OPERATING INSTRUCTIONS

RE1

Magnetic safety switch

DM-RE1

SICK
Sensor Intelligence.

Contents

1 Ordering information

1.1 Scope of delivery

- Magnetic safety switch
- Actuator
- 4 safety screws M4 x 14
- Safety note
- Operating instructions for download: www.sick.com

1.2 Ordering Information

Type	Part number
DM-RE1	1090444

2 About this document

These operating instructions are original operating instructions.

3 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.

3.1 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.

3.2 Application

The safety switch is a magnetically operated, non-contact safety switch. 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.

3.3 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.

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 chapter 7.2.

3.4 General safety notes and protective measures

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

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

4 Function description

The safety switch is magnetically coded. Its contacts are operated by the related actuator. The safety switch is equipped with 2 normally open contacts (NO/NO).

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

4.1 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 (see figure 2).
- 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.

NOTICE

The safe evaluation unit’s inputs and outputs connected to the safety switch must meet the requirements of EN 61 131.

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

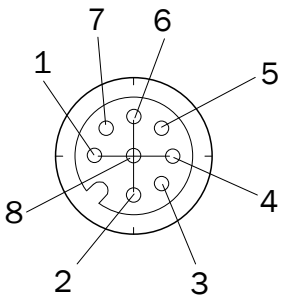


Figure 1: Plug assignments

	Function	Unactivated
3 / 4	Normally open contact (NO)	Open
7 / 8	Normally open contact (NO)	Open

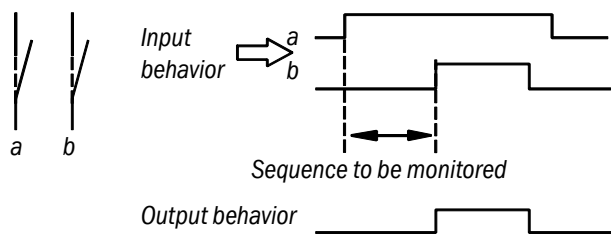


Figure 2: Switching behavior (unactivated)

5 Mounting

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

- 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.

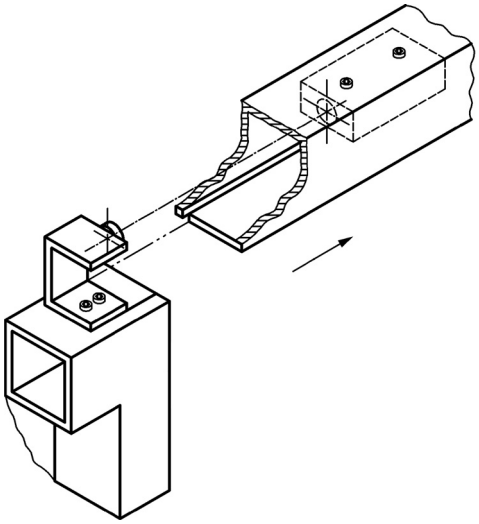


Figure 3: Protection example for bypassing a magnetic safety switch in compliance with EN ISO 14 119

- Do not mount the safety switch in an environment with interfering magnetic fields.
- Note the possible operating positions (figure 5).
- 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 4).
- Fit an additional stop and guide for the moving part of the protective device (figure 4).
- 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 swiveling doors the actuator is to be fitted to the closing edge (figure 6).

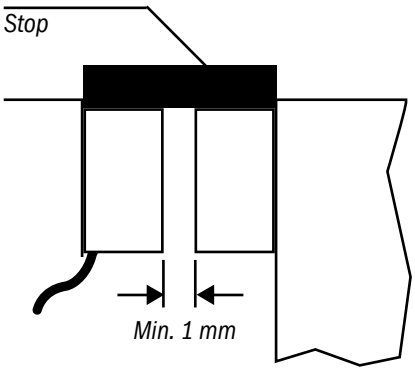


Figure 4: Mounting example for safety switch and actuator

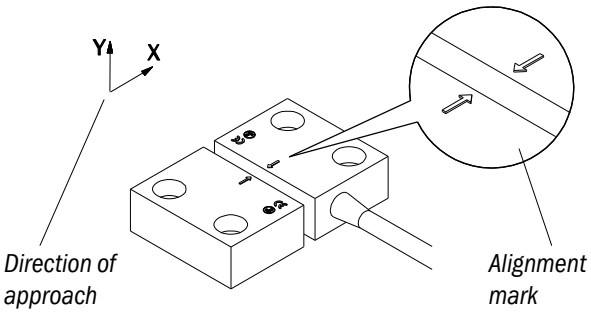


Figure 5: Alignment of sensor and actuator

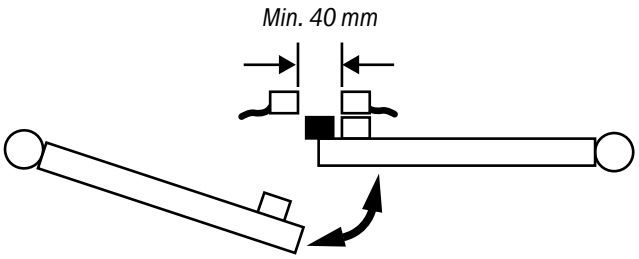


Figure 6: Mounting example on swiveling doors

6 Electrical installation

DANGER

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

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.

- 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.

7 Commissioning

7.1 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!

7.2 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.

7.2.1 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.

7.2.2 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.

8 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.

9 Compliance with EU directives

EU declaration of conformity (excerpt)

The undersigned, representing the following 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 respective standards and/or technical specifications are taken as the basis.

Complete EU declaration of conformity for download: www.sick.com

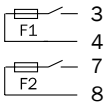
10 Technical specifications

10.1 Data sheet

Table 1: Data sheet

Safety-related parameters	
B_{10d}	20 × 10^6 with low load (EN ISO 13 8491:2008)
PFH_D[1)]	2.5 × 10^{-8}
Type	Type 4 (EN ISO 14 119)
Actuator coding level	Low coding level (EN ISO 14 119)
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.
TM (mission time)	20 years (EN ISO 13 849)
General data	
Housing material	Glass fibre-reinforced PPS
Enclosure rating	IP 67 (IEC 60 529)
Function	Magnetic
Storage temperature	–20 ... +60 °C
Switching voltage U_{max} (UL Class2)	30 V DC
Max. switching current	100 mA
Max. switching frequency	30/minute
Shock resistance	30 g/11 ms
Vibration resistance	10 ... 55 Hz, ampl. 1 mm
Mechanical life	100 × 10^6 switching operations
Mounting orientation	Any, note alignment to actuator (mark)
Switching distances	see table 2
Type of connection	Cable 0.2 m with 8-pin M12 plug
Cable material	PVC

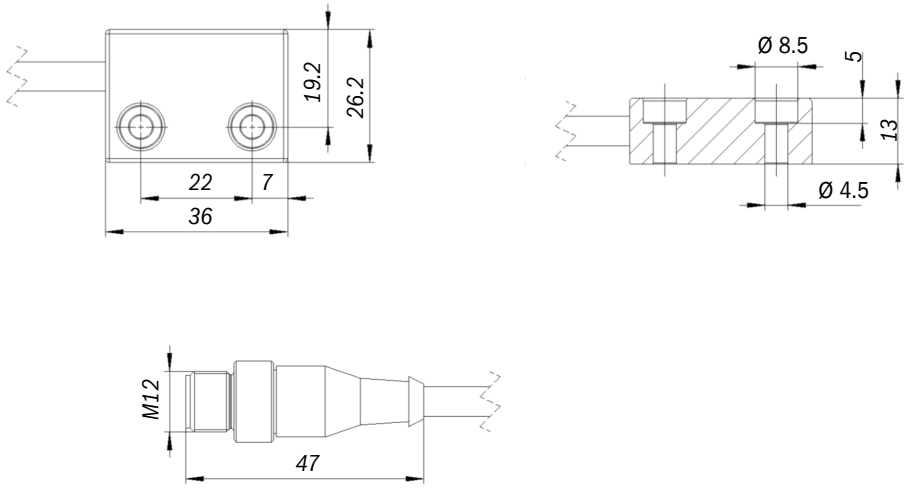
Table 2: Response range

Type	RE13-1090444
Internal circuitry (not actuated)	
Safe switch on distance S_{ao} [mm][2)]	7
Safe switch off distance S_{ar} [mm]	20

1) **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.**

2) **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.**

10.2 Dimensional drawings



M12 plug

Figure 7: Dimensional drawing

10.3 Typical response range

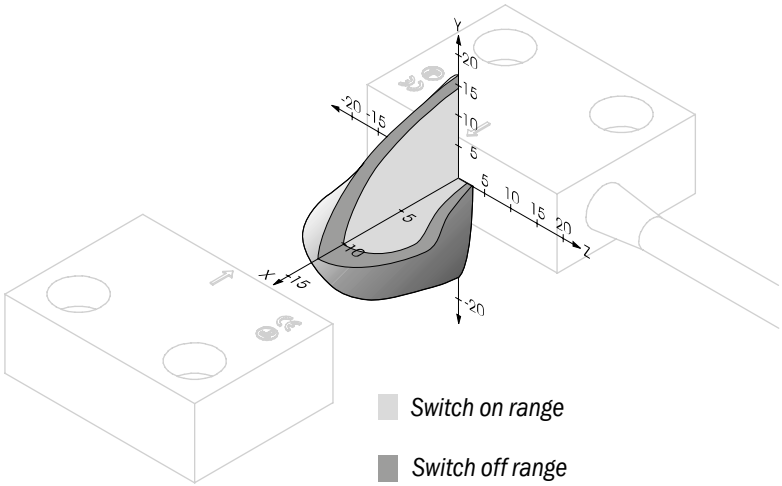


Figure 8: Typical response range

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