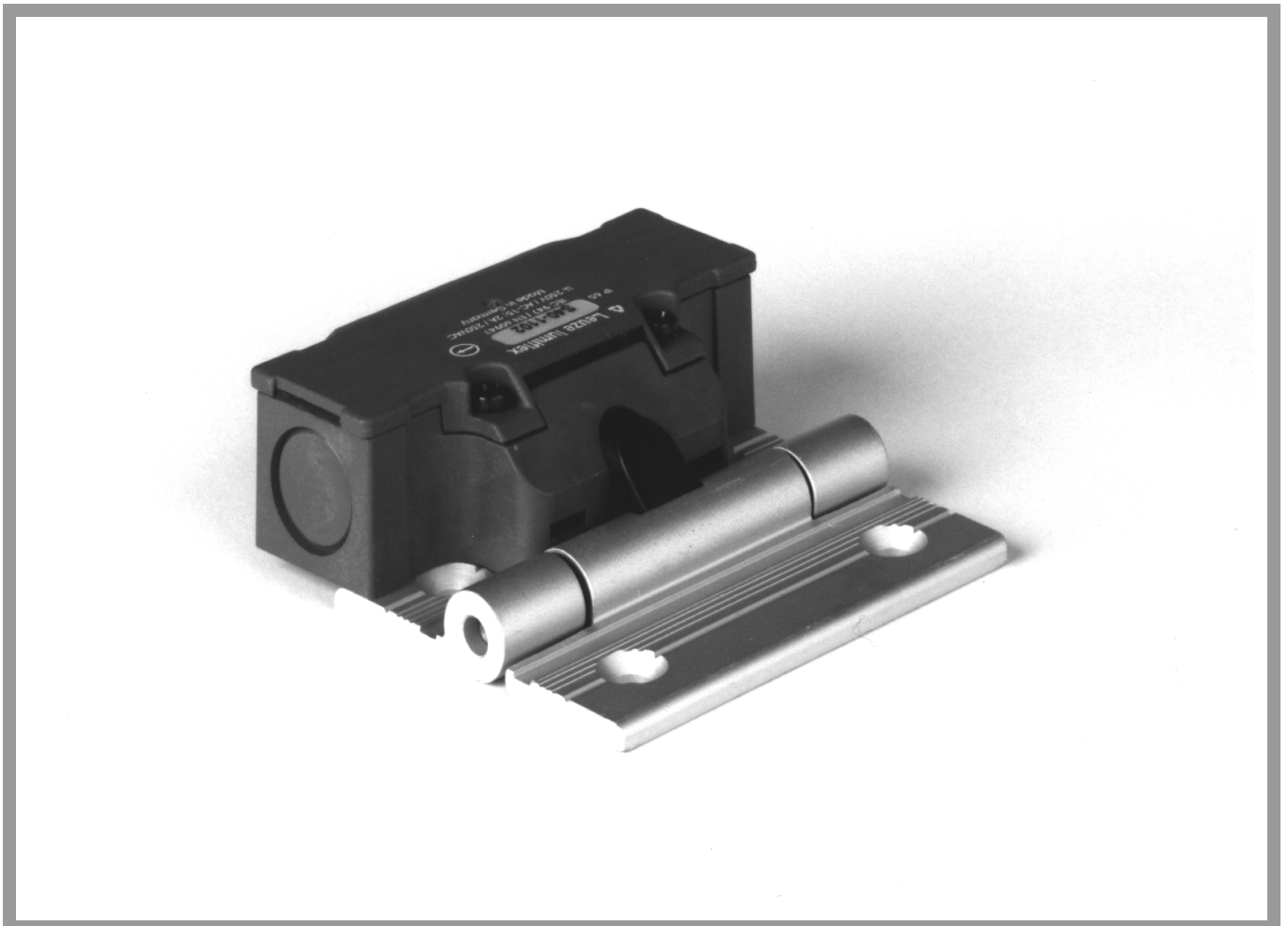




# S40

## Safety Hinge Switch

### Technical Description



### **About this technical description**

This description contains information regarding the proper and effective use of the safety interlocking devices S40.

Safety precautions and warnings are designated by the symbol.



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# 1 Safety Hinge Switch S40

“Interlocking device without guard locking”  
(European Standard EN 1088)

## 1.1 Safety Features

- Protects humans from dangerous movements in the operating range of industrial machinery and systems.
- Monitors the position of pivoting protective devices (e.g. safety doors) by means of a monitoring switch integrated into the hinge.
- The types of additional measures taken against defeating safety interlocking devices with separate actuators (e.g. concealed installations) are not necessary for the safety hinge switch S40 since there is no safety-related possibility of accessing its actuating mechanism.



- Protective device monitors (according to EN 954-1): Safety interlocking devices are not assigned to a safety category (SC). They can merely fulfill the requirement set by particular categories for integration into safety circuits. Connection examples for SC 1 to 4 are given in the Appendix, Section 3.1.

## 1.2 Method of Operation

Depending on the rotating movement of the protective device (e.g. safety door), a cam on the hinge pin actuates the plunger and, after approx. 3.5 degrees of movement, positively opens the safety contact(s) in the switch against the pressure of the plunger spring. When the protective device is closed again, the safety contact(s) close(s) tensionally under the actuating force of the plunger spring, signaling the safe state of the protective device to the downstream circuitry.

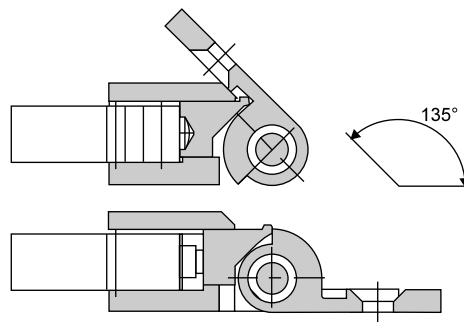


Fig. 1 Functional scheme of the safety hinge switch S40

## 1.3 Functional and Constructive Features

### 1.3.1 Design Advantages

- The mounting is much less complicated than those of other interlocking devices for pivoting protective devices.
- It is also much easier to realize protective device monitors for higher safety categories (3/4), such as interlocking devices redundantly constructed with two hinge switches. For example, it is no longer necessary to construct elaborate cam discs for actuating the position switch.
- As an option, mounting sets for commercially available profiles (30, 35 or 45 mm) can be provided upon request.

### 1.3.2 Dimensions

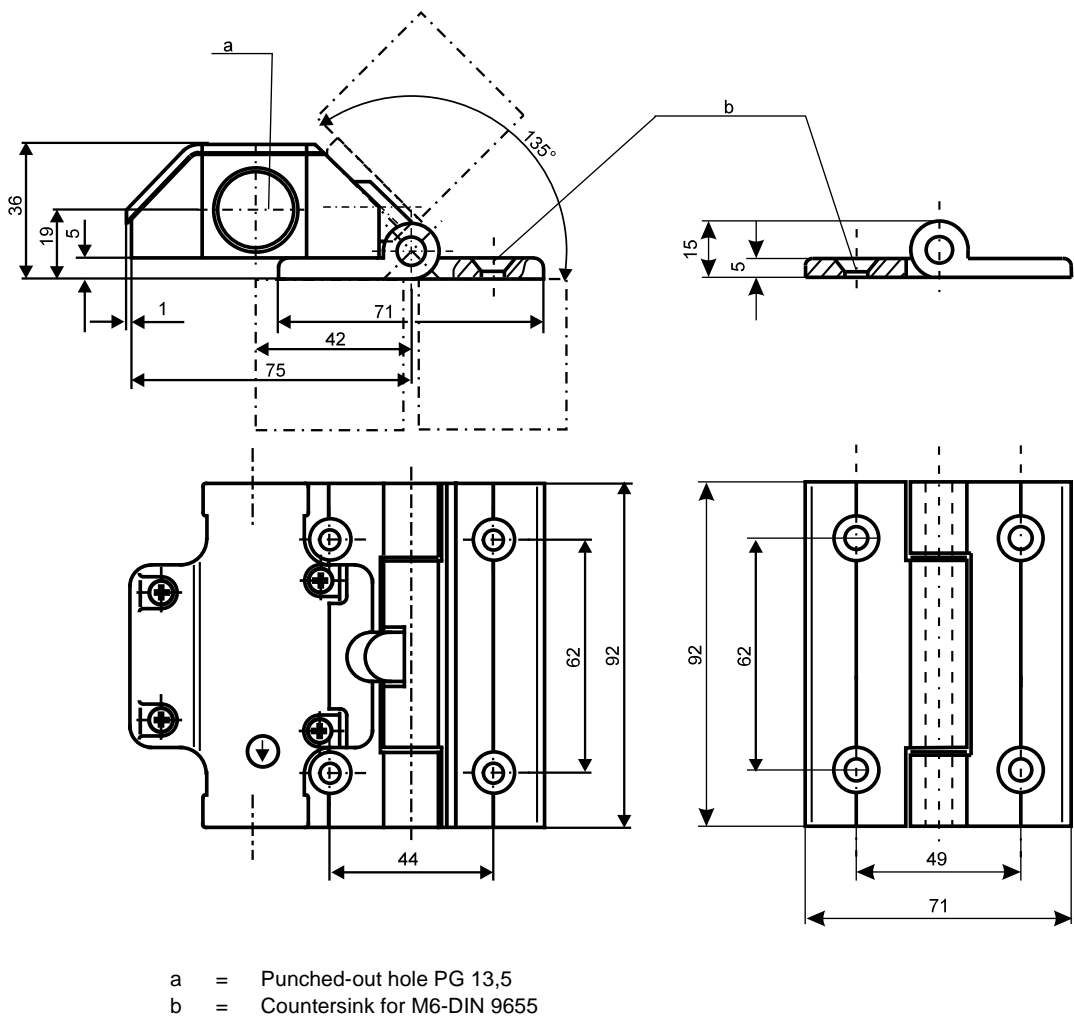


Fig. 2 Dimensions – Safety hinge switch S40

### 1.3.3 Contact Layouts

Assignment:

- Normally closed contact 11-12 (21-22) ⇒ safety contact(s) for the safety signal circuit;
- Normally open contact 23-24 (33-34) ? feedback contact(s);

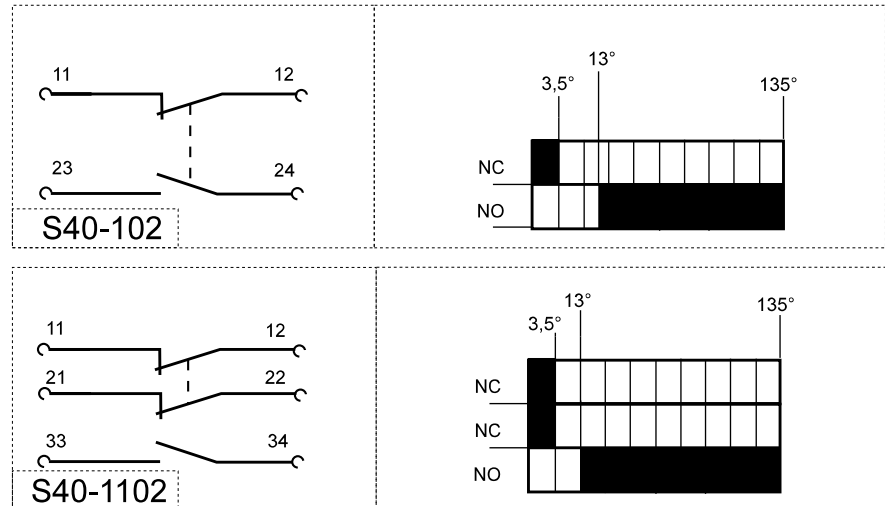


Fig. 3 Contact layouts / switch path diagram – S40

### 1.4 General Mounting Instructions for Series S40

Installation position	Any chosen position. The plunger should, however, be positioned so that it is protected from direct exposure to flying chips, cooling and cutting oils, etc.
Attachment – S40	Attached with countersunk screws 4 x M6 DIN 965 (included in delivery). Designed for mounting on 40 mm profiles as well as on all commonly used aluminum profiles, square pipes and machine cover panels
Switching function/ opening angle of the safety door	The pivoting protective device can be opened up to a maximum of 135° (see Fig. 2). The factory-set opening angle of the hinge switch is 3-4°. By the time the mechanical serviceable life reaches its upper limit (see Technical Data), normal wear and tear can cause this to change to 5-6°. The safety distances specified in the standards DIN EN 294 and DIN EN 349 must be observed!



## 1.5 Delivery Overview

Safety interlocking devices, Series S40, with accessories

Type	Contact Components	Order No.
<b>Safety hinge switch</b>		
S40-1102 *	2 NC / 1 NO	640010
S40-102 *	1 NC / 1 NO	640011

Delivery does not include the actuators of the safety guard interlocks S 10, L 30 and L 50.

### Accessories

Type	Feature	Order no.
Additional hinge	Separate, suited for use with Series 40	640065

\* including additional hinge

## 1.6 Technical Data

### Standards/Regulations

Industrial switch gear, positively opening	In accordance with IEC 947; EN 60947; DIN VDE 0660
Interlocking device without guard locking	In accordance with EN 1088

### Mechanical Data

Enclosure rating	IP 65
Ambient temperature range	-25 °C ... +65 °C
Housing material	PA 66, self-extinguishing, hardly flammable
Sealing	Perbunan, resistant to liquid fuels and oil
Cable entries	2 x PG 13,5
Connection types	Screw terminals, 0.5 mm <sup>2</sup> .. 1.5 mm <sup>2</sup>
Connection designation	DIN EN 50 005/50 013
Installation position	Any chosen position
Mechanical serviceable life	min. 1 x 10 <sup>6</sup> switching cycles



Mechanical loading capacity	max. torque 3 kN/m at 1 m hinge distance
Switching frequency	1,200 Schaltspiele/h
Switch path (lit)	ca. 4.5 mm
Actuating force at lift end	12 N
Shock resistance	> 30 g/18 ms
Vibration resistance	> 20 g/10 ... 200 Hz
Climatic resistance	Conforms to DIN EN 60 068 part 2-30

#### Electrical Data

Utilization category in accordance with DIN VDE 0660/part 200	AC-15/ 250 V AC/ 2 A DC-13/ 24 V DC/ 1 A
Contact material	AgNi 10, gold-plated, separate switching chambers
Switching of small loads	min. 5 V/1 mA
Rated isolated voltage $U_{ri}$	250 V, test voltage 2,000 V
Thermal rated performance	max. 2.5 A
Clearance and creepage distance in accordance with DIN VDE 0110	Pollution degree 3 over-voltage category III
Proof of positive opening	2.5 kV, impulse voltage
Positive opening path	approx. 2 mm after reaching the opening point
Short circuit protection	gG 2 A
<b>Approvals</b>	BIA, UL, CSA

## 2 Appendix

### 2.1 Connection Examples

Corresponding to a risk assessment as specified in EN 954-1A, a safety category is determined for devices intended to protect humans at production systems. The contacts of the safety interlocking devices function as the interface to the safety relay modules in the machine controls. The circuit diagrams below show wiring examples for connecting safety interlocking devices with MSI safety relay modules, classified by safety category (1 – 4).

(For the configurations and technical data related to the MSI safety relay modules, refer to the Connection and Operating Instructions for MSI-SR1 and MSI-SR2)

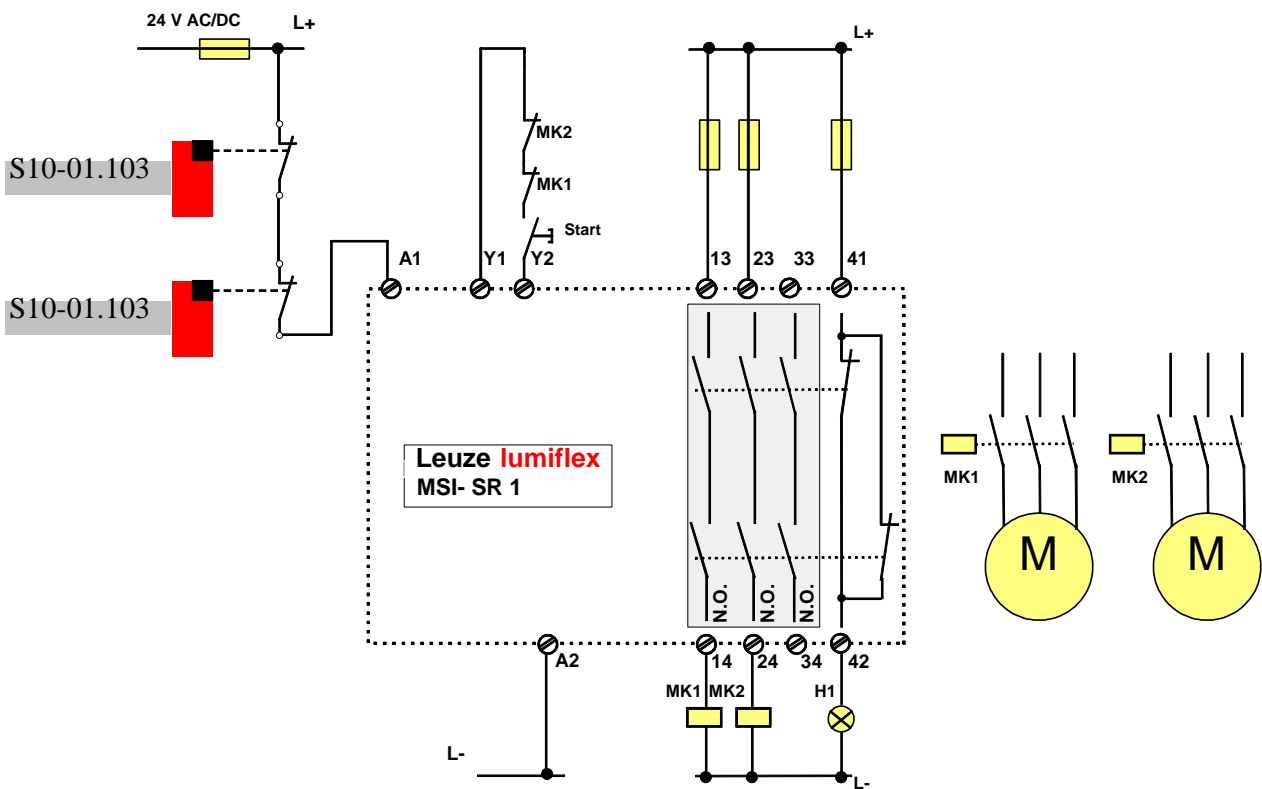
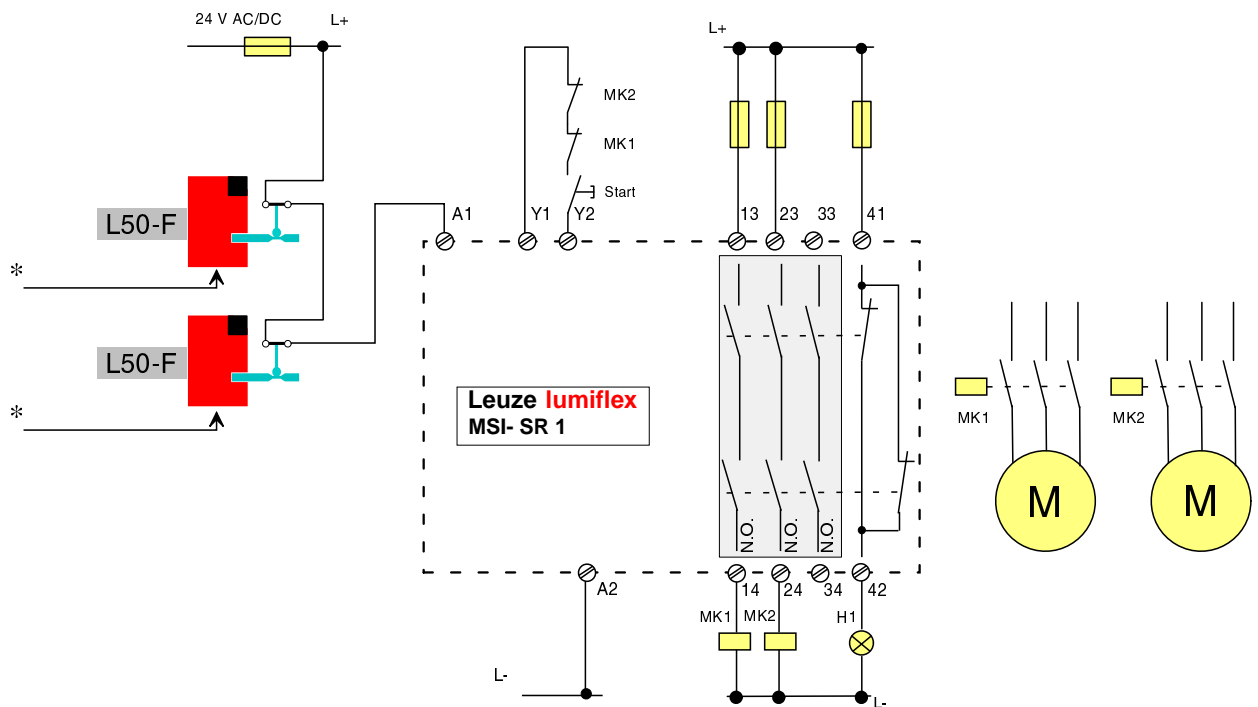


Fig. 4 Safety door monitoring in safety category 2 (1) according to EN 954-1

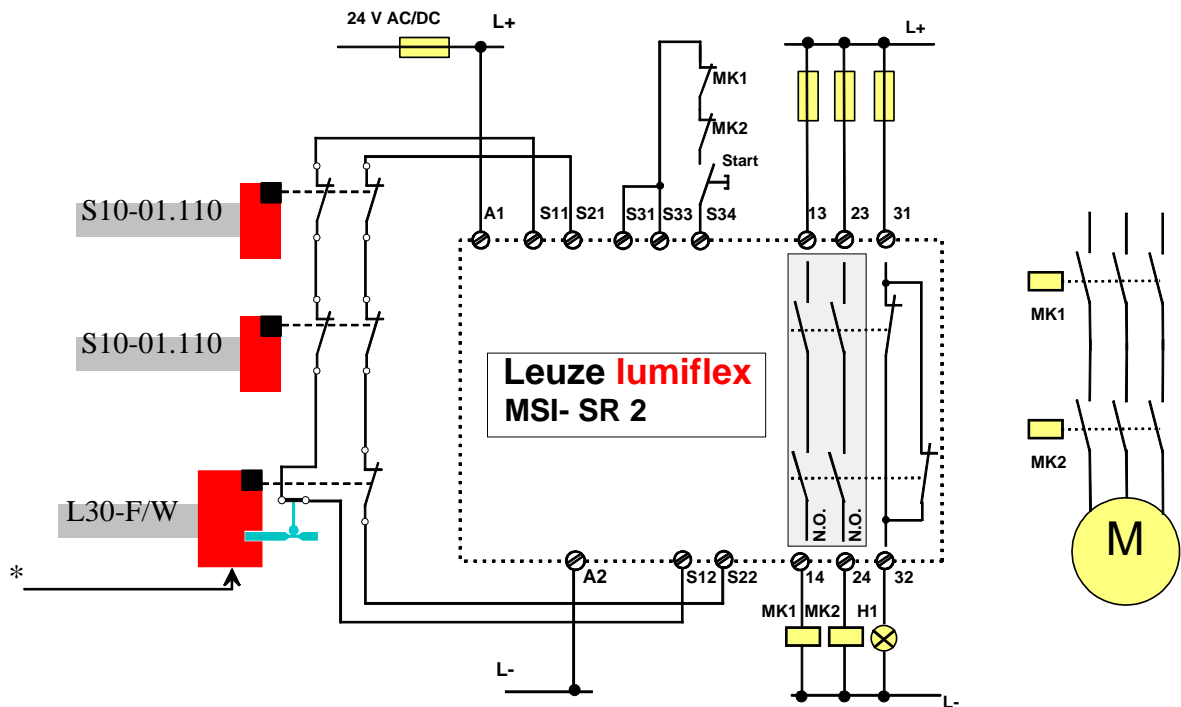
- MSI-SR1, single-channel
- Combination of several safety doors, each with 1 safety interlocking device S10 (S40)



\* Separate magnet voltage supply (24 V DC) serves as the guard locking signal by way of a time-delayed enabling circuit or stoppage control circuit – see Technical Description of safety interlocking device L50 (L30).

Fig. 5 Safety door monitoring with guard locking in safety category 2 (1) according to EN 954-1

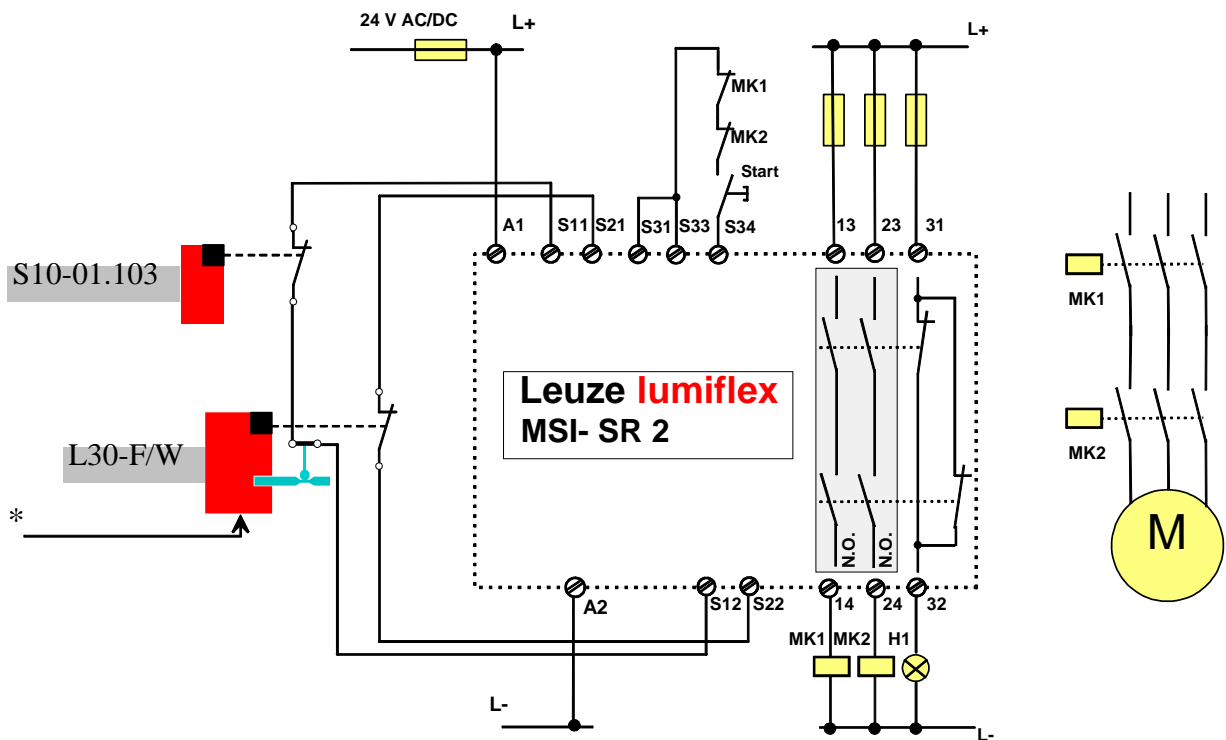
- MSI-SR1, single-channel
- Combination of several safety doors, each with 1 safety interlocking device with guard locking L50 (L30)



\* Separate magnet voltage supply (24 V DC) serves as the guard locking signal by way of a time-delayed enabling circuit or stoppage control circuit – see Technical Description of safety interlocking device L50 (L30).

Fig. 6 Safety door monitoring with/without guard locking, combined, in safety category 3 according to EN 954-1

- MSI-SR2, dual-channel (with cross circuit monitoring - for safety category 4)
- Combination of several safety devices, each with 1 safety interlocking device with/without guard locking S10 (S40) and L30 (L50) combined



\* Separate magnet voltage supply (24 V DC) serves as the guard locking signal by way of a time-delayed enabling circuit or stoppage control circuit – see Technical Description of safety interlocking device L50 (L30).

Fig. 7 Safety door monitoring with guard locking in safety category 4 according to EN 954-1

- MSI-SR2, dual-channel with cross circuit monitoring
- 1 safety interlocking device with guard locking L30 (L50) and 1 safety interlocking device S10 (S40) per safety door

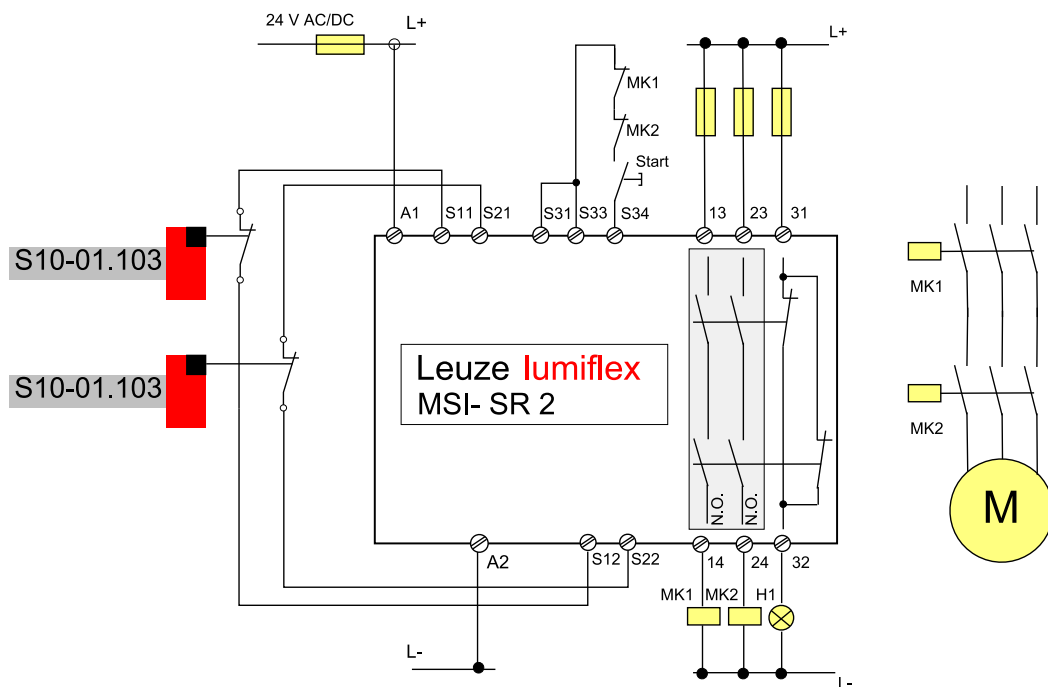


Fig. 8 Safety door monitoring in safety category 4 according to EN 954-1

- MSI-SR2, dual-channel with cross circuit monitoring
- 2 safety interlocking devices S10 (S40) per safety door with only 1 NC-contact per S10 (S40)



To ensure trouble-free operation, the cables used for connecting the safety interlocking devices to the MSI safety relay modules may not exceed specific lengths. For more information, refer to the admissible input cable resistance values in the Technical Data section of the connection and operating instructions for MSI-SR1 and MSI-SR2.