



## DIY Miniature safety edges



EN | Product information

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### Copyright

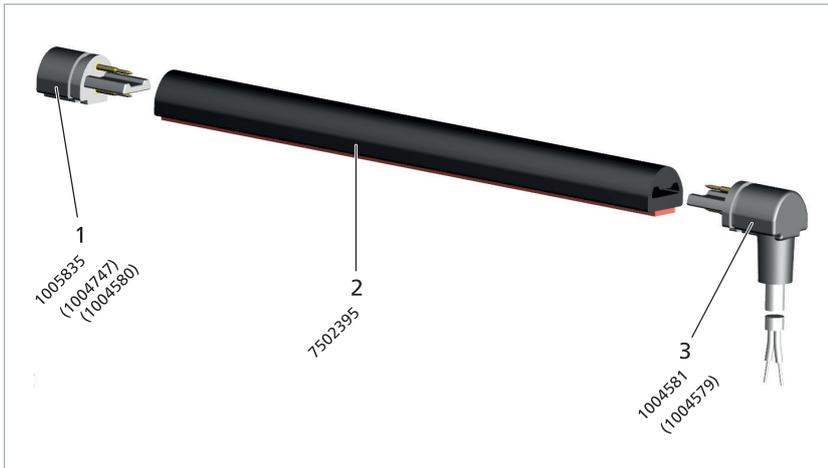
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## Overview

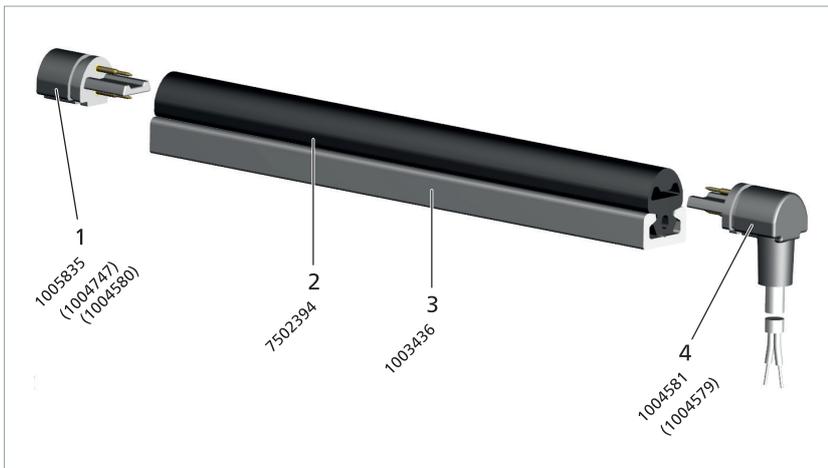
### Contact profile – Miniature safety edge

The semi-finished contact profile is cut to length and assembled with the other components. The functioning product is then called a miniature safety edge.



#### EKS 011 TPE

- 1 End piece with resistor
- 2 Contact profile
- 3 End piece with cable



#### EKS 014 TPE

- 1 End piece with resistor
- 2 Contact profile
- 3 Aluminium profile
- 4 End piece with cable



#### EKS 052 TPE

- 1 End piece with resistor
- 2 Contact profile
- 3 End piece with cable

*Subject to technical modifications.*

## Materials list

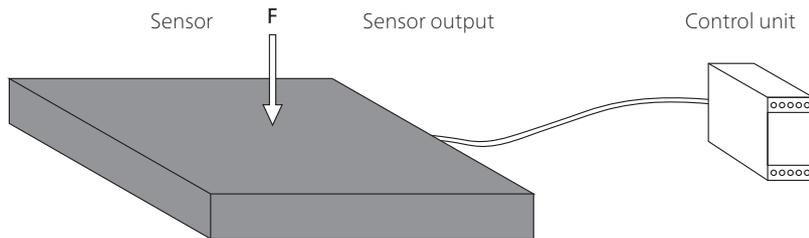
Part No.	Designation	PU
7502395	Contact profile EKS 011 TPE, self-adhesive	50 m
7502394	Contact profile EKS 014 TPE, with snap-in foot	50 m
7502773	Contact profile EKS 052 TPE, with clamp foot	45 m
1004580	End piece with resistor 1k2	50 pc.
1004747	End piece with resistor 2k2	50 pc.
1005835	End piece with resistor 8k2	50 pc.
1004579	End piece with PUR cable 2.5 m, axial	50 pc.
1004581	End piece with PUR cable 2.5 m, angled 90°	50 pc.
1003436	Aluminium profile C 10 for EKS 014 with snap-in foot	6 m
1004988	Scissors with stop	1 pc.
7502412	Assembly aid set	1 pc.
1004987	Special adhesive Contact VA 250 Black, 12 g, for IP64	1 pc.
7501995	Primer 4297 Type 3M, 125 ml, in can	1 pc.

*Subject to technical modifications.*

## Definitions

### Pressure-sensitive protection device

A pressure-sensitive protection device consists of pressure-sensitive sensor(s), signal processing and output signal switching device(s). The control unit is made up of the signal processing and output signal switching device(s). The pressure-sensitive protection device is triggered when the sensor is activated.

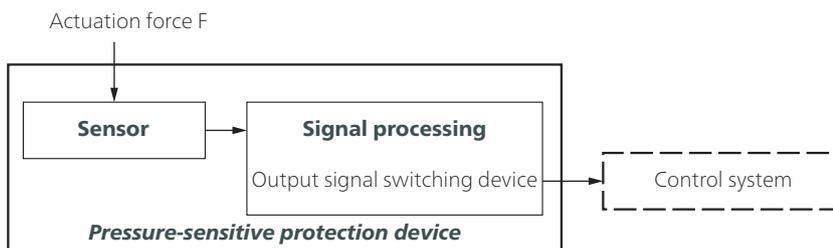


#### Sensor

The sensor is the part of the pressure-sensitive protection device that generates a signal when the actuating force  $F$  is applied. Mayser safety systems have a sensor whereby the actuating surface is deformed locally.

#### Signal processing

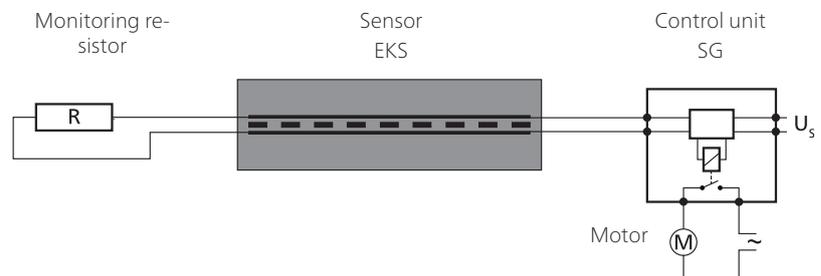
The signal processing is the part of the pressure-sensitive protection device that converts the output signal of the sensor and controls the status of the output signal switching device. The output signal switching device is that part of the signal processing which is connected to the machine controls and transmits safety output signals such as STOP.



## Criteria for selecting the sensor type

- Category according to ISO 13849-1
- Performance level of pressure-sensitive protection device = at least  $PL_r$
- Temperature range
- Degree of protection in accordance with IEC 60529: IP40 is the standard for diy miniature safety edges. Higher degree of protection possible with special adhesive (part no.: 1004987).
- Low switching forces
- Minimum overall height

## Operation principle 2-wire-technology



The monitoring resistor must be compatible with the control unit. Standard value is 8k2.

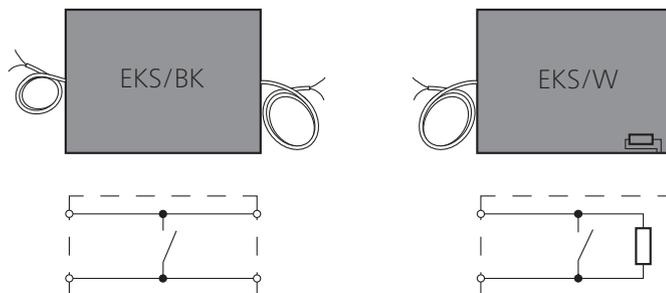
For your safety:

Sensor and connecting cables are constantly monitored for function. Monitoring is carried out by controlled bridging of the contact surfaces with a monitoring resistor (closed current principle).

## Design

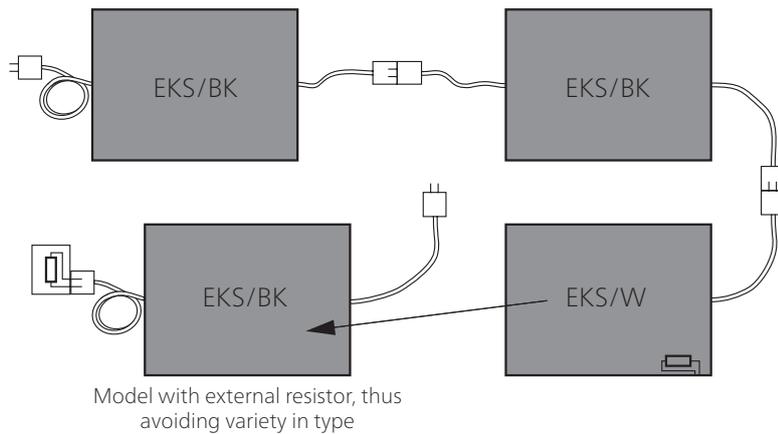
EKS/BK with cables on both sides as a through sensor or as an end sensor with external monitoring resistor

EKS/W as an end sensor with integrated monitoring resistor



Subject to technical modifications.

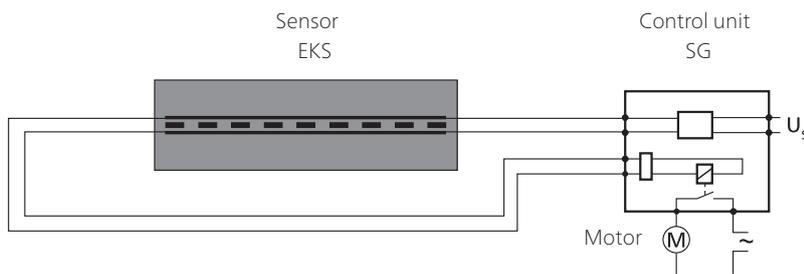
**Combination of sensors**



Combination:

- Connection of more than one sensor
- Only one control unit required
- Safety edge design with custom lengths and angles

**Operation principle 4-wire-technology**



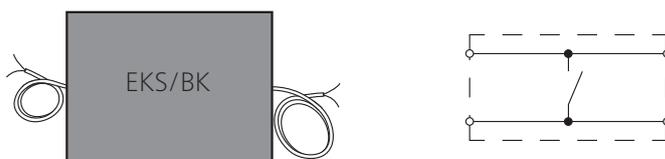
The 4-wire technology can be used only together with control unit SG-EFS 104/4L.

For your safety:

Sensor and connecting cables are constantly monitored for function. This is possible because of signal transmission feedback – without monitoring resistor.

**Design**

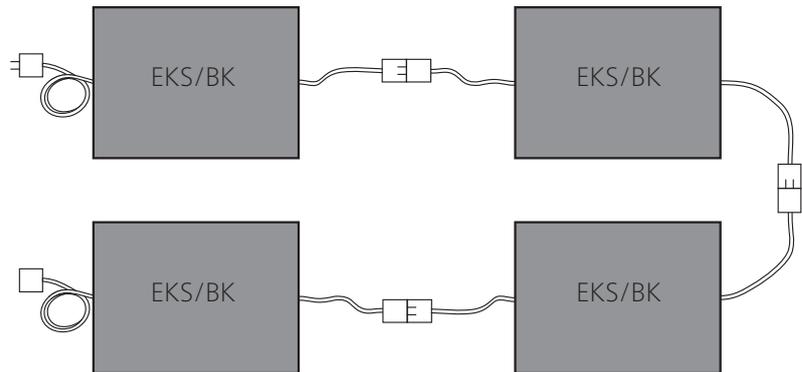
EKS/BK with cables on both sides as a through sensor



060319 v2.01-RIA

*Subject to technical modifications.*

## Combination of sensors



Combination:

- Connection of more than one sensor
- Only one control unit required
- Safety edge design with custom lengths and angles

## Safety

### Intended use

A safety edge detects a person or the person's limbs from the pressure exerted on the effective actuation area. It is a linear tripping device. It is designed to prevent potential hazardous situations such as shearing and pinching edges for a person within a danger zone.

Typical areas of use are automated windows and façade systems, automation technology and moving units in medical technology.

The reliable functioning of a safety edge depends on

- the surface condition of the mounting surface,
- the correct choice of EKS profile,
- and proper installation.

Due to the design, the visible actuation area is reduced by the non-sensitive edges. What remains is the actual effective actuation area (see chapter *Effective actuation area*).

### Limits

- max. 3 sensors type BK on one control unit
  - max. 2 sensors type BK and 1 sensor type W on one control unit
- If more sensors are required, please contact Mayser's service department.

*Subject to technical modifications.*

## Exclusions

The sensors are not suitable for performing a sealing function. Constant actuation of sensors can result in permanent damage.

## Other safety aspects

The following safety aspects relate to pressure-sensitive protection devices consisting of a sensor and a control unit

### **Performance Level (PL)**

Exclusion of error according to ISO 13849-2, Table D.8: Non-closing of contacts in the case of pressure-sensitive safety devices according to ISO 13856. In this case, none of the sensor parameters are used for determining the PL. Assuming the control unit has a high  $MTTF_D$  value, the entire miniature safety edge system (pressure-sensitive safety device) can achieve the maximum value PL d.

### **Is the safeguard appropriate?**

The PL required for the hazard must be decided by the integrator. This is followed by the choice of safeguard.

Finally, the integrator needs to check whether the category and PL of the safeguard chosen are appropriate.

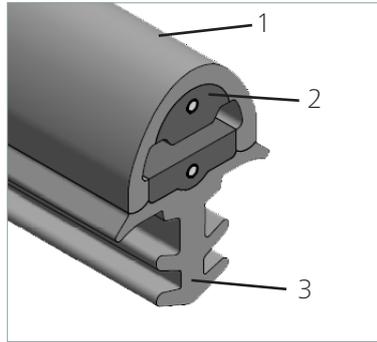
### **Risk and safety assessment**

For the risk and safety assessment of your machine we recommend ISO 12100 „Safety of machinery – general principles for design“.

### **Without reset function**

When a safeguard without reset function is used (automatic reset), the reset function must be made available in some other way.

**Design**



The miniature safety edge consists of a sensor (1 to 3)  
 (1) contact profile EKS with  
 (2) integrated NO contact safety element,  
 (3) mounting element.

**Effective actuation area**

The parameters X, Y, Z, L<sub>NE</sub> and the angle α describe the effective actuation area.

For the effective actuation area, the following applies:

$$L_{WB} = L_{EKS} - 2 \times L_{NE}$$

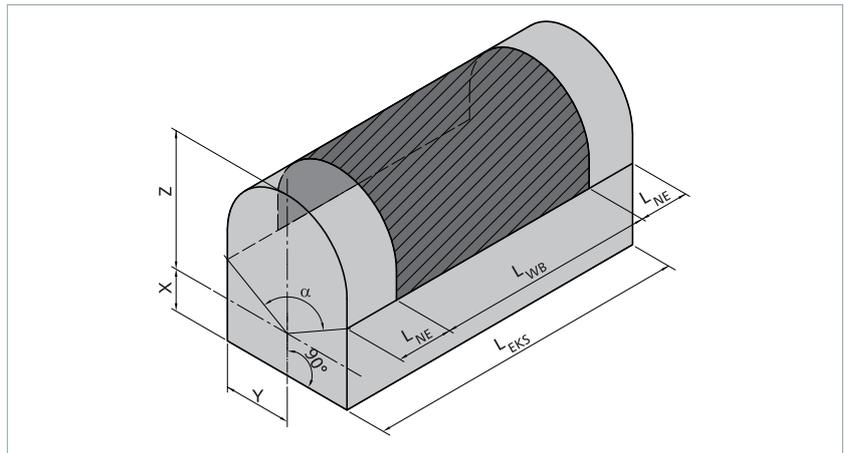
Parameters:

L<sub>WB</sub> = effective actuation length

L<sub>EKS</sub> = total length of miniature safety edge

L<sub>NE</sub> = non-sensitive length at end of miniature safety edge

α = effective actuation angle



		<b>EKS 011</b>	<b>EKS 014</b>	<b>EKS 052</b>
<b>α</b>		80°	80°	80°
<b>L<sub>NE</sub></b>	End piece W	27 mm	27 mm	27 mm
	End piece cable angled 90°	28.5 mm	28.5 mm	28.5 mm
	End piece cable axial	32 mm	32 mm	32 mm
<b>X</b>		2.05 mm	2.3 mm	2.1 mm
<b>Y</b>		3.95 mm	3.9 mm	4.7 mm
<b>Z</b>		4.6 mm	4.5 mm	4.5 mm

*Subject to technical modifications.*

## Installation position

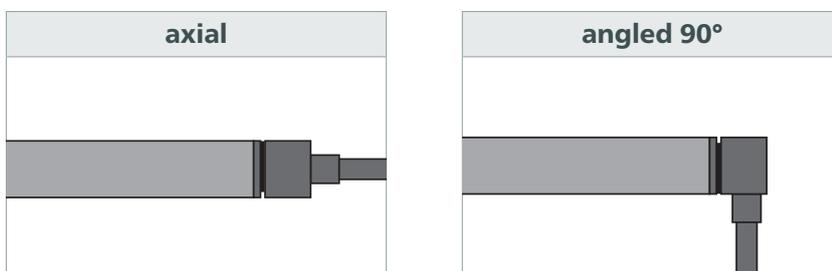
The installation position is variable.

In idle state, it must be ensured that no pressure is exerted on the sensors.

## Connection

### Cable exits

Two cable exits are available: axial and 90° angle.

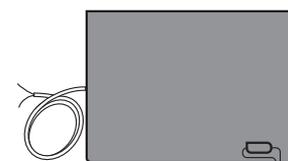


### Cable connection

- Standard cable lengths  
 $L = 2,5 \text{ m}$
- Maximum total cable length to the control unit  
 $L_{\text{max}} = 100 \text{ m}$

#### Sensor type W

- As a single sensor type W or an end sensor type W
- Integrated resistor
- 2-wire cable ( $\varnothing 2.9 \text{ mm PUR}$ ,  $2 \times 0.25 \text{ mm}^2 \text{ Cu}$ )



#### Sensor type BK with 2 lines

- As a feed-through sensor type BK
- Without resistor
- Two 2-wire cables ( $\varnothing 2.9 \text{ mm PUR}$ ,  $2 \times 0.25 \text{ mm}^2 \text{ Cu}$ )

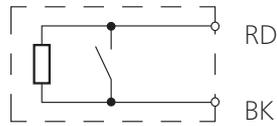


## Wire colours

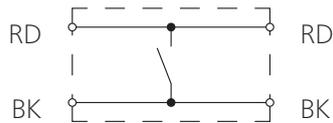
### Colour coding

BK Black  
RD Red

### Sensor type W



### Sensor type BK with 2 lines



## Sensor surface

### Physical resistance

#### Higher degree of protection

A special adhesive (part no. 1004987) allows a higher degree of protection up to IP64.

Miniature safety edge EKS	TPE
IEC 60529: Degree of protection	IP40
UV-resistance	yes

### Chemical resistance

The sensor is resistant against normal chemical influences such as diluted acids and alkalis as well as alcohol over an exposure period of 24 hrs.

The specifications in the table are the result of tests conducted in our lab at room temperature (+23 °C). The suitability of our products for your special area of application must always be verified with your own practical tests.

*Subject to technical modifications.*

Material	TPE
Acetone	-
Formic acid	-
Armor All	+
Car shampoo	+
Petrol	-
Brake fluid	+
Buraton	+
Butanol	-
Sodium hypochlorite	-
Disinfectant 1 %	+
Diesel	-
Acetic acid 10 %	-
Ethanol	+
Ethyl acetate	-
Ethylene glycol	+
Greases	±
Anti-frost agent	+
Skin cream	+
Icidine	+
Incidine	+
Incidine plus	+
Cooling lubricant	-
Plastic cleaner	+
Lyso FD 10	+
Metal working oil	-
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5 %	+
White spirit (ethyl alcohol)	+
Terralin	+
Centring oil	-

**Explanation of symbols:**

+ = resistant

± = resistant to a certain extent

- = not resistant

## Attachment

Three mounting types are available:

- Acrylic foam adhesion
- Snap-in foot
- Clamp foot

The mounting type depends on the selected contact profile.

Mounting type	EKS 011	EKS 014	EKS 052
Acrylic foam adhesion	•	–	–
Snap-in foot	–	•	–
Clamp foot	–	–	•

## Per acrylic foam adhesion

The miniature safety edge is equipped with double-sided foam adhesive tape. The double-sided foam adhesive tape (acrylic foam) is already affixed to the bottom side of the contact profile.

### With primer

The clean, dry and smooth bonding surface must be treated with primer before the miniature safety edge is mounted.

### Without primer

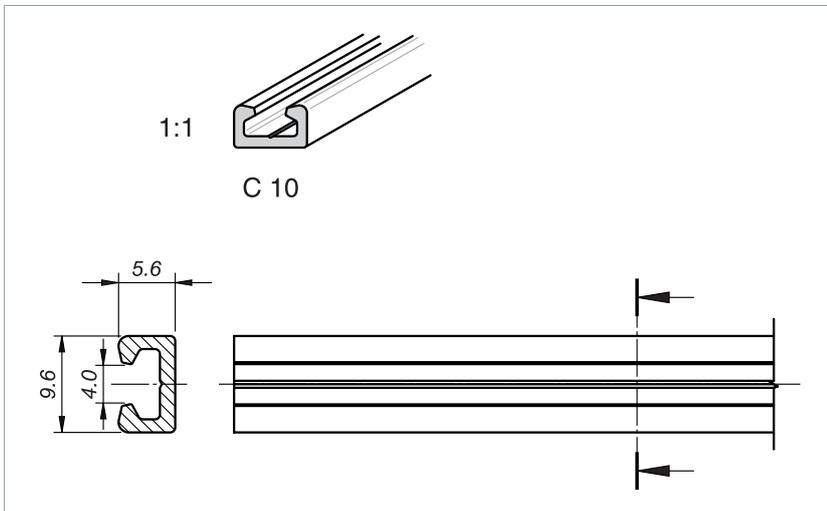
Only in the case of uncoated aluminium, the acrylic foam also adheres dependably without primer.

### Not suitable

The following materials are not suitable for acrylic foam adhesive tape: CAB, glass, natural wood, PE, HDPE and PS.

## Per snap-in foot

The miniature safety edge is clipped into an aluminium profile.



### Aluminium profile C 10

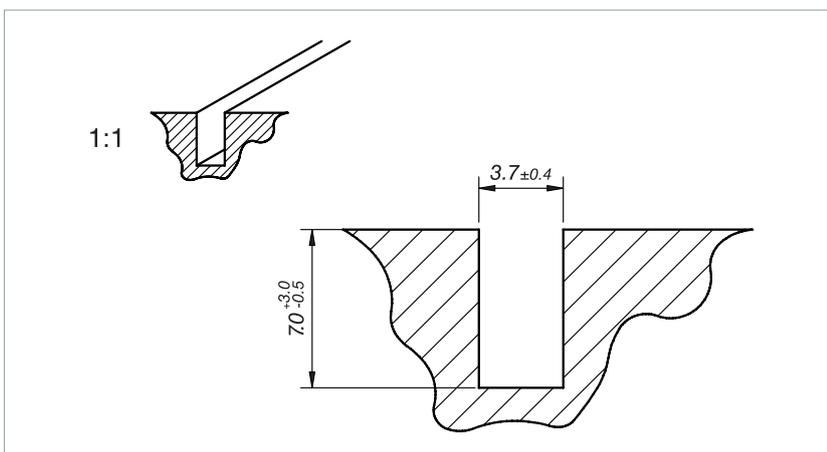
Standard profile for EKS 014:

First the aluminium profile must be mounted onto the closing edge and then the miniature safety edge clipped into the aluminium profile.

## Per clamp foot

The miniature safety edge is pressed into a groove.

A precise groove provides for an accurate and lasting fit.



## Maintenance and cleaning

The sensors are virtually maintenance-free.

The control unit also monitors the sensor.

### Regular inspection

Depending on the utilisation, sensors must be inspected at regular intervals (at least monthly)

- for proper functioning,
- damage,
- and correct mounting.

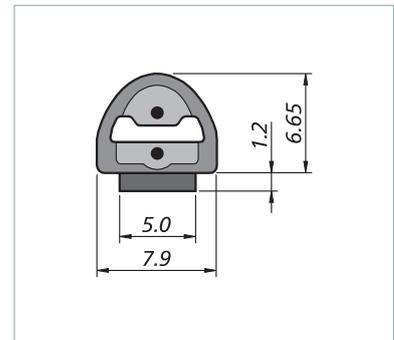
### Cleaning

If the sensors become dirty, they can be cleaned with a mild cleaning product.

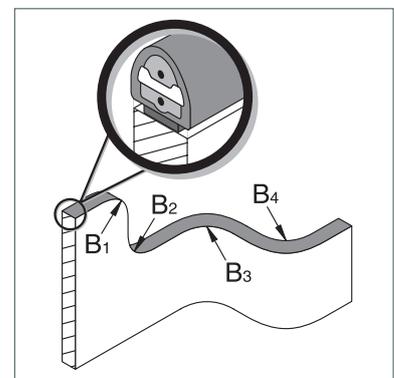
## Technical data

### SK EKS 011 TPE

Miniature safety edge (without sensor)	SK EKS/W 011 TPE or SK EKS/BK 011 TPE	
Test principles	based on ISO 13856-2	
<b>Switching characteristics at <math>v_{\text{test}} = 50 \text{ mm/s}</math></b>		
Switching operations	$> 1 \times 10^5$	
Test piece $\varnothing 10 \text{ mm}$ , $F = 100 \text{ N}$		
Actuation force	<b>+23 °C</b>	<b>-25 °C</b>
Test piece $\varnothing 4 \text{ mm}$	$< 15 \text{ N}$	$< 30 \text{ N}$
Test piece (cylinder) $\varnothing 200 \text{ mm}$	$< 25 \text{ N}$	$< 50 \text{ N}$
Actuation distance	$< 2.0 \text{ mm}$	
Test piece (cylinder) $\varnothing 80 \text{ mm}$		
Actuation angle	$\pm 40^\circ$	
Test piece (cylinder) $\varnothing 80 \text{ mm}$		
Finger detection	yes	
<b>Safety classifications</b>		
ISO 13849-1: $B_{10D}$	$2 \times 10^6$	
<b>Mechanical operating conditions</b>		
Sensor length (min./max.)	10 cm / 50 m	
Cable length	2.5 m	
Acrylic foam: Peel force	15 N/cm	
Bend radii (min.): $B_1 / B_2 / B_3 / B_4$	120 / 150 / 20 / 20 mm	
max. load capacity (signal)	600 N	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature	$-25 \text{ to } +80 \text{ °C}$	
short-term (15 min)	$-40 \text{ to } +100 \text{ °C}$	
Storage temperature	$-40 \text{ to } +80 \text{ °C}$	
DIN 75200: Behaviour in fire	ca. 40 mm/min	
Weight (with Acrylic foam)	43 g/m	
<b>Electrical operating conditions</b>		
Terminal resistance ( $\pm 1\%$ )	1k2, 2k2 or 8k2	
Rated capacity (max.)	250 mW	
Contact transition resistance	$< 400 \text{ Ohm}$ (per sensor)	
Number of sensors type BK	max. 3 in series (For more information refer to the chapter <i>Limits</i> )	
Switching voltage (max.)	DC 24 V	
Switching current (min. / max.)	1 mA / 10 mA	
Connection cable	$\varnothing 2.9 \text{ mm PUR } 2 \times 0.25 \text{ mm}^2$	
<b>Dimensional tolerances</b>		
Length according to	ISO 3302 L2	
Profile section according to	ISO 3302 E2	



Bend radii:

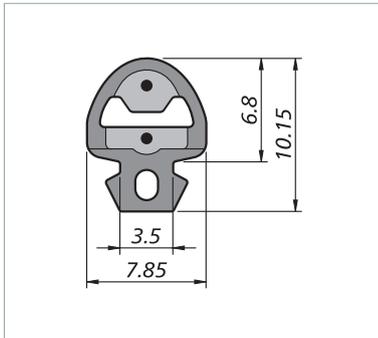


#### Higher degree of protection, higher tensile load

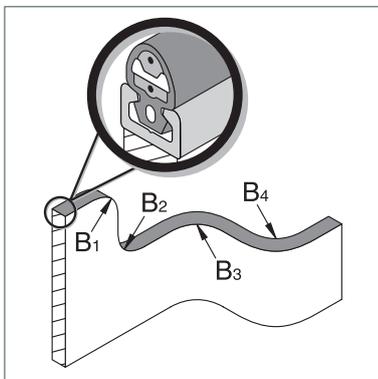
A special adhesive (part no. 1004987) allows a higher degree of protection up to IP64 and a tensile load on the cable up to 60 N.

**Technical data**

**SK EKS 014 TPE**



Bend radii:



**Higher degree of protection, higher tensile load**

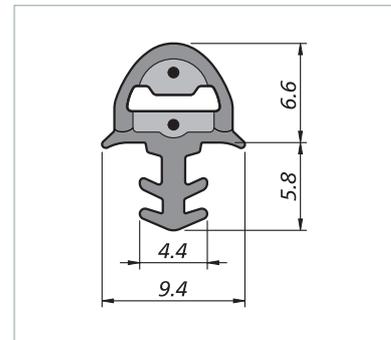
A special adhesive (part no. 1004987) allows a higher degree of protection up to IP64 and a tensile load on the cable up to 60 N.

Miniature safety edge (without sensor)	SK EKS/W 014 TPE or SK EKS/BK 014 TPE	
Test principles	based on ISO 13856-2	
<b>Switching characteristics at <math>v_{test} = 50 \text{ mm/s}</math></b>		
Switching operations	$> 1 \times 10^5$	
Test piece $\varnothing 10 \text{ mm}$ , $F = 100 \text{ N}$		
Actuation force	<b>+23 °C</b>	<b>-25 °C</b>
Test piece $\varnothing 4 \text{ mm}$	$< 15 \text{ N}$	$< 30 \text{ N}$
Test piece (cylinder) $\varnothing 200 \text{ mm}$	$< 25 \text{ N}$	$< 50 \text{ N}$
Actuation distance	$< 2.0 \text{ mm}$	
Test piece (cylinder) $\varnothing 80 \text{ mm}$		
Actuation angle	$\pm 40^\circ$	
Test piece (cylinder) $\varnothing 80 \text{ mm}$		
Finger detection	yes	
<b>Safety classifications</b>		
ISO 13849-1: $B_{10D}$	$2 \times 10^6$	
<b>Mechanical operating conditions</b>		
Sensor length (min./max.)	10 cm / 50 m	
Cable length	2.5 m	
Snap-in foot width	3.5 mm	
Alu-Profil (empfohlen)	C 10	
Bend radii (min.): $B_1 / B_2 / B_3 / B_4$	120 / 150 / 20 / 20 mm	
max. load capacity (signal)	600 N	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature	-25 to +80 °C	
short-term (15 min)	-40 to +100 °C	
Storage temperature	-40 to +80 °C	
DIN 75200: Behaviour in fire	ca. 40 mm/min	
Weight (without/with Aluminium profile)	49 g/m / 125 g/m	
<b>Electrical operating conditions</b>		
Terminal resistance ( $\pm 1\%$ )	1k2, 2k2 or 8k2	
Nennleistung (max.)	250 mW	
Contact transition resistance	$< 400 \text{ Ohm}$ (per sensor)	
Number of sensors type BK	max. 3 in series (For more information refer to the chapter <i>Limits</i> )	
Switching voltage (max.)	DC 24 V	
Switching current (min. / max.)	1 mA / 10 mA	
Connection cable	$\varnothing 2.9 \text{ mm PUR } 2 \times 0.25 \text{ mm}^2$	
<b>Dimensional tolerances</b>		
Length according to	ISO 3302 L2	
Profile section according to	ISO 3302 E2	

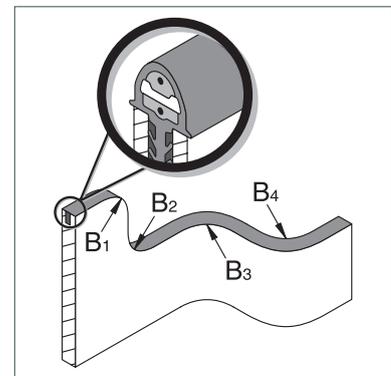
## Technical data

### SK EKS 052 TPE

Miniature safety edge (without sensor)	SK EKS/W 052 TPE oder SK EKS/BK 052 TPE	
Test principles	based on ISO 13856-2	
<b>Switching characteristics at <math>v_{\text{test}} = 50 \text{ mm/s}</math></b>		
Switching operations		
Test piece $\varnothing 10 \text{ mm}$ , $F = 100 \text{ N}$	$> 1 \times 10^5$	
Actuation force		
Test piece $\varnothing 4 \text{ mm}$	<b>+23 °C</b>	<b>-25 °C</b>
Test piece (cylinder) $\varnothing 200 \text{ mm}$	$< 15 \text{ N}$	$< 30 \text{ N}$
Actuation distance		
Test piece (cylinder) $\varnothing 80 \text{ mm}$	$< 2.0 \text{ mm}$	
Actuation angle		
Test piece (cylinder) $\varnothing 80 \text{ mm}$	$\pm 40^\circ$	
Finger detection	yes	
<b>Safety classifications</b>		
ISO 13849-1: $B_{10D}$	$2 \times 10^6$	
<b>Mechanical operating conditions</b>		
Sensor length (min./max.)	10 cm / 45 m	
Cable length	2.5 m	
Groove width for clamp foot	$3.7 \pm 0,4 \text{ mm}$	
Bend radii (min.): $B_1 / B_2 / B_3 / B_4$	120 / 150 / 20 / 20 mm	
max. load capacity (signal)	600 N	
Tensile load, cable (max.)	20 N	
IEC 60529: Degree of protection	IP40	
Operating temperature		
short-term (15 min)	$-25 \text{ to } +80 \text{ °C}$ $-40 \text{ to } +100 \text{ °C}$	
Storage temperature	$-40 \text{ to } +80 \text{ °C}$	
DIN 75200: Behaviour in fire	ca. 40 mm/min	
Weight	54 g/m	
<b>Electrical operating conditions</b>		
Terminal resistance ( $\pm 1\%$ )	1k2, 2k2 or 8k2	
Nennleistung (max.)	250 mW	
Contact transition resistance	$< 400 \text{ Ohm}$ (per sensor)	
Number of sensors type BK	max. 3 in series (For more information refer to the chapter <i>Limits</i> )	
Switching voltage (max.)	DC 24 V	
Switching current (min. / max.)	1 mA / 10 mA	
Connection cable	$\varnothing 2.9 \text{ mm PUR } 2 \times 0.25 \text{ mm}^2$	
<b>Dimensional tolerances</b>		
Length according to	ISO 3302 L2	
Profile section according to	ISO 3302 E2	



Bend radii:



#### Higher degree of protection, higher tensile load

A special adhesive (part no. 1004987) allows a higher degree of protection up to IP64 and a tensile load on the cable up to 60 N.

## Marking

If you combine sensors with control units and thereby release pressure-sensitive safeguards onto the market, observe the basic regulations in ISO 13856.

Apart from technical requirements, this applies in particular also to marking and information for use.