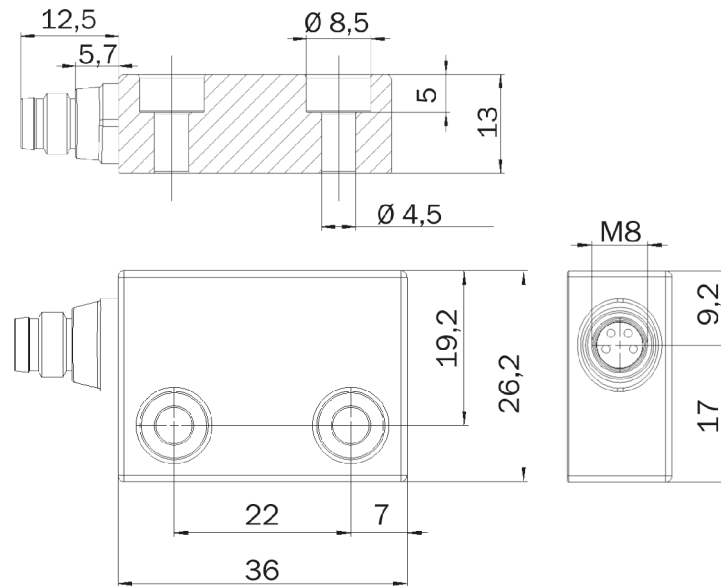
Type	RE11	RE13	RE15	RE21	RE23	RE27 <sup>1)</sup>
Type						
Internal circuitry (not actuated)						
Safe switch on distance $S_{ao}$ [mm] <sup>2)</sup>	3	7	7	6	9	9 (7) <sup>3)</sup>
Safe switch off distance $S_{ar}$ [mm]	12	20	20	31	22	20 (15) <sup>3)</sup>

- The LED for the output state indication has an internal resistance of 1.5 kΩ.
- There must not be any ferro-magnetic material near the sensor or actuator. All data apply for approach from the front and alignment offset  $m = 0$ .
- Response distance for the output state indication and LED.

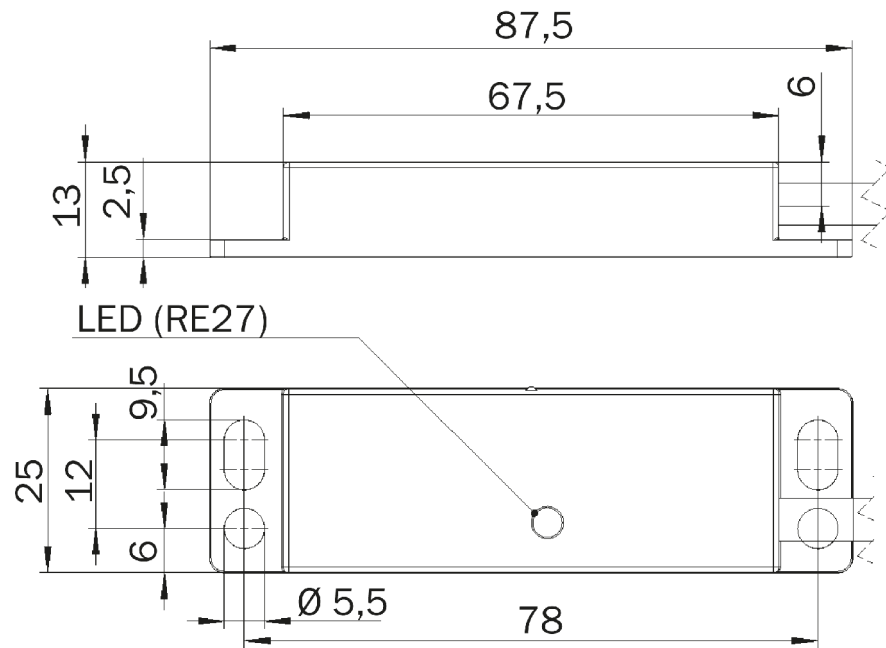
## 9.2 Dimensional drawings

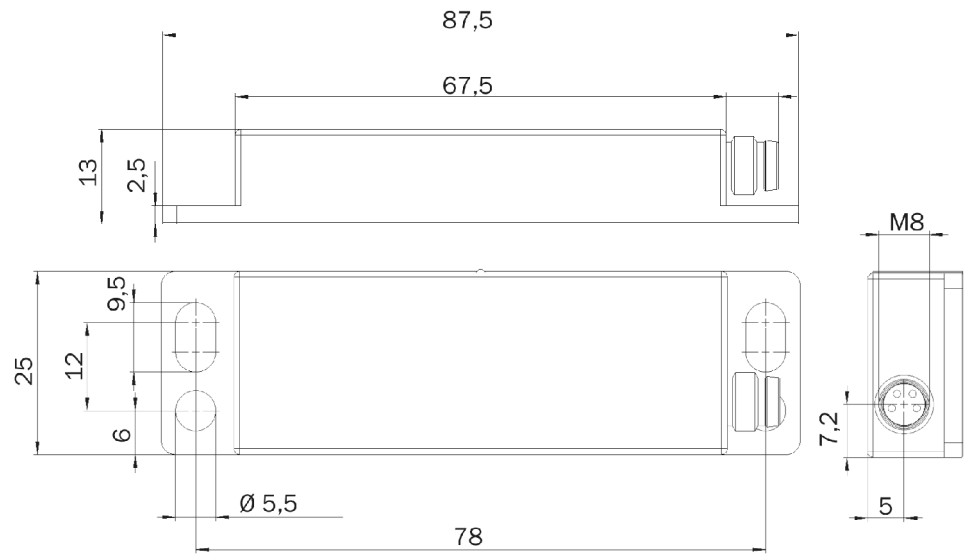
Dimensional drawings magnetic safety switches RE1.. (mm)



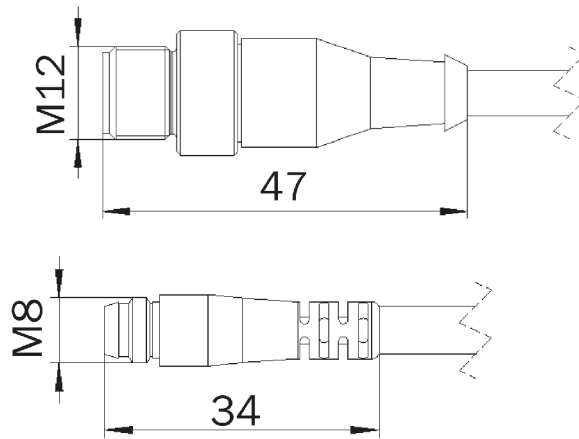


Dimensional drawings magnetic safety switches RE2.. (mm)

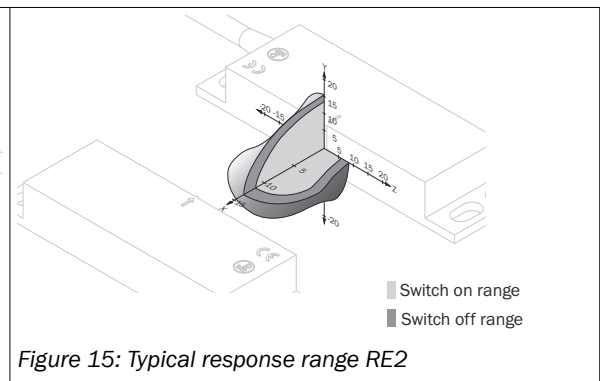
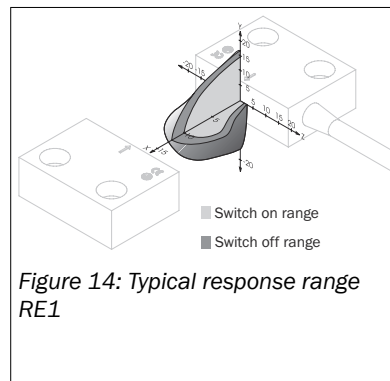




Dimensional drawings male connector (mm)



### 9.3 Typical response range



## 10 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at [www.sick.com](http://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).

### 10.1 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
- EMC DIRECTIVE 2014/30/EU
- MACHINERY DIRECTIVE 2006/42/EC

### 10.2 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
- Electromagnetic Compatibility Regulations 2016
- 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) 30 229 25 44  
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

**Russia**

Phone +7 495 283 09 90  
E-Mail info@sick.ru

**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](http://www.sick.com)

