MAYSER®

Innovative by tradition.

DIY miniature safety edges

EN | Product information

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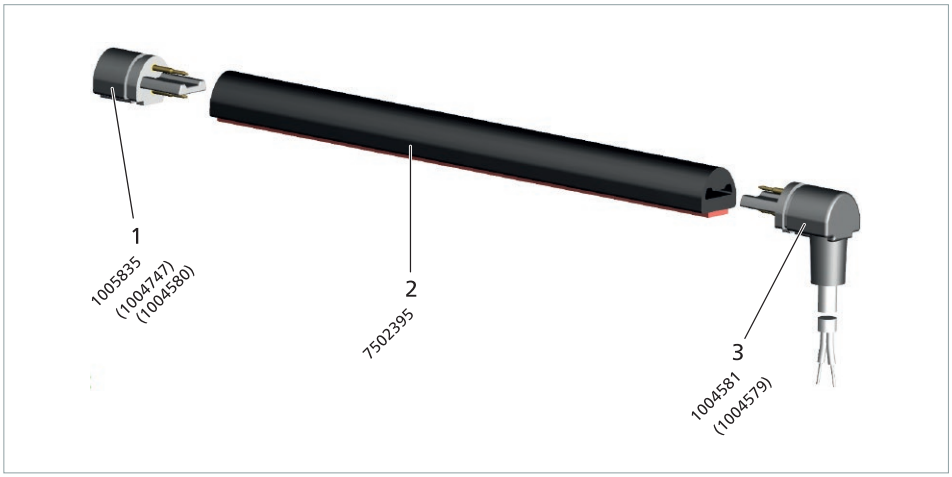
Overview

Contact profile – miniature safety edge

The semi-finished contact profile is cut to length and assembled with the other components to create the finished working product, which is called a miniature safety edge.

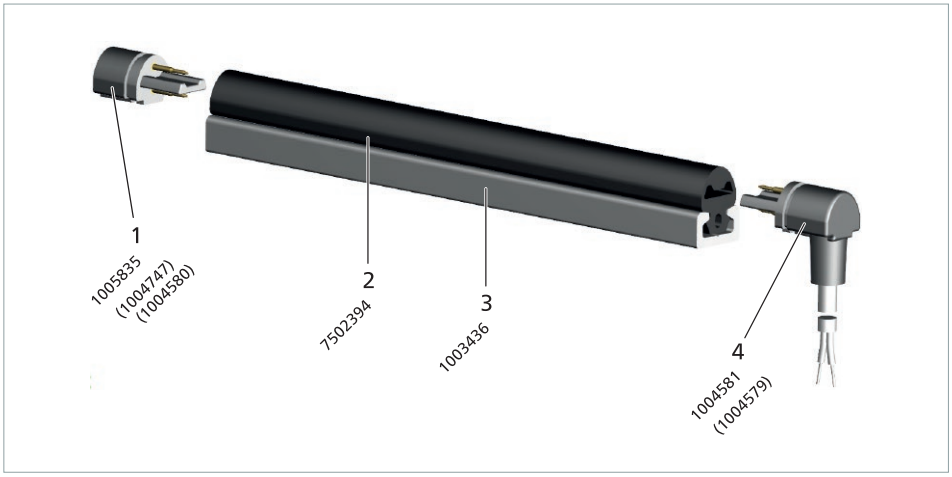
EKS 011 TPE

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



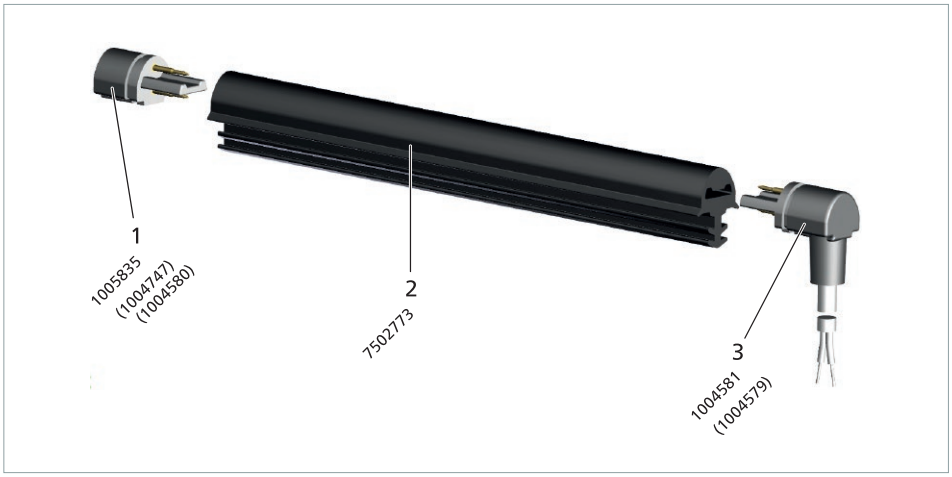
EKS 014 TPE

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

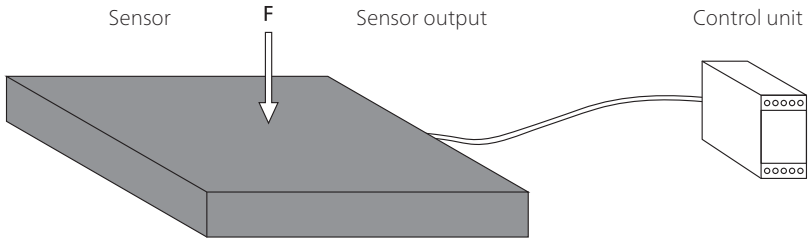
Part No.	Designation	PU
7502395	Contact profile EKS 011 TPE, self-adhesive	50 m (164′)
7502394	Contact profile EKS 014 TPE, with snap-in foot	50 m (164′)
7502773	Contact profile EKS 052 TPE, with clamp foot	45 m (147′)
1004580	End piece with resistor 1k2	50 pc.
1004747	End piece with resistor 2k2	50 pc.
1005835	End piece with resistor 8k2	50 pc.
1004579	End piece with PVC cable 2.5 m (8′), axial	50 pc.
1004581	End piece with PVC cable 2.5 m (8′), angled 90°	50 pc.
1003436	Aluminium profile C 10 for EKS 014 with snap-in foot	6 m (19′ 8″)
11002568	Scissors with stop	1 pc.
7502412	Assembly aid set	1 pc.
1004987	Special adhesive Contact VA 250 Black, 12 g (0.42 oz), for IP64	1 pc.

Subject to technical modifications.

Definitions

Pressure-sensitive protective device

A pressure-sensitive protective device consists of one or more pressure-sensitive sensors, a signal processing unit, and one or more output signal switching devices. The control unit is made up of the signal processing unit and output signal switching device(s). The pressure-sensitive protective device is triggered when the sensor is activated.

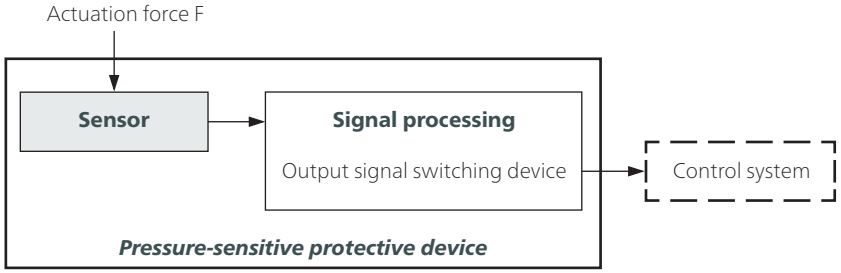


Sensor

The sensor is the part of the pressure-sensitive protective device that generates a signal when the actuation force F is applied. Mayser safety systems feature a sensor whose actuation area is deformed locally.

Signal processing

The signal processing unit is the part of the pressure-sensitive protective 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 the part of the signal processing unit which is connected to the downstream control system and which transmits safety output signals such as STOP.

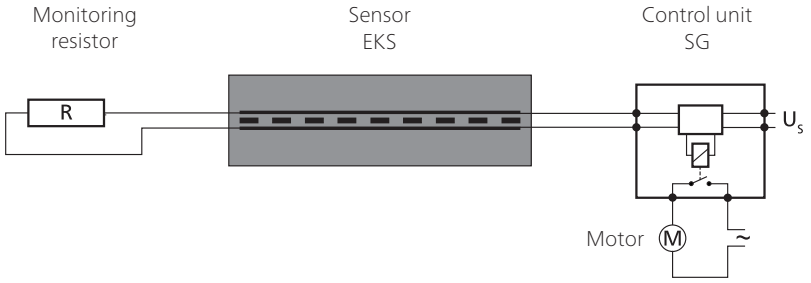


Tip: Terms are defined in ISO 13856-2 Section 3.

Criteria for selecting the sensor type

- Category according to ISO 13849-1
- Performance level of the pressure-sensitive protective device = at least PL_r
- Temperature range
- Degree of protection according to IEC 60529:
  IP40 is the standard for DIY miniature safety edges.
  Higher degrees of protection are possible if special adhesive is used (part no. 1004987).
- Low actuation forces
- Minimum overall height

Operation principle of 2-wire technology



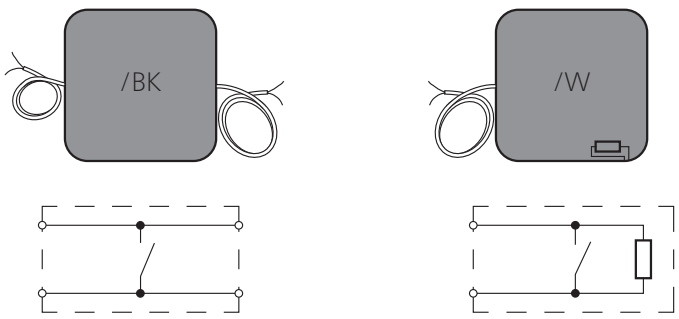
The monitoring resistor must be compatible with the control unit. The standard type is 8k2.

For your safety:
The sensor and connection cables are constantly monitored to ensure they are functioning correctly. Monitoring relies on controlled bridging of the contact surfaces with a monitoring resistor (closed-circuit principle).

Types

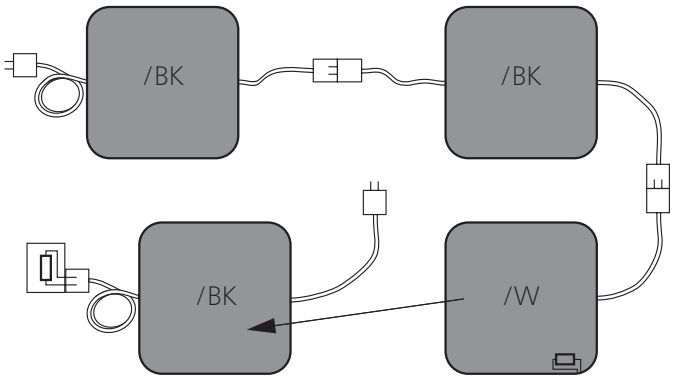
/BK With cables on both sides for use as a through sensor or with an external monitoring resistor for use as an end sensor

/W With an integrated monitoring resistor for use as an end sensor



Subject to technical modifications.

Sensor combination

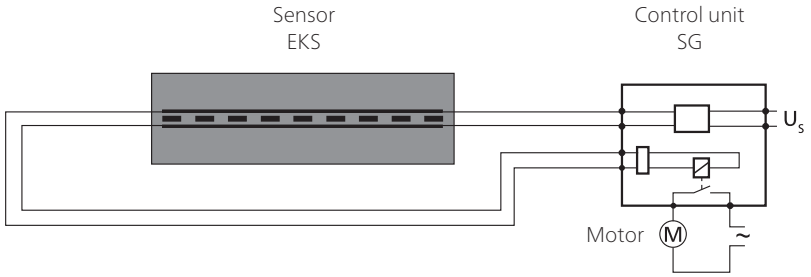


Version with external resistor,
therefore no variety of models

Combination:

- Connection of more than one sensor
- Only one control unit required
- Safety edges can be combined to achieve custom lengths and angles

Operation principle of 4-wire technology



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

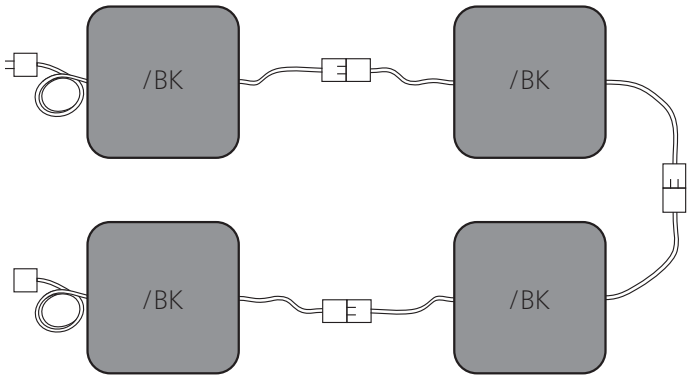
For your safety:
The sensor and connection cables are constantly monitored to ensure they are functioning correctly. Monitoring relies on signal transmission feedback – without a monitoring resistor.

Types

/BK With cables on both sides for use as a through sensor

Subject to technical modifications.

Sensor combination



Combination:

- Connection of more than one sensor
- Only one control unit required
- Safety edges can be combined to achieve custom lengths and angles

Safety

Intended use

A miniature safety edge detects a person or part of their body when pressure is applied to the actuation area. It is a linear tripping device. Its purpose is to prevent possible hazardous situations that could affect someone within a danger zone, such as shearing and pinching edges.
Typical areas of application are automated windows and façade systems, automation technology and moving units in medical technology.
Safe operation of a miniature safety edge depends entirely on

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

Due to the design, the actuation area is actually smaller than it looks because of the non-sensitive edges. Once these have been allowed for, what remains is the effective actuation area (see chapter *Effective actuation area*).

Limits

- No more than 3 /BK-type sensors can be connected to one control unit
- No more than 2 /BK-type sensors and 1 /W-type sensor can be connected to one control unit

If more sensors are required, please contact Mayser's service department.

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 protective devices consisting of a sensor and a control unit.

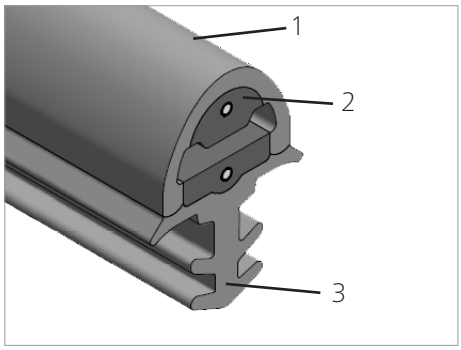
Performance Level (PL)
Fault exclusion according to ISO 13849-2 Table D.8: Non-closing of contacts in the case of pressure-sensitive protective devices according to ISO 13856. In this case, the diagnostic coverage (DC) is not calculated or taken into account when determining the PL. Assuming a high $MTTF_D$ value for the control unit, a performance level of up to PL d can be achieved by the miniature safety edge system (pressure-sensitive protective device) as a whole.

Is the protective device suitable?
First, the integrator must decide what PL_r is required for the hazard. After that, they must select the protective device.
Finally, the integrator needs to check whether the category and PL of the selected protective device 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 protective device without reset function is used (automatic reset), the reset function must be provided in some other way.

Design



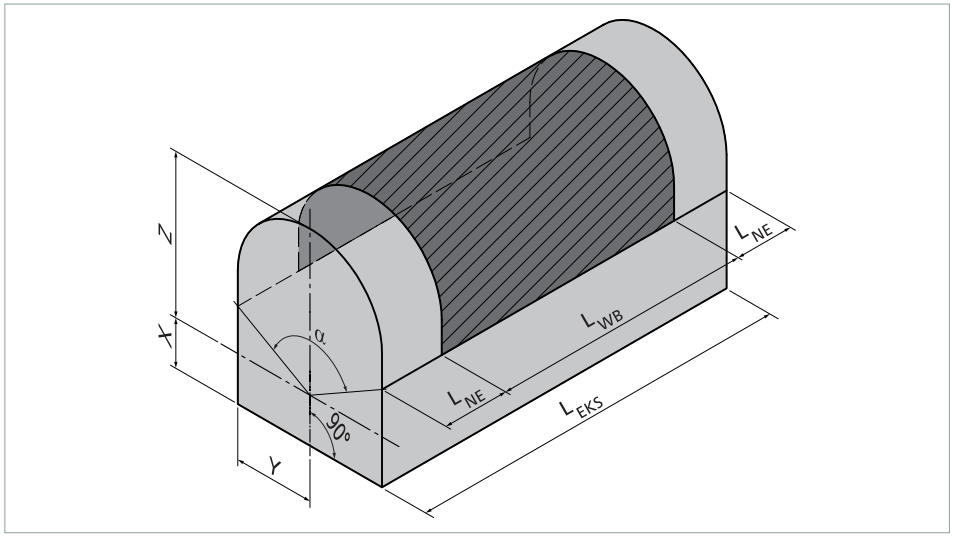
The miniature safety edge consists of a sensor (1 to 3) –
(1) EKS contact profile with
(2) integrated NO switch element,
(3) mounting element
and an SG evaluating control unit.

Effective actuation area

The parameters X, Y, Z, L_{WB} 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_{WB} = effective actuation length
L_{EKS} = overall length of the miniature safety edge
L_{NE} = non-sensitive length at the end of the miniature safety edge
α = effective actuation angle



All dimensions are in millimeter (mm), unless otherwise stated.

		EKS 011	EKS 014	EKS 052
α		80°	80°	40°
L_{NE}	End piece W	27 (1 1/16″)	27 (1 1/16″)	27 (1 1/16″)
	End piece with cable, angled 90°	28.5 (1 1/8″)	28.5 (1 1/8″)	28.5 (1 1/8″)
	End piece with cable, axial	27 (1 1/16″)	27 (1 1/16″)	27 (1 1/16″)
X		2.05 (5/64″)	2.3 (3/32″)	2.1 (5/64″)
Y		3.95 (5/32″)	3.9 (5/32″)	4.7 (3/16″)
Z		4.6 (3/16″)	4.5 (11/64″)	4.5 (11/64″)

Subject to technical modifications.

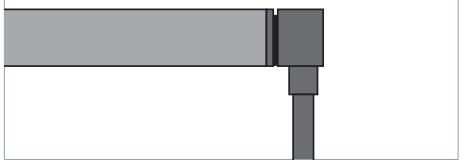
Installation position

The installation position can be selected as required, i.e. all installation positions from A to D as per ISO 13856-2 are possible.

Connection

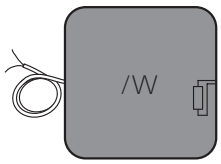
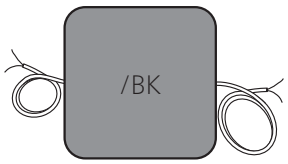
Cable exits

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

Axial	Angled 90°
	

Cable connection

- Standard cable lengths
  L = 2.5 m (8')
- Maximum total cable length to the control unit
  L_{max} = 100 m (328')

/W-type sensor with 1 line	/BK-type sensor with 2 lines
• As an individual /W-type sensor or a /W-type end sensor • Integrated resistor • 1 two-wire cable	• As a /BK-type through sensor • Without resistor • 2 two-wire cables
	

Subject to technical modifications.

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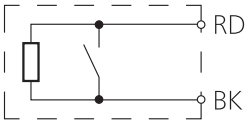
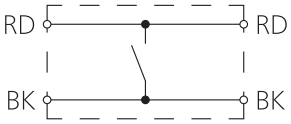
Wire colours

Colour coding

BK Black
RD Red

/W-type sensor with 1 line	/BK-type sensor with 2 lines
	

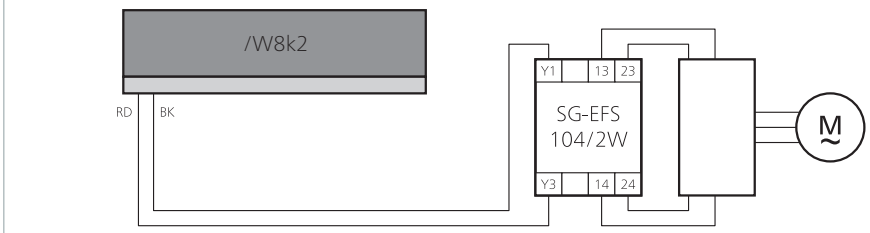
Connection examples

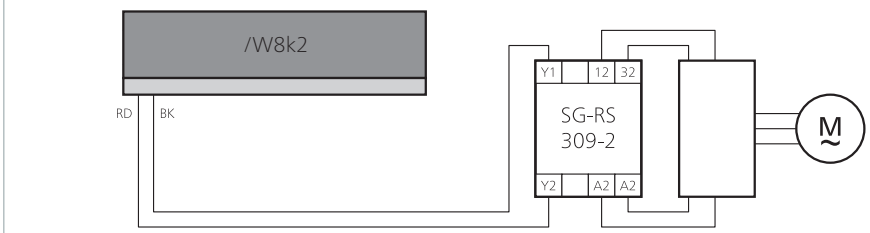
Key:

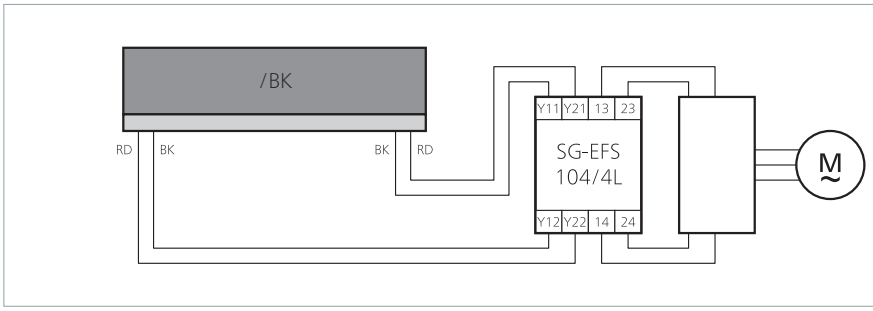
/W8k2	Sensor for 2-wire technology with resistor 8k2
/BK	Sensor for 4-wire technology
M	Motor

Colour coding

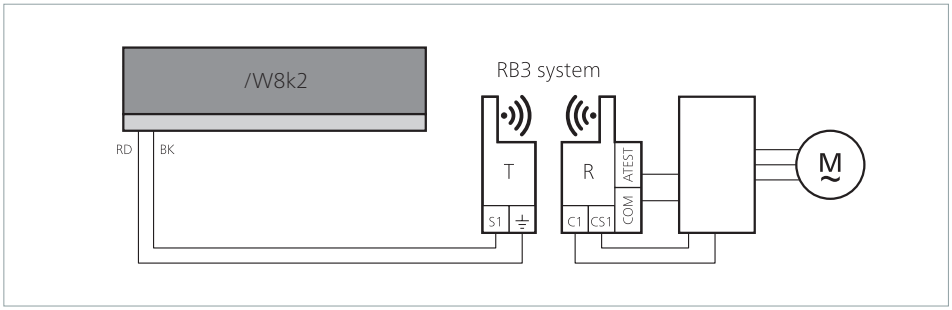
BK Black
RD Red







Subject to technical modifications.



Sensor surface

Resistance

The resistance ratings listed below (at a room temperature of 23 °C (73.4 °F)) depend on the sensor having an undamaged surface.

Physical resistance

	TPE
IEC 60529: degree of protection	IP40
UV resistance	Yes

Higher degree of protection
Higher degrees of protection up to IP64 are possible using special adhesive (part no. 1004987).

Chemical resistance

The sensor is resistant to a certain extent to normal chemical influences such as diluted acids and alkalis, as well as alcohol, over an exposure period of 24 hrs.

The values in the table are the results of tests carried out in our laboratory. You must always conduct your own practical tests to verify that our products are suitable for your specific area of application.

Subject to technical modifications.

Explanation of symbols:

+ = resistant
± = resistant to a certain extent
– = not resistant

	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	+
Incidin	+
Incidin Plus	+
Cooling lubricant	–
Plastic cleaner	+
Lyso FD 10	+
Metal working oil	–
Microbac	+
Microbac forte	+
Minutil	+
Saline solution 5%	+
Spirit (ethyl alcohol)	+
Terralin	+
Centring oil	–

Subject to technical modifications.

Fixing

Three fixing methods are available:
- Using acrylic foam adhesive tape
- Using a snap-in foot
- Using a clamp foot

The fixing method depends on which contact profile is selected.

Fixing method	EKS 011	EKS 014	EKS 052
Acrylic foam adhesive tape	●	–	–
Snap-in foot	–	●	–
Clamp foot	–	–	●

Using acrylic foam adhesive tape

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

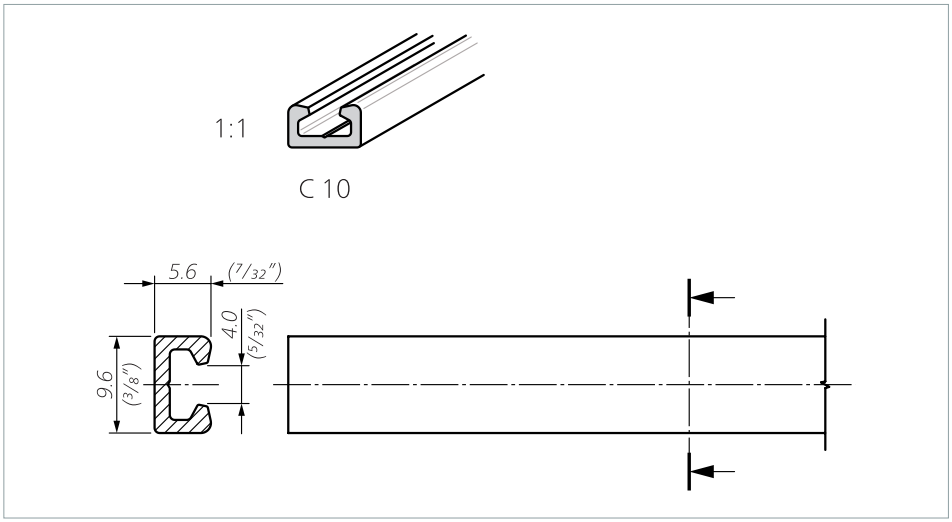
With primer
The clean, dry and smooth bonding surface must be treated with primer before sticking on the miniature safety edge.

Without primer
The only material that the acrylic foam will adhere to reliably without using primer is uncoated aluminium.

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

Using a snap-in foot

The miniature safety edge is clipped into an aluminium profile.

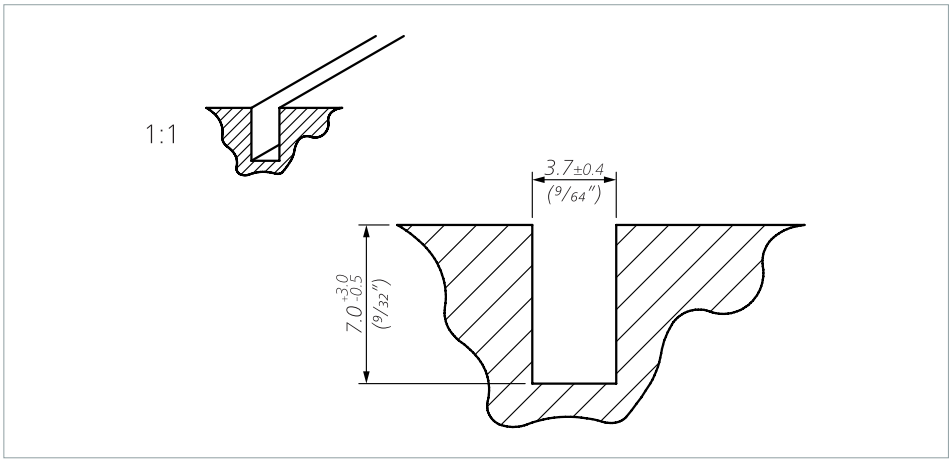


Tolerances in accordance with EN 755-9

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.

Using a clamp foot

The miniature safety edge is pressed into a groove.
A precise groove ensures an accurate and lasting fit.



Subject to technical modifications.

Maintenance and cleaning

The sensors are virtually maintenance-free.
The control unit also monitors the sensor at the same time.

Regular inspection

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

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

Cleaning

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

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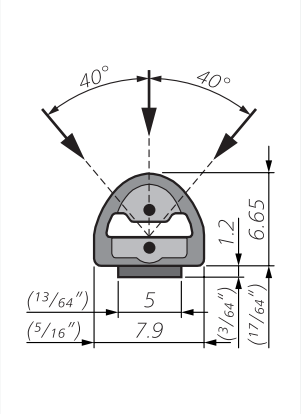
Technical data

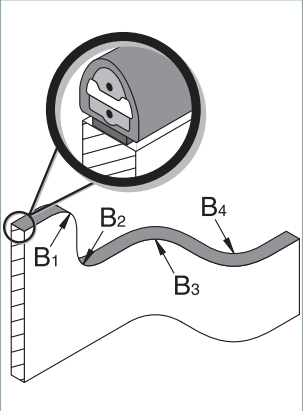
SK EKS 011 TPE



Dimensional tolerances according to ISO 3302 E2/L2

Miniature safety edge (without control unit)	**SK EKS/W 011 TPE or SK EKS/BK 011 TPE**
Testing basis	In accordance with ISO 13856-2
Switching characteristics at v_{test} = 50 mm/min (2 in/min)	
Switching operations Test piece (rod) Ø 10 mm (25/64"), F = 100 N (22 lbf)	 > 1× 10^5
Actuation force Test piece (rod) Ø 4 mm (5/32") Test piece (cylinder) Ø 200 mm (7 7/8")	**+23 °C** (+73.4 °F) **–25 °C** (–4 °F) < 15 N (3.3 lbf) < 30 N (6.7 lbf) < 25 N (5.6 lbf) < 50 N (11.2 lbf)
Actuation distance Test piece (cylinder) Ø 80 mm (3 5/32")	 < 2.0 mm (5/64")
Actuation angle Test piece (cylinder) Ø 80 mm (3 5/32")	 ± 40°
Finger detection	Yes
Safety classifications	
ISO 13849-1: B_{10D}	2× 10^6
Mechanical operating conditions	
Sensor length (min./max.)	10 cm / 50 m (4" / 164')
Cable length	2.5 m (8')
Acrylic foam: peel force	15 N/cm (1.03 lbf/ft)
Bend radii (min.): B1 / B2 / B3 / B4	120 / 150 / 20 / 20 mm (4 23/32" / 5 29/32" / 25/32" / 25/32")
Max. load capacity (impulse)	600 N (134 lbf)
Tensile load, cable (max.)	20 N (4 lbf)
IEC 60529: degree of protection	IP40
Operating temperature Short-term (15 min)	–25 to +80 °C (–13 to +176 °F) –40 to +100 °C (–40 to +212 °F)
Storage temperature	–40 to +80 °C (–40 to +176 °F)
Weight (with acrylic foam)	43 g/m (0.47 oz/ft)
Electrical operating conditions	
Terminal resistance (±1%) Nominal output (max.)	1k2, 2k2 or 8k2 250 mW
Contact transition resistance	< 400 ohms (per sensor)
Number of /BK-type sensors	Max. 3 in series
Switching voltage (max.)	DC 24 V
Switching current (min. / max.)	1 mA / 10 mA
Connection cable	Ø 2.9 mm PVC 2 × 0.25 mm² (Ø 7/64" PVC 2× AWG24)

Bend radii:



Higher degree of protection, higher tensile load

Using a special adhesive (part no. 1004987) allows higher degrees of protection up to IP64 and a tensile load on the cable of up to 60 N (13 lbf).

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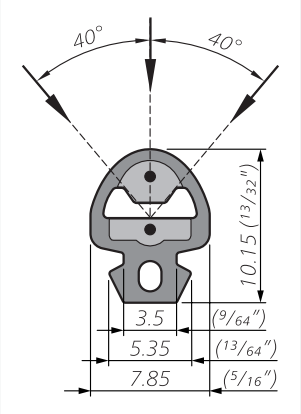
Technical data

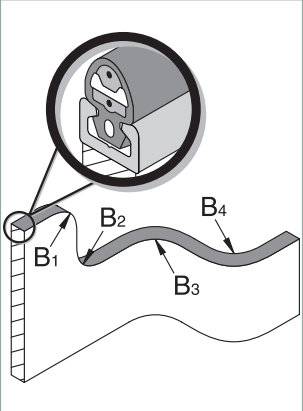
SK EKS 014 TPE



Dimensional tolerances according to ISO 3302 E2/L2

Miniature safety edge (without control unit)	**SK EKS/W 014 TPE or SK EKS/BK 014 TPE**
Testing basis	In accordance with ISO 13856-2
Switching characteristics at v_{test} = 50 mm/min (2 in/min)	
Switching operations Test piece (rod) Ø 10 mm (25/64"), F = 100 N (22 lbf)	 > 1× 10^5
Actuation force Test piece (rod) Ø 4 mm (5/32") Test piece (cylinder) Ø 200 mm (7 7/8")	**+23 °C** (+73.4 °F) **–25 °C** (-4 °F) < 15 N (3.3 lbf) < 30 N (6.7 lbf) < 25 N (5.6 lbf) < 50 N (11.2 lbf)
Actuation distance Test piece (cylinder) Ø 80 mm (3 5/32")	 < 2.0 mm (5/64")
Actuation angle Test piece (cylinder) Ø 80 mm (3 5/32")	 ± 40°
Finger detection	Yes
Safety classifications	
ISO 13849-1: B_{10D}	2× 10^6
Mechanical operating conditions	
Sensor length (min./max.)	10 cm / 50 m (4" / 164')
Cable length	2.5 m (8')
Snap-in foot width	3.5 mm (9/64")
Aluminium profile (recommended)	C 10
Bend radii (min.): B_1 / B_2 / B_3 / B_4	120 / 150 / 20 / 20 mm (4 23/32" / 5 29/32" / 25/32" / 25/32")
Max. load capacity (impulse)	600 N (134 lbf)
Tensile load, cable (max.)	20 N (4 lbf)
IEC 60529: degree of protection	IP40
Operating temperature Short-term (15 min)	–25 to +80 °C (–13 to +176 °F) –40 to +100 °C (–40 to +212 °F)
Storage temperature	–40 to +80 °C (–40 to +176 °F)
Weight (without / with aluminium profile)	49 g/m / 125 g/m (0.53 oz/ft / 1.35 oz/ft)
Electrical operating conditions	
Terminal resistance (±1%) Nominal output (max.)	1k2, 2k2 or 8k2 250 mW
Contact transition resistance	< 400 ohms (per sensor)
Number of /BK-type sensors	Max. 3 in series
Switching voltage (max.)	DC 24 V
Switching current (min. / max.)	1 mA / 10 mA
Connection cable	Ø 2.9 mm PVC 2× 0.25 mm² (Ø 7/64" PVC 2× AWG24)

Bend radii:



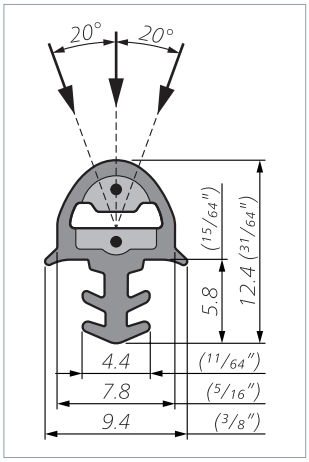
Higher degree of protection, higher tensile load

Using a special adhesive (part no. 1004987) allows higher degrees of protection up to IP64 and a tensile load on the cable of up to 60 N (13 lbf).

MAYSER®

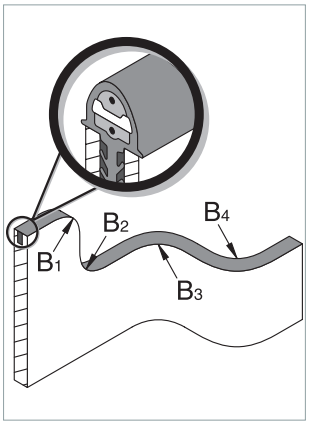
Technical data

SK EKS 052 TPE



Dimensional tolerances according to ISO 3302 E2/L2

Bend radii:



Higher degree of protection, higher tensile load

Using a special adhesive (part no. 1004987) allows higher degrees of protection up to IP64 and a tensile load on the cable of up to 60 N (13 lbf).

Miniature safety edge (without control unit)	**SK EKS/W 052 TPE or SK EKS/BK 052 TPE**
Testing basis	In accordance with ISO 13856-2
Switching characteristics at v_{test} = 50 mm/min (2 in/min)	
Switching operations Test piece (rod) Ø 10 mm (25/64"), F = 100 N (22 lbf)	 > 1× 10^5
Actuation force	**+23 °C** (+73.4 °F) **–25 °C** (–4 °F)
Test piece (rod) Ø 4 mm (5/32")	< 25 N (5.6 lbf) < 30 N (6.7 lbf)
Test piece (cylinder) Ø 200 mm (7 7/8")	< 40 N (9 lbf) < 50 N (11 lbf)
Actuation distance Test piece (cylinder) Ø 80 mm (3 5/32")	 < 2.0 mm (5/64")
Actuation angle Test piece (cylinder) Ø 80 mm (3 5/32")	 ± 20°
Finger detection	Yes
Safety classifications	
ISO 13849-1: B_{10D}	2× 10^6
Mechanical operating conditions	
Sensor length (min./max.)	10 cm / 45 m (4" / 147')
Cable length	2.5 m (8')
Groove width for clamp foot	3.7 ±0.4 mm (9/64")
Bend radii (min.): B1 / B2 / B3 / B4	120 / 150 / 20 / 20 mm (4 23/32" / 5 29/32" / 25/32" / 25/32")
Max. load capacity (impulse)	600 N (134 lbf)
Tensile load, cable (max.)	20 N (4 lbf)
IEC 60529: degree of protection	IP40
Operating temperature	–25 to +80 °C (–13 to +176 °F)
Short-term (15 min)	–40 to +100 °C (–40 to +212 °F)
Storage temperature	–40 to +80 °C (–40 to +176 °F)
Weight	54 g/m (0.58 oz/ft)
Electrical operating conditions	
Terminal resistance (±1%)	1k2, 2k2 or 8k2
Nominal output (max.)	250 mW
Contact transition resistance	< 400 ohms (per sensor)
Number of /BK-type sensors	Max. 3 in series
Switching voltage (max.)	DC 24 V
Switching current (min. / max.)	1 mA / 10 mA
Connection cable	Ø 2.9 mm PVC 2× 0.25 mm^2 (Ø 7/64" PVC 2× AWG24)

Marking

If you combine sensors with control units and thereby place pressure-sensitive protective devices on the market, you should observe the basic requirements according to ISO 13856.
As well as meeting technical requirements, this also means – in particular – observing any that relate to marking and information for use.

UL certification

The design type of the product conforms to the basic requirements of UL certification:

- UL 325